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Temporary help agencies and participation histories in the labour market: a sequence-oriented approach(*)

por
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ABSTRACT

This paper analyzes whether having been enrolled by a Temporary Help Agency compared to being in a non-employment situation is related to enjoying a subsequent job under a permanent contract. Micro-level data from the Spanish Social Security records are exploited through the use of Optimal Matching Analysis. The empirical analysis focuses on the whole sequence of labour market states (and not on transitions). We find evidence supporting that agency jobs may serve as "stepping stones" towards permanent employment for some workers, especially women with or below 35 years-old, compared to those in non-employment.

Key words: Optimal matching analysis, labour market attachment, temporary help agencies.

AMS Classification: 11B99.

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1. INTRODUCTION

In this article, we apply sequence analysis techniques to understand the role of Temporary Help Agencies (THA) in facilitating the stabilization of the labour career. Our objective is to find out whether or not these agencies provide an easier access to open-ended contracts for the workers they hire. Sequence analysis is especially suitable for this task since it allows analyzing the whole sequence of labour market states and not only transitions from one state (for example, non-employment) to another one (for example, having an open-ended contract). An additional advantage is that sequence analysis does not need as much information as the typical information required for event history analysis (as duration models). Sequence analysis allows us to compare labour market trajectories, while duration models estimate the determinants of transitions towards other labour market states. Sequence analysis captures the sequence of events (and not only transitions) concerning the relationship of the individual with the labour market over time. In particular, Optimal Matching Analysis (OMA) –probably the most well known technique for sequence analysis– has been mainly applied to the analysis of labour careers (see Abbot and Hrycak, 1990) and class careers (see Chan, 1994; Halpin and Chan, 1998), which have been considered in Sociology as a finite set of temporarily ordered patterns along time.

In our case, we apply OMA on a longitudinal administrative data set from Spanish Social Security records, comparing the sequences of labour market states for two sub-samples. The first one containing individuals who were hired by a THA in a specific date, and the second one with individuals who were not on-the-job at that same date. The approach followed in this article is to examine the career perspectives of both groups of workers in order to study their mobility towards open-ended contracts. This analysis is relevant for a number of reasons. First of all, if agency workers move into open-ended contracts after a short while, this would suggest that agency jobs are "stepping stones" into open-ended employment rather than "dead-end" jobs. The question of whether and to what extent agency jobs may adversely affect job careers has been subject to a vigorous debate in the literature: on the one hand, agency work may help promote a segmented labor market, since "firms may prefer to have a cushion of workers without employment rights who can be freely discharged in the event of adverse market conditions" (Booth et. al. 2000, pp. 2; see, in addition, Blank, 1998; Houseman, 1997; Nollen, 1996). However, on the other hand, agency employment may indeed increase the transition rate into a permanent job given that some employers use atypical contracts as a way of screening for permanent jobs (Houseman and Polivka, 2000; Houseman, 2001; García-Pérez and Muñoz-Bullón, 2005a). Second, it is important to know whether an eventual “stigma” associated with agency employment exists: the association of agency work with a secondary labor market occupation may be an adverse signal for future employers, at least if these jobs are associated with unfavourable attributes; in addition, having worked through a THA may serve as a signal that the person has not received any offers for permanent contract jobs, so that agency jobs may be stigmatized (Ma and Weiss, 1993). Thus, mobility towards a better career path would be signalling that this stigma does not exist. Third, our analysis sheds further light on which individuals’ profiles are more likely to be associated with successful transitions into permanent jobs.

Our findings show a relationship between THA intermediation and successful labour market careers, especially for relatively young women (below 35). In addition, applying the Blinder/Oaxaca methodology, we find that being engaged by a THA constitutes the main reason for the gap between THA and non-THA workers’ distance to careers ending with open-ended contracts.

The article proceeds as follows. Firstly, we present an overview of sequence analysis focusing on OMA. Secondly, we briefly review the THA industry. Thirdly, we present the data and explain in detail how the sequences of labour market states have been defined. Fourthly, we present the results of OMA and we apply the Blinder/Oaxaca methodology to analyze the determinants of dissimilarities between the two sub-samples. Finally, a conclusions section summarizes the main contributions of the article.

2. OPTIMAL MATCHING ANALYSIS

Sequence analysis potentially provides a convenient method in order to get an overview about the pattern of sequences of labour market states. First, they consider directly the sequence of events as a whole: in this sense, our study should be linked to the determinants of a particular labour market trajectory, rather than to a particular transition. Second, the order in which jobs are taken up is not overlooked, which is an important element of career structure; it may be the case, for instance, that labour market states appear in a certain order, so that some job sequences may be empirically less probable than others. Third, those techniques enable the study of similarities among different sequences, and they do this without imposing restrictive stochastic assumptions to the empirical analysis.

With the application of *optimal matching analysis* (OMA), one can search for some interesting patterns in each sequence separately; or one can compare all sequences in a given sample. In any case, a proximity or distance measure is needed to assess either the similarity or dissimilarity of sequences, or of sequences with some pattern. This technique does not directly answer questions about sequence pattern; rather, they generate interval–level measures of resemblance between sequences. Finally, it must be considered as a complementary strategy (but not a substitute) to event history models: while event history models focus on transitions, sequence analysis pay attention to the resemblance of whole sequences.

2.1 Background: The Basics of Optimal Matching Analysis (OMA)

Let us briefly make a comment on the intuitive idea underlying this process of *optimal matching* (see Kruskal and Sankoff, 1983, for a full account of the mathematical algorithm used by optimal matching). We consider sequences of states which are elements of a finite space state, say $\mathbf{Y}$. **S** denotes the set of all finite sequences over $\mathbf{Y}$, meaning that:

$$\text{if } a \in \mathbf{S} \text{ then } a=(a_1,...,a_n) \text{ with } a_1,...,a_n \in \mathbf{Y}$$

n= |*a*| is the length of the sequence. We desire to compare two sequences a,b $\in$ **S**. The basic idea is to define a set of elementary operations which can be used sequentially to transform one sequence until it becomes equal to the other sequence.

Let **Z** denote the set of basic operations and a(w) the sequence resulting from *a* by applying the operation w $\in$ **Z**. We consider three elementary operations:

a) Insertion: a(i) denotes the sequence resulting from a $\in$ **S** by inserting one new element (a state from $\mathbf{Y}$) into the sequence *a*.

b) Deletion: a(d) denotes the sequence resulting from a by deleting one element from this sequence.

c) Substitution: a(s) denotes the sequence resulting from *a* by changing one of its elements into another state.

We can think of sequentially applying elementary operations to a given sequence. Let $a(w_1, w_2, ..., w_k)$ denote the new sequence resulting from a by applying first the elementary operation w_1, then w_2, and so on until finally w_k. Then, given two sequences, a,b $\in$ **S**, we can ask for a sequence of elementary operations which transform a into b.

In general, there will be many such sequences of elementary operations which transform a into b. Now, the intuitive idea for developing a distance measure for sequences is to look for the shortest sequence of elementary operations which transform a into b. A slightly more general approach is to evaluate the elementary operations by introducing c*(*w*)* as the cost of applying the elementary operation $w \in$ **Z**. We will assume that c(w) is between 0 and infinite. The cost of applying a sequence of elementary operations will be denoted by:

$$c[w_1, w_2, \ldots, w_k] = \sum_{i=1}^{k} c[w_i] \quad [1]$$

Setting *c[] = 0* for no operation, we can formally define:

$$d_Z(a,b) = \min\{c[w_1, w_2, \ldots, w_k] \mid b = a[w_1, w_2, \ldots, w_k], w_i \in Z, k \geq 0\} \quad [2]$$

to measure the distance between the sequences *a* and b. This measure is by definition non–negative, and $d_Z(a,b) = 0$ only if *a* = b(1).

"*Optimal matching*" without further qualification normally means referring to this distance measure based on **Z**={i,d,s} resulting in a metric distance. Of course, the distance measure also depends on the definition of the cost functions c[w]. These cost functions can be arbitrarily defined (as we will see below) with respect to the intended applications. As a special case, one can set:

$$c(i)=c(d)=1, \text{ and } c(s)=2 \quad [3]$$

The distance between two sequences *a* and *b* is then simply the number of indel operations (insertions and deletions) which are necessary to transform one sequence into the other. Once the costs of those three basic operations are established, the algorithm evaluates all possible solutions for each pair of sequences and returns the cost of the most efficient transformation path as the "distance" between the sequences. Pairs of sequences with small "distances" are similar to one another, while pairs with larger "distances" are more distinct.

2.2 Optimal Matching Parameters: Substitution Costs

The establishment of substitution (*indel, in*sertion and *del*etion) costs between sequence elements –i.e., the different labour market states– involves, in general, serious consideration of theoretical questions. Optimal matching requires an explicit parameterization of substitutions, since substitution costs may affect distances. This step is crucial to the matching process, since the cost of the transformation determines the quantitative resemblance between pairs of sequences. Ideally, these costs reflect a combination of the researcher's theoretical assumptions about the inherent distinctions between the states and an empirical assessment of the differ-

(1) Symmetry does not automatically hold, but can be forced by equating insertion and deletion costs, or by a slightly different definition: minimum cost of transforming *a* into *b* or *b* into *a*. Whether the distance measure will also be transitive, and thus constitutes a metric distance, depends on the definition of the set of elementary operations, **Z**. Transitivity is automatically guaranteed for the simple case when there are only insertions, deletions and subtitutions.

ences between the states in sequence elements. In applications such us ours, where there are no accepted measures of quantitative differences between states to guide the estimation of the costs of substituting labour market states, researchers must rely on their own theoretical assumptions and whatever empirical data are available to facilitate this process.

A usual starting point is to use a *default cost function* where *indel* cost equals 1 and substitution cost equals 2. In this case, the alignment of two sequences provides, then, the longest common subsequence(2). This option is interesting because it makes a substitution equivalent to two indel operations –a deletion followed by an insertion; that is, both cost the same.

However, we consider that, in our case, the initial basis for setting those costs should be related to the relative importance of changing the labour market states along the job history of the individual. Even though the data shows numerous moves across labour market states in the period of observation, some labour market moves involve a substantial change in the degree of attachment to the labour market, when compared to other types of changes. That is, some pair of states seems to be fairly closely connected by career mobility than others. It seems necessary, therefore, to add mobility information to our measures of state resemblance or dissimilarity.

In order to do that, we adopted a two–folded approach, which involved the use of two different "distance" matrices. For the first of those matrices, substitution costs is calculated as the absolute difference $w(a_i,a_j)=|\ a_i - a_j|$; the underlying assumption for this is based on the fact that it is desirable that two states are more similar the less drastic the associated change between the correspondent labour market states. That is, not all substitutions really "cost" the same. The difference between a state of unemployment and a situation of employment through an open–ended contract is greater than the difference between unemployment and a temporary contract. This is why we must differentiate the costs of substitution. Considering the labour market states in Table 1, careers involving state changes characterized by low "vertical" distances across states will then be linked closely by the matching algorithms. Therefore, this assignment of substitution costs reflects the relative importance –as regards the labour market attachment– when changing the labour market state. Definitions A and B proposed in Table 1 are meaningful for this approach. Definition A assumes a positive distance between a temporary contract through a THA and other temporary contract, whilst definition B neglects this assumption.

(2) The relationship is as follows: length of longest common subsequence=0.5*(m+n-d(a,b))*, where *d(a,b)* is the optimal matching distance when using the cost functions as indicated in the text; *m* and *n* denote the length of the first and second sequence, respectively.

Table 1
DEFINITIONS OF LABOUR MARKET STATES

DEFINITION A		DEFINITION B	
Coding	*Description*	*Value*	*Description*
1	Unemployed or inactive	1	Unemployed or inactive
2	Temporarily employed	2	Temporarily employed (THA or not)
3	Temporarily employed through a THA	3	Open-ended contract
4	Open-ended contract		

Note: Labour market attachment is increasing with the coding number

For our application, it will be also worthwhile to derive substitution costs from the frequency of transitions in the given sequence data; with this option, mobility is therefore added to our measure of job resemblance by making use of data-based substitution costs. This involved producing a “distance” matrix –in fact, the third distance matrix used in our empirical analysis– based on mobility information by creating a matrix of transitions between the different values of the labour market states (as defined in Table 3). To explain this idea, let us assume a sample of i=1,...,n sequences: $y_i = (y_{i1}, y_{i2},..., y_{iT})$, where the elements are valid states in the state space **Y=**{ 1,...q }. We can then define:

$N_t(x)$= Number of sequences being in state x at t [4]

$N_{t,t'}(x,y)$= Number of sequences being in state x at t and in state y at t’ [5]

Those quantities can be used to construct the referred substitution cost matrix; the underlying intuition is that two states are less different when there are, in the dataset, more transitions from one state into the other. One way of using this information about transitions would be to use:

$$p(x,y) = \frac{\sum_{t=1}^{T-1} N_{t,t+1}(x,y)}{\sum_{t=1}^{T-1} N_t(x)} \quad [6]$$

in order to define substitution costs as follows:

$$w(a_i, b_j) = 2 - p(a_i, b_j) - p(b_j, a_i) \quad \text{if} \quad a_i \neq b_j \qquad [7]$$

$$w(a_i, b_j) = 0 \quad \text{if} \quad a_i = b_j \qquad [8]$$

That is, the information on substitution costs is implemented through a matrix of transitions which classifies every move in the individuals' labour market careers. Since this substitution cost matrix must be symmetric, we then symmetrixed this matrix by adding corresponding elements (i.e., the i,jth and the j,ith for all i and j) and replacing both the i,jth and the j,ith with this sum.

Finally, since transition figures rise with mobility closeness rather than with distance (i.e., cost), we turned the matrix into a dissimilarity matrix by substracting each element from a constant. Then, $0 < w(a_i,b_j) < 2$, and the substitution cost directly reflects the cumulated transitions across states. If there are many transitions from a_i to b_j (both directions), the substitution cost will be low, and vice versa.

3. THE THA INDUSTRY: LINKING THA EMPLOYMENT AND CAREER PROSPECTS

THAs are companies that hire temporary workers and send them out to do temporary work on the premises of, and under the supervision of, client firms. Their key feature is that workers remain on the THA's payroll while working for the client firm: i.e., workers engaged by THAs and placed at the disposal of client firms become a part of the triadic relationship between the worker, the THA and the firm in which the work is performed. In every member state of the European Union, temporary agency work has at least doubled during the 1990s, and in Scandinavia, Spain, Italy and Austria, it has increased at least five-fold. By the end of the decade, it accounted for 1.3 percent of the stock of employment in the European Union (see Storrie, 2002). In the Spanish labour market, nowadays 16 percent of the annual flow of temporary contracts is implemented through those intermediaries (Cebrián et al., 2001; García-Pérez and Muñoz-Bullón, 2005a). For a survey about Spanish THA and the characteristics of THA workers see, for example, Cebrián et al. (2001).

In most countries, temporary agency work is of very short duration, even shorter than fixed-term contracts, and only a minority of workers expresses a preference for agency work (Cohany, 1998). However, some agencies have explicitly developed a differentiation strategy mainly based on secreening for potential workers into a permanent job(3). These temp-to-perm arrangements permit organizations to

(3) See, for instance, "*MacTemps: Building Commitment in the Interim Workforce*", case number 9-497-005, Harvard Business School Publishing (1997).

choose the most productive workers after observing their performance, and to avoid legal costs associated with the firing permanent employees. In this respect, Christensen (1995) found that over half of her respondents from large corporations indicated that they employed people as direct-hire temporaries in order to screen them for regular full-time jobs. Houseman (2001) found that managers in 21% of the diverse establishments in her sample said they used temporary help agencies to screen prospective employees. Houseman (1997) found that transitions from temporary to permanent jobs are more likely to take place for workers hired via the intermediary of a THA than for other categories of temporary workers. Abraham (1990) also reports similar findings, as did Gordon and Thal-Larsen (1969) for both part-time and temporary help agency employees(4).

Note that in jobs where agency contracting is a form of probation, the assigned temp will enjoy a relatively high probability of achieving a permanent post after a temporary assignment (either at the current employer or at a new employer)(5). This is particularly likely if agencies have a comparative advantage in screening workers and can make better initial matches than firms would make by hiring on their own (Houseman and Polivka, 2000). In addition, other reasons why agency work may make it easy to shape individuals' careers are the following: first, accepting an agency job may not only reduce the cost of search for a permanent employment (as unemployment depletes financial resources), but also, may avoid any possible negative stigma associated with unemployment; second, agency job provides work experience and hence increases the accumulation of human capital; third, agency employment identifies those individuals most able to work, and signals to potential employers the individual's ability to work; fourth, agency employment enlarges the individual's social network within the working community and his/her self-esteem; fifth, if agency jobs are associated with reduced employment stability, rational workers will anticipate the higher risk of job losses and will, therefore, start searching for a (permanent contract) job earlier. That is, agency jobs may promote on-the-job-search.

(4) A recent literature (Autor, 2001; Polivka, 1996; Abraham and Taylor, 1996; Houseman and Polivka, 2000; Houseman, Kalleberg and Erickek, 2001; Muñoz-Bullón, 2004; Muñoz-Bullón and Rodes, 2004; García-Pérez and Muñoz-Bullón, 2005a, 2005b) remark that temporary help agencies have economies of scale in screening and training temporary workers. Therefore, firms might find it optimal to hire agency workers only when there is an element of probation involved.

(5) In Spain, it is widely known that client firms use agency services in order to find workers suitable for long-term labour relations. Indeed, since the 29/99 Act became Law (which amends the Law whereby THAs were allowed to operate, the 14/94 Law), user firms can resort to hiring through THAs for the same reasons as they directly contract temporary workers (and in the 14/94 Law, agency selection of workers for permanent positions was not explicitly forbidden).

Therefore, there should be little overall loss (or, perhaps, even some improvement) in working through a THA, since the latter would not create a disruption in labour market careers, but the opposite. This is the hypothesis that we will address in our empirical analysis.

4. DATA AND MAIN VARIABLES

Data on the labour market careers of Spanish workers has been extracted from the Spanish Social Security records. We have two sub-samples from those files: they contain the work history from 1990 until 1999 of, respectively, 9,937 affiliated individuals who were working for a THA at the 31st of December of 1995, and 9,903 affiliated individuals who were non-employed at that same date(6). This latter sample is taken as a control group. The original database's total number of records is 301,277. Each record corresponds to the affiliation of an individual to a particular Social Security account and, therefore, represents an employment spell with a particular firm (i.e., a matching).

There are two features of the data that are worth emphasizing. First, given that we use an administrative dataset, its labour market information is much accurate than the one contained in any other longitudinal survey of comparable length, since it allows us to determine job and non –employment durations precisely, and collects information on all jobs held. Second, we focus on the major output of temporary help agencies, the employment history of their workers, in order to understand the implications of this type of labour contracting.

For each incumbency, data include information about age and gender of the workers, professional category of the worker's contribution to the Social Security, dates when the employment spell starts and ends, type of Social Security system for the worker, the reasons for the termination of the spell (voluntary quit, dismissal or retirement), the Spanish province where the employment spell took place, an identifier indicating whether or not each employment spell is accomplished through a THA, another indicator identifying whether the spell is accomplished through a public employer, and, finally, the type of contract the worker is holding (temporary or permanent).

(6) As in this data base we cannot distinguish between unemployment and out of the labour force, we address these spells as "non-employment", given that the information we have is just that these workers are not employed at this time. However, note that these persons are included in Social Security records because they were previously working (although in the extraction date they are not employed).

Table 2
SAMPLE COMPOSITION

	THA Workers		*Non-THA Workers*	
	Men	Women	Men	Women
Initial Age ≤35	1,098	1,136	432	359
Initial Age >35	322	232	539	252
TOTAL	1,420	1,368	971	611

Inclusion in the present study requires, firstly, that workers' career be completely known; therefore, we eliminate any individuals with missing variables, and keep only those workers affiliated to the General System (*Régimen General*) in order to avoid the bias that special systems like Agriculture, Fisheries, and so on would provoke. In addition we erase the employment history of individuals who belonged to the non–THA sub-sample and had experienced sometime employment in a THA during the period analyzed, in order to be sure of comparing one group of individuals with THA experience versus another group without THA experience (i.e., two groups of individuals being actually different from each other in terms of their labour experience) (7). Finally, given the selection criteria of both sub-samples (as previously described) and the fact that THAs were not allowed to operate in Spain until 1994 and their performance was not significant until two years later, we have further reduced the sample by restricting our analysis to the period 1996-1999. The final sample contains the employment history of 4,370 individuals (2,788 THA workers, and 1,582 non–THA individuals). Table 2 summarizes the sample composition by gender and age, measuring the latter variable at the first time moment of the sequence.

Now, we proceed to define our main variable, the sequence of labour market states. Along the labour market trajectory, employment spells are interspersed with

(7) Were these individuals included in the non-THA subgroup, we would mix individuals with different initial conditions: some of the individuals in such a group would have initially been assigned to some client firm through a THA at the end of December, 1995; While the remainder ones would have been non-employed at that same date. The elimination of those individuals has also been implemented in other research using this same dataset. See, for instance, Muñoz-Bullón and Rodes, 2004. Finally, this definition of the control group is in line with the design in almost every evaluation study where the control group consists of people who never enter into the evaluated programme during the period of time covered by the dataset (Hagen, 2003). However, we must acknowledge that with the elimination of these individuals, the non-THA group is a sample of unemployed individuals —instead of being a random sample of individuals who have never been employed through a THA (thus, results are likely to be positively biased towards the treatment group).

unemployment and inactivity periods. Those three main labour market states –inactivity, unemployment, and employment– imply different degrees of attachment to the labour market. However, the position at a given moment is an incomplete piece of information on the individual's labour market attachment. Therefore, it is necessary to construct sequences of labour market states in order to learn how strong (or weak) the attachment of an individual is to the labour market. The strongest degree of labour market attachment corresponds to those spells under a permanent contract, since the link to the labour market is presumably of long–term nature. A weaker degree of attachment may be assigned to those spells under a temporary contract, since the link is presumed to be of short-term nature –at least with the current job. Finally, differences may be considered among different temporary contracts, and their degree of attachment to the labour market can, therefore, be analysed. The weakest attachment corresponds to non-employment (in our data base we can not distinguish between unemployment and inactivity states). Table 1 shows these differences in terms of the attachment degree.

Following Spilerman's (1977) terminology for labour careers, we classify the labour market participation histories as 'ordered' or 'chaotic'. A history is defined as 'ordered' when the attachment to the labour market is increasing through the observed sequence of states. Otherwise, the sequence would not increase the individual's attachment to the labour market. Note that temporary contracts along with unemployment or inactivity states in between must not necessarily be considered chaotic: the unemployment spell may be needed to develop a more efficient search for a better job. Strictly speaking, we could properly distinguish 'chaotic' and 'ordered' histories by exclusively considering labour market participation histories along the whole life course. In addition, an ordered history may be disrupted by a dismissal, consequently creating a 'chaotic' sequence from then on. In short, a 'chaotic' sequence should exhibit a non-unilineal evolution (in terms of labour market attachment). Hence, the distinction between 'ordered' and 'chaotic' histories must be carefully handled: those two types of individual histories should be considered as extreme cases, with many intermediate situations in between. We will consider that an ordered history ends in a job under a permanent contract (i.e., the state with the greatest attachment to the labour market).

Sequence data –which are inherently discrete– on individuals' labour market states can easily be sampled at intervals from the employment and non–employment spells which constitute the individuals' work history along the period 1996-1999. All that is required is that states are clearly defined and that we have a rule for telling which state a person is at each moment of time.

Each worker's labour market participation history will be expressed as a sequence of 8 labour market states, using a six-month basis as the basic time interval(8) The assigned numbers (following Table 1) only indicate the degree of the attachment. For instance, the value 4 means that the attachment to the labour market is larger than that for value 2, though, of course, not exactly twice as much. A transition from one state to another is defined as a change in this variable. As we do not want to ex-ante impose individuals under a THA temporary contract to enjoy a greater degree of attachment than individuals under any other temporary contract, we have also considered definition B of attachment. In definition B, we do not consider –in terms of attachment– THA-temporary contracts to be different from the remainder ones. This issue is relevant since it affects the sequence as a whole. For example, using definition A the sequences '11121234' and '11121224' are different, but not under definition B (both would be represented by the sequence '11121223').

Table 3 shows the empirical distribution of states, as well as the percentage of individuals who never attain an open-ended contract during the observation period. The non-employment state at the first moment accounts for most observations in all groups(9). The relative presence of this state declines until an increase is observed in the last time periods. This rise is higher for the THA sub-sample. A very different trend is observed for the permanent contract state: an extremely low presence at the first moment, but increasing from then on. In addition, initially for all groups, non-employment is more frequent in the non-THA sub-sample (especially for women), while the presence of the permanent contract state achieves the maximum at the 7th moment for the THA sub-sample (especially for women).

(8) The states are measured at the initial moment of each semester considered. Tables B.1 and B.2 in Appendix B offers correlations between the states as measured at the initial moment of each semester considered and the states as measured both at the intermediate and the end moment of each semester considered. As can be observed, almost every correlation is positive and very significant, except for a few cases. Therefore, results are unlikely to substantially vary depending on the moment considered in the semester.

(9) Concerning our sample extraction, this result is sensible: on the one hand, individuals belonging to the non-THA sub-sample, (i.e., who were non-employed in December 1995) are not expected to abandon such a situation soon, given the difficulties they must face in Spain to exit from unemployment; on the other hand, individuals employed through a THA in December 1995 are expected to get jobless due to the short duration of their employment spells (see García-Pérez and Muñoz-Bullón, 2005b).

Table 3

CONTINUUM OF LABOUR MARKET STATES

(Continues)

THA Workers								
Men, Initial Age≤35 Coding	***% Observations in Time Periods*:**							
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***
Unemployed or inactive	92.53	51.91	38.71	29.42	23.68	18.49	27.96	53.10
Temporary contract	4.10	29.14	37.89	48.00	47.09	47.45	41.35	23.22
Temporary contract via THA	2.73	15.94	16.94	13.11	12.11	8.65	4.92	1.73
Open-ended contract	0.64	3.01	6.47	9.47	17.12	25.41	25.77	21.95
% Never get open-ended contract	68.31							
Men, Initial Age>35 Coding								
Unemployed or inactive	95.03	55.28	37.89	30.43	22.36	17.08	24.84	50.62
Temporary contract	2.80	21.74	31.99	36.34	36.34	38.20	36.02	19.88
Temporary contract via THA	1.55	15.84	16.77	14.91	17.70	17.08	9.32	3.73
Open-ended contract	0.62	7.14	13.35	18.32	23.60	27.64	29.81	25.78
% Never get open-ended contract	64.29							
Women, Initial Age≤35 Coding								
Unemployed or inactive	91.81	54.23	40.32	33.36	27.02	21.83	36.00	57.66
Temporary contract	3.35	23.06	31.95	37.94	37.24	36.62	29.84	15.93
Temporary contract via THA	4.58	18.49	18.93	15.23	12.24	9.86	4.67	1.50
Open-ended contract	0.26	4.23	8.80	13.47	25.30	31.69	29.49	24.91
% Never get open-ended contract	61.18							
Women, Initial Age >35 Coding								
Unemployed or inactive	91.81	60.78	46.55	41.38	29.31	25.86	40.09	61.64
Temporary contract	3.88	19.83	27.16	30.60	31.03	33.62	30.60	15.95
Temporary contract via THA	3.88	14.66	20.26	16.81	19.83	13.36	6.47	1.72
Open-ended contract	0.43	4.74	6.03	11.21	19.83	27.16	22.84	20.69
% Never get open-ended contract	67.24							

Table 3

CONTINUUM OF LABOUR MARKET STATES

(Conclusion)

Non–THA Workers								
Men, Initial Age≤35 Coding	***% Observations in Time Periods***:							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Unemployed or inactive	96.30	65.05	54.86	39.35	35.42	27.08	27.55	41.94
Temporary contract	3.24	32.41	40.97	52.08	49.54	52.31	50.23	37.27
Open-ended contract	0.46	2.55	4.17	8.56	15.05	20.60	22.22	21.30
% Never get open-ended contract	74.07							
Men, Initial Age>35 Coding								
Unemployed or inactive	96.85	68.09	59.37	43.97	37.29	28.76	26.16	36.36
Temporary contract	2.60	28.57	33.58	45.08	47.12	49.91	49.17	41.19
Open-ended contract	0.56	3.34	7.05	10.95	15.58	21.34	24.68	22.45
% Never get open-ended contract	72.17							
Women, Initial Age≤35 Coding								
Unemployed or inactive	97.77	76.32	61.56	46.80	45.68	39.00	34.82	43.45
Temporary contract	2.23	20.33	34.26	44.85	40.67	41.50	39.00	30.36
Open-ended contract	-	3.34	4.18	8.36	13.65	19.50	26.18	26.18
% Never get open-ended contract	75.99							
Women, Initial Age >35 Coding								
Unemployed or inactive	97.22	77.78	65.87	56.35	48.02	40.48	37.70	41.27
Temporary contract	1.98	20.63	29.76	35.71	39.68	40.48	40.08	37.70
Open-ended contract	0.79	1.59	4.37	7.94	12.30	19.05	22.22	21.03
% Never get open-ended contract	75.40							

Finally, comparing both sub-samples, the proportion of individuals who never achieve an open-ended contract is higher in the non-THA sub-sample, independently of gender or age. These descriptive results provide preliminary support for the hypothesis that THA employment is associated with no stigma, but with a more successful long-term labour market career.

5. EMPIRICAL ANALYSIS

The empirical analysis of this section involves a series of steps. Firstly, we will apply OMA and we will test whether or not the calculated distances are substantially affected by different measures of substitution costs, and, correspondingly, to learn if our method behaves robustly with respect to variation in those costs.

Secondly, and once the cost scheme is established, the optimal alignment algorithm is used to compute the dissimilarities between all pairs of sequences. Since computation time increases exponentially with the size of the sample, subgroups of sequences are drawn taking into account individuals' age and sex. Therefore, the algorithm compares each pair of sequences within these subgroups.

Finally, we again use the results obtained from optimal matching algorithm, this time to find the determinants of the differences in optimal distances to ordered sequences across the THA and the non-THA sub-sample. The empirical challenge is to go beyond the descriptive analysis provided by OMA and to distinguish how much of the difference in optimal distances across both sub-samples can be explained by the impact of individual characteristics and that of having experienced a spell through a THA. For this purpose, we will apply to our analysis the Blinder/Oaxaca methodology frequently used to estimate discriminatory wage differentials in the literature.

5.1 Application of OMA

Given a model of substitution costs, we can apply the optimal matching algorithm to our data. Pairwise comparison of *n* sequences requires n(n-1)/2 alignments. If n is big –as is in our dataset– the computational burden becomes prohibitive(10). We were able to circumvent this problem by taking into account the basic aim pursued with our research. Since our focus is on analyzing the influence of working through a Temporary Help Agency on the degree of individuals' labour market attachment, it makes sense to compare all sequences present in each of the two sub-samples with only a set of predefined sequences. Those predefined sequences correspond to the job histories that, for each sub-sample, end in a permanent contract along the period of observation (i.e., those sequences that, either in the THA sub-sample or in the non–THA sub-sample, show a state value equal to '4' in the last moment). This approach is reasonable, since this set of sequences constitutes our "target" sequences to be used for comparison.

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(10) This occurs in particular with long sequences, since computing time is approximately proportional to the square of the sequence length.

The detailed procedure was as follows. We firstly identified which sequences finished in a permanent contract in the total sample (a table containing all sequences finishing in a permanent contract can be obtained from authors upon request). The three different measures of substitution costs defined in the previous section are used in order to optimally compare all sequences of each sub-sample –THA group and non–THA group– with each of those predefined sequences(11).

Since our aim is to learn whether or not we may expect THA workers to have better opportunities for access to permanent contracts than non–THA ones, we then computed the mean dissimilarity that each individual in those two groups may expect with respect to the set of predefined sequences; finally, the average individual dissimilarity is computed across the individuals in each group. This final value is showed in Table 4 for each of the distance matrices used –named 'Default', 'Absolute Value' or 'Data-Based'.

Table 4

AVERAGE OPTIMAL MATCHING DISSIMILARITIY MEASURE TO SEQUENCES ENDING IN PERMANENT CONTRACT

(Continues)

SUBSTITUTION COST MATRIX	*AVERAGE DISSIMILARITY MEASURE*		*T–statistic*
	***THA** workers*	***Non-THA** workers*	
DEFAULT (Definition A)			
Men, Initial Age≤35	8.9075	9.0011	-0.8372
Men, Initial Age>35	9.0638	8.8886	1.2576
OVERALL	8.9429	8.9386	0.0533
Women, Initial Age≤35	9.1412	9.3033	-1.3056*
Women, Initial Age>35	9.4184	9.3196	0.5395
OVERALL	9.1882	9.3100	-1.2255
ABSOLUTE VALUE (Definition A)			
Men, Initial Age≤35	7.3997	7.6488	-2.5680**
Men, Initial Age>35	7.4887	7.7175	-1.9043**
OVERALL	7.4199	7.6869	-3.7569**
Women, Initial Age≤35	7.6180	7.9819	-3.2564**
Women, Initial Age>35	7.8779	8.0886	-1.2833*
OVERALL	7.6621	8.0259	-4.0706**

(11) In each of those cases, *indel* cost equals 1. In addition, it must be taken into account that the no–THA group can only be compared to those sequences that in Table 4 do not show the state value '3', since no substitution cost can be defined for transitions from and to this state value '3'.

Table 4

AVERAGE OPTIMAL MATCHING DISSIMILARITIY MEASURE TO SEQUENCES ENDING IN PERMANENT CONTRACT

(Conclusion)

SUBSTITUTION COST MATRIX	*AVERAGE DISSIMILARITY MEASURE*		*T–statistic*
	***THA** workers*	***Non-THA** workers*	
ABSOLUTE VALUE (Definition B)			
Men, Initial Age≤35	5.5723	5.7677	-2.0237**
Men, Initial Age>35	5.7705	6.0131	-1.9727**
OVERALL	5.6173	5.9039	-4.0052**
Women, Initial Age≤35	5.8627	6.2520	-3.2843**
Women, Initial Age>35	6.3162	6.4977	-1.0662
OVERALL	5.9396	6.3534	-4.3776**
DATA-BASED (Definition A)			
Men, Initial Age≤35	8.1962	8.2786	-0.8101
Men, Initial Age>35	8.4426	8.2622	1.3915*
OVERALL	8.2520	8.2695	-0.2315
Women, Initial Age≤35	8.3931	8.5609	-1.4947*
Women, Initial Age>35	8.6860	8.8005	-0.6646
OVERALL	8.4428	8.6597	-2.3890**

*Significant at 0.10 level; **Significant at 0.05 level

Results are presented by gender and age, comparing THA and non-THA sub-samples. Apart from the dissimilarity index, a means contrast is reported in the last column of those tables, in order to statistically check the differences by sub-sample. First of all, the results on the optimal dissimilarity measure remain, in general, qualitatively the same across the different substitution cost matrices(12). The most persistent result –across substitution cost matrices– consists of non–THA women with or below 35 years–old presenting a significant larger dissimilarity measure than THA similar women: this dissimilarity is between 2 and 6 percent higher for these individuals. In addition, when the absolute value matrix is used, THA men also show a significant lower dissimilarity measure than non–THA men.

(12) This robustness of the results with respect to different cost matrices was expected, given the experimental work by Forrest and Abbot (1990) who, in other empirical context, indicate the substantial robustness with respect to substitution costs.

For the remainder groups, OMA shows average dissimilarity measures greater for the non-THA sub-sample(13).

A comparison of ‘typical’ successful trajectories is then implemented in order to understand the importance of OMA and how this technique can help to extract non–evident information from sequence data. Table 5 shows for each group the sequences ending in permanent contract which present the lowest mean disagreement. That is, those sequences ending in ‘4’ with the lowest mean disagreement with respect to the rest of sequences ending in ‘4’ for each group. These sequences are addressed as ‘typical’ successful sequences. These sequences are almost identical for all groups: there are two or three initial non-employment states, followed in most cases by one or two temporary contracts; finally, a permanent contract is obtained at the fifth moment (the fourth one for men and women above 35, when the default or the data-based substitution cost matrix is used).

Table 5

TYPICAL SEQUENCES ENDING IN PERMANENT CONTRACT

	SUBSTITUTION COST MATRIX		
	‘Default’	*‘Absolute Value’**	*‘Data-Based’*
Men, Initial Age ≤35			
Sequence with lowest mean disagreement	11224444	11224444	11224444
Number of sequences	333	333	333
Mean dissimilarity	4.1994	3.3688	3.6715
Men, Initial Age >35			
Sequence with lowest mean disagreement	11244444	11124444	11244444
Number of sequences	204	204	204
Mean dissimilarity	4.3431	3.7647	3.8075
Women, Initial Age ≤35			
Sequence with lowest mean disagreement	11224444	11224444	11224444
Number of sequences	377	377	377
Mean dissimilarity	4.5620	3.6412	4.0398
Women, Initial Age >35			
Sequence with lowest mean disagreement	11244444	11224444	11144444
Number of sequences	101	101	101
Mean dissimilarity	4.4752	3.504	3.96

* Definition A

(13) This is relevant because the lack of significance of the t-statistic can be related to the relatively small sample size of the defined subgroups (the only exception if that of no–THA men above 35 years–old, who appear less dissimilar when the default and the data-based cost matrices are used).

Those ‘typical’ successful sequences can be compared to the ‘typical’ general sequence (that is, whether successful or not). Those typical general sequences are obtained by comparing the sequences in each group to every other sequence in the group. Results are presented in Table 6. In general ‘typical’ general sequences are chaotic: in most cases their end is with a slighter attachment than previous states. Using the absolute value matrix, we appreciate that in the first part of the observed period the typical THA sequence is quite similar to the typical sequence ending in permanent contract. The differences are in the second half of the period, where a chaotic feature is detected in almost all cases. Nevertheless, the typical non-THA sequences present more changes between non-employment and temporary contracts (that is, they seem more chaotic, especially for women under thirty five years-old). Results are similar using the data based substitution cost matrix, although there are some differences between THA and non-THA sub-samples for women.

Table 6

TYPICAL SEQUENCES

(Continues)

	***THA** WORKERS*		
	SUBSTITUTION COST MATRIX		
	Default	*Absolute Value**	*Data-Based*
Men, Initial Age ≤35			
Sequence with lowest mean disagreement	11122221	11122221	11122221
Number of sequences	1,098	1,098	1,098
Mean dissimilarity	6.5385	4.8024	5.8335
Men, Initial Age ≤35			
Sequence with lowest mean disagreement	11112221	11122221	11112221
Number of sequences	322	322	322
Mean dissimilarity	7.3073	5.5089	6.6401
Women, Initial Age ≤35			
Sequence with lowest mean disagreement	11122211	11222211	11122211
Number of sequences	1,136	1,136	1,136
Mean dissimilarity	7.0197	5.4178	6.3298
Women, Initial Age >35			
Sequence with lowest mean disagreement	11112211	11122211	11112211
Number of sequences	232	232	232
Mean dissimilarity	7.0258	5.2715	6.2902

*Definition A

Table 6

TYPICAL SEQUENCES

(Conclusion)

	NON-THA *WORKERS*		
	SUBSTITUTION COST MATRIX		
	Default	*Absolute Value**	*Data-Based*
Men, Initial Age ≤35			
Sequence with lowest mean disagreement	11122221	11122221	11122221
Number of sequences	432	432	432
Mean dissimilarity	5.8703	4.1839	5.0980
Men, Initial Age ≤35			
Sequence with lowest mean disagreement	11112221	11122222	11122221
Number of sequences	539	539	539
Mean dissimilarity	5.5905	5.8006	6.6032
Women, Initial Age ≤35			
Sequence with lowest mean disagreement	11121221	11121221	11121221
Number of sequences	359	359	359
Mean dissimilarity	6.2343	4.6786	5.5232
Women, Initial Age >35			
Sequence with lowest mean disagreement	11111212	11111221	11111221
Number of sequences	252	252	252
Mean dissimilarity	5.8492	4.0238	2.413

*Definition A

Focusing on the results for women with or below 35 years-old, we can see the usefulness of OMA techniques. For this group the ‘typical’ general sequence of the THA sub-sample seems not very distinct from the ‘typical’ general sequence of the no-THA sub-sample. However, when we work out the mean dissimilarity of all sequences to every successful sequence, it is detected a robust difference between sub-samples for this group.

To sum up, women with or below 35 years-old who have experienced a job through a THA present labour market participation histories –taken as wholes– more similar to successful labour market participation histories. Depending on the substitution cost matrix, this similarity is between 2 to 6 per cent higher than for those who did not experience a job through a THA. For the remainder of groups, results are in the same way, although differences in the mean dissimilarity between sub-samples are not always statistically significant.

5.2 MULTIVARIATE ANALYSIS: DETERMINANTS OF SEQUENCE DISSIMILARITIES

In this section, we provide a more comprehensive treatment of differences across THA and non-THA workers. We seek to go beyond the descriptive results presented in the previous section, by assessing the role played (in access to ordered sequences) by labour experience through a THA. In addition, we take into consideration other factors in determining the likelihood that the individual enjoys a permanent contract at the end of the observation period. The model consists of variables to control both for initial conditions and other aspects which remain constant along time. We measure human capital of individuals (initial age and qualification group(14), the class and duration of the initial spell (non-employment, temporary or open-ended contract), the sector, whether or not the employer is a public firm, and, finally, the region of the initial spell (Appendix A reports the means and standard errors for the THA and non-THA sub-samples).

We estimated dissimilarity equations for THA and non-THA sub-samples. The three different measures of substitution costs are used to estimate the mean dissimilarity that each individual in those two sub-samples has with respect to the set of ordered sequences for the total sample. Those three measures of individual distances are taken as dependent variables in the estimations. Finally, the distance gap between THA and non-THA workers is decomposed into a portion explained by differences in characteristics and a portion “unexplained”, following Blinder (1973) and Oaxaca (1979) methodology.

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(14) We would like to remark that the ten professional categories of contribution to the Social Security in the database do not collect workers’ level of qualification, but the required level of qualification for the job. In any case, we will refer to contribution categories from here onwards as “qualification’”, although this remark should be remembered for the subsequent analysis. We group those eleven categories in the following four: Qualification High collects the highest level in between the contribution categories, that is, 1 (*ingenieros* and *licenciados*), 2 (*ingenieros técnicos, peritos* and *ayudantes titulados*) and 3 (*jefes administrativos* and *de taller*); Qualification Medium-High collects contribution categories 4 (*ayudantes no titulados*), 5 (*oficiales administrativos*) and 6 (*subalternos*); Qualification Medium-Low collects contribution categories 7 (*auxiliares administrativos*) and 8 (*oficiales de primera* and *segunda*); finally, Qualification Low collecst contribution categories 9 (*oficiales de tercera* and *especialistas*) and 10 (*peones*).

Estimated coefficients are given in Table 7. Estimated average distances to ordered sequences by THA and non-THA individuals differ according to the type of distance measure used. However, the longer the duration of the initial temporary spell observed, the higher the estimated dissimilarity is. In addition, the duration of the initial non-employment spell is also a significant contributor to higher distances in both sub-samples. Thus, beginning the sequence status with a long duration in non-employment or in a temporary contract makes the individual harder the attainment of an open-ended contract at the end of the observation period. Moreover, the average individual distance is reduced by age and qualification required for the job. Finally, individuals employed in a public firm show a larger distance than those in the reference group (private employer).

Table 7

ORDINARY LEAST SQUARES ESTIMATES FOR THA AND NON-THA DISSIMILARITY EQUATIONS

(Continues)

VARIABLE	*DATA-BASED*			
	THA		*NON-THA*	
	N=2,788		*N=1,582*	
Intercept	10.785		6.058	***
Sex (1=male)	0.109	*	-0.081	
Initial Age	-0.117	***	0.032	
Initial Age squared	0.002	***	-0.0002	
Qualif.:				
High	-0.980	***	-0.626	***
Upper-intermediate	-0.475	***	-0.300	***
Lower-intermediate	-0.208	***	-0.228	***
Low	-	-	-	-
Duration of initial spell*Temporary spell	0.002	***	0.002	***
Duration of initial spell*Non-employmentspell	0.002	***	0.002	***
Duration of initial spell*Open-ended spell	-0.00002	-	0.002	*
Type of initial spell:				
Temporary	-0.247		1.703	
Non-employment	-1.076		1.195	
Open-ended	-	-	-	-
Sector of initial spell:				
Service	0.076		0.065	
Industry	-0.413		-0.070	
Construction	0.118		0.403	
Agriculture	-	-	-	-
Type of employer of initial spell:				
Public	0.366		0.390	***
Private	-	-	-	-
R^2	0.158		0.206	
F-value	16.190	***	12.530	***

Notes: The dependent variable is the average dissimilarity of each individual in the sub-sample to the sequences that end in permanent contracts for the total sample. Reference individual: Qualification Low, Permanent initial spell, Agriculture sector, Private employer. A set of regional dummies was included in estimations.

* = Significant at 0.10 level; ** = Significant at 0.05 level; *** = Significant at 0.01 level or better

Table 7

ORDINARY LEAST SQUARES ESTIMATES FOR THA AND NON-THA DISSIMILARITY EQUATIONS

(Continuation)

VARIABLE	*DEFAULT*			
	THA		*NON-THA*	
	N=2,788		*N=1,582*	
Intercept	13.385		6.523	***
Sex (1=male)	0.104		-0.105	
Initial Age	-0.135	***	0.044	
Initial Age squared	0.002	***	0.000	
Qualif.:				
High	-1.078	***	-0.658	***
Upper-intermediate	-0.515	***	-0.327	***
Lower-intermediate	-0.217	***	-0.255	***
Low	-	-	-	-
Duration of initial spell*Temporary spell	0.002	***	0.002	***
Duration of initial spell*Non-employmentspell	0.002	***	0.003	***
Duration of initial spell*Open-ended spell	-0.001		0.002	
Type of initial spell:				
Temporary	-1.864		1.798	
Non-employment	-2.805		1.241	
Open-ended	-	-	-	-
Sector of initial spell:				
Service	0.141		-0.001	
Industry	-0.421		-0.140	
Construction	0.176		0.368	
Agriculture	-	-	-	-
Type of employer of initial spell:				
Public	0.435		0.422	***
Private	-	-	-	-
R^2	0.175		0.218	
F-value	18.200	***	13.480	***

Notes: The dependent variable is the average dissimilarity of each individual in the sub-sample to the sequences that end in permanent contracts for the total sample. Reference individual: Qualification Low, Permanent initial spell, Agriculture sector, Private employer. A set of regional dummies was included in estimations.

* = Significant at 0.10 level; ** = Significant at 0.05 level; *** = Significant at 0.01 level or better

Table 7

ORDINARY LEAST SQUARES ESTIMATES FOR THA AND NON-THA DISSIMILARITY EQUATIONS

(Conclusion)

	ABSOLUTE VALUE			
	THA		*NON-THA*	
Variable	*N=2,788*		*N=1,582*	
Intercept	11.186		4.986	***
Sex (1=male)	0.055		-0.110	
Initial Age	-0.153	***	0.037	
Initial Age squared	0.003	***	-0.0002	
Qualif.:				
High	-0.880	***	-0.655	***
Upper-intermediate	-0.450	***	-0.305	***
Lower-intermediate	-0.216	***	-0.233	***
Low	-	-	-	-
Duration of initial spell*Temporary spell	0.001	***	0.001	***
Duration of initial spell*Non-employmentspell	0.002	***	0.002	***
Duration of initial spell*Open-ended spell	-0.0002		0.002	*
Type of initial spell:				
Temporary	-1.149		1.712	
Non-employment	-1.858		1.511	
Open-ended	-	-	-	-
Sector of initial spell:				
Service	0.221		0.083	
Industry	-0.190		-0.094	
Construction	0.364		0.401	
Agriculture	-	-	-	-
Type of employer of initial spell:				
Public	0.426	**	0.434	***
Private	-	-	-	-
R^2	0.174		0.211	
F-value	18.100	***	12.970	***

Notes: The dependent variable is the average dissimilarity of each individual in the sub-sample to the sequences that end in permanent contracts for the total sample. Reference individual: Qualification Low, Permanent initial spell, Agriculture sector, Private employer. A set of regional dummies was included in estimations.

* = Significant at 0.10 level; ** = Significant at 0.05 level; *** = Significant at 0.01 level or better

The Oaxaca-Blinder decomposition is shown in Table 8. When the default distance measure is used as dependent variable, around sixty-two percent of the gap can be accounted for by differences in independent variables. However, when the data-based or the absolute value measures are used, differences in characteristics now only explain a percentage well below 50 percent of the gap. With the absolute value distance measure, characteristics only account for 26.04 percent.

The most relevant result is that –compared to be in a non-employment state– having worked through a THA is by far the chief factor explaining individuals' distance to the sequences ending in permanent contracts. Although the regressions obviously omit some productivity-related characteristics (such as, for instance, education and its quality, or work experience), the unexplained distance gap between THA and non-THA individuals is so large that it seems unlikely to be due to omitted variables. Anyway, because of the limits of the applied methodology, this result indicates an upper limit of the influence of obtaining a job through a THA compared to a non-employment situation(15).

Table 8

DETERMINANTS OF THA–NO THA DISSIMILARITY DIFFERENTIALS

DESCRIPTION	*SUBSTITUTION COST MATRIX*					
	Data-Based		*Absolute Value*		*Default*	
	Absolute gap	Percentage gap	Absolute gap	Percentage gap	Absolute gap	Percentage gap
Gap	-0.1667	100 %	-.3226	100 %	-.1353	100 %
Unexplained Gap	-0.1024	61.4 %	-.2373	73.6 %	-.0518	38.2 %
Explained Gap	-0.0644	38.59 %	-.0853	26.4 %	-.0836	61.7%

Note: This table is based on regression results for THA and non-THA sub-samples showed in Table 9.

Therefore, either because individuals who have worked through a THA are somehow different from the rest –and this agency experience is a signal of those variables which are making them different– or because the THA adds "value" to the individual (in order to achieve a permanent contract in the future), those high unexplained portions of the distance gap across sub-samples indicate that the labour market values having worked through a THA in the sense that the comparative easiness in the attainment of an ordered labour market participation history is substantially larger compared to our non-THA sub-sample (i.e., those in non-

(15) Given that a substantial part of heterogeneity is uncontrolled for in the empirical exercise, a control for unobserved heterogeneity might help do the analysis more robust. This procedure, however, requires at least two observations per individual and there is only one observation per individual in our dataset, due to the methodology (only one observation of dissimilarity exists for each individual, given that each person has only one labour market trajectory).

employment in the same date that the individuals from the other sub-sample were hired through a THA).

CONCLUSION

In this article, we have proposed the use of a relatively new empirical methodology to analyse the influence of THA intermediation over the dynamics of individuals' attachment to the labour market. This methodology consists of analysing sequences of events taken as wholes, whilst the usual method consists of estimating the determinants of transitions across labour market states. We argue that these techniques allow us to (1) identify empirically common career trajectories; and (2) examine how individuals' mobility patterns and attachments to different labour market statuses unfold and evolve over time.

Two sub-samples of workers –one of them constituted by individuals experiencing a job through a THA at a specific date and the other by non-employed individuals at the same date– are compared. The most interesting finding from our analysis is that agency workers do not appear to experience less career stability. This is particularly the case for women below 35 years-old, for whom our OMA application has found a relationship between THA intermediation and successful labour market participation histories.

In addition, we have found evidence that the main reason for the gap between THA and non-THA workers' distances to ordered sequences was precisely due to the fact of having been employed through one of those intermediaries. The Blinder/Oaxaca decomposition of the distance gap across sub-samples reveals that differences in measured characteristics may explain only under one-third of the gap. Results support the view that being an agency worker represents a very relevant event explaining progress towards a permanent contract status.

APPENDIX A: MEAN CHARACTERISTICS OF THA AND NON-THA SUBSAMPLES

Variable		*THA* N= 2,788	*Non-THA* N= 1,582
Sex		.5093 (.5000)	.6137 (.4870)
Initial Age		27 (7.1022)	30 (6.0563)
Initial qualification group:			
	High	.0828 (.2757)	.0594 (.2364)
	Medium-High	.1646 (.3709)	.1396 (.3467)
	Medium-Low	.3748 (.4841)	.3476 (.4763)
	Low	.3776 (.4848)	.4532 (.4979)
Duration of initial spell (in days)		133 (281.718)	155 (289.6962)
Type of initial spell:			
	Non-employment	.9246 (.2639)	.9696 (.1715)
	Temporary	.0706 (.2563)	.0259 (.1589)
	Permanent	.0046 (.0681)	.0044 (.0663)
Sector of initial spell:			
	Service	.8579 (.3491)	.6422 (.4794)
	Industry	.1090 (.3117)	.1681 (.3741)
	Construction	.0301 (.1709)	.1826 (.3865)
	Agriculture	.0028 (.0534)	.0069 (.0831)
Type of employer of initial spell:			
	Public	.0175 (.1314)	.0979 (.2973)
Region of initial spell:			
	Andalucía	.0857 (.2800)	.1833 (.3870)
	Aragón	.0200 (.1403)	.0183 (.1341)
	Asturias	.0096 (.0979)	.0227 (.1491)
	Baleares	.0086 (.0923)	.0189 (.1364)
	Canarias	.0222 (.1474)	.0499 (.2178)
	Cantabria	.0050 (.0706)	.0139 (.1171)
	Castilla-La-Mancha	.0060 (.0778)	.0372 (.1895)
	Castilla-León	.0337 (.1805)	.0398 (.1956)
	Catalonia	.2894 (.4535)	.2060 (.4046)
	Valencia	.0703 (.2557)	.1169 (.3214)
	Extremadura	.0086 (.0923)	.0233 (.1511)
	Galicia	.0509 (.2198)	.0524 (.2230)
	Madrid	.2604 (.4389)	.1649 (.3712)
	Murcia	.0154 (.1232)	.0164 (.1271)
	Navarra	.0157 (.1246)	.0063 (.0792)
	País Vasco	.0868 (.2815)	.0259 (.1589)
	La Rioja	.0075 (.0864)	.0025 (.0502)
	Ceuta and Melilla	.0035 (.0597)	.0006 (.0251)

Notes: Standard errors in parentheses.

APPENDIX B: CORRELATIONS BETWEEN STATES

Table B.1

CORRELATIONS BETWEEN STATES FOR THA WORKERS

(Continues)

		Time periods (measured at intermediate point of semester)							
		1	2	3	4	5	6	7	8
		Men, Initial Age≤35							
Time periods (measured at the beginning of the semester)	1	0.27*	-	-	-	-	-	-	-
	2	-	0.41*	-	-	-	-	-	-
	3	-	-	0.56*	-	-	-	-	-
	4	-	-	-	0.47*	-	-	-	-
	5	-	-	-	-	0.39*	-	-	-
	6	-	-	-	-	-	0.29*	-	-
	7	-	-	-	-	-	-	0.30*	-
	8	-	-	-	-	-	-	-	0.35*
		Men, Initial Age>35							
Time periods (measured at the beginning of the semester)	1	0.21*	-	-	-	-	-	-	-
	2	-	0.59*	-	-	-	-	-	-
	3	-	-	0.60*	-	-	-	-	-
	4	-	-	-	0.43*	-	-	-	-
	5	-	-	-	-	0.38*	-	-	-
	6	-	-	-	-	-	0.27*	-	-
	7	-	-	-	-	-	-	0.38*	-
	8	-	-	-	-	-	-	-	0.43*

Notes: (*) Significant at 1 percent;
(**) Significant at 5 percent;
(***) Significant at 10 percent;
(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.1

CORRELATIONS BETWEEN STATES FOR THA WORKERS

(Continuation)

		Time periods (measured at intermediate point of semester)							
		1	2	3	4	5	6	7	8
		Women, Initial Age≤35							
Time periods (measured at the beginning of the semester)	1	0.14*	-	-	-	-	-	-	-
	2	-	0.38*	-	-	-	-	-	-
	3	-	-	0.52*	-	-	-	-	-
	4	-	-	-	0.42*	-	-	-	-
	5	-	-	-	-	0.42*	-	-	-
	6	-	-	-	-	-	0.29*	-	-
	7	-	-	-	-	-	-	0.30*	-
	8	-	-	-	-	-	-	-	0.35*
		Women, Initial Age>35							
Time periods (measured at the beginning of the semester)	1	0.1301**	-	-	-	-	-	-	-
	2	-	0.53*	-	-	-	-	-	-
	3	-	-	0.43*	-	-	-	-	-
	4	-	-	-	0.39*	-	-	-	-
	5	-	-	-	-	0.41*	-	-	-
	6	-	-	-	-	-	0.34*	-	-
	7	-	-	-	-	-	-	0.43*	-
	8	-	-	-	-	-	-	-	0.49*

Notes: (*) Significant at 1 percent;

(**) Significant at 5 percent;

(***) Significant at 10 percent;

(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.1

CORRELATIONS BETWEEN STATES FOR THA WORKERS

(Continuation)

		Time periods (measured at the end of semester)						
		1	2	3	4	5	6	7
		Men, Initial age≤35						
Time periods (measured at the beginning of the semester)	1	0.15*	-	-	-	-	-	-
	2	-	0.36*	-	-	-	-	-
	3	-	-	0.47*	-	-	-	-
	4	-	-	-	0.43*	-	-	-
	5	-	-	-	-	0.34*	-	-
	6	-	-	-	-	-	0.19*	-
	7	-	-	-	-	-	-	0.28*
	8	-	-	-	-	-	-	-
		Men, Initial Age**>**35						
Time periods (measured at the begin-ning of the semester)	1	0.15*	-	-	-	-	-	-
	2	-	0.50*	-	-	-	-	-
	3	-	-	0.39*	-	-	-	-
	4	-	-	-	0.42*	-	-	-
	5	-	-	-	-	0.33*	-	-
	6	-	-	-	-	-	0.12*	-
	7	-	-	-	-	-	-	0.35*
	8	-*	-	-	-	-	-	-

Notes: **(***) Significant at 1 percent;

(**) Significant at 5 percent;

(***) Significant at 10 percent;

(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.1

CORRELATIONS BETWEEN STATES FOR THA WORKERS

(Conclusion)

		Time periods (measured at the end of semester)						
		1	2	3	4	5	6	7
		Women, Initial age≤35						
Time periods (measured at the beginning of the semester)	1	0.0241****		-	-	-	-	-
	2	-	0.30*	-	-	-	-*	-
	3	-	-	0.41*	-	-	-	
	4	-	-	-	0.36*	-	-	-
	5	-	-	-	-	0.36*	-	-
	6	-	-	-	-	-	0.14*	-
	7	-	-	-	-	-	-	0.29*
	8	-	-	-	-	-	-	-
		Women, Initial Age>35						
Time periods (measured at the beginning of the semester)	1	0.0838****		-	-		-	-
	2	-	0.50*	-	-	-	-	-
	3	-	-	0.31*	-	-	-	
	4	-	-	-	0.35*	-	-	-
	5	-	-	-	-	0.31*	-	-
	6	-	-	-	-	-	0.16*	-
	7	-	-	-	-	-	-	0.43*
	8	-	-	-	-	-	-	-

Notes: (*) Significant at 1 percent;

(**) Significant at 5 percent;

(***) Significant at 10 percent;

(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.2

CORRELATIONS BETWEEN STATES FOR NON–THA WORKERS

(Continues)

		Time periods (measured at intermediate point of semester)							
		1	2	3	4	5	6	7	8
		Men, Initial Age≤35							
Time periods (measured at the beginning of the semester)	1	0.52*	-	-	-	-	-	-	-
	2	-	0.66*	-	-	-	-	-	-
	3	-	-	0.62*	-	-	-	-	-
	4	-	-	-	0.47*	-	-	-	-
	5	-	-	-	-	0.45*	-	-	-
	6	-	-	-	-	-	0.38*	-	-
	7	-	-	-	-	-	-	0.39*	-
	8	-	-	-	-	-	-	-	0.43*
		Men, Initial Age>35							
Time periods (measured at the beginning of the semester)	1	0.33*	-	-	-	-	-	-	-
	2	-	0.67*	-	-	-	-	-	-
	3	-	-	0.72*	-	-	-	-	-
	4	-	-	-	0.61*	-	-	-	-
	5	-	-	-	-	0.46*	-	-	-
	6	-	-	-	-	-	0.42*	-	-
	7	-	-	-	-	-	-	0.42*	-
	8	-	-	-	-	-	-	-	0.44*

Notes: (*) Significant at 1 percent;

(**) Significant at 5 percent;

(***) Significant at 10 percent;

(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.2

CORRELATIONS BETWEEN STATES FOR NON–THA WORKERS

(Continuation)

		Time periods (measured at intermediate point of semester)							
		1	2	3	4	5	6	7	8
		Women, Initial Age≤35							
Time periods (measured at the beginning of the semester)	1	0.23*	-	-	-	-	-	-	-
	2	-	0.51*	-	-	-	-	-	-
	3	-	-	0.68*	-	-	-	-	-
	4	-	-	-	0.50*	-	-	-	-
	5	-	-	-	-	0.40*	-	-	-
	6	-	-	-	-	-	0.37*	-	-
	7	-	-	-	-	-	-	0.31*	-
	8	-	-	-	-	-	-	-	0.34*
		Women, Initial Age>35							
Time periods (measured at the beginning of the semester)	1	0.64*	-	-	-	-	-	-	-
	2	-	0.51*	-	-	-	-	-	-
	3	-	-	0.70*	-	-	-	-	-
	4	-	-	-	0.60*	-	-	-	-
	5	-	-	-	-	0.47*	-	-	-
	6	-	-	-	-	-	0.47*	-	-
	7	-	-	-	-	-	-	0.43*	-
	8	-	-	-	-	-	-	-	0.40*

Notes: (*) Significant at 1 percent;

(**) Significant at 5 percent;

(***) Significant at 10 percent;

(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.2

CORRELATIONS BETWEEN STATES FOR NON–THA WORKERS

(Continuation)

		Time periods (measured at the end of semester)						
		1	2	3	4	5	6	7
		Men, Initial age≤35						
Time periods (measured at the beginning of the semester)	1	0.32*	-	-	-	-	-	-
	2	-	0.54*	-	-	-	-	-
	3	-	-	0.47*	-	-	-	-
	4	-	-	-	0.45*	-	-	-
	5	-	-	-	-	0.40*	-	-
	6	-	-	-	-	-	0.32*	-
	7	-	-	-	-	-	-	0.38*
	8	-	-	-	-	-	-	-
		Men, Initial Age>35						
Time periods (measured at the beginning of the semester)	1	0.20*	-	-	-	-	-	-
	2	-	0.62*	-	-	-	-	-
	3	-	-	0.62*	-	-	-	-
	4	-	-	-	0.58*	-	-	-
	5	-	-	-	-	0.36*	-	-
	6	-	-	-	-	-	0.31*	-
	7	-	-	-	-	-	-	0.39*
	8	-*	-	-	-	-	-	-

Notes: (*) Significant at 1 percent;
(**) Significant at 5 percent;
(***) Significant at 10 percent;
(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

Table B.2

CORRELATIONS BETWEEN STATES FOR NON–THA WORKERS

(Conclusion)

		Time periods (measured at the end of semester)						
		1	2	3	4	5	6	7
		Women, Initial age≤35						
Time periods (measured at the beginning of the semester)	1	0.1**	-	-	-	-	-	-
	2	-	0.42*	-	-	-	-	-
	3	-	-	0.47*	-	-	-	-
	4	-	-	-	0.42*	-	-	-
	5	-	-	-	-	0.37*	-	-
	6	-	-	-	-	-	0.24*	-
	7	-	-	-	-	-	-	0.28*
	8	-	-	-	-	-	-	-
		Women, Initial Age>35						
Time periods (measured at the beginning of the semester)	1	0.53*	-	-	-	-	-	-
	2	-	0.44*	-	-	-	-	-
	3	-	-	0.57*	-	-	-	-
	4	-	-	-	0.50*	-	-	-
	5	-	-	-	-	0.39*	-	-
	6	-	-	-	-	-	0.41*	-
	7	-	-	-	-	-	-	0.40*
	8	-*	-	-	-	-	-	-

Notes: (*) Significant at 1 percent;

(**) Significant at 5 percent;

(***) Significant at 10 percent;

(****) Non-significant. There are seven time periods at the end of the last semester considered, since every individuals is registered as unemployed at that moment

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EMPRESAS DE TRABAJO TEMPORAL E HISTORIAS DE PARTICIPACIÓN LABORAL: UN ANÁLISIS DE SECUENCIAS

RESUMEN

Este resumen analiza en qué medida el ser trabajador en misión a través de una empresa de trabajo temporal tiene alguna relación con el disfrute, con posterioridad, de un contrato de carácter indefinido en comparación a individuos que buscaban empleo. Se utilizan microdatos procedentes de registros de la Seguridad Social por medio del Análisis de Emparejamiento Óptimo. El análisis empírico se centra en la totalidad de las secuencias de estados laborales (y no en transiciones). Los resultados muestran que el empleo via empresas de trabajo temporl puede servir como “trampolín” hacia el empleo de carácter indefinido para ciertos trabajadores, en especial para las mujeres con edad igual o inferior a 35 años, en comparación a aquellos individuos que estaban desempleados en el mismo momento del tiempo.

Palabras Clave: Análisis de emparejamiento óptimo, grado de implicación en el mercado de trabajo, empresas de trabajo temporal.

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