The search behaviour of firms and workers in OECD labour markets

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Abstract

Most labour economists today agree on a view of the labour market in which various types of imperfections prevent firms with unfilled vacancies and workers who want a job to meet readily. This dissertation explores several empirical aspects of the behaviour of workers and firms in search for partners to form employment relationships.

The first chapter looks at the effect of the interaction between welfare programmes on the search behaviour of the unemployed. It suggests that unemployment insurance recipients, who are also entitled to some kind of social assistance, are less concerned about changes in their unemployment benefits. Empirical evidence from the European Community Household Panel (ECHP) shows that the unemployed who are eligible for social assistance programmes leave unemployment at a lower rate than similar individuals who only receive unemployment compensation.

The second chapter looks at the characteristics of jobs found through formal and informal methods. Data from the ECHP show that wage premiums and wage penalties to finding jobs through personal contacts are equally frequent and of about the same size. This result is rationalised with a simple model in which firms choose their optimal recruitment strategies. In labour markets where employers invest heavily in formal recruitment, matches created through this channel are of better quality than those created through informal networks. The empirical predictions of the theory are successfully tested using a combination of the ECHP and industry-level data on recruitment costs.

The last chapter uses an original sample of British recruits to investigate the role of employers' recruitment strategies on labour turnover. A simple extension of the model presented in the previous chapter shows that firms invest more in recruitment for high-productivity jobs, that this leads to better matches and, consequently, to lower turnover at the top than at the bottom of the jobs' distribution.

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Introduction

Most labour economists today agree on a view of the labour market in which various types of imperfections make the search for employment partners costly and time-consuming for both firms with unfilled vacancies and workers who want a job. These imperfections are often called frictions and arise for several reasons. Information is imperfect and it takes time to acquire knowledge about the actual location of potential employment partners. Suitable vacancies might be far away and geographical distances impose additional costs on the search process. In times of rapid technological change the skill composition of the workforce might not be adequate to the needs of employers and it might take time and resources to adapt to the new environment. These are just few examples of the possible sources of frictions in modern labour markets.

In this framework the analysis of the search behaviour of both firms and workers becomes crucial to understand the functioning of the labour market. Workers engage in various activities to find an employer who is willing to hire them and, symmetrically, firms spend considerable resources to advertise their vacancies and screen job applicants. It is the combination of the search activities of firms and workers that allows the market to overcome frictions and generate job matches.

The evolution of employment and unemployment over time is, hence, crucially affected by changes in the intensity and the quality of the search activities carried out on both sides of the labour market. Similarly, the cross-sectional distribution of the risk of unemployment and of the quality of employment is heavily influenced by the searching techniques adopted

by firms and workers with different individual characteristics. For example, one of the reasons why skilled workers exit unemployment more quickly is because they are better informed, or more able to collect information, about job offers. Moreover, the quality of job matches is also affected by the searching technology used by employers and jobseekers.

Parallel to the development of the theoretical literature of search and matching models, a large number of empirical papers have analysed the impact of different search activities on various labour market outcomes. One of the peculiarities of these empirical studies, however, is the almost exclusive focus on jobseekers. The employers' side of the market has received much less attention, primarily because of the difficulties in obtaining data. For example, information about workers' search actions is usually collected in most countries' labour force surveys, thus offering researchers a large set of individual level microdata readily usable for research purposes. On the other hand, even aggregate data on unfilled vacancies are difficult to obtain, especially from statistical sources that are internationally comparable. Micro-level data on firms' recruitment policies and practices are extremely rare.

This dissertation is a contribution to this empirical literature in two directions: first, it provides new internationally comparable evidence on the search activities of workers and firms and their effects on various labour market outcomes; second, it produces new results on employers' advertisement and recruitment practices. Moreover, throughout the chapters particular attention is paid to the interactions between the two sides of the market and to how employers' recruitment strategies affect jobseekers and vice versa. Although the main focus of the analysis presented in the three chapters that follow is essentially empirical, interesting theoretical contributions appear in chapters 2 and 3, where the employers' choice of the optimal recruitment strategy and intensity is explicitly modelled, an exercise that has rarely been done in the existing literature.

The sequence of the chapters directly follows from the motivation. The first chapter uses a recent dataset produced by Eurostat in cooperation with the National Statistical Offices of the EU Member Countries, the European Community Household Panel, which contains

homogenised data on individuals and families in all the Countries of the European Union. These data are used to look at the effect of welfare programmes on the search activities of unemployed workers in all European Countries.

Most of the existing studies of unemployment duration suggest that, by lowering the level or the duration of unemployment compensation, jobseekers should search more intensively and accept lower wages, thus increasing their probability of finding a job. In an attempt to reduce the high levels of unemployment, most European countries have implemented reforms of this type in the past decades but the available evidence seems to indicate that their effect on the unemployment rate has been at best limited.

This chapter shows that unemployed workers in Europe have access to many welfare programmes on top and above unemployment compensation: family benefits, housing benefits, child care benefits, etc. As a consequence they will not be particularly worried about their unemployment benefits being reduced or expiring. In fact, evidence produced using the European Community Household Panel indicates that unemployed workers who are eligible for social assistance programmes leave unemployment at a lower rate than similar individuals who only receive unemployment compensation.

The main contribution of the analysis contained in chapter 1 consists in exploiting the cross-country comparability of the data to test the importance of interactions between different welfare programmes on the search effort of the unemployed. However, the analysis still considers workers' search in isolation, separately from the recruitment activities carried out by firms on the other side of the market. Chapter 2 incorporates employers' search in the analysis to show how it affects the efficiency of workers' search. It also extends the results of chapter 1 by exploring in more details the types of search activities carried out by jobseekers. While in the first chapter workers' search is considered as an undifferentiated set of activities, here I look at which search methods workers use, how their intensity varies across workers with different characteristics and how each method affects the outcome of the jobseeking process.

In particular, existing studies suggest that using informal personal contacts typically lead to a good job that pays a high wage. However, most of the available evidence is produced with US data and using the European Community Household Panel it is possible to obtain comparable estimates for several countries to test the robustness of this finding. In fact, chapter 2 begins by documenting how wage premiums and wage penalties to finding a job through informal methods are equally frequent and of about the same size across countries as well as within countries across industrial sectors. If personal contacts offer employers costless information about job candidates and thus allow to make better hiring decisions, these new results indicate that formal methods, although more expensive, are often also more effective.

In order to explain the variation in wage differentials between jobs found through different methods, it is crucial to look at employers' search efforts. In some labour markets and for some jobs employers find it optimal to invest heavily in recruitment and screening. In these cases formal recruitment methods turn out to be more efficient than informal contacts and allow to form better matches which are partly reflected in higher wages. The chapter also contains a simple theoretical model that is useful to understand the factors that determine employers' investment in recruitment. According to the implications of the theory, firms search more intensively when they are recruiting for high productivity jobs and when the labour market is looser.

To test these hypotheses I use data on recruitment expenditure obtained from the Eurostat Labour Cost Survey, which contains labour costs by country and industrial sector, broken down by category (wages and salaries, social security contributions, training, etc., and recruitment costs). These data are merged into the European Community Household Panel to show that, indeed, using personal contacts to find a job is more likely to lead to a higher wage in those labour markets where firms invest little in formal recruitment.

The third and last chapter eventually shifts the focus of the analysis to firms' recruitment policies. It begins by documenting an important empirical regularity that has been recognised in several previous studies but that has never been offered a direct and satisfactory

explanation: labour turnover - i.e. the fraction of workers who experience some type of job transition (either to another job or to unemployment or to inactivity) in a given period of time (one quarter in our analysis) - is typically much higher for unskilled workers in low productivity jobs than for well educated workers in top positions.

The simple model developed in chapter 2 is here revisited and extended to show that firms find it optimal to invest little in recruitment and screening for low productivity jobs, thus leading to matches of worse overall quality. For this reason, it is more likely in lower (manual unskilled jobs) than in top (managerial) occupations that either the firm or the worker will find a better employment partner and thus separate from their current one.

The implications of the theory developed in the initial part of the chapter are then tested empirically using a unique dataset of British hirings, the 1992 Survey of Employers Recruitment Practices, which contains detailed information about the recruitment process that led to the formation of new employment contracts. The data allow to construct various measures of recruitment intensity which are used in the empirical analysis to show that firms engage in more complex and expensive recruitment practices when hiring for high level jobs. Moreover, the chapter documents that, in all types of jobs, matches created through more careful screening processes are characterised by higher quality, measured along several dimensions: wages, tenure and satisfaction.

The logic underlying the sequence of the chapters is the following: chapter 1 looks at the search behaviour of workers per se, chapter 2 explores this issue in more details and acknowledges the importance of the recruitment activities carried out by employers on the other side of the market, chapter 3 finally focuses on firms' recruitment policies to show how these influence labour market outcomes. The combination of these three studies will hopefully improve our understanding of the labour market and encourage more research on employers' recruitment strategies and their interactions with the jobseeking activities of workers.

Chapter 1

Unemployment Duration and the Interactions between Unemployment Compensation and Social Assistance

Introduction[1]

The effect of unemployment insurance (UI) on unemployment duration is the object of many studies in a rather large literature. Two empirical findings are now widely accepted. First, as initially showed by Nickell (1979) and Lancaster (1979), higher benefits are associated with longer unemployment spells. Later, Moffit (1985) and Meyer (1990), having access to information about both the level and the duration of benefit entitlement at the individual level, were able to show a second important empirical finding, that the probability of exiting unemployment increases around the time of benefit exhaustion.

The literature also provides a comprehensive theoretical framework for interpreting these results. Mortensen (1974) develops a simple search model that easily delivers negative corre-

[1]This chapter has benefited from comments from seminar participants at the CEP-LSE and University of Verona. All errors are my own responsibility.

lation between exit rates and unemployment benefit via search effort and reservation wages being respectively negatively and positively affected by income out of work. When UI entitlement expires, income out of work suddenly drops, inducing an instantaneous increase in search effort and a decrease in the reservation wage, thus providing an explanation for the observed higher exits rates around the time of exhaustion. Cahuc et al. (2000) recently extended the model by endogenising wages and allowing the unemployment benefit to gradually decline over time.

On the basis of these findings, one would expect reforms that reduce either the level or the duration of unemployment benefits to have a positive impact on unemployment rates. However, this prediction does not seem to conform with the recent experience of many European countries. Figure 1.1 plots the time series of the unemployment rate for selected European countries. The vertical lines indicate the implementation years of reforms that have modified either the level or the duration of unemployment benefits. The solid bars refer to changes in the amount of the benefits and the dashed lines to changes in their duration. The colours indicate the direction of the changes: red for reductions (either in the amount or duration of benefits) and green for increases.

The first message of figure 1.1 is that the past 20 years have been constellated by labour market reforms in virtually all European countries. Moreover, despite the coexistence in many countries of reforms of opposite sign, often implemented close to each other (in Finland and France for example), most of the changes (19 out of 29) modified the system towards less generous benefits paid for a shorter time. However, already a simple visual inspection of figure 1.1 suggests that the correlation between these reforms and the evolution of unemployment is rather weak.

More convincing evidence can be produced for those countries where reforms took place during the years covered by the European Community Household Panel (ECHP)[2]. This is possible for seven countries: Austria, Belgium, Finland, Germany, Greece, Ireland and the

[2]Data are described in section 1.4.

United Kingdom. Table 1.1 shows the conditional difference in the probability of leaving unemployment between individuals who entered unemployment before and after the reform. The estimates are produced with a standard hazard model controlling for gender, age, health status, education, marital status, family size, presence of children, household income and regional unemployment[3]. Results confirm the visual impression from figure 1.1: reforms that reduced the level or the duration of unemployment benefits did not have a significant effect on the probability of finding a job. There are marginally significant effects only in Austria (where the estimate is actually negative) and Ireland.

This chapter suggests an explanation for the failure of so many reforms of the unemployment compensation system. European countries all have complex welfare states and unemployment compensation is only one element of the system that necessarily interacts in various ways with all the other programmes. In particular, many unemployed persons receive other social assistance benefits together with their unemployment insurance. Most of these other benefits are means-tested, therefore a reduction or an anticipated withdrawal of unemployment insurance is often compensated, at least partly, by higher transfers from other programmes. Moreover, even those unemployed who only receive unemployment insurance may still expect to become eligible for some social assistance programmes when their benefits expire. For these workers, too, reductions or exhaustion of unemployment insurance are less of a concern and do not affect much their search effort nor their reservation wages.

These arguments will be tested empirically using data from the European Community Household Panel (ECHP), which allow to reconstruct monthly labour market histories for samples of individuals from all EU countries. Contrary to most studies in this literature that use data from administrative sources, this chapter exploits survey data which have two main advantages. First, the ECHP contains information on numerous types of social transfers and thus permits to identify UI recipients who are also entitled to other social assistance programmes. Second, by relying on self-reported information about one's labour market

[3]A complete description of the econometric model is provided in section 1.4.1.

status it is possible to reconstruct unemployment spells that end into employment and into inactivity separately. Hence, I will be able to estimate the probability of finding a job rather than that of leaving unemployment or the UI registry. This is an important innovation: in the sample used in this study exits into inactivity represent about 15% of total exits from unemployment.

However, using survey rather than administrative sources necessarily lowers the quality of the data on UI payments and durations. In particular, the total amount of UI benefits received by each individual in the ECHP is only recorded annually (not monthly) and the duration of payments is not known. This is solved by imputing benefit entitlements on the basis of individual characteristics available from the ECHP and institutional information about the functioning of the welfare system in each country.

Results indicate that UI recipients who are also entitled to other social assistance programmes are less sensitive to changes in the level of their unemployment benefits and show much less pronounced spikes in the re-employment probability around the time of benefit exhaustion.

The importance of interactions between welfare programmes has lately been recognised by both academics and policy makers. Belot and van Ours (2000) provide evidence from macro data showing that countries where unemployment has fallen often owe their success to comprehensive rather than piecewise reforms of labour market policies. A theoretical justification for the importance of these interaction is discussed in Coe et al. (1997) within a search and matching framework. Despite the acknowledged importance of potential overlappings between welfare programmes, specific evidence from micro data is still lacking. This chapter aims at filling this gap by providing detailed evidence on one specific interaction, that between the unemployment benefit system and other social assistance programmes, namely family cash benefits, sickness and invalidity benefits, housing benefits and low-income benefits (minimum income schemes).

The chapter is organized as follows. Section 1.2 briefly describes the institutional details

of unemployment benefits and other social assistance programmes in Europe. Section 1.3 shows how interactions between welfare programmes can be analysed in a standard search model. Section 1.4 describes the data and the empirical strategy used in section 1.5 for the analysis of re-employment probabilities. Section 1.6 concludes.

1.2 Unemployment Compensation and Social Assistance in Europe

1.2.1 Institutional Framework

European countries all have large and well developed welfare states, nevertheless there still exists a large variation in institutional details across countries. The comparison of different types of welfare states in Europe has been the object of a large number of studies in both the economic and the political literature[4]. This section simply aims at providing a very general overview of welfare programmes in the years covered by the empirical analysis that follows.

Excluding old age pensions (which are still the major component of welfare provision in many countries, both in terms of expenditure and beneficiaries), welfare benefits are generally grouped into 5 large categories: unemployment related benefits, family cash benefits, invalidity benefits/pensions, housing benefits and general social assistance. In kind benefits will not be considered here, even if they might play an important role for some groups of beneficiaries (disabled persons, large families, et.).

Unemployment benefits are generally distinguished into unemployment insurance and unemployment assistance. Unemployment insurance is usually a standard insurance scheme by which workers who have paid sufficient contributions out of their salaries are allowed to receive a compensation if they become unemployed. Unemployment insurance is usually rather generous but benefits are typically paid only for a limited period of time (with Belgium,

[4]Bertola et. al (2000), Esping-Andersen (1990), Ferrera (1998).

where the duration of payments is unlimited, being a notable exception) and various re-eligibility conditions apply for repeated spells of unemployment. Clearly then, unemployment insurance does not cover the whole population of jobseekers: young workers - and anybody who has not paid enough contributions - and the long term unemployed - who have exhausted their entitlement - cannot claim the benefit. For this reason many countries have introduced a parallel unemployment assistance programme that pays a (typically lower) benefit to those who, for any reason, are not entitled to unemployment insurance. Along with these general characteristics, the details of the unemployment benefit schemes vary widely across countries.

Invalidity benefits are another important component of the welfare system and often take the form of pensions. The typical scheme pays a benefit to individuals whose capacity to work and earn is substantially reduced by some sort of invalidity. Almost all countries also require some kind of contribution conditions. There are few exceptions to this general rule: in the Netherlands there is no qualifying conditions while in Finland and Sweden the main conditions relate to residence in the country rather than to contribution records. The level of the benefit is usually determined on the basis of a measure of "normalised" earnings, i.e. earnings of a similar person who does not suffer from the invalidity. In some countries invalidity benefits also vary with age but payments are always carried over to retirement, at which point an invalidity pension is typically converted into an old age pension.

Family cash benefits are the most important welfare programme that is not related to employment. In the majority of countries (10 out of 15) family benefits are actually paid to any household with children, regardless of their income . These benefits are paid until the child reaches a certain age and the amount varies according to the child's age and to the number of children in the household. Some countries also offer supplements for single parents. Children who undertake higher education or training are often allowed to receive benefits for some additional years above the age limit.

The provision of housing benefits is more varied. Some countries offer a generalised housing benefit available to everyone whose income is sufficiently low (Germany, France,

Netherlands, Finland) while others simply provide specific housing supplements for those on low-income benefits (Ireland, Luxembourg, Austria and Portugal), Denmark and Sweden have both. Some countries do not offer any housing benefit but often social housing is available for low income families.

Finally, all countries, with the exception of Greece and Italy[5], also provide a general social assistance scheme that aims at preventing poverty for those individuals or families who do not qualify for any of the other "categorical" benefit or that still remain under a variously defined income threshold. Qualifying conditions for this type of assistance are usually related to nationality, residence and age. All countries also require those who are able to work to prove that they are actually willing to take up job offers and beneficiaries are often required to participate in training or other active labour market programmes.

Synthetic tables that summarise the details of welfare programmes in the European countries can be found in appendix 1.B.

1.2.2 Welfare Reforms in Europe

Table 1.2 presents a more complete description of the reforms indicated in figure 1.1, including additional details on changes in social assistance programmes as well. In the past two decades policy makers have apparently been listening to economists as many reforms have actually changed the unemployment compensation system in the direction of lower benefits paid for shorter periods. Much less effort has been put in reforming other welfare programmes and one of the main claims of this chapter will be that the scarce success of UI reforms is partly due to the lack of coordination with other parts of the welfare system.

Looking at table 1.2 some notable facts emerge. First, in the effort to reduce unemployment in the recession of the early 90s, there has been a clustering of reforms between 1992 and 1996. Secondly, the large majority of reforms clearly focused on unemployment benefits

[5]A minimum income scheme was experimented in Italy between 1998 and 2002 (*Reddito Minimo d'Inserimento*) but was never introduced on a universal basis.

and have typically taken the form of reducing either the duration or the level of the benefits. Many countries have also tightened eligibility conditions or increased work requirements for the unemployed. Only few reforms addressed other welfare programmes and even fewer tried to comprehensively change several programmes (Germany in 1998, Ireland in 1993, the United Kingdom in 1996).

1.3 A simple theoretical framework

The interaction between unemployment benefits and social assistance can be analysed in the framework of a very standard search model. The theory in this section is a mere revised and simplified version of that in Mortensen (1977).

In each period t, an unemployed worker needs to invest leisure time (s_t) to search for job offers. These arrive, with per-period probability αs_t, from an exogenous wage distribution $F(\cdot)$ with support $(0, \overline{w}]$. In each period utility is a non-decreasing function of income (y_t) and leisure (l_t), $u(y_t, l_t)$[6]. For simplicity, assume that working time is constant and equal to h in all jobs and that the total endowment of leisure is normalised to 1. Then, per-period utility while unemployed with benefit b_t and searching for a job is $u(b_t, 1 - s_t)$, while a job that pays w_t generates a utility flow equal to $u(w_t, 1 - h)$. Unemployed workers also need to choose a reservation wage w_t^*: only wage offers above w_t^* are accepted, all others are turned down.

Under these assumptions the value of unemployment U at time t can be written as:

$$(1+r)U_t = u(b_t, 1-s_t) + \alpha s_t \left[\Pr\{w < w_t^*\} U_{t+1} + \Pr\{w \geq w_t^*\} E\{V(w) | w \geq w_t^*\}\right] \quad (1.1)$$

where $V(w)$ is the value of employment at wage w. For simplicity assume that there is

[6]Per-period utility satisfies the standard assumptions: it is twice differentiable with: $\frac{\partial u(y,l)}{\partial y} > 0$, $\frac{\partial u(y,l)}{\partial l} > 0$ and $\frac{\partial u(y,l)}{\partial y \partial y} \leq 0$, $\frac{\partial u(y,l)}{\partial l \partial l} \leq 0$.

no job destruction: once workers enter employment they stay in the job forever at constant wage[7]. Equation (1.1) can be rewritten as:

$$(1+r)U_t = u(b_t, 1-s_t) + \left[1 - \alpha s_t (1 - F(w_t^*))\right] U_{t+1} + \alpha s_t \int_{w_t^*}^{\overline{w}} V(w) dF(w) \qquad (1.2)$$

The optimal levels of w_t^* and s_t are then chosen in order to maximise equation (1.2), according to the following first order conditions:

$$V(w_t^*) = U_{t+1} \qquad (1.3)$$

$$\frac{\partial u(b_t, 1-s_t)}{\partial s_t} = \alpha \left[\int_{w_t^*}^{\overline{w}} V(w) dF(w) - (1 - F(w_t^*)) U_{t+1} \right] \qquad (1.4)$$

The intuitive interpretation of these two conditions is straightforward. Equation (1.3) shows that the optimal reservation wage is set at a level that equalises the value of employment and unemployment. An unemployed worker can allocate time to two different activities, search and leisure, hence optimal search time equalises marginal utility of search and leisure, as shown in equation (1.4). Note that both s_t and w_t^* are time-varying: equations (1.3) and (1.4) hold for all t and, for any known sequence of benefits, $\{b_t\}_0^\infty$, identify a series of reservation wages, $\{w_t^*\}_0^\infty$ and optimal search times, $\{s_t\}_0^\infty$. The per-period probability of exiting unemployment - the hazard rate - is then calculated as:

$$q_t = \alpha s_t \cdot [1 - F(w_t^*)] \qquad (1.5)$$

[7] In this case:

$$V(w,h) = \sum_{j=t}^{\infty} \frac{u(w,h)}{(1+r)^j}$$

Introducing exogenous job destruction does not modify the empirical implications of the model.

These results are useful to analyse the implications of different assumptions about the sequence of benefits for the exit rate. Equation (1.5) shows that the exit rate is higher when job search is more intense and when the reservation wage is lower, i.e. when unemployed workers are less choosy about wage offers:

$$\begin{pmatrix} s_t \uparrow \\ w_t^* \downarrow \end{pmatrix} \Longrightarrow q_t \uparrow$$

Let us now analyse how search time, reservation wages and exit rates look like for different time profiles of the benefit.

Unemployment benefit without social assistance Consider the standard case of an unemployed worker who receives a constant unemployment benefit (b) for a given number of periods, T, and nothing after that (this is the specific case discussed in Mortensen (1977)).

For such worker the value of unemployment decreases over time as periods of positive benefit payments run out and expected future income out of work decreases, i.e. $U_{t+1} < U_t$. Equation (1.3) implies that the reservation wage also decreases over time. Similarly, the right hand side of equation (1.4) increases with time (the value of unemployment enters with a negative sign and the derivative with respect to w_t^*, given equation (1.3), is zero[8]), therefore in order for the equality to hold the left hand side must increase as well and this can only be achieved with higher s_t, i.e. search time also increases with time.

At time T, when unemployment benefit entitlement expires, b_t discontinuously drops to zero. This requires the reservation wage to jump down and optimal search time to jump up. Note incidentally that for these effects to be non-ambiguous leisure and income must be complements (i.e. $u_{21}(b_t, 1 - s_t) \leq 0$). These results are represented in figure 1.2.

[8]The derivative with respect to w_t^* of the right hand side of equation (1.4) is:

$$\frac{\partial RHS}{\partial w_t} = \alpha \left[V(w_t^*) - U_{t+1} \right]$$

which is zero at the optimum.

Unemployment Benefit and Social Assistance The previous analysis can be easily extended to a worker who receives social assistance together with his/her unemployment benefit, or, similarly, to somebody who expects to become eligible for some social assistance programmes once his/her unemployment insurance expires. Eventually all changes from one scheme to another simply generate jumps in the time profile of the benefit and can be analysed within the same framework used for understanding exhaustion of unemployment benefits in the previous paragraph.

It may for example be the case that, given the particular rules and household composition of applicants, social assistance transfers top up family income once unemployment insurance expires, leaving the time profile of benefit payments flat. In this case the model predicts no discontinuous jumps in reservation wage, search effort and exit rate, which will all remain constant throughout the entire unemployment spell.

In other instances it might happen that payments under social assistance are actually higher than under unemployment insurance. This possibility, although rare, can occur in some countries where social assistance systems are particularly generous (see OECD (2002)). In such an extreme case the value of unemployment increases with time and all the effects derived previously are reversed, as shown in figure 1.3.

1.4 The data and the empirical strategy

Most of the existing studies of unemployment insurance and unemployment duration make use of administrative data from the institutional body that administers unemployment benefits[9]. The advantage of these data usually consists in having very detailed information about the amount and sequence of payments as well as about individual eligibility and entitlement conditions.

However, for the purpose of this chapter the use of administrative data would be prob-

[9]Boeri and Steiner (1998), Katz and Meyer (1990), Lancaster (1979), Meyer (1990), Moffit (1985), Narendranathan and Stewart (1993b).

lematic for at least two reasons. First, in many countries unemployment insurance and social assistance programmes are administered by different governmental bodies and, consequently, data available from one body rarely include information about benefits paid by others. Therefore, using administrative data would make it very difficult to look at interactions between different programmes. Secondly, and probably more importantly, even if comprehensive administrative data were available, in order to explore the interactions between different programmes one would need to compare similar individuals facing different unemployment benefits and social transfers: in other words one would need enough variation in the rules and regulations of both unemployment insurance and social assistance. However, there is typically little variation in such rules within one country[10] and for identification purposes it would be helpful to use some cross-country variation as well. Unfortunately, cross-country comparable administrative microdata are simply not available. Alternatively one would like to use some exogenous time variation induced, for example, by a reform but, as already mentioned in section 1.2, there hasn't been much reforming in social assistance programmes over the past years.

In order to overcome these problems, comparable cross-country survey data are utilized in this chapter. Data come from the European Community Household Panel (ECHP), a panel of households and individuals from EU countries produced by Eurostat in cooperation with the member states statistical offices. The main advantage of this data source is the high level of cross-country comparability. This is guaranteed by standardised sampling procedures, defined by Eurostat and implemented by each country's national statistical office. Moreover, identical questions are asked to households sampled in each country, merely translated into the local language. However, several discrepancies between countries still exist[11].

The dataset is also meant to keep track of changes in the demographic composition of

[10]This is especially true for unemlpoyment benefit while social assistance is more varied, being often admistered at the local level (but this also makes it more difficult to obtain information about the system as well as about the beneficiaries).

[11]see Peracchi (2002) for a detailed description of the ECHP.

the population over time, by recording and including in the survey all births occurred within sampled households as well as new households created from the split of existing ones. An individual questionnaire exists for all persons living in a sampled household. Sample sizes differ from country to country, with the highest sample to population ratios for the largest and the poorest countries.

The ECHP started in 1994 and 8 waves of data have been released so far, covering the period from 1994 to 2001. Not all countries entered the survey at the same time and for three of them - Germany, Luxembourg and the United Kingdom - the original sample has been replaced after the first three waves with harmonised versions of household panels already been produced nationally: the German Socio-Economic Panel (GSOEP), the Luxembourg's Socio-Economic Panel (PSELL) and the British Household Panel Survey (BHPS). When possible data from the existing panels have been provided for the first three years too.

For the purpose of this chapter it is important to note the ECHP includes information about unemployment benefit payments and social assistance transfers received both at the individual and at the household level. Moreover, it also contains retrospective information which allow the reconstruction of employment/unemployment/inactivity monthly spells. In fact, individuals are interviewed once per year and at that time they are asked to report their monthly labour market status over the previous calendar year. One drawback of these data is due to the fact that all the variables are recorded annually and, as we will see later on, this will make it difficult to attach the correct numbers to each unemployment spell.

The sample used for the empirical exercise presented in the following paragraphs consists of 12,460 monthly unemployment spells experienced by people aged between 18 to 64 in 12 European countries[12] between 1994 and 2001. Unemployment spells end into employment or inactivity or are right-censored. Left-censored spells, and unemployment spells experienced by new entrants in the labour market have been dropped from the sample to avoid stock-

[12]Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Portugal, Spain, United Kingdom. Luxembourg, the Netherlands and Sweden have been excluded because there information on retrospective employment status is lacking for these countries.

sample bias.

The ECHP is a collection of country samples which have been drawn from the total population following common procedures but independently. This means that the sample-to-population ratios differ from country to country and observations have to be weighted accordingly when pooled together across countries. The 12,460 observations represent 3,003,192 unemployment spells which are distributed across countries as shown in figure 1.4. This distribution is obviously influenced by both the relative size of each country and the level of the unemployment rate experienced in each area (plotted in figure 1.4 along the red line and scaled on the right hand side vertical axis).

As mentioned earlier, the information from the ECHP allow to distinguish those unemployed who only receive unemployment benefits from those who also receive some other social assistance transfers. Summary statistics for the entire sample and separately for these two sub-groups are reported in table 1.3.

1.4.1 The empirical strategy

In order to test the implications derived from the simple theory of section 1.3, it is necessary to specify an empirical analog for the theoretical hazard function of equation (1.5). One difficulty arises because in the ECHP unemployment durations are recorded in months - i.e. in discrete intervals of time - whereas the underlying process of job search occurs essentially in continuous time (workers can find a job at any moment within a month). Following the custom in the literature, let us assume that the hazard rate, $\vartheta(t|X_i,\beta)$, of the underlying continuous process for individual i, i.e. the instant probability that the spell ends at time t, can be written as the product of two parts: a baseline hazard, that depends on duration only, $h_0(t)$, and a "proportional shifter", $e^{\beta' X_i}$, that, according to each individual's characteristics X_i, shifts the baseline up or down:

$$\vartheta(t|X_i,\beta) = h_0(t) \cdot e^{\beta' X_i} \tag{1.6}$$

The discrete time analog of $\vartheta(t|X_i,\beta)$ for spell i that ends between month T_i and T_i+1, is usually written as:

$$\begin{aligned} h(T_i \mid X_i,\gamma) &= \Pr\{T_i < t < T_i+1 \mid t > T_i, X_i,\beta\} = \\ &= \frac{S(T_i|X_i,\beta) - S(T_i+1|\ X_i,\beta)}{S(T_i|\ X_i,\beta)} = 1 - \exp\left[e^{\beta' X_i}\,(H_i - H_{i+1})\right] \end{aligned} \tag{1.7}$$

where $H_i = \int_0^{T_i} h_0(u)du$.

It is useful to apply to equation (1.7) the following transformation:

$$\log(-\log[1 - h(T_i \mid X_i,\beta)]) = \beta' X_i + \tau_i \tag{1.8}$$

Equation (1.8) allows to recover for (a transformation of) the discrete time hazard $h(\cdot)$ the separability property of its continuos-time analog $\vartheta(\cdot)$. In fact, $h(\cdot)$, just like $\vartheta(\cdot)$, can now be separated into two parts: one, $\tau_i = \log[H(T_i) - H(T_i+1)]$, that depends on the shape of the baseline hazard only, and another one, $\beta' X_i$, which depends only on individual's characteristics (possibly time-varying).

According to equation (1.8), the discrete time hazard can be rewritten as:

$$h(T_i \mid X_i,\gamma) = 1 - \exp\left(-e^{\beta' X_i + \tau_i}\right) \tag{1.9}$$

Then, it is possible to express the likelihood contributions of completed and uncompleted spells in terms of the discrete-time hazard and apply the transformation of equation (1.8) for

the estimation:

$$\text{completed spells} \quad : \quad \Pr\{T_i < t < T_i + 1 \mid X_i, \beta\} = h(T_j \mid X_j, \beta) \prod_{k=0}^{T_j - 1} [1 - h(k \mid X_j, \beta)]$$

$$\text{uncompleted spells:} \qquad \Pr\{t > T_i \mid X_i, \beta\} = \prod_{k=0}^{T_j} [1 - h(k \mid X_j, \beta)]$$

In our data, a spell can end either into employment or into inactivity. Assuming that the probabilities of ending in any of these two states are independent, Narendrenathan and Stewart (1993) showed that, by making the additional, harmless but greatly simplifying assumption, that exits can only occur at the boundaries of the interval (i.e. either at the beginning or at the end of each month), the correct hazard for exits into employment can be estimated by considering as censored all those spells that end into inactivity. This is also the approach taken here and the investigation of the determinants of exits into inactivity is left for future research.

The imputation of monthly unemployment benefit payments The theory of section 1.3 suggests that unemployment insurance recipients who also receive some social assistance will be less sensitive to both the level and the duration of their benefits. This implies that the effect of being a social assistance recipient on the probability of finding employment should be negative.

Although the ECHP easily allows to identify individuals who receive unemployment benefits only (i.e. we know they don't receive any other benefit) and individuals who receive unemployment benefits and some social assistance during the same unemployment spell, it records the amount received in "unemployment related benefits"[13] only annually and this makes it difficult to identify the monthly sequence of payments satisfactorily. Obviously, the hypothesis that social assistance recipients exit unemployment less easily has to be tested

[13]Thus including both unemployment insurance and unemployment assistance (in those countries where both schemes are present).

conditioning on the level and duration of unemployment insurance. It is then necessary to construct a good measure for both the level and the duration of monthly unemployment benefits.

The most obvious solution consists in simply dividing the annual amount by the number of months spent in unemployment during that particular year. However, this approach would generate zero variation in unemployment benefits over time, unless a spell spans over more than one year. Moreover, unless both the amount of the benefit and the number of months of unemployment are exactly measured, this approach is likely to generate some spurious covariance between monthly benefits and unemployment durations. The duration of a spell is very highly correlated with the number of months spent in unemployment in one year (it is actually exactly equal to that number if the unemployment spell begins and ends in the same year). Hazard models can also be seen as regression models where uncompleted spells and duration dependence are correctly taken into account. Viewed in this sense, the dependent variable (unemployment duration) would appear at the denominator of one of the regressors (monthly unemployment benefit), introducing spurious correlation unless variables are exactly measured (see Borjas (1979)).

The amount of social assistance transfers is also reported annually. However, social assistance payments are not necessarily related to unemployment, therefore a sensible monthly amount can be obtained by simply dividing by 12 the annual amount. No "division bias" arises in this case.

In order to solve these problems, monthly unemployment benefits have been imputed on the basis of country specific rules and regulations. In fact, both the amounts and the duration of unemployment benefits in all countries are calculated on the basis of individual characteristics, most of which are easily available from the ECHP: previous employment records, previous wage, age, family composition, et.. Combining these data with the rules of each country's unemployment benefit system, a rather precise imputation of both the levels and the duration of payments can be obtained. In econometric terms, this procedure is

equivalent to instrumenting the unemployment benefit with country specific regulations.

The imputation routine requires two basic ingredients: a detailed description of the unemployment compensation system in all countries and years covered by the ECHP, and all relevant personal characteristics used by each country's system to compute benefit entitlement. The institutional features of all welfare programmes in the member countries of the European Union are systematically collected in the MISSOC[14], a publication of the European Commission that every year reports comparative descriptions of rules and regulations of welfare programmes in the member states. Additional complementary information can be extracted from institutional databases created by other research institutions, like the Fondazione Rodolfo Debenedetti (www.frdb.org) and the CESIfo centre (www.cesifo.de). Most of the relevant personal characteristics necessary for this imputation are available from the ECHP, with few exceptions.

Combining these two sources of information - institutional details from the Missoc and other sources and personal characteristics from the ECHP - it has been possible to write imputation procedures for each country and year. These procedures consists of computer programmes that for each individual in the sample compute entitlement and payment profiles of unemployment benefits throughout one's unemployment spell. The programmes' outcome is a vector of imputed variables including the duration of benefit entitlement in months and the monthly sequence of payments[15].

In order to test the goodness of these imputations figure 1.5 compares the cumulated annual amount of imputed benefits with annual income from unemployment related benefits as recorded in the ECHP. The results of figure 1.5 indicate that the imputation procedure works relatively well for most countries. Generally, the precision of the imputation is higher for low payments while the dispersion increases towards the upper right corner of each panel. Computation of unemployment benefits for high wage earners is likely to be more problematic

[14]Mutual Information System on Social Protection in the Member States of the European Union.
[15]The programmes are written in Stata8.2 and can be obtained from the author upon request.

for a number of reasons. First, these workers are more likely to be subject to benefit ceiling, thus making imputation more complex. Second, in some countries benefits are computed on gross earnings while the ECHP reports only net values. At high earnings levels the discrepancy between gross and net amounts is larger.

The imputation procedure also suffers from a number of problems that make it impossible to be perfectly consistent with reported data. First of all, the imputed measure of benefits is more a measure of entitlement than recipiency. It is a known fact that the degree of benefit non-take-up (i.e. the fraction of persons who are entitled to a benefit but don't claim it) varies largely across countries due to differences in the complexity of the system and can reach very high levels. The evident clusterings of points along the horizontal axes in all the panels of figure 1.1 represents individuals who, according to the imputation, are entitled to unemployment benefits but appear not to claim them (for a recent review of the literature on benefit take-up see Hernanz et al. (2004)).

A second problem concerns the timing of the reforms. Changes in the unemployment compensation system could in principle be applied to the newly unemployed only, i.e. those who lose their jobs after the reform, or to all recipients. Information about these details of the reforms is very difficult to obtain. For simplicity, the imputation procedures used here assume that all changes always affect all recipients, regardless of whether they entered unemployment before or after the reform.

Besides, in the ECHP employment histories of individuals are perfectly known since the time they joined the survey but little is known about their previous records and some assumptions need to be made. Specifically, it has been assumed that individuals have always worked and paid contributions since the start of their first job, a piece of information available from the data. A final difficulty, that inevitably introduces measurement error in imputed benefits, arises from the fact that in many countries benefits are calculated on the basis of gross earnings while the ECHP only reports net earnings. Moreover, benefits are also often taxed.

Keeping all these caveats in mind, the results in figure 1.1 are rather satisfactory: imputed unemployment benefits are strongly correlated with reported annual data. A notable exception is Greece: unemployment benefits in this country, like in many others, are subject to a minimum and a maximum level but here the distribution of annual benefits is highly concentrated around the minimum. It seems like the large majority of the unemployed in Greece receive only the minimum benefit even when our imputation suggests they should be entitled to higher transfers. It was not possible to find a good explanation for this fact.

Italy is another anomalous case: in this country the correlation between imputed and actual benefits is very low. In particular, there are many individuals who appear to be entitled but receive no benefit. This result, however, is more understandable than for Greece. In Italy unemployment benefits are highly differentiated by sector of industrial activity and firm size. Moreover, access to the most generous programmes (Cassa Integrazione Guadagni and Mobilità) is often subject to government approval. This particular institutional setting, characterised by a high degree of discretionality, necessarily leads to a poor imputation.

Measuring the earning potential of the unemployed One additional difficulty in defining the correct set of explanatory variables comes from the very nature of the data. One of the crucial controls that needs to be included in the estimation is a measure of the previous wage, as an indicator of the earning potential of individuals: the same benefit amount affects differently people who can earn different wages on the job. What really counts in determining the incentives/disincentives to work is the actual difference between income in work and income out of work. This is why the replacement rate (the ratio between the unemployment benefit and the previous wage) will be used instead of the level of the benefit itself.

However, in the ECHP unemployed workers do not report their previous wages. Only individuals who are working at the time of the interview are asked about their current monthly wage. In the estimation, the most recent observed current wage from previous interviews has been used as previous wage. Obviously there are many individuals who happen to be

unemployed at all interviews, even if they report some employment spells between subsequent interviews. For these individuals no previous wage is observed. One possibility is to drop them from the sample but this would reduce the sample size dramatically and, even more worrisome, it would introduce a potentially large sample bias: the probability of having being unemployed at all interviews is obviously higher for individuals at high risk of long and/or repeated unemployment.

Alternatively, one can use the average wage earned by individuals with similar characteristics. This is the approach taken in the empirical exercise below: missing previous wages are replaced by the average wage of full-time workers with the same level of education, age, experience, gender and region of residence[16].

1.5 Estimation results

The brief theoretical discussion in section 1.3 suggests that unemployed who only receive unemployment benefits and no social assistance, being on average less likely to receive high benefits when their unemployment insurance expires, will exit more quickly as exhaustion approaches. SA recipients will be less concerned about exhaustion of unemployment benefit: what really counts to them is the total level of the benefit, i.e. social assistance plus unemployment benefit.

Figures 1.6 and 1.7 show the empirical hazards[17] for the entire sample and for the two sub-samples of individuals who only receive unemployment benefit and who receive both UB and SA. A person is classified as SA recipient if he/she receives some social assistance at least once during the unemployment spell. In the figures the distribution of imputed duration of unemployment benefit is reported (scaled on the right-hand vertical axis). The

[16]This is computed by running a series of year-by-year country-by-country OLS wage regressions including *education, age, experience and regional dummies* and run separately for males and females.

[17]The empirical hazard at time t is computed as the ratio of individuals who actually exit unemployment at time t over the number of all individuals who have been unemployed at least until t, i.e. all individuals who could have exited at time t.

figure for the entire sample (figure 1.6) shows the expected peaks in the hazard around the time of UB exhaustion, which has mass points at 12, 15, 24 and, later, at 30 and 43 months. Looking at the same picture for the two sub-samples in figure 1.7, it is already evident that social assistance recipients tend to have lower exit rates, especially in the first months of unemployment.

Evidence from empirical hazards, although already suggestive, is not fully convincing because the extent to which these graphs are influenced by personal characteristics and duration dependence is not taken into account. Moreover, empirical hazards are less and less precise as unemployment duration increases: the size of the sample decreases as individuals exit unemployment and the standard errors grow larger. This can be seen in figure 1.6 where the confidence intervals clearly grow lager as duration increases. In figure 1.7, confidence intervals have not been drawn for readability but they are obviously larger as sample sizes are smaller, especially for SA recipients (see table 1.3 for sample sizes).

Table 1.4 reports the results of various specifications of the proportional hazard models described earlier. The baseline hazard chosen for these estimates is specified in the most flexible form allowed by the data, i.e. only imposing that it can vary in an unspecified way every two months. This is obtained by introducing a set of τ dummies for every two months of duration ($\tau_1 = 1$ for the first 2 months of unemployment and zero otherwise, $\tau_2 = 1$ for the third and the fourth, and so on).

The results of table 1.4 are obtained without controlling for unobserved heterogeneity. The role of the unobservables is likely to be particularly important in the sample used here, where about 60% of the individuals experience more than one unemployment spell during the period of observation. In principle, unobserved heterogeneity could be controlled for in at least two different ways. First, as customary in this literature, an arbitrary assumption about the distribution of the unobservables is assumed and the likelihood of the model is estimated by integrating it out. However, Heckman and Singer (1984) showed that, allowing for a flexible baseline hazard, already largely captures the effects of unobserved heterogeneity

and that often estimates produced imposing an arbitrary distributed random term are less robust. For comparison, however, all the estimates are also reproduced assuming the presence of a normally distributed random individual term and the results are reported in appendix 1.A (tables 1.A.1 and 1.A.2). These results are only marginally different from those in the main text and, if anything, they are more precisely estimated.

However, this method of controlling for unobserved heterogeneity does not allow for correlation between the random term and the other observable regressors. An alternative solution consists in introducing individual effects in the model's specification. These effects could in principle be identified by those individuals who experience more than one spell during the period of observation. There are however two serious an related problems with this approach: considering only individuals with multiple spells would reduce the sample by almost 50% introducing bias and making identification of all the other effects more difficult. In fact, when the estimation of such specification was attempted convergence could not be reached.

Let us now move on to the discussion of the estimates of table 1.4. The set of controls includes all the relevant observable personal characteristics, country and region specific controls for labour market conditions and year dummies. Country (or regional) dummies have not been included because these would have captured too much variance: in fact, in order to identify the effect of different welfare systems on individual search decisions one needs to compare similar individuals subject to different benefit schemes and, since the rules and regulations upon which benefits are calculated vary very little within each country, one eventually needs to exploit some cross country variation. In other words one wants to control for all country/region specific characteristics that are not related to the benefit schemes. The regional unemployment rate and the rate of long-term unemployment (% of unemployed workers who have been unemployed for more than 12 months) are likely to be good controls for the specific peculiarities of the local labour markets without washing out the variance due to the different benefit schemes.

Results in column 1 of table 1.4 simply replicate previous findings. The disincentive

effect of the unemployment benefit is confirmed, although it is relatively small in size and varies with duration, being less prominent in the first months of unemployment. A 10 point increase in the replacement rate reduces the hazard by only 0.3% during the first 3 months of unemployment and by 2.6% afterwards.

The coefficients on the "months to exhaustion" dummies also confirm that UB recipients are more likely to find a job when their unemployment benefit gets closer to exhaustion. This effect is strong and already detectable at the beginning of the last year of benefit entitlement (for those whose UI lasts more than 12 months) and grows larger. In the last month of entitlement the hazard is almost 50% higher than 12 months before. There also seems to be some cyclicality in this process, with a dip between 3 to 6 months to exhaustion.

In the second column of table 1.4 this standard specification is augmented by introducing a dummy indicator for individuals who, at some point during the unemployment spell, receive some social assistance benefits. The coefficient on this variable is negative and strongly significant. The hazard for social assistance recipients is on average 34.5% lower than that of a similar person who only receive unemployment benefits. This is a very sizeable effect: it implies that for the average individual in the sample receiving social assistance throughout the spell reduces the probability of finding a job within the first 3 months from 30% to 21%, from 54% to 39% within the first 6 months and from 75% to 59% within the first year. The third column of table 1.4 explores this fact more thoroughly.

In particular, it is important to understand whether being under social assistance affects one's sensitivity to the unemployment benefit or whether it reduces the incentives to exit unemployment during the last periods of entitlement. To this end, the UB replacement rate and the exhaustion dummies are interacted with the dummy for SA recipients. Results suggest that the two groups mainly differ in how they react to UB exhaustion: the negative coefficients on the interaction dummies support the prediction that, relative to those who only receive unemployment benefit, SA recipients are less likely to exit unemployment during the last months of UB entitlement. The size of these interaction effects indicates that there is

no significant spike in the hazard rates of social assistance recipients around UB exhaustion.

The following two columns introduce first the replacement rate of social assistance (which is obviously zero for those who only receive unemployment insurance) and then (column 5) the total replacement rate, i.e. the ratio between total benefits (unemployment insurance and social assistance) and previous wages. Both these variables enter significantly and with a negative sign. The sizes of their effects are also in line with expectations.

The results presented so far could be biased if social assistance recipients were different from their observationally equivalent UI-only recipients along some unobservable dimensions. In this case, the estimated coefficients on the dummy for social assistance recipients and its interactions would be simply picking up the effects of these unobservables. Note that controlling for unobserved heterogeneity of the type considered in table 1.A.1 is not enough. In fact, the estimates of table 1.A.1 are produced under the assumption that the unobserved random term is uncorrelated with all the covariates. Moreover, the results of table 1.4 do not consider the possibility that unemployed workers who do not receive social assistance transfers can nonetheless be influenced in their search decisions by the possibility of becoming eligible when their unemployment benefit expires. The theory predicts that workers who are likely to receive social assistance in the future will search less intensively as exhaustion of their unemployment insurance approaches, just like workers who already receive social assistance.

In order to solve these two sets of problems - potential endogeneity of social assistance recipiency and the effect of social assistance on those who are not currently eligible - table 1.5 reports results obtained by replacing the dummy for social assistance with an estimate of the probability of receiving any of the social transfers considered. This procedure is equivalent to instrumenting the dummy for social assistance with those variables that are included in the estimates of the probability of receiving social transfers and excluded from the main hazard model. This probability is estimated with a simple series of country-by-country and year-by-year probit regressions where the excluded regressors are the number of children aged below 16 in the household, whether the person owns his/her home and the number of rooms

per household member in the house. Results are reported in table 1.A.3 in appendix 1.A and show that these variables are strongly significant and their effect move in the expected direction.

table 1.5 reports the results of the hazard model when the dummy for social assistance recipients is replaced by the predicted probability of receipt. The standard errors are now adjusted by bootstrapping methods. The first and the second columns of table 1.5 replicates column 2 and 3 of table 1.4 respectively. Results confirm both the direction and the size of the effect estimated in table 1.5.

1.6 Conclusions

This chapter investigates how interactions between unemployment insurance and social assistance affect the job search behaviour of unemployed workers. The theoretical framework presented in section 1.3 formalizes the idea that people are eventually interested in total payments (i.e. unemployment benefit and social assistance) and their time profile: unemployed workers will react differently to changes in the rules of the UB system depending on what alternative or complementary welfare programmes are available.

The identification of the effects of the unemployment benefit and of social assistance on unemployment duration exploits information about monthly labour market histories of European unemployed and variation in unemployment insurance programmes across countries and over time. Results show that individuals who receive some social assistance transfers together with their unemployment benefits are less sensitive to changes in the replacement rate as well as in its duration. For the average person in the sample the probability of finding a job within the first 12 months of unemployment falls from 75% to 59% if he/she receives social assistance and unemployment benefits together.

This large effect is mostly due to the exit rate for social assistance recipients not increasing significantly around the time of unemployment benefit exhaustion. In the last month of

entitlement the hazard rate of unemployment benefit recipients jumps up by almost 50% compared to 12 months before. The same figure for an observationally identical person who also receives social assistance is 12% and it is hardly significant. Also non-SA recipients, who are nonetheless likely to become eligible for social assistance in the future, follow a similar behaviour.

The estimates also indicate that reducing the duration of UB payments is likely to be a much more effective policy to incentivize the re-employment of recipients than reducing the generosity of payments. This chapter also highlights the need to design welfare reforms with very careful consideration for the interactions between different programmes in the system: reducing the level or the duration of unemployment benefit may not be very effective in incentivizing unemployed workers to search harder if they can easily shift into other social assistance programmes. This result is consistent with some recent papers that have underlined how wide and comprehensive reforms of labour market policies, even if politically harder to implement, are often more effective than piecewise reforms.

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Figures and Tables

Figure 1.1: Unemployment and social reforms in Europe

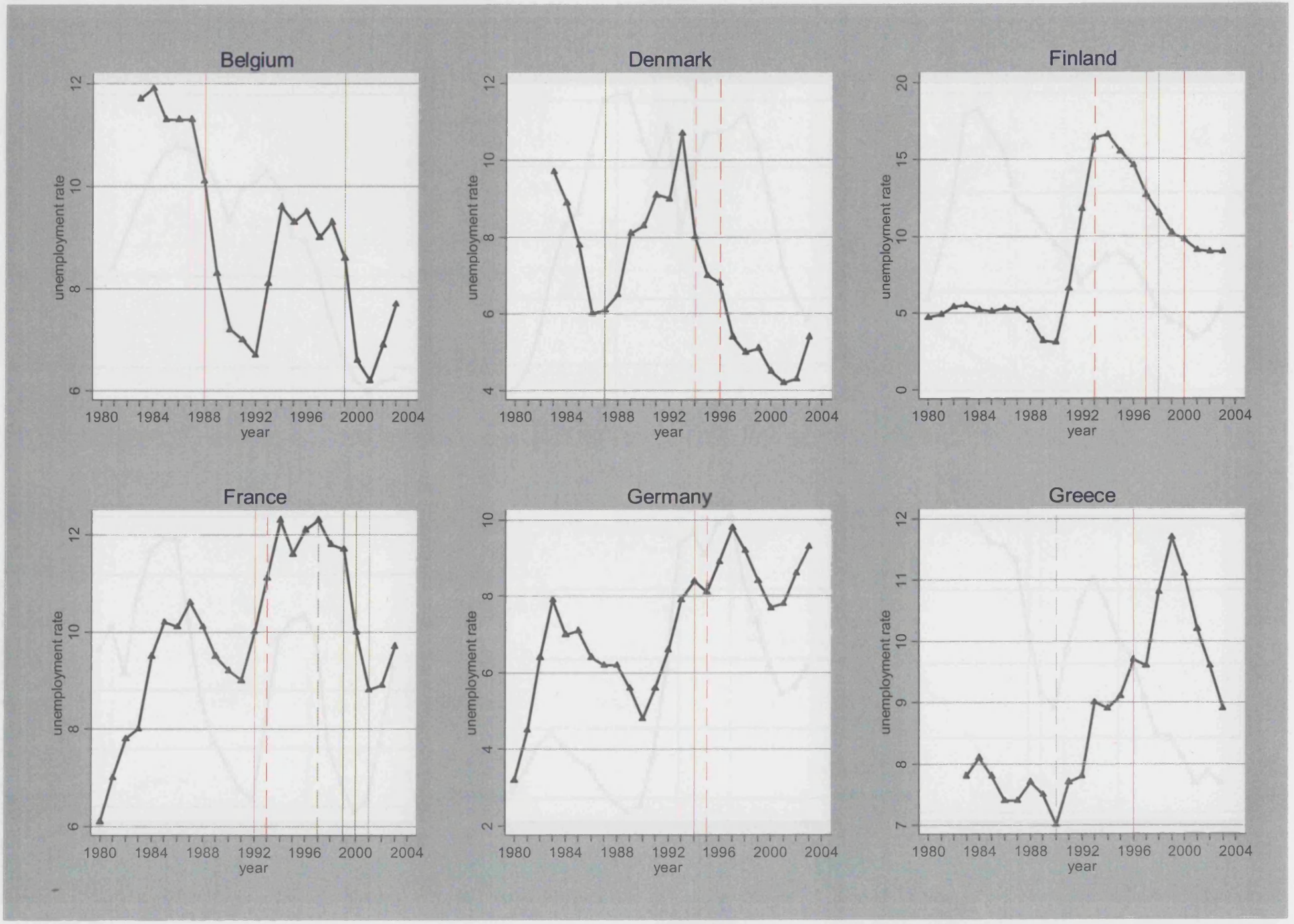
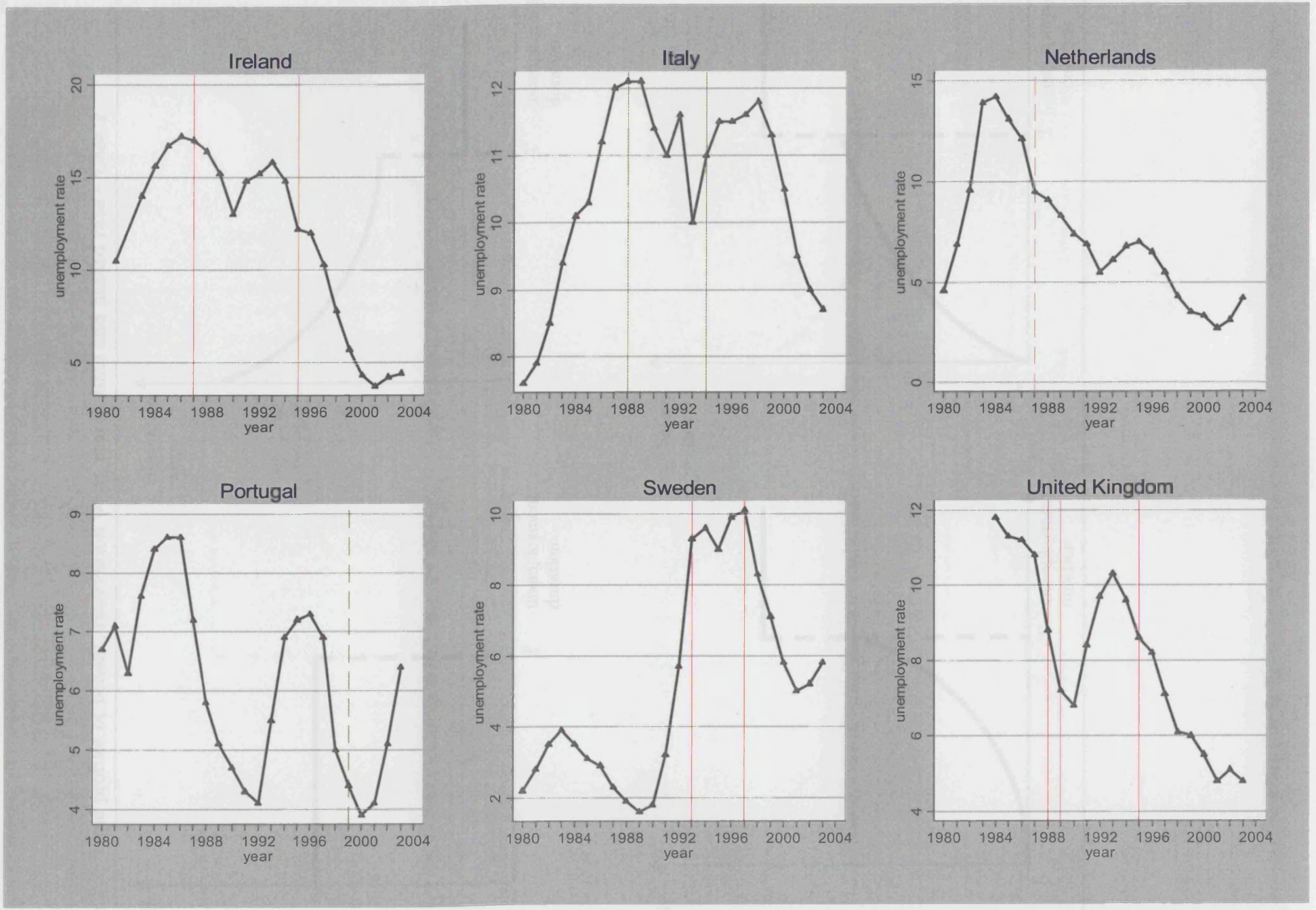


Figure 1.1: Unemployment and social reforms in Europe (continued...)



Type of reform:
— UI benefit

Direction of the reform:
red: less generous (i.e. lower and/or shorter payments)

Figure 1.2: Time profiles of benefit, reservation wage, search time and hazard rate – Case 1

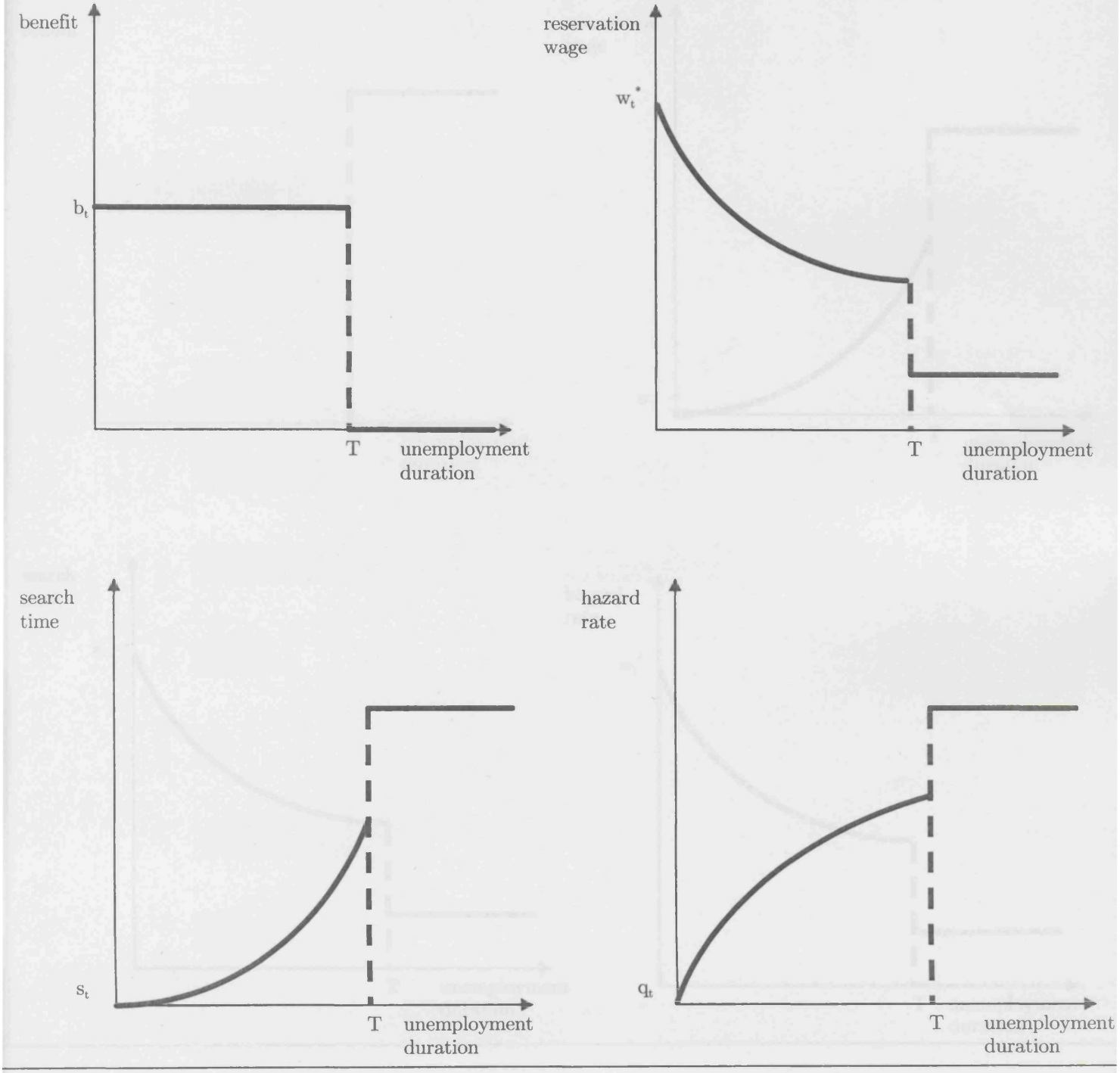


Figure 1.3: Time profiles of benefit, reservation wage, search time and hazard rate – Case 2

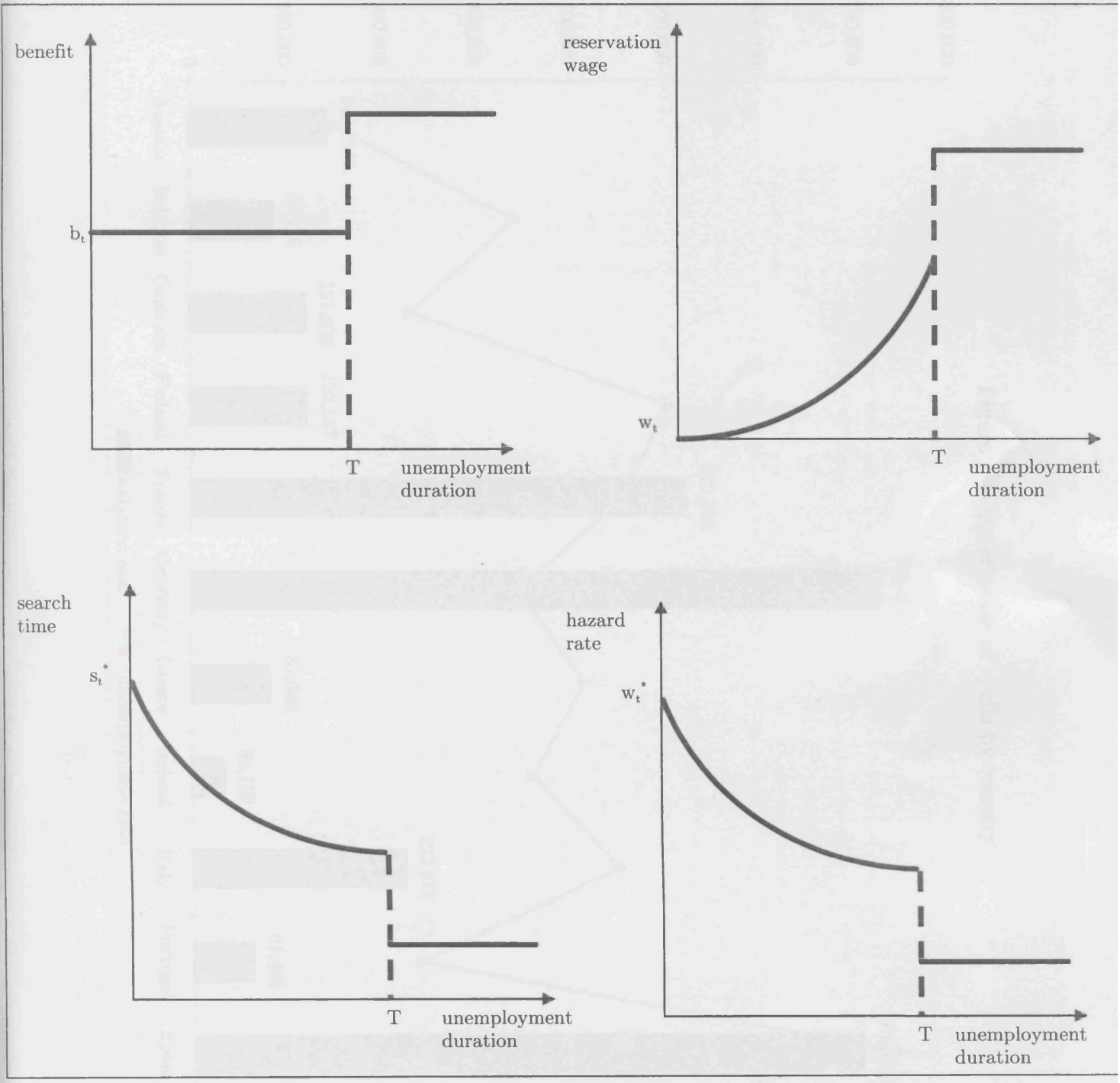


Figure 1.4: Distribution of spells by country

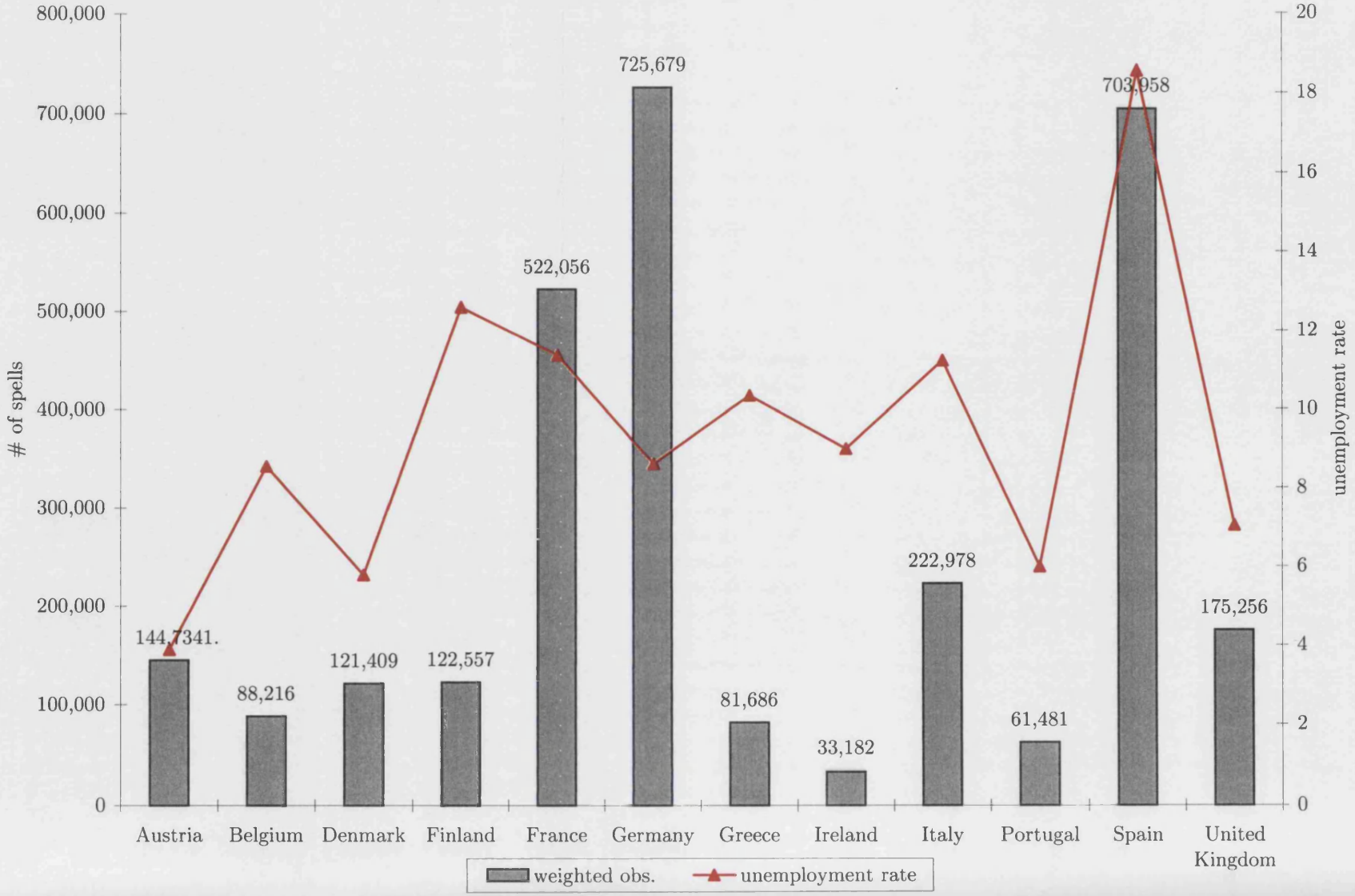


Figure 1.5: Comparison between imputed and reported annual unemployment benefit (national currencies)

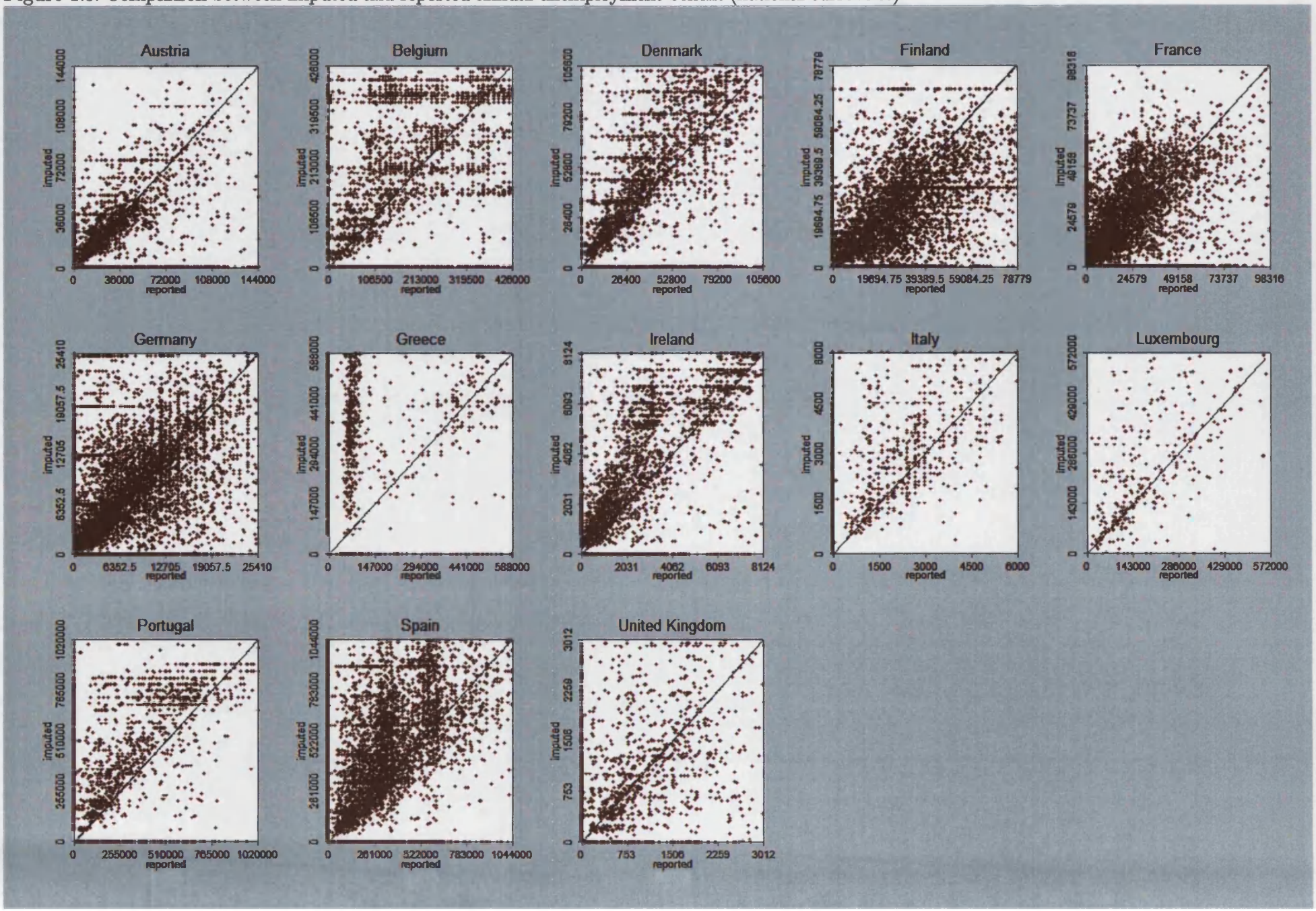


Figure 1.6: Empirical Hazard for unemployment-to-job transitions

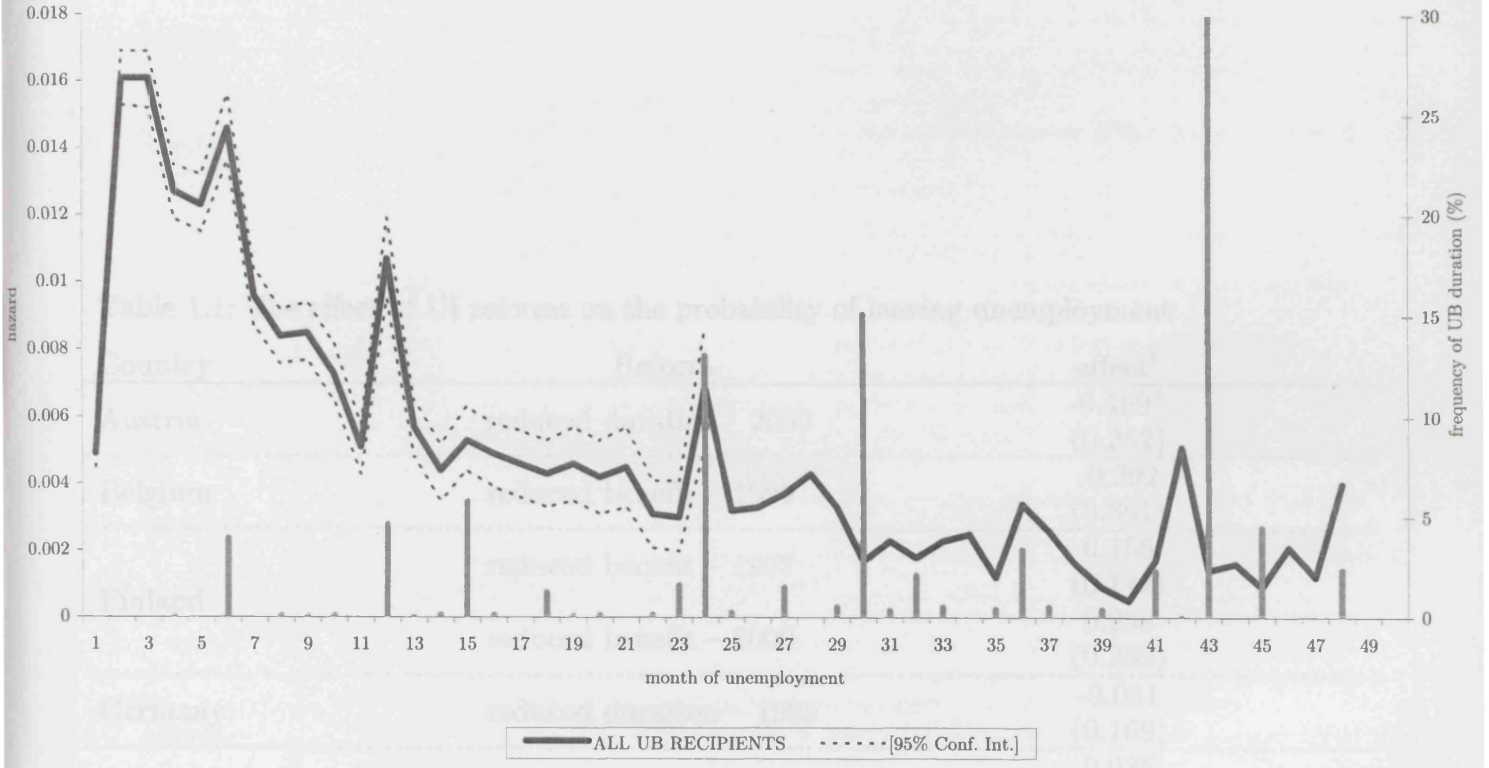


Figure 1.7: Empirical Hazard for unemployment-to-job transtions
by recipent groups

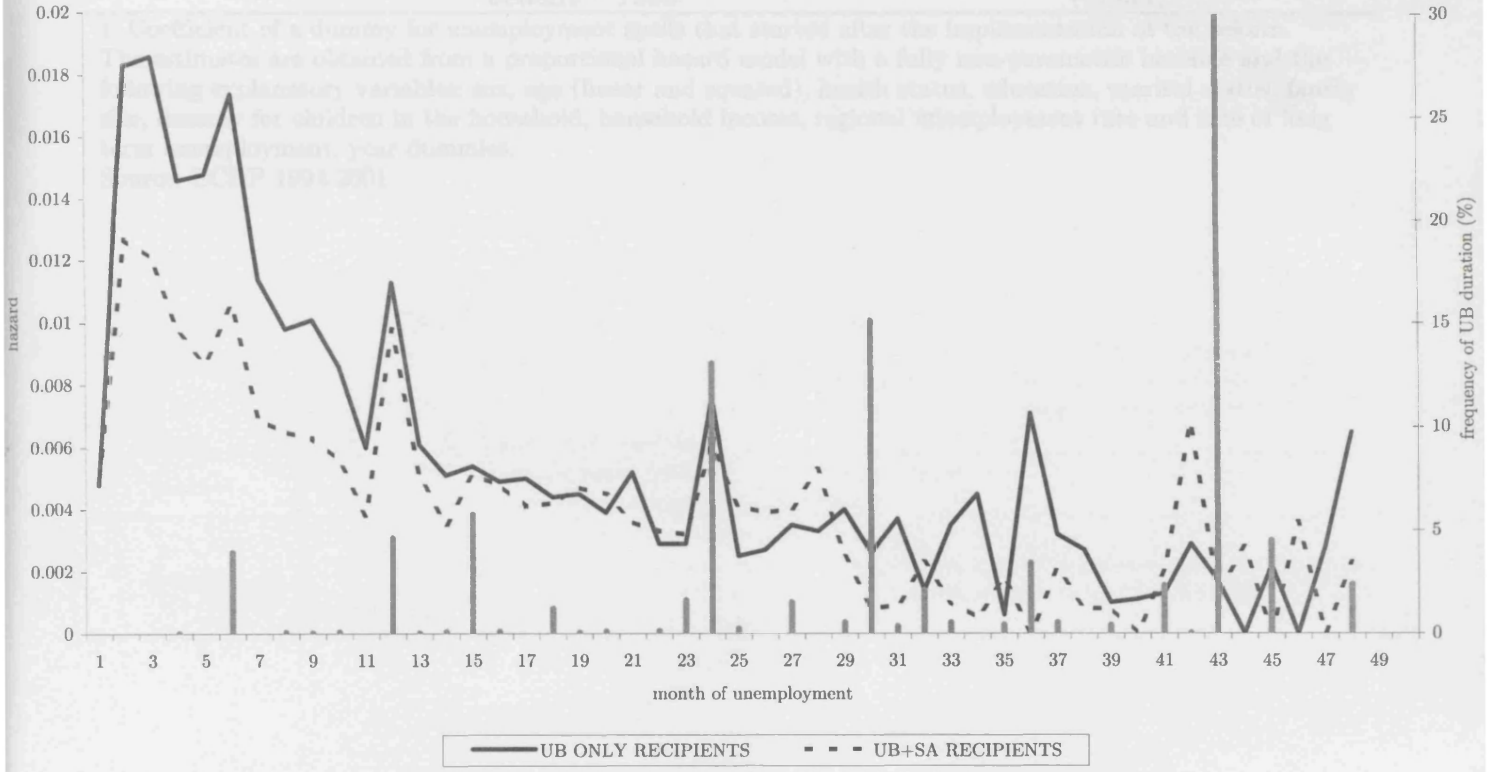


Table 1.1: The effect of UI reforms on the probability of leaving unemployment

Country	Reform	effect[1]
Austria	reduced duration - 2000	-0.459*
		(0.252)
Belgium	reduced benefit – 1999	-0.292
		(0.361)
Finland	reduced benefit – 1997	0.156
		(0.142)
	reduced benefit – 2000	0.258
		(0.253)
Germany	reduced duration – 1995	-0.031
		(0.169)
Greece	reduced benefit - 1996	0.035
		(0.184)
Ireland	reduced benefit – 1995	0.486*
		(0.279)
United Kingdom	reduced duration and benefit – 1995	0.291
		(0.334)

1. Coefficient of a dummy for unemployment spells that started after the implementation of the reform. The estimates are obtained from a proportional hazard model with a fully non-parametric baseline and the following explanatory variables: sex, age (linear and squared), health status, education, marital status, family size, dummy for children in the household, household income, regional unemployment rate and rate of long term unemployment, year dummies.
Source: ECHP 1994-2001

Table 1.2: Welfare reforms in Europe

COUNTRY	*REFORMS*
Austria	• 1995: *Unemployment benefits* are cut (particularly for those with high incomes) • 1999-2000: *Family Benefits* are made more generous • 2000: *Unemployment benefits'* duration is increased for persons with at least 15 years of contributions. • 2002: *Unemployment benefits* made more generous. • 2002: *Child-care support* made more generous.
Belgium	• 1988: Replacement rates for *unemployment benefits* are reduced • 1992: Reform of *unemployment benefit*: access for those on temporary or part-time jobs; redefinition of "suitable offer"; new rules for early retirement. • 1998: Improved incentive for those on *Income Support* (Minimex) to take up jobs. • 1999: *Unemployment benefits* made more generous for single persons • 2001: Introduction of tax deductibility for child-care costs. • 2001: Social assistance made more generous for old people.
Denmark	• 1987: *Unemployment benefits* are increased. • 1994: Labour Market Reform: *unemployment benefits'* duration is reduced and eligibility conditions are tightened. • 1996: Follow-up of Labour Market Reform: *unemployment benefits'* duration is shortened and eligibility conditions are tightened.
Finland	• 1993: Reform of (flat-rate) *Unemployment Assistance*: duration is limited and eligibility requirements brought in line with those for the earnings-related supplementary benefit. • 1995: Reform of the *unemployment benefits* system: stricter conditions for the unemployed to re-qualify for unemployment benefits, shortened duration for older workers • 1997: Reform of the *unemployment benefits* system: stricter access conditions and lower payments. • 1998: *Unemployment benefits* are increased. • 1998: Stricter access conditions for *minimum income* benefits. • 2000: *Unemployment benefits* are decreased.
France	• 1992: Reform of u*nemployment benefits* that introduces a downward sliding scale for payments. • 1993: *Unemployment benefits'* duration is reduced. • 1993: Increased generosity of *general social assistance*: *housing benefits*, *family benefits*, *employment accidents and occupational illness* benefits are increased and made easier to access. • 1997: Minimum *unemployment benefit* is increased and duration of benefits is also extended. • 1998: *Minimum income benefit* increased. • 1999: *Unemployment benefits* increased. • 2000: Generalised increases in both *unemployment and minimum income benefits*. • 2001: Generalised increases in both *unemployment and minimum income benefits*.
Germany	• 1994: *Unemployment benefits* are reduced. • 1995: *Unemployment benefit* duration is reduced. • 1998: Several changes: stricter rules for access to the *minimum income scheme* (RMI); lower payments for *sickness benefits*; better incentives for *unemployment benefit* recipients to take up jobs (redefinition of suitable offer; incentive to take part-time jobs, et.). • 1999: Increased *sickness benefits*.
Greece	• 1990: *Unemployment benefits'* duration is increased. • 1996: *Unemployment benefits* are reduced.
Ireland	• 1987: *Unemployment benefits* are reduced. • 1993: Labour Market Reform: eligibility for *unemployment benefits* is made stricter; *child benefits* are increased, *family benefits* are increased; *income support* is increased. • 1995: *Unemployment benefits* are reduced.

Italy	• 1988: Ordinary *unemployment benefits* are increased. • 1991: New *unemployment benefit* scheme for long-term unemployment is introduced (only for certain categories) • 1994: *Unemployment benefits* are increased and coverage is extended. • 1998: *Minimum income scheme* introduced on an experimental basis. • 1999: introduced new means-tested *family cash benefits*.
Netherlands	• 1987: Revision of the Social Security System Act: duration of *unemployment benefits* is reduced; stricter rules for *invalidity benefits/pensions*; conditions for accessing all benefits are tightened. • 1991: Social Insurance Organisational Act: administration of all benefits delegated to a single governmental body. • 1996: General Social Assistance Act: improved incentives for those on *income support* to take up jobs; privatisation of *sickness benefits*. • 1997: A new *housing benefit* is introduced. • 2001: *Employment bonus* paid to people on unemployment benefit who find job.
Portugal	• 1997: Reform of *family benefits* (completely different structure, cannot say if more/less generous overall); easier access to *employment injuries/occupational disease benefits*; a new *minimum income* scheme is introduced. • 1998: Introduction of a "partial" *unemployment benefit* for part-timers. • 1998: Longer contribution record required for eligibility of *unemployment benefits*. • 1999: Extended duration of *unemployment benefits*.
Spain	• 1992: Reform of the *unemployment benefits* (reduced duration and payments). • 1993: *Unemployment benefits* are reduced. • 1994: *Unemployment benefits* are subject to taxation. • 2000: Extended *unemployment benefits* for older workers with children.
Sweden	• 1986: Participation in training programmes is considered equivalent to work for the purpose of eligibility for *unemployment benefits* • 1987: Subsidised jobs are offered to those whose *unemployment benefit* expires (and the job must, by law, last at least enough to make the worker eligible for unemployment benefits again). • 1993: *Unemployment benefits* are reduced. • 1997: Reform of *unemployment benefits*: benefits are reduced and re-qualification through subsidised jobs no longer available. • 1998: Increased *sickness benefits*. • 1999: *Housing benefits* made stricter and lower. • 2002: Child-care made more generous.
United Kingdom	• 1988: *Unemployment benefits* are reduced. • 1989: *Unemployment benefits* are reduced. • 1996: Job Seekers Allowance (JSA) replaces the old *unemployment benefit*: both payments and duration of benefits are reduced, *income support* is replaced by a means-tested component of the JSA. • 1997: Introduction of an *employment bonus* for older workers. • 1998: Welfare-to-Work Programme: training for long-term unemployed, hiring subsidies for employers, sanctions for refusing job offers, etc. • 1999: Introduction of new means-tested *child-care* tax credit.
Sources: European Commission *Missoc (1992-2001)*, *Missoc-info (1985-2001)*; Fondazione RDB "*Social Policy Reforms Database*"; CESifo "*DICE Database*".	

Table 1.3: Descriptive Statistics

Variable	All UB recipients 1.Mean	Std. Dev.	UB only recipients Mean	Std. Dev.	UB+SA recipients Mean	Std. Dev.
1=female	0.48	(0.50)	0.44	(0.50)	0.56	(0.50)
Age	38.74	(11.12)	39.49	(11.79)	37.32	(9.57)
1=bad health	0.07	(0.25)	0.06	(0.24)	0.07	(0.26)
1=primary education	0.48	(0.50)	0.52	(0.50)	0.39	(0.49)
1=secondary education	0.38	(0.49)	0.35	(0.48)	0.44	(0.50)
1=tertiary education	0.14	(0.35)	0.13	(0.34)	0.17	(0.38)
Household size	3.72	(1.41)	3.62	(1.40)	3.90	(1.39)
Log Household income (PPP)[1]	9.27	(0.96)	9.32	(0.94)	9.17	(0.98)
1=SA recipient	0.35	(0.48)	-	-	-	-
UB replacement rate[2]	0.68	(0.27)	0.66	(0.22)	0.71	(0.33)
SA replacement rate[2]	0.08	(0.30)	-	-	0.22	(0.48)
SA+UB replacement rate	0.76	(0.46)	-	-	0.93	(0.69)
Maximum entitlement of UB (in months)[3]	39.13	(39.27)	35.89	(38.25)	52.04	(40.64)
Regional unemployment rate	12.39	(6.39)	13.36	(6.95)	10.56	(4.67)
Country long term unemployment rate[4]	45.93	(12.26)	48.49	(11.53)	41.11	(12.15)
Duration of all unemployment spells	7.59	(7.92)	7.27	(7.38)	8.19	(8.82)
Duration of completed unemployment spells	6.79	(6.69)	6.58	(6.34)	7.21	(7.29)
Fraction of completed spells	0.78		0.78		0.77	
ending into employment	0.65		0.68		0.60	
ending into inactivity	0.13		0.10		0.17	
Number of spells	12460		8146		4314	
Numer of individuals	7917		5225		3116	

(1) Income of all other household members

(2) Monthly benefit / previous monthly wage. UB amount imputed on the basis of country regulations and personal characteristics (MISSOC, 1994-2001).

(3) Imputed on the basis of country regulations and personal characteristics (MISSOC, 1994-2001). The numbers refer to individuals whose unemployment benefit entitlement is limited. In some countries unemployment assistance schemes are available and make unemployment benefit duration unlimited.

(4) % of unemployed workers who have been unemployed for more than 12 months. Source: OECD.

Table 1.4: Hazard Model estimates – Exits into Jobs

	[1]	[2]	[3]	[4]	[5]
Personal and Family characteristics...					
1=female	-0.325***	-0.298***	-0.298***	-0.293***	-0.292***
	(0.039)	(0.040)	(0.040)	(0.040)	(0.040)
age	0.097***	0.110***	0.110***	0.110***	0.110***
	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)
age squared	-0.001***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1=bad health	-0.508***	-0.481***	-0.480***	-0.481***	-0.481***
	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)
1=primary education	0.043	0.017	0.022	0.022	0.022
	(0.041)	(0.041)	(0.042)	(0.042)	(0.042)
1=tertiary education	0.126**	0.128**	0.132**	0.131**	0.130**
	(0.056)	(0.056)	(0.055)	(0.055)	(0.055)
household size	-0.020	0.005	0.005	0.008	0.008
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
(log) hh income[1]	0.011	-0.026	-0.025	-0.028*	-0.028*
	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)
Social Transfers ...					
UB replacement rate [UBρ][2]	-0.259***	-0.219***	-0.230**	-0.217**	-
	(0.085)	(0.083)	(0.106)	(0.087)	
UBρ·(time<=3)	0.224**	0.212**	0.210**	0.213**	-
	(0.096)	(0.095)	(0.095)	(0.097)	
1=SA recipient	-	-0.345***	-0.312***	-0.286***	-0.289***
		(0.042)	(0.106)	(0.046)	(0.044)
SA replacement rate[3]	-	-	-	-0.189*	-
				(0.106)	
Total replacement rate[4]	-	-	-	-	-0.227***
					(0.069)
Total rep. rate·(time<=3)	-	-	-	-	0.171**
					(0.078)
"Months to UB exhaustion" dummies...					
1=less than 1 months [EX1]	0.476***	0.471***	0.584***	0.588***	0.581***
	(0.183)	(0.183)	(0.216)	(0.215)	(0.214)
1=1 to 3 months [EX1_3]	0.450***	0.442***	0.549***	0.553***	0.544***
	(0.125)	(0.126)	(0.138)	(0.137)	(0.136)
1=3 to 6 months [EX3_6]	0.195*	0.185*	0.112	0.116	0.107
	(0.105)	(0.105)	(0.119)	(0.118)	(0.117)
1=6 to 12 months [EX6_12]	0.304***	0.286***	0.401***	0.403***	0.396***
	(0.074)	(0.073)	(0.083)	(0.083)	(0.082)
Interaction terms..					
(1=SA rec.)·UBρ [I1]	-	-	-0.006	-	-
			(0.139)		
(1=SA rec.) (EX1 [I2]	-	-	-0.460	-0.465	-0.456
			(0.368)	(0.359)	(0.359)
(1=SA rec.) (EX1_3 [I3]	-	-	-0.631**	-0.637**	-0.628**
			(0.292)	(0.291)	(0.291)
(1=SA rec.) (EX3_6 [I4]	-	-	0.234	0.233	0.242
			(0.211)	(0.209)	(0.208)
(1=SA rec.) (EX6_12 [I5]	-	-	-0.385**	-0.384**	-0.392***
			(0.150)	(0.149)	(0.149)
Country/Region specific characteristics...					
Regional unemployment rate	0.004	-0.000	-0.000	-0.000	-0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
National long-term un. rate[5]	-0.005**	-0.009***	-0.009***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year dummies	yes	yes	yes	yes	yes
Non-parametric baseline	yes	yes	yes	yes	yes
Observations	111900	111900	111900	111900	111900
Subjects	12460	12460	12460	12460	12460
Log-likelihood	-28839.78	-28748.46	-28734.23	-28731.17	-28731.78

1. Income of all other household members.
2. monthly UB amount / previous wage. UB amount imputed on the basis of country regulations and personal characteristics (MISSOC, 1993-2001).
3. monthly SA amount / previous wage
4. UB + SA / previous wage
5. Source: OECD.

Robust standard errors in parentheses (clustered by individual). * significant at 10%; ** significant at 5%; *** significant at 1%

Table 1.5: Hazard Model estimates with the probability of SA- Exits into Jobs

	[1]	[3]
Personal and Family characteristics...		
1=female	-0.299***	-0.299***
	(0.026)	(0.026)
age	0.109***	0.109***
	(0.009)	(0.007)
age squared	-0.002***	-0.002***
	(0.000)	(0.000)
1=bad health	-0.481***	-0.479***
	(0.053)	(0.053)
1=primary education	0.017	0.022
	(0.027)	(0.027)
1=tertiary education	0.127***	0.132***
	(0.034)	(0.034)
household size	0.004	0.004
	(0.010)	(0.010)
(log) hh income[1]	-0.025*	-0.025*
	(0.013)	(0.013)
Social Transfers ...		
UB replacement rate [UBρ][2]	-0.222***	-0.235***
	(0.064)	(0.077)
UBρ·(time<=3)	0.213***	0.210***
	(0.057)	(0.057)
Prob. of receiving SA[3] [PrSA]	-0.357***	-0.326***
	(0.028)	(0.083)
"Months to UB exhaustion" dummies...		
1=less than 1 months [EX1]	0.471***	0.586***
	(0.138)	(0.166)
1=1 to 3 months [EX1_3]	0.442***	0.577***
	(0.107)	(0.120)
1=3 to 6 months [EX3_6]	0.185**	0.103
	(0.082)	(0.101)
1=6 to 12 months [EX6_12]	0.288***	0.424***
	(0.050)	(0.057)
Interaction terms..		
PrSA · UBρ [I1]	-	-0.002
		(0.111)
PrSA · EX1 [I2]	-	-0.398
		(0.319)
PrSA · EX1_3 [I3]	-	-0.649***
		(0.245)
PrSA · EX3_6 [I4]	-	0.234
		(0.175)
PrSA · EX6_12 [I5]	-	-0.404***
		(0.112)
Country/Region specific characteristics...		
Regional unemployment rate	-0.000	-0.000
	(0.002)	(0.002)
National long-term un. rate[4]	-0.009***	-0.009***
	(0.001)	(0.001)
Year dummies	yes	yes
Non-parametric baseline	yes	yes
Observations	111900	111900
Subjects	12460	12460
Log-likelihood	-28750.08	-28736.47

1. Income of all other household members.
2. monthly UB amount / previous wage. UB amount imputed on the basis of country regulations and personal characteristics (MISSOC, 1993-2001).
3. Probit prediction. See appendix for full specification.
5. Source: OECD.
Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 1.A:

Additional estimation results

Table 1.A.1: Hazard Modelestimates with heterogeneity - Exits into jobs

	[1]	[2]	[3]	[4]	[5]
Personal and Family characteristics...					
1=female	-0.456***	-0.427***	-0.426***	-0.418***	-0.418***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
age	0.125***	0.141***	0.140***	0.141***	0.140***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
age squared	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1=bad health	-0.484***	-0.459***	-0.459***	-0.459***	-0.459***
	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)
1=primary education	0.046	0.018	0.021	0.020	0.022
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
1=tertiary education	0.216***	0.219***	0.217***	0.216***	0.215***
	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)
household size	-0.029**	0.001	0.001	0.006	0.005
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
(log) hh income[1]	0.018	-0.026	-0.025	-0.029*	-0.028*
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Social Transfers ...					
UB replacement rate [UBρ][2]	-0.258***	-0.214**	-0.201*	-0.196**	-
	(0.085)	(0.084)	(0.107)	(0.087)	
UBρ·(time<=3)	0.156**	0.146**	0.138**	0.140**	-
	(0.063)	(0.063)	(0.063)	(0.064)	
1=SA recipient	-	-0.452***	-0.404***	-0.394***	-0.403***
		(0.035)	(0.111)	(0.040)	(0.038)
SA replacement rate[3]	-	-	-	-0.252**	-
				(0.104)	
Total replacement rate[4]	-	-	-	-	-0.241***
					(0.065)
Total rep. rate·(time<=3)	-	-	-	-	0.135**
					(0.054)
"Months to UB exhaustion" dummies...					
1=less than 1 months [EX1]	0.493***	0.491***	0.591***	0.592***	0.576***
	(0.121)	(0.121)	(0.137)	(0.136)	(0.135)
1=1 to 3 months [EX1_3]	0.421***	0.417***	0.504***	0.505***	0.491***
	(0.091)	(0.091)	(0.101)	(0.099)	(0.097)
1=3 to 6 months [EX3_6]	0.228***	0.222***	0.108	0.110	0.098
	(0.084)	(0.084)	(0.101)	(0.100)	(0.098)
1=6 to 12 months [EX6_12]	0.380***	0.365***	0.459***	0.459***	0.451***
	(0.062)	(0.062)	(0.072)	(0.072)	(0.071)
Interaction terms..					
(1=SA rec.)·UBρ [I1]	-	-	-0.043	-	-
			(0.159)		
(1=SA rec.) (EX1 [I2]	-	-	-0.408	-0.402	-0.393
			(0.287)	(0.282)	(0.282)
(1=SA rec.) (EX1_3 [I3]	-	-	-0.525**	-0.519**	-0.513**
			(0.244)	(0.239)	(0.239)
(1=SA rec.) (EX3_6 [I4]	-	-	0.379**	0.388**	0.392**
			(0.174)	(0.167)	(0.167)
(1=SA rec.) (EX6_12 [I5]	-	-	-0.302**	-0.296**	-0.301**
			(0.128)	(0.123)	(0.123)
Country/Region specific characteristics...					
Regional unemployment rate	0.002	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
National long-term un. rate[5]	-0.009***	-0.014***	-0.014***	-0.014***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year dummies	yes	yes	yes	yes	yes
Non-parametric baseline	yes	yes	yes	yes	yes
Observations	111900	111900	111900	111900	111900
# of spells	12460	12460	12460	12460	12460
# of individuals	7917	7917	7917	7917	7917
Distribution of heterogeneity (v)	normal	normal	normal	normal	normal
variance of v	0.879***	0.872***	0.870***	0.870***	0.870***
	(0.029)	(0.028)	(0.029)	(0.029)	(0.029)
Log-likelihood	-28526.61	-28441.04	-28430.64	-28427.29	-28426.88

1. Income of all other household members.
2. monthly UB amount / previous wage. UB amount imputed on the basis of country regulations and personal characteristics (MISSOC, 1993-2001).
3. monthly SA amount / previous wage
4. UB + SA / previous wage
5. Source: OECD.

Robust standard errors in parentheses (clustered by individual). * significant at 10%; ** significant at 5%; *** significant at 1%

Table 1.A.2: Hazard Modelestimates with heterogeneity and the probability of SA - Exits into jobs

	[1]	[3]
Personal and Family characteristics...		
1=female	-0.435***	-0.425***
	(0.034)	(0.034)
age	0.136***	0.141***
	(0.011)	(0.011)
age squared	-0.002***	-0.002***
	(0.000)	(0.000)
1=bad health	-0.473***	-0.465***
	(0.053)	(0.054)
1=primary education	0.030	0.024
	(0.035)	(0.035)
1=tertiary education	0.224***	0.222***
	(0.046)	(0.046)
household size	-0.014	-0.005
	(0.013)	(0.013)
(log) hh income[1]	-0.010	-0.022
	(0.016)	(0.016)
Social Transfers ...		
UB replacement rate [UBρ][2]	-0.230***	-0.016
	(0.084)	(0.093)
UBρ·(time<=3)	0.156**	0.142**
	(0.064)	(0.064)
Prob. of receiving SA[3] [PrSA]	-0.393***	-0.116**
	(0.038)	(0.054)
"Months to UB exhaustion" dummies...		
1=less than 1 months [EX1]	0.514***	0.687***
	(0.121)	(0.144)
1=1 to 3 months [EX1_3]	0.417***	0.593***
	(0.092)	(0.105)
1=3 to 6 months [EX3_6]	0.204**	0.121
	(0.085)	(0.107)
1=6 to 12 months [EX6_12]	0.373***	0.517***
	(0.062)	(0.075)
Interaction terms..		
PrSA · UBρ [I1]	-	-0.500***
		(0.076)
PrSA · EX1 [I2]	-	-0.534*
		(0.288)
PrSA · EX1_3 [I3]	-	-0.692***
		(0.247)
PrSA · EX3_6 [I4]	-	0.266
		(0.176)
PrSA · EX6_12 [I5]	-	-0.440***
		(0.128)
Country/Region specific characteristics...		
Regional unemployment rate	-0.001	-0.002
	(0.003)	(0.003)
National long-term un. rate[4]	-0.012***	-0.013***
	(0.002)	(0.002)
Year dummies	yes	yes
Non-parametric baseline	yes	yes
# of observations	111900	111900
# of spells	12460	12460
# of individuals	7917	7917
Distribution of heterogeneity (v)	normal	normal
variance of v	0.855***	0.860***
	(0.029)	(0.029)
Log-likelihood	-27986.50	-27951.19

1. Income of all other household members.
2. monthly UB amount / previous wage. UB amount imputed on the basis of country regulations and personal characteristics (MISSOC, 1993-2001).
3. Probit prediction. See appendix for full specification.
5. Source: OECD.
Robust standard errors in parentheses (clustered by individual). * significant at 10%; ** significant at 5%; *** significant at 1%

Table 1.A.3: Probit regressions for the probability of receiving Social Assistance (ECHP 2001) – continues...

	Austria	Belgium	Denmark	Finland	France	Germany
1=female	0.168***	0.744***	1.185***	0.588***	-0.548***	-0.273***
	(0.039)	(0.047)	(0.052)	(0.039)	(0.032)	(0.029)
Age	-0.000	-0.002	-0.008***	-0.011***	-0.002	0.000
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
1=primary education	-0.241***	-0.256***	-0.217***	-0.265***	0.030	-0.361***
	(0.046)	(0.057)	(0.063)	(0.050)	(0.051)	(0.037)
1=tertiary education	0.237***	0.114**	0.007	-0.011	-0.044	0.273***
	(0.076)	(0.057)	(0.062)	(0.050)	(0.054)	(0.037)
1=bad health	0.694***	0.656***	0.605***	0.309***	0.452***	0.154***
	(0.074)	(0.104)	(0.109)	(0.094)	(0.058)	(0.040)
Household size	0.058***	0.176***	0.253***	0.435***	0.142***	0.297***
	(0.021)	(0.032)	(0.050)	(0.033)	(0.022)	(0.022)
Number of children	0.323***	0.319***	0.307***	-0.005	0.535***	0.355***
	(0.027)	(0.033)	(0.053)	(0.036)	(0.025)	(0.023)
Household total disposable income	-0.413***	-0.313***	-0.884***	-0.570***	-0.509***	-0.702***
	(0.033)	(0.043)	(0.052)	(0.035)	(0.025)	(0.030)
1=house owner	0.191***	0.011	-0.442***	-0.413***	-0.482***	-0.042
	(0.048)	(0.060)	(0.063)	(0.055)	(0.035)	(0.034)
# of rooms per household member	-0.123***	-0.173***	-0.242***	-0.024	-0.084***	-0.050*
	(0.031)	(0.036)	(0.038)	(0.031)	(0.025)	(0.026)
Constant	4.312***	3.087***	10.247***	6.146***	5.574***	6.219***
	(0.420)	(0.593)	(0.597)	(0.373)	(0.286)	(0.311)
Observations	5526	4180	3732	5021	9170	10203
Log-likelihood	-2878.17	-2024.62	-1676.46	-2761.15	-4278.50	-5085.56

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 1.A.3: Probit regressions for the probability of receiving Social Assistance (ECHP 2001) - continued

	Greece	Ireland	Italy	Luxembourg	Portugal	Spain	United Kingdom
1=female	0.333***	0.972***	-0.227***	-0.871***	-0.410***	-0.017	0.770***
	(0.045)	(0.047)	(0.035)	(0.046)	(0.029)	(0.036)	(0.033)
Age	0.004***	0.006***	0.005***	0.003*	-0.006***	-0.007***	0.006***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
1=primary education	0.286***	0.103*	0.008	-0.107**	0.002	0.031	0.032
	(0.061)	(0.055)	(0.043)	(0.052)	(0.047)	(0.053)	(0.047)
1=tertiary education	0.029	0.057	-0.201**	0.305***	0.248***	-0.023	0.084*
	(0.093)	(0.071)	(0.083)	(0.069)	(0.068)	(0.063)	(0.045)
1=bad health	0.813***	0.445***	0.709***		0.291***	0.693***	0.555***
	(0.062)	(0.144)	(0.051)		(0.041)	(0.053)	(0.056)
Household size	0.212***	0.041	0.029	0.177***	-0.048***	0.085***	-0.011
	(0.022)	(0.026)	(0.019)	(0.028)	(0.015)	(0.019)	(0.024)
Number of children	0.090***	0.282***	0.178***	0.367***	0.450***	-0.018	0.570***
	(0.029)	(0.027)	(0.024)	(0.034)	(0.021)	(0.025)	(0.028)
Household total disposable income	-0.245***	-0.661***	-0.181***	-0.700***	-0.152***	-0.338***	-0.448***
	(0.034)	(0.043)	(0.027)	(0.049)	(0.022)	(0.019)	(0.027)
1=house owner	-0.304***	-0.153**	-0.063	0.136**	0.057*	-0.128**	-0.426***
	(0.059)	(0.076)	(0.043)	(0.057)	(0.034)	(0.051)	(0.042)
# of rooms per household member	0.131***	-0.202***	-0.097***	-0.132***	-0.229***	-0.143***	-0.114***
	(0.042)	(0.038)	(0.033)	(0.034)	(0.027)	(0.035)	(0.023)
Constant	0.796	5.519***	0.139	9.099***	2.056***	3.801***	3.522***
	(0.516)	(0.432)	(0.283)	(0.676)	(0.320)	(0.297)	(0.258)
Observations	9172	3948	13170	4561	10850	11893	8023
Log-likelihood	-2044.10	-2005.10	-2982.76	-2114.99	-5070.99	-2849.02	-4080.77

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix B:

Descriptive tables of Welfare programmes in the European countries

TABLE 1.B.1. UNEMPLOYMENT BENEFIT IN EUROPEAN COUNTRIES (situation on January 2001)

Country	Existing schemes	Qualifying period[1]	Duration of payment[2]	Rate[3]
Belgium	Insurance	Variable according to age	No limit	60% to 55% initially declining to 44%-35% as unemployment continues
Denmark	Insurance (optional)	52 weeks in the preceding 3 years	1+3 years	90% of reference earnings
Germany	Insurance Assistance	12 months in the preceding 3 years	Depending on age and contribution history (between 12 and 64 months)	Insurance: 60%-67% of net earnings Assistance: 57%-53% of net earnings
Greece	Insurance	125 days of work during the 14 months preceding job loss or, at least, 200 days of work during the 2 years preceding job loss.	Depending on contribution history (between 5 and 12 months)	40%-50% of earnings
Spain	Insurance Assistance	12 months in the previous 6 years	Depending on contribution history	Insurance: 70%-60% of reference earnings Assistance: 75% of minimum wage
France	Insurance Assistance	least 4 months insurance in last 18 months.	Depending on age and contribution history (between 4 and 60 months)	Insurance: 40.4%-57.4% of earnings, declining. Assistance: lump sum
Ireland	Insurance Assistance	39 weeks' contributions paid	390 days	Insurance: 98€ per week Assistance: 97-98€ per week
Italy	Insurance	Varies according to the industry	Depending on the industry (180 days or 90 days or 36 months)	30%-80% of earnings
Luxembourg	Insurance	26 weeks of employment during the last year	365+182 days	80% of earnings
Netherlands	Insurance Assistance	26 weeks of employment during the last 39 months	6 months+ 9 months to 5 years depending on age and employment history.	Insurance: 70% of earnings Assistance: 70% of minimum wage
Austria	Insurance Assistance	52 weeks during the last 24 months	Depending on age and contribution history (between 20 to 78 weeks)	Insurance: 55% of earnings + lump sum Assistance: 92-95% of unemployment insurance
Portugal	Insurance Assistance	540 days during the last 24 months	Depending on age (between 12 and 30 months)	Insurance: 65% of earnings Assistance: 70%-100% of minimum wage
Finland	Insurance Assistance	43 weeks of employment during the last 24 months	500 days	Insurance: lump sum (21€ per day) + earning related supplement Assistance: lump sum (21€ per day)
Sweden	Insurance	6 months of employment	Depending on age (between 300 and 450 days)	Insurance: 80% of earnings
United Kingdom	Insurance Assistance	Contributions paid in one of the 2 tax years on which the claim is based amounting to at least 25 times the minimum contribution for that year	182 days	Insurance: lump sum (65-83€ per week) Assistance: lump sum (99-130€ per week for a couple)

(1) Qualifying periods refer to working periods during which contributions are paid unless otherwise specified.
(2) When duration is expressed in days these usually refer to a 5 or 6 day weekly payments. Duration usually refers only to insurance schemes, unemployment assistance is typically unlimited.
(3) When different rates are specified for the same scheme, the actual rate depends on family characteristics, age, contribution history or duration of unemployment. Only basic rates are reported, excluding any supplement (family, old age, etc.)

Source: European Commission *Missoc 2001.*

TABLE 1.B.2. INVALIDITY BENEFITS IN EUROPEAN COUNTRIES (situation on January 2001)

Country	Type of benefit	minimum level of incapacity[1]	Qualifying conditions	Duration	Amount of benefit[2]
Belgium	Invalidity benefit	66.66%	6 months of contributions with 120 days worked	Until retirement	40-65% of last earnings
Denmark	Invalidity pension	50%	3 years of residence	Until retirement	Depends on incapacity (from 6.855€ to 18.012€ per year)
Germany	Invalidity benefit	50%	60 months of work with 36 months of contributions in the previous 5 years	Until retirement	Depends on incapacity
Greece	Invalidity pension	50%	Between 5 and 15 years of work with 300 to 1500 contributions' days (depending on age)	Until retirement	Depends on incapacity
Spain	Invalidity pension	33%	Worked 1/2 of the time between age 20 and the claim	Until retirement	50%-100% of reference earnings
France	Invalidity pension	66.66%	12 months of work with sufficient contributions paid	Until retirement	30%-50% of annual earnings
Ireland	Invalidity pension	Eligible only after 12 months of sickness benefit	260 contributions' weeks	Until retirement	Depends on age (103-128€ per week)
Italy	•Invalidity pension •Incapacity benefit	•66% •100%	5 years of contributions	Until retirement	Depends on income and contribution records
Luxembourg	Invalidity pension	Eligible if invalidity prevents the beneficiary form doing his last job (or a similar one)	12 months in the previous 3 years	Until retirement	Depends on contribution records
Netherlands	Invalidity pension	25%	None	Until retirement	Depends on incapacity
Austria	Invalidity pension	50%	60 contributions' months in the previous 120 months	Until retirement	Depends on income
Portugal	Invalidity pension	66.66%	5 years	Until retirement	Depends on contribution records
Finland	Invalidity pension	40%	3 years of residence	Until retirement	Depends on age
Sweden	Invalidity pension	25%	Residence in Sweden	Until retirement	25%-100% of basic pension
United Kingdom	•Short-term invalidity •Long-term invalidity	100%	•Enough contributions paid •Having exhausted short-term invalidity benefit	•364 days •Until retirement	Lump sum Depends on age.

(1) Reduced capacity of earning or work unless otherwise specified.
(2) When a range is specified this usually varies with age and contribution records.
Source: European Commission *Missoc 2001.*

TABLE 1.B.3. FAMILY CASH BENEFITS IN EUROPEAN COUNTRIES (situation on January 2001)

Country	Income Test	Age Limit[1]	Calculation of benefit	Supplement for single parents
Belgium	No	18 to 25	Depends on the age of the child	No
Denmark	No	18	Depends on the age of the child	Yes
Germany	Yes	18	Depends on the number of children	No
Greece	Yes	18 to 22	Depends on the number of children	Only for widows
Spain	Yes	18	Depends on the age of the child	No
France	No	18 to 20	Depends on the number of children	Yes
Ireland	No	16 to 19	Depends on the number and age of the children	Yes
Italy	Yes	18	Depends on family and number of children	Yes
Luxembourg	No	18 to 27	Depends on the number and age of the children	No
Netherlands	No	17 to 24	Depends on the number and age of the children	No
Austria	No	19 to 26	Depends on the number of children	No
Portugal	Yes	15 to 24	Depends on the number of children	No
Finland	No	16	Depends on the number of children	Yes
Sweden	No	16	Depends on the number of children	Yes
United Kingdom	No	16 to 19	Depends on the number of children	Yes

(1) Benefits are paid until the child reaches this age limit, which is extended for children in training or higher education.
Source: European Commission *Missoc 2001.*

TABLE 1.B.4. HOUSING BENEFITS IN EUROPE (situation in 1999)

Country	Type of Benefit	Qualifying conditions	Calculation of benefit
Belgium	No direct benefit but social housing is available	-	-
Denmark	• General housing benefit (open to everybody) • Special housing benefit (for those receiving income support)	• Means test • Occurrence of a negative " social event" that affects housing.	Depending on income, family composition and rent
Germany	Housing benefit	Means test	Income related
Greece	No direct benefit but a tax allowance for house rents is available.		
Spain	No general housing benefit but some regions have introduced one.	-	-
France	Housing benefit	• Means test • Children in the household • Married for less than 5 years	Depending on income, rent and family composition
Ireland	Housing Supplement for those under Social Welfare Allowance	• Means test • Receiving Social Welfare Allowance	Depending on Income
Italy	No direct benefit but social housing is available	-	-
Luxembourg	Housing Supplement for those under RMI	• Means test • Receiving RMI	Depending on Income
Netherlands	Housing benefit	Means tested	Depending on income and rent
Austria	Housing Supplement for those under Social Assistance (but it varies across regions)	Varies across regions	Varies across regions
Portugal	Housing Supplement for those under RMI	Means tested	Depending on income
Finland	• Housing benefit for low income households • Housing benefit for pensioners • Housing benefit for students	Means tested	Depending on income, family composition and town of residence
Sweden	• Housing benefit for low income households • Housing supplement for social assistance recipients • Housing benefit for pensioners	Means tested	Depending on income, rent and family composition
United Kingdom	Housing benefit	Means tested	Depending on income and rent. Special supplements for those under Income Support, young and old households.

Source: OECD, *Benefit System ad Work Incentives (2002).*

TABLE 1.B.5. LOW-INCOME BENEFITS IN EUROPE (situation on January 2001)

Country	Denomination	Qualifying conditions	Duration	Willingness to work requirement[1]
Belgium	Minimum de Moyens d'Existence (MIMEX)	• Nationals and refugees • Resident in the country • Aged 18y.o. and above	Unlimited	Yes
Denmark	Sozial Bistand	All persons	Unlimited	Yes
Germany	Sozialhilfe	• National and refugees • Resident in the country	Unlimited	
Greece	-	-	-	-
Spain	Renta Minima	• Resident in the country • Aged between 25 and 65y.o.	12 months	Yes
France	Revenu Minimum d'Insertion (RMI)	• Resident in the country • Aged 25y.o. and above	3 to 12 months	Yes
Ireland	Supplementary Welfare Allowance	• Nationals and refugees • Resident in the country • Aged 18y.o. and above	Unlimited	Yes
Italy[2]	Minimo Vitale/Reddito Minimo	Vary across towns	Varies across towns	Varies across towns
Luxembourg	Revenu Minimum Garanti	• Resident in the country • Aged 18y.o. and above	Unlimited	Yes
Netherlands	Algemene Bijstand	• Nationals and refugees • Resident in the country • Aged 18y.o. and above	Unlimited	Yes
Austria	Sozialhilfe	• Resident in the country	Unlimited	Yes
Portugal[3]	Rendimento Minimo Garantido	• Resident in the country • Aged 18y.o. and above	12 months, extendible	Yes
Finland	Toimeentulotuki	None	Unlimited	Yes
Sweden	Social Bidrag	None	Unlimited	Yes
United Kingdom	Income Support	• Nationals • Resident in the country • Aged 18y.o. and above	Unlimited	Yes

(1) For those who are able to work.
(2) There is no national legal framework for income support. Many towns, however, have introduced a minimum income scheme but rules vary widely across the nation. In 1998 an experiment was run in 39 towns with the objective of introducing a national minimum income scheme by the year 2000. The experiment has been extended to 2002 and then abandoned.
(3) Introduced in 1997.
Source: European Commission *Missoc 2001.*

Chapter 2

Do Friends and Relatives Really Help in Getting a Good Job?

Introduction[1]

Informal contacts are extensively used by both firms and workers to find jobs and fill vacancies. Figure 2.1 shows the distribution of job finding methods for employed workers in European countries and the United States, and documents that, together with direct application and answering/placing advertisement, personal contacts are among the most important channels that lead people into jobs.

The importance of informal networks in the labour market is a known fact and has motivated a number of studies. Findings suggest that, compared to formal methods, informal contacts are a better channel to transmit information between job applicants and potential employers and should therefore lead to matches of better quality that pay higher wages. Some empirical evidence, mainly for the United States, supports this view and has contributed to

[1]I would like to thank all participants to the CEP/LSE PhD Labour Market Workshops for useful comments and suggestions. This chapter also greatly benefited from discussions with Tito Boeri, Pietro Garibaldi, Jan Van Ours, Samuel Bentolila, Marco Leonardi, Federico Perali and Javier Ortega. All errors are my own responsibility.

make it the common wisdom among economists.

This chapter produces new estimates for EU countries and discovers a large cross-country as well as cross-industry variation in the wage premiums paid to jobs found through informal networks. The data come from the European Community Household Panel (ECHP)[2], where employed workers are asked to indicate the search channel through which they have found their current job. For the sake of comparison, data for the United States are also included in the analysis[3].

My best estimates indicate that informal search channels lead to significantly better paying jobs in Austria, Belgium and the Netherlands, while the opposite is true in Greece, Italy, Portugal and the United Kingdom. In the other EU countries - and in the US - no significant wage difference is observed. A even larger variation emerges from the cross-industry analysis. None of the 9 broad sectors considered shows differentials of the same sign in all countries. Moreover, only in 5 countries (Austria, Finland, Greece, Italy and United Kingdom) out of 15 the effects consistently point towards the existence of either a wage premium or a wage penalty to finding a job through personal contacts. In all other countries, informal search methods lead to significantly better paying jobs only in some sectors, while the opposite is true in others.

This chapter aims at providing an explanation for the variation in wage differentials between jobs found through formal and informal channels. In doing this I take a rather unconventional approach in this branch of the literature. Most of the existing articles attempt to describe either the formation or the characteristics of social networks and, on this ground, draw conclusions about the quality of the information that such networks are able to vehicle. This chapter argues that a lot of the observed variation in wage differentials can be explained by variation in formal recruitment policies. In deciding their investment in recruitment, firms trade off the costs of a more intensive screening with the benefits of a more accurately selected

[2]The same data are used in chapter 1 and described in section 1.4.

[3]Although the sample is not fully comparable to the ECHP. See section 2.2.1.

workforce. This decision is obviously affected by the prevailing labour market conditions and is supposedly a very important factor in determining the ability of firms in selecting workers through formal recruitment methods relative to informal ones.

Specifically, the model that will be presented later, assumes that employers optimally choose their "formal recruitment effort": choose in how many newspapers and for how long to post a vacancy, decide how long and tough the interviewing process should be, buy and administer aptitudinal tests, choose the interviewers, etc. This allows to control the amount and the quality of the information that can be extracted from job applicants. The model shows that firms invest more in formal recruitment for high productivity jobs and positions that require considerable training. High productivity implies that the cost of hiring an unsuitable worker is higher, both in terms of forgone profits and wages, thus employers are induced to put more effort in selecting an appropriate candidate. High training costs also induce more recruitment effort in order to avoid bearing them again in the future, if the hire turns out to be unfit for the job. Formal recruitment for these types of positions is therefore likely to be more efficient than informal methods. This mechanism generates variation in the average quality of matches created through different channels and, in turn, leads to variation in wages.

The predictions of the model are tested using industry-level data on recruitment and training costs in selected EU countries[4]. Results confirm that the wage premium paid to jobs found through informal networks is indeed lower in industries in which firms invest more in recruitment, in high productivity jobs and positions that require training. Other empirical predictions of the model are also supported by the data.

Given their extensive use, informal networks must be an important factor in determining the overall efficiency of the matching process and this is already a sufficient motivation for studying the characteristics of jobs created through this channel. Moreover, by looking at firm's recruitment strategies, this chapter touches upon a field that has received surprisingly

[4]See section 2.2.2 for a detailed description of these data.

little attention by economists. While the search behaviour of both the employed and the unemployed has been extensively studied, very little is known about how firms look for workers. Finally, a better understanding of the role of informal networks would shed light on other unsolved issues like the sources of wage inequality and the functioning of social capital at the micro level.

Several papers have already investigated the role of informal networks in the labour market, mostly addressing two broad questions. The first one concerns the relative efficiency of search methods: are informal networks an efficient channel to find a job? Most microdata surveys contain questions about the search methods used by both employed and unemployed workers and a few papers (Holzer (1987b, 1988), Lindeboom et al. (1994), Osberg (1993)) have exploited this information to look at the relative efficiency of formal versus informal search. Findings indicate that those who rely on personal contacts normally receive more offers and find employment more quickly, thus suggesting that informal search is indeed a very efficient way to get a job.

The second question relates to the type of jobs that are found through informal networks: are these good or bad jobs? Do they pay higher or lower wages than similar jobs found via formal methods? There seems to be a generalised wisdom in the literature that these should actually be better jobs. A number of papers provide convincing explanations to support this wisdom. For example, Montgomery (1991) argues that, as people tend to have social ties with similar persons, employers can proxy the unobserved characteristics of applicants with those of their referees, about whom they have better information because, for instance, they have already worked at the firm for some time. Other authors (Kugler (2003), Saloner (1985)) suggest that employed contacts of unemployed workers tend to refer only good applicants because their reputation is at stake and, consequently, less able workers will find it more difficult to get a reference in the first place. For similar reasons, referees should also monitor their refereed coworkers once they are hired, thus making them more productive.

However, while individual-level surveys normally contain information about the search

actions taken by jobseekers, it is less common to know which search method led to the job people are holding at the time of an interview. With panel surveys - which follow the same individuals over time - it is theoretically possible to retrospectively associate to an employed person a set of search methods used when he/she was looking for a new employer (provided he/she has been interviewed at that time). Nonetheless, it is rather difficult to know exactly which method led to the observed job. As a consequence there still is limited empirical evidence to test the theoretical arguments mentioned above. Some findings exist for the United States, which, indeed, confirm the idea that jobs found through informal networks pay higher wages[5]. However, many of these papers use very selected samples (Granovetter (1974), Marmaros et al. (2002), Simon et al. (1992)) while others fail to properly control for the unobserved characteristics of individuals and their personal contacts (Corcoran et al. (1980), Datcher (1983), Staiger (1990)). This chapter produces evidence using representative samples for each European country and applying fixed-effect estimation techniques.

After a description of the data in section 2.2, the chapter is broadly organised in three parts: first (section 2.3), empirical evidence from the ECHP is used to document variation in wage differentials between jobs found through different channels; then (section 2.4), these results motivate the simple theoretical model which is finally (section 2.5) tested against more empirical evidence. section 2.6 concludes.

2.2 The Data

2.2.1 ECHP and NLSY

The European Community Household Panel is a panel dataset of households that covers all European Countries and it has already been described in section 1.4. The sample used in this chapter includes all individuals aged 16-64 who are observed in dependent employment

[5]Corcoran at al. (1980), Datcher (1983), Granovetter (1974), Marmaros et al. (2002), Kugler (2003), Simon et al. (1992), Staiger (1990).

at least in two interviews during the first 6 years of the survey, between 1994 and 1999. This excludes Sweden from the analysis because it only entered the ECHP in 1999. The last two waves of the ECHP (2000 and 2001) are not used for the empirical analysis of this chapter in order to maintain consistency with information from the Eurostat Labour Cost Survey (described in section 2.2.2 below), which is currently available only for 1992 and 1996.

Employed workers in the ECHP are asked to indicate how they have found their current job. The exact phrasing of the question reads: *"By what means were you first informed about your current job?"*. Six possible answers are offered:

- by applying to the employer directly (including approach by an employer);
- by inserting or answering adverts in newspapers, TV, radio;
- through employment or vocational guidance agencies;
- through family, friends or other contacts;
- started own business or joined family business;
- other.

Respondents can choose only one answer. Unfortunately, this question is not asked in the PSELL and the BHPS, therefore for these two countries only data from the ECHP original sample in the first three years (1994 to 1996) can be used.

Two important variables are problematic in the ECHP. First, firm's size was initially collected only for workers in the private sector and it has then been updated for all workers only when they changed job since the previous year. As a consequence, firm's size is missing for most public sector workers. A similar problem exists for temporary jobs. Information about the type of contract (temporary vs. permanent) was not collected in the first year and then updated in the later waves for all workers. In order to use all available information and not to reduce sample sizes, observations with missing values in both of these variables have been included in the analysis (with values equal to -1) with a specific dummy to control for them.

The upper panel of table 2.1 describes the time and country coverage of the data used

in the chapter, while summary statistics of the main variables are provided in appendix 2.B (table 2.B.1).

Existing estimates of the wage premium paid to jobs found through informal networks are produced mostly with US data. For the sake of comparison, US estimates are also reported here. The Panel Study of Income Dynamics (PSID) is the American data source most comparable to the ECHP, however it does not contain questions about the search methods used by employed workers to find their current jobs.

This information is readily available in the National Longitudinal Survey of Youths (NLSY), a survey of a representative cohort of children aged 14 to 21 in 1979 and interviewed 17 times since then. The cross-sectional sample is supplemented by two additional samples: one with overrepresentation of blacks, Hispanics and economically disadvantaged persons and a second one meant to be representative of the military forces. Once appropriately weighted, all individuals from the three samples have been used to produce the estimates presented here.

In the surveys between 1994 and 2000, a set of questions regarding the search methods used to find the current job(s) has been included in the NLSY79 questionnaire, resulting in 4 valid observations over time for each individual (1994, 1996, 1998, 2000). As for European countries, the American sample used in the rest of the chapter consists of all individuals who are observed in dependent employment at least twice.

Two main differences make the American and European data not fully comparable. First, they are produced with very different sampling procedures: the ECHP is meant to be representative of the entire population in each EU country while the NLSY is representative only of a cohort of US-citizens. Second, the NLSY question about the search method that led to the current job is slightly different and reads as follows: *"which of the methods on this card led you to your being offered your current job?"*. 12 possible answers are shown on the card:

- contacted employer directly/interview;
- contacted public employment agency;

- contacted private employment agency;
- contacted friends and relatives;
- contacted school/university employment center;
- sent out resumes/filled out applications;
- placed or answered adverts;
- checked union/professional register;
- other (active);
- looked at adverts;
- attended job training programs/courses;
- other (passive).

These 12 alternative answers have been regrouped into the ECHP categories according to the following criterion:

NLSY	ECHP
contacted employer directly/interview sent out resumes/filled out applications	applying to the employer directly
placed or answered adverts looked at adverts	inserting or answering adverts in newspapers, TV, radio
contacted public employment agency contacted private employment agency contacted school/university employment center	employment or vocational guidance agency
contacted friends and relatives	family, friends or other contacts
checked union/professional register other (passive) other (active)	other

Respondents can indicate more than one method. In the estimation, a job is considered as found through personal contacts if this method was used, even if together with others. The NLSY also asks the "main" method used (and in this case respondents must give only one answer) but there is a high number of missing values in this variable and results do not change substantially when the previous definition is used.

The wage measure used in the following empirical exercises is the net hourly wage, which is directly available in the NLSY and is constructed as the net monthly wage divided by the usual number of working hours per week (multiplied by 4.3) in the ECHP.

2.2.2 Eurostat Labour Cost Surveys

Information about recruitment costs come from the Eurostat Labour Costs Survey, a survey of European firms carried out at regular intervals since 1975[6]. The sample is designed to represent all firms with 10 or more employees. Total labour costs are broken down by various categories and subcategories, and, although these change from year to year, in 1992 and 1996 the percentage of total labour costs accounted for by recruitment costs is available for several countries.

The exact definition of recruitment costs is as follows: *"...the sums paid to recruitment agencies, expenditure on job advertisements in the press, travel expenses paid to candidates called for interview, installation allowances paid to newly recruited staff, etc. This does not include running administration costs (office expenses, staff wages, etc.)."*.

Unfortunately, for 1996 - the only year that overlaps with the time coverage of the ECHP - these figures are only available for 6 countries: Austria, Finland, France, Germany, Luxembourg, Portugal. For Belgium, Denmark, Greece and the United Kingdom data are only available for 1992, while France, Luxembourg and Portugal have reported information for both 1992 and 1996. The country and year coverage of the data used in this chapter are described in the lower panel of table 2.1.

The data refer to the manufacturing and service sectors. No information is available for firms operating in agriculture. The data are distributed in aggregate format, broken down by industry classification (2-digit NACE) and firm size.

Table 2.2 shows recruitment costs as a percentage of total labour costs and per employee (in ECU) in the industry and service sectors. Austria is a clear outlier with recruitment costs 5 to 10 times higher than the other countries. Eurostat could not offer any explanations for this large discrepancy, however, in the empirical exercises performed later on in the chapter, country dummies are always included in the various specifications.

Being the ECHP also produced by Eurostat, the industry classification available here can

[6]The latest release of data contain surveys for the years 1975, 1978, 1981, 1984, 1988, 1992, 1996.

be readily merged into the microdata for each country. The Eurostat Labour Costs Survey also provides information on training costs.

2.3 Jobs found through personal contacts: evidence from the ECHP

2.3.1 Who finds job through personal contacts?

I start by documenting the characteristics of jobs found through informal contacts. To this end, standard probit regressions for having found a job through informal networks have been estimated for each country, using the 1996 wave of the ECHP[7] and data for the same year from the NLSY. The set of controls include a gender dummy, age and age squared, the number of adults in the household, two dummies for the highest level of completed education, dummies for part-time, first, temporary and public sector jobs and a set of dummies for broad occupational, firm size and industry categories. Results are shown in table 2.3. The figures represent marginal effects.

There seems to be no notable regularity across countries in terms of gender, age or income. Jobs found through informal networks appear to be generally concentrated in the private sector. This is probably due to the requirement in many countries to pass a nationwide competitive exam in order to enter the public administration.

In most countries the coefficients on the occupational and educational groups are negative and significant (the reference groups being the lowest occupations and the least educated). These results indicate an interesting cross-country regularity: jobs found through personal contacts are systematically concentrated into lower occupational groups and among less educated workers. This result conforms with findings in Staiger (1990) on the NLSY.

The use of personal contacts also appears to lead more frequently to jobs in small and

[7]The 1996 wave of the ECHP is the one with the widest country coverage (see table 2.1).

medium sized firms. The distribution across industries looks more varied.

2.3.2 Wage premiums to jobs found through personal contacts

Given the above finding that jobs found through personal contacts are concentrated into lower occupational and educational groups, it is reasonable to expect lower wages paid to these jobs compared to jobs found through formal channels. This can be checked by running the following OLS wage regression for each country:

$$\ln(w_{i,t}) = \pi PERSONAL_{i,t} + x'_{i,t}\beta + \nu_{i,t} \tag{2.1}$$

where $PERSONAL_{i,t}$ is a dummy equal to 1 if individual i used personal contacts to find the job he/she is holding at time t, $x_{i,t}$ is a set of controls which includes a constant, experience and experience squared, tenure and tenure squared, a dummy for job-to-job movers, a dummy for first job and a set of year dummies. $\nu_{i,t}$ is a random error.

All regressions are repeated with and without job's characteristics (i.e. a dummy for part-time, a dummy for temporary and a dummy for public sector jobs), occupational (22), industry[8] (18) and firm size (7) dummies. The dependent variable is the log of the net hourly wage.

The estimates of π for each country are shown in the upper panels of figure 2.2 and table 2.4. In figure 2.2 the vertical bars represent 10%-level confidence intervals. In order to visually show the differences in the distribution and the size of the estimates across the various specifications, in all panels of figure 2.2 countries are ordered according to the ranking of the OLS coefficients in the upper left quadrant.

Looking at this first set of results, some important differences across countries already emerge: statistically significant coefficients range from -2.4% in Belgium to -11.5% in Luxembourg. In Austria and Denmark point estimates, although not significant, are positive, while

[8]No industry dummies are available for Germany (due to a particular confidentiality agreement with Eurostat).

in Finland and France they are negative (still not significant). Results for the US indicate no significant wage differential.

As expected, when job's characteristics are included in the set of controls (upper right panel of figure 2.2), wage differences are more than halved but the ranking of countries remains unchanged. The detailed results of these regressions are reported in table 2.B.2 in appendix 2.B.

Evidence from OLS estimates, although already suggestive of the considerable cross-country variation in wage differentials, are still far from convincing. The group of workers who have access to informal networks is probably very selected and the quality of such networks is also likely to be individual specific. This implies that OLS estimates are affected by a potentially important selection bias. As long as the unobservable characteristics that influence access to social networks and their quality are fixed over time, consistent estimates can be produced introducing individual fixed-effects (ε_i) in equation (2.1):

$$\ln(w_{i,t}) = \pi PERSONAL_{i,t} + x'_{i,t}\beta + \varepsilon_i + \nu_{i,t} \tag{2.2}$$

This model is identified thanks to the longitudinal dimension of the ECHP. The estimates of π are reported in the lower panels of table 2.4 and figure 2.2. Detailed results from these regressions can be found in appendix 2.B (table 2.B.3).

The introduction of individual fixed-effects implies that wage differentials are now identified by the same worker who is observed in different jobs obtained through different channels during the sample period[9].

Figure 2.2 shows that the cross-country distribution of the estimates is now very different, suggesting that individual fixed effects are indeed important and that their correlation with the use of personal contacts varies considerably across countries.

In seven out of the 15 countries the effect is significant at the 10% level: in Austria, Bel-

[9]In table 2.B.1, this is called the "identifying sample" and its size varies from 5% to 26% of the entire sample.

gium and the Netherlands jobs obtained through informal networks respectively pay 4.2%, 6% and 2.9% more, while in the Greece, Italy, Portugal and the UK the effect is of opposite sign: -2.2% in Greece and Italy, -1.3% in Portugal, and -3.5% in the UK. For all other countries estimated coefficients are not significantly different from zero. Unlike other authors (Kugler (2002), Staiger (1990)), who find a positive and significant wage premium, my estimates for the US are positive but non-significant. When job characteristics are included in the set of controls, results don't change dramatically: the impact of these variables is probably largely captured by the fixed-effects.

A even larger variation emerges from the cross-sector analysis. Industry-specific wage differentials between jobs found through informal and formal methods are produced by interacting the dummy $PERSONAL_{i,t}$ with a full set of sector dummies:

$$\ln(w_{i,t}) = \sum_j \pi_j \left[industry(j)_{i,t} * PERSONAL_{i,t}\right] + x'_{i,t}\beta + \varepsilon_i + \nu_{i,t} \tag{2.3}$$

where $industry(j)_{i,t}$ is a dummy equal to 1 if individual i is observed working in sector j at time t, and zero otherwise. The other symbols have the usual meaning. The sector-specific wage differentials, π_j's, are now identified by those individuals who change either sector or search method over time (or both), however the number of identifying individuals in each industry can be very small, thus reducing the precision of the estimates. For this reason, in order to achieve larger cell sizes, I have re-grouped the 18 industries available from the ECHP into 9 broader sectors. The exact definitions of the industry classification is provided in table 2.B.6, in appendix 2.B.

Equation (2.3), estimated separately for each country, yields 126 (9 sectors in 14 countries) coefficients, of which only those significant at the 10% level are reported in figure 2.3. As expected, because of the smaller cell sizes, these effects are larger with larger standard errors. The main message of figure 2.3, however, is that wage differentials between jobs found through informal and formal methods vary considerably across sectors as well as across countries. None of the 9 broad sectors considered here shows wage differentials of the same sign in

all countries. Moreover, only in 5 countries (Austria, Finland, Greece, Italy and United Kingdom) out of 15 the effects consistently point towards the existence of either a wage premium or a wage penalty to finding a job through personal contacts. In all other countries, informal search methods lead to significantly better paying jobs only in some sectors, while the opposite is true in others.

There can be at least two alternative explanations for the existence of wage differentials between jobs found through formal and informal channels. First, jobs obtained through informal networks might be different along some non monetary dimensions that are difficult to observe, like job security or stability, responsibility or effort, etc. In this case, wages would simply reflect compensating differentials for some permanent job specific characteristic. Alternatively, differences could be due to actual mismatching, with formal or informal channels being better or worse at matching the right worker to the right job.

These two alternative explanations have opposite empirical implications: if the wage premiums observed in the data are due to compensating differentials, then they should be permanent, i.e. they should not disappear with tenure. On the contrary, if they are due to real mismatching, then, as workers and employers move on to better job partners, these bad matches are destroyed and, consequently, wage differentials should disappear as tenure increases.

Estimates in table 2.5 allow to discriminate between these two hypotheses. The coefficients reported in this table come from fixed-effect wage regressions similar to equation (2.2) where the dummy for jobs found through personal contacts has been replaced by its interactions with two dummies for tenure higher and lower than 6 months, respectively:

$$\begin{aligned} \ln(w_{i,t}) &= \pi_1[PERSONAL_{i,t} \cdot LOW\_TEN_{i,t}] + \\ &+\pi_2[PERSONAL_{i,t} \cdot HIGH\_TEN_{i,t}] + \\ &+x'_{i,t}\beta + \varepsilon_i + \nu_{i,t} \end{aligned} \tag{2.4}$$

If individual i at time t has been in his/her current job for less than 6 months, $LOW\_TEN_{i,t}$ takes value 1 and $HIGH\_TEN_{i,t}$ is equal to 0, vice versa if individual i at time t has been in his/her current job for more than 6 months.

For these regressions the sample has been restricted to jobs created during the sample period only, to avoid stock-sampling bias that would affect all tenure effects. Hence, the figures reported in table 2.5 are to be interpreted as the average wage differentials in jobs with less and more than 6 months of tenure respectively[10].

Apart from the anomalous case of Finland, in all other countries wage differences tend to disappear with tenure, thus suggesting that they must be due to some sort of mismatching rather than to compensating differentials. The model presented in the next section will elaborate on this assumption.

I conclude by briefly discussing the possibility that also fixed-effect estimates are biased by sample selection. Although all available observations have been included in the regressions described so far, it has already been mentioned that fixed-effect wage differences are identified by workers who, during the sample period, changed both job and search method (formal vs. informal) at least once. Let us call this group the "identifying sample".

Summary statistics in table 2.B.1 indicate that the size of this sub sample of workers varies between 5% and 26% of the total. There are various potential reasons to think that the composition of the "identifying sample" differs from that of the total sample. For example, if one search channel systematically leads to well paid and stable jobs, then people who used that channel for their first job would be less likely to change employer and search method in the future.

In order to check whether this, or other sources of selection, affect the results discussed earlier, table 2.B.5 in appendix 2.B reports results from country-by-country probit regressions for the probability of being in the "identifying sample" (marginal effects shown in the table). The estimates somehow replicate some of the results of table 2.3, given that in order to be

[10]Detailed results are in table 2.B.4 in appendix 2.B.

in the identifying sample one must have found at least one job through personal contacts. However, there is no new systematic trend along the individual characteristics included in the set of controls, suggesting that, conditional on the observables, selection is to a large extent random.

2.4 A model with endogenous recruitment effort

The empirical results discussed in the previous section challenge a generalized belief in the literature that informal contacts contribute to improve the quality of job matches (although some working papers have already documented contrasting results for some countries. See Bentolila et al. (2003), Calvo et al. (2003)). Once comparable data for several countries are available - as in the ECHP - a large cross-country variation in the premiums paid to jobs created through informal networks emerges.

This is a new empirical result that clearly points towards the role of some underlying country-specific or labour market-specific characteristics that somehow modify the impact of informal networks on individual wages. These considerations motivate the attempt conducted in this section to construct a simple theory that explains the existence of both negative and positive premiums to jobs found through personal contacts.

Previous papers (Montgomery (1991), Mortensen et al. (1994), Simon et al. (1992)) have suggested that personal contacts transmit information between job applicants and potential employers more effectively than other channels. However, as long as personal contacts are assumed to be a better channel for the delivery of information, no explanation for the observed wide variation in wage premiums can be provided, especially for those cases in which jobs found through informal networks pay lower wages.

The most intuitive way to relax this assumption is to endogenise the amount and quality of information delivered by informal contacts relative to other recruitment channels. In other words, what matters is not the informational content of references per se, but relative to how

informative other recruitment strategies are.

Moreover, firms have typically little control over the amount of information they can obtain through informal contacts and they are likely to take the value of references as exogenous. On the other hand, firms do choose their recruitment strategies as far as formal channels are concerned: set up a human resource department, decide how long and tough the interviewing process should be, buy and administer aptitudinal tests, choose the interviewers, etc. The more the firm invests in formal recruitment the more information about the worker's unobserved characteristics can be extracted.

This is the approach taken in the simple model presented here, where the key ingredient is the firm's endogenous choice of formal "recruitment effort". As the informational content of references is assumed to be exogenous (although positive and potentially very relevant), it is the effort that the firm decides to put into formal screening that determines which one of the two channels (formal vs. informal) is more informative and, consequently, which wage is higher.

Specifically, the model shows that firms invest more in formal recruitment for filling high productivity jobs and jobs that involve substantial training. Consequently, positions with these characteristics are comparatively more likely to be filled with suitable candidates through formal channels than informal ones, the first being more productive. As long as wages vary with productivity, this mechanism generates variation in the average quality of matches created through different channels as well as in wages.

Let us now move on to the equations of the model, which is a simple modification of a standard matching model à la Pissarides (2000). All equations are written in discrete time. In order to focus attention on the choice of the recruitment strategy, neither the supply side of the labour market nor the process of wage negotiation will be modelled here: firms always offer wages equal to an exogenous fraction β of expected or actual productivity and workers always accept the offer. Moreover, the analysis is conducted in partial equilibrium, i.e. holding the total number of jobs fixed: each firm only has one vacancy and no new firms

can enter the market.

Productivity is match-specific and for each firm there exist two types of workers, suitable and unsuitable. The types are unknown to both the firm and the worker until production takes place. A job filled with a suitable worker produces $x = p > 0$, unsuitable workers produce $x = 0$. This assumption incorporates the idea that recruitment mistakes are more costly when filling a high than a low productivity job: hiring a bad cleaner is costly but not as disastrous as hiring a bad manager. In order to start operating a job and before knowing the worker's type, a fraction k of productivity p must be spent on training.

Firms meet workers with per-period probability q. Conditional on having met a worker, he/she can arrive through the formal or the informal channel with probabilities δ and $(1-\delta)$[11].

Through each channel employers can meet either suitable or unsuitable candidates and, by undertaking recruitment activities, they can improve the probability of being matched to a suitable one. This is captured in the model by a "recruitment function" $\zeta(R_{f,i})$ which represents the probability of being matched with a suitable candidate (conditional on having met one through either of the two channels) and where R_f represents formal recruitment effort and R_i is its analog for the informal channel.

In other words, in each period 5 events can occur for each unfilled vacancy:

Event	Probability
1. the vacancy remains unfilled	(1-q)
2. the vacancy is filled with a *suitable* candidate through the *formal* channel	$q\delta\zeta(R_f)$
3. the vacancy is filled with an unsuitable candidate through the formal channel	$q\delta(1-\zeta(R_f))$
4. the vacancy is filled with a suitable candidate through the informal channel	$q(1-\delta)\zeta(R_i)$
5. the vacancy is filled with an unsuitable candidate through the informal channel	$q(1-\delta)(1-\zeta(R_i))$

[11]This is just a convenient solution to allow firms to hire through both channels simultaneously. Several alternative assumptions are possible about the meeting probabilities but none of the empirical implications depend crucially on these.

In this framework, recruitment effort - $R_{f,i}$ - can be interpreted both as extensive and intensive recruitment, i.e. employers can improve the probability of finding a suitable worker by intensifying their searching activities (e.g. by advertising more and in better selected newspapers, by organising events at professional schools and/or colleges, etc.) and/or by intensifying their screening activities (e.g. more and more accurate interviews, aptitudinal tests, etc.). The $\zeta(\cdot)$ function is a convenient modelling tool to capture the joint effect of both sets of activities. In chapter 3, the model will be extended to look at intensive and extensive recruitment separately.

R_i is to be interpreted as the informational value of personal contacts: filling a vacancy with a suitable candidate through the informal channel is as likely as through formal methods with effort equal to R_i. A crucial assumption of the model will be that R_i is exogenous to the firm, while R_f is chosen optimally to maximise the value of an unfilled vacancy.

The properties of $\zeta(\cdot)$ are intuitive: in the absence of any screening - $\zeta(0)$ - the probability of meeting a suitable candidate is simply equal to the fraction of such workers in the pool of job applicants, as $R_{f,i} \to \infty$, $\zeta(R_{f,i}) \to 1$. Hence, $\zeta(R_{f,i})$ is increasing and concave in $R_{f,i}$. Additionally, the return to $R_{f,i}$ should tend to zero when the number of suitable workers goes either to 1 or to zero: there is no advantage in screening candidates when they are all either suitable or unsuitable for the job[12].

Firms optimally choose formal recruitment effort - R_f - by trading off the benefits of a higher probability of creating a good match with the linear costs of recruitment, cR_f. Informal contacts provide some exogenous information - R_i - about candidates, which comes at no cost to the firm but cannot be adjusted optimally. It must be noted here that also applicants contacted via informal methods typically go through a screening process, but this is usually shorter and less intense[13]. For simplicity, the model makes the extreme assumption

[12]For example, an appropiate functional form for $\zeta(\cdot)$ could be the following:

$$\zeta(R) = 1 - (1-n)e^{-nR}$$

where n is the fraction of suitable workers.

[13]This, as well as other assumptions made here about the behaviour of firms, have been tested using

that candidates met through informal contacts do not go through any formal screening.

Given the above assumptions and a per-period discount rate r, the value of a vacancy to a representative firm is:

$$\begin{aligned} V &= -cR_f + \frac{q}{1+r}\{\delta\zeta(R_f)[J_f(p)-kp] + \delta(1-\zeta(R_f))[J_f(0)-kp] + \\ &+(1-\delta)\zeta(R_i)[J_i(p)-kp] + (1-\delta)(1-\zeta(R_i))[J_i(0)-kp]\} + \\ &+\frac{1-q}{1+r}V \end{aligned} \tag{2.5}$$

where $J_{f,i}(p)$ and $J_{f,i}(0)$ are the value of a job filled with a suitable and unsuitable worker, respectively[14]. A job filled with a suitable candidate produces $x = p$ and is never destroyed. An initial wage - $w_{f,i}$ - equal to expected productivity is paid in the first period and is later updated to a fraction of actual productivity for all the subsequent periods. A job filled with an unsuitable candidate produces $x = 0$, the initial wage - $w_{f,i}$ - must be paid for one period before the worker is dismissed and the vacancy re-opened. Given the above assumptions, $J_{f,i}(p)$ and $J_{f,i}(0)$ can be written as:

$$J_{f,i}(p) = p - w_{f,i} + (1-\beta)\frac{p}{r} \tag{2.6}$$

$$J_{f,i}(0) = -w_{f,i} + \frac{1}{1+r}V \tag{2.7}$$

where $w_{f,i} = \beta\zeta(R_{f,i})p$.

Firms choose R_f in order to maximise equation (2.5) according to the following first order

establishment level data for the United Kingdom (*Survey of Employers' Recruitment Practices, 1992*). This dataset is used more extensively in chapter 3.

[14]In this specification it is assumed that recruitment costs are paid ex-ante, i.e. before meeting workers. This is consistent with empirical evidence from firms' data. However, the empirical implications of the model remain unchanged under the alternative assumption that recruitment costs are only paid if a worker is hired through the formal channel.

condition:

$$0 = \delta\zeta'(\widehat{R}_f)\left[c\widehat{R}_f + \frac{q}{1+r}kp + (1-\beta)(1+r+q)p\right] - \\ -c\left[\frac{r}{q}(1+r+q) + \delta\zeta(\widehat{R}_f) + (1-\delta)\zeta(R_i)\right] \tag{2.8}$$

The effects of the parameters on the optimal level of recruitment, $\widehat{R}_f$, can be easily computed from equation (2.8). The following paragraphs give the intuition of the comparative statics, while the detailed proofs are shown in appendix 2.A.

The effect of productivity (p) is rather intuitive: for a highly productive job forgone earnings from keeping the vacancy open are higher and, additionally, if an unsuitable worker is hired, the firm incurs in a higher loss because of the higher wage. Both effects induce more investment in recruitment.

Higher training costs (k) also lead to higher $\widehat{R}_f$. For the same level of productivity, higher training costs induce firms to invest more in recruitment in order not to have to train several workers before finding a suitable one.

$\widehat{R}_f$ also increases with the meeting probability, q. This is analog to the "discouraged-job" effect described in Pissarides (2000)[15]: a higher probability of finding a worker increases the value of a vacancy and firms respond by recruiting more intensively.

For the same reason also a higher δ, the parameter that describes the relative importance of the formal relative to the informal channel, has a positive effect on $\widehat{R}_f$.

Finally, investment in formal recruitment decreases with R_i, the informational value of personal contacts.

Turning now to wages, the model readily predicts that continuation wages are identical for all matches regardless of the recruitment channel used to create them. This conforms with the empirical evidence presented in the previous sections that wage differentials fade

[15]Chapter 5, pag. 130.

away with tenure (see table 2.5). Initial wages, however, differ and their ratio depends on the relative efficiency of formal vs. informal screening:

$$\frac{w_i}{w_f} = \frac{\zeta(R_i)}{\zeta(\widehat{R}_f)} \tag{2.9}$$

Clearly, the premium paid to jobs found through personal contacts decreases with productivity, with training costs and with the formal meeting probability. It increases with the informational value of informal networks - R_i.

2.5 Testing the empirical predictions of the model

The model presented in the previous section contains two main empirically testable implications. The first is equation (2.8), which suggests that investment in recruitment is positively correlated with productivity (p), training costs (k) and the meeting rate (q), and negatively correlated with the informational value of personal contacts (R_i). The second is equation (2.9), which implies that the wage premium to finding a job through personal contacts ($\frac{w_i}{w_f}$) is correlated negatively with investment in recruitment ($\widehat{R}_f$) and positively with the informational value of personal contacts (R_i).

In this section each of these implications will be tested against the empirical evidence using industry-level data. Moreover, a reduced form of the model in which relative wages depend negatively on productivity and training, controlling for labour market conditions, will also be tested using both industry- and individual-level data.

As discussed in section 2.2.2, the 1992 and 1996 Eurostat Labour Costs Surveys contain information on both recruitment and training costs at the industry level, which can be used to construct empirical counterparts of R_f and k. Measures of productivity at the industry level are also readily available from Eurostat.

Unfortunately, R_i cannot be easily observed and additional identification assumptions are needed. In particular, personal contacts will be assumed to be equally informative within

each country, so that R_i can be controlled for by country dummies. This restriction does not come at no cost, specifically it implies that I will be able to explain the variation in wage differentials between jobs found through different channels only across sectors and within countries.

The measurement of q also requires some discussion. Following the conventional view of the matching function, meeting probabilities for firms depend positively on the number of jobseekers and negatively on the number of unfilled vacancies. However, workers typically search for jobs across industries, hence a measure of labour supply (i.e. the unemployment rate) at the industry level is hard to define and construct. Variation in labour demand at the industry level (i.e. the number of vacancies) is therefore likely to capture a large fraction of the variation in meeting rates across industries.

An internationally comparable measure of labour demand can be constructed from the *OECD Business Trend Survey*, a quarterly survey of businesses' expectations in the manufacturing sector in selected OECD countries. Among other things, employers are asked whether they are planning to increase/decrease or maintain constant their workforce in the following 3 months.

The measure of labour demand that will be used here is computed as the annual average of the difference between the fraction of respondents who expect to increase and decrease their employment. I will call this variable "employment trend". A positive number indicates that throughout the year firms have been posting new vacancies rather than closing down jobs. According to the definition of meeting probability, in markets where firms are posting more vacancies the probability of meeting a worker is lower. Although this is only an indirect and imperfect measure of labour demand, it is, to my knowledge, the only internationally comparable source of information about vacancies.

Test 1: the determinants of recruitment effort. With these data, the effects of the level of productivity and training costs on recruitment effort can be identified by estimating the following regression at the industry level:

$$R_{c,s,t} = \alpha_1 p_{c,s,t} + \alpha_2 k_{c,s,t} + \alpha_3 emp_{c,s,t} + \eta_c + \nu_t + \varepsilon_{c,s,t} \quad (2.10)$$

where $R_{c,s,t}$, $p_{c,s,t}$ and $k_{c,s,t}$ are annual recruitment costs, annual output and annual training costs per employee in country c, sector s and year t (all in logs of current ECU), respectively; $emp_{c,s,t}$ is the measure of labour demand described above; η_c is a country dummy and ν_t is a year dummy. $\varepsilon_{c,s,t}$ is the error term, clustered by country-industry cells.

Results are shown in table 2.6. Since employment trend is only available for the manufacturing sector, this variable is omitted in the first column, which shows the estimates for both the manufacturing and the service sectors. As predicted, firms spend more on recruitment in industries in which jobs are more productive and more training is provided. Column 2 repeats the estimation for the manufacturing sector only and results are confirmed[16].

Finally, column 3 includes employment trend as a regressor and, once again, the coefficients on productivity and training costs are positive and strongly significant[17]. Employment trend is also found to have a significant and negative effect suggesting that firms invest less in recruitment in tighter labour markets, the "discouraged-job" effect mentioned earlier on.

Test 2: wage differentials and recruitment costs. Turning now to equation (2.9), the predicted negative correlation between the wage differential ($\frac{w_i}{w_f}$) and recruitment can be tested by running a fixed-effect wage regression similar to (2.2), pooling all countries together and introducing an interaction term between the dummy for jobs found through personal contacts and average recruitment costs in the corresponding industry in 1996, $R_{s,96}$:

$$\ln(w_{i,t}) = \gamma \left[PERSONAL_{i,t} * R_{s,96} \right] + \pi PERSONAL_{i,t} + x'_{i,t}\beta + \varepsilon_i + \nu_{i,t} \quad (2.11)$$

[16]The reason why in column 2 there are more observations than coumn 1 is because, while training and recruitment data come at a very detailed industry level (NACE rev.1), productivity at such a disaggregated level is only available for the manufacturing sector. If one wants to include the service sector too, many manufactory subindustries must be reaggregated at a higher level.

[17]The number of observations is now much smaller because, in the process of matching data from Eurostat (recruitment, training and productivity) with data from the OECD (business trend), some sectors are lost and others have to be reaggregated to a higher level.

Time-variation in the interaction term will only be generated by individuals observed in jobs found via different channels. Unfortunately, only 5 countries - Austria, Finland, France, Luxembourg and Portugal - provided data on recruitment in 1996.

Results are shown in the first column of table 2.7 and, indeed, confirm the prediction of the model. In this specification, however, the coefficients on all the controls ($x_{i,t}$) are constrained to be the same for all countries. The second column of table 2.7 reports results obtained from the same equation, when all the $x_{i,t}$'s are interacted with a full set of country dummies to allow for country-specific coefficients. The estimates are virtually identical.

Test 3: the reduced form model. Equations (2.8) and (2.9) can be combined into a reduced form model, in which relative wages depend negatively on productivity and training, controlling for labour market conditions and country (or individual) fixed-effects.

This model can be tested in two alternative ways. First, industry-level data on productivity, training and employment trend can be matched into the ECHP to check whether they are correlated with the wage differentials ($\frac{w_i}{w_f}$).

This is done in the upper panel (panel A) of table 2.8. In the first two columns, the basic model refers to a regression similar to equation (2.11), where the interaction between $PERSONAL_{i,t}$ and $R_{s,96}$ is replaced with interactions terms between $PERSONAL_{i,t}$ and productivity, training costs an employment trend. In the fully interacted model, all controls are interacted with country dummies. Both specifications are estimated for the manufacturing and service sectors together, and for manufacturing only. In the latter case, the employment trend variable can be included.

Results are now less clear. The coefficients are always very small and never statistically significant. The point estimates seem to contradict the prediction of the model.

The lower panel (panel B) of table 2.8 presents an alternative test of the reduced form model. The ECHP contains information on occupational categories which can be used to test the effect of productivity: as long as jobs in higher level occupations are more productive, one would expect the premium paid to jobs found through informal networks to be lower in

higher occupations. Information on training is also available in the ECHP. Employed workers are asked to indicate whether they have received any training that they are finding useful in their current job. Unfortunately, it is not possible to know whether training has been provided by the current or a previous employer. The model predicts that, in these jobs, the premium to personal contacts should be lower. Note that individual fixed effects are likely to be a good control for the informational value of references (R_i), which can now vary at the individual level. A set of regional dummies is included to control for local labour market conditions.

Eventually, the reduced form model is tested by estimating the following fixed-effect wage regression:

$$\begin{aligned} \ln(w_{i,t}) &= \sum_j \theta_j \left[Occup(j)_{i,t} * PERSONAL_{i,t}\right] + \\ &+\delta \left[train_{i,t} * PERSONAL_{i,t}\right] + x'_{i,t}\beta + \varepsilon_i + \nu_{i,t} \end{aligned} \tag{2.12}$$

where $Occup(j)_{i,t}$ is a dummy equal to 1 if individual i at time t is holding a job in the j^{th} occupational group, $train_{i,t}$ is a dummy equal to 1 if individual i indicates to have received training which is useful in carrying out the job he's holding at time t and the other symbols have the usual meaning. Three standard broad occupational dummies are considered: high, intermediate and lower occupations. Estimates now confirm the predictions of the model.

Similarly to equation (2.11), also equation (2.12) can be improved by allowing all coefficients on the $x_{i,t}$'s to vary by country. This is done in the second column of table 2.8 (panel B), where, once again, the estimates suggest that the wage premium paid to jobs found through informal networks is lower in higher occupations. The coefficient on the training interaction has the expected sign but it is not significant.

Additional implications: the incidence of jobs found through personal contacts

The model also predicts that, in each period, a fraction $q\delta$ of jobs is created through the

formal channel and $1-\zeta(\widehat{R}_f)$ of these are immediately destroyed. Similarly, the informal channel leads a fraction $q(1-\delta)$ of vacancies to be filled in each period, $1-\zeta(R_i)$ of which are destroyed. This implies that, at the end of each period, the ratio of vacancies filled through the informal channel relative to the formal one is:

$$P = \frac{(1-\delta)}{\delta}\frac{\zeta(R_i)}{\zeta(\widehat{R}_f)} \tag{2.13}$$

Equation (2.13) suggests that the probability of observing a job filled though the formal channel is lower when firms invest more in formal recruitment. This is tested in table 2.9 which reports results from the following probit regression on the pooled sample of individuals from all countries:

$$\Pr(y_i = 1) = \Theta\left(\gamma R_s + x_i'\beta\right) \tag{2.14}$$

where y_i is equal to 1 if individual i has found her current job through personal contacts and zero otherwise. As above, R_s is the log of average recruitment costs per employee in the industry s where individual i is observed. $\Theta(\cdot)$ is the cumulative of the normal distribution. The estimation is run using data from the 1996 wave of the ECHP, which is the one that allows the widest country coverage, and excluding individuals with less than one year of tenure. The set of controls is the same as in table 2.3, except that here all countries have been pooled together.

The estimate of γ is shown in the first column of table 2.9 and confirms the prediction that less jobs are found through personal contacts when firms invest more in recruitment activities. The second column of table 2.9 reports the results obtained from the same model when the coefficients of all the controls are allowed to vary by country. The point estimate is still negative but not significant.

Similarly to equation (2.9), the reduced form version of equation (2.13) can also be tested using either industry-level or individual-level regressors for productivity and training. The

upper panel (panel A) of table 2.10 exploits the first option and contains estimates of probit regressions similar to (2.14) where R_s is replaced by productivity, training and employment trend corresponding to the industry in which individual i is observed. Once again, the estimation is performed with fixed (basic model) and country-specific (fully interacted model) coefficients for the controls as well as for manufacturing and industry together and for manufacturing only.

Results are mixed: in the basic model (column 1 and 2) productivity appears to have the predicted negative and significant effect on wage differentials, while the effect of training is either non significant or of the wrong sign. These findings are reversed in the fully interacted model (column 3 and 4) where productivity shows a positive effect (either significant or not) and the coefficient of training has the expected negative sign (significant in one specification).

Alternatively, a test of the reduced form of equation (2.13) using individual level data is shown in the lower panel (panel B) of table 2.10. This is done by running the following probit regression:

$$\Pr(y_i = 1) = \Theta\left(\sum_j \theta_j Occup(j)_i + \delta TRAIN_i + x_i'\beta\right) \tag{2.15}$$

where the symbols have the same meaning as in equation (2.12). Regional dummies are also added to the set of controls. Results are now clearly supporting the predictions of the model: there are less jobs created through the informal channel in high occupations as well as in positions that require more training.

2.6 Conclusions

How does this chapter answer the question of the title? Do friends and relatives really help in getting a good job? It depends.

The first part of the chapter documents that, contrary to the common belief, informal search channels not always lead to significantly better paid jobs. Across countries and in-

dustries wage premiums and wage penalties to finding a job through personal contacts are equally frequent. Workers' and jobs' observable characteristics are controlled for in computing these wage differentials and individual fixed-effect are also introduced to account for the fact that both access to informal networks and the quality of information transmitted via personal contacts might be individual specific. Moreover, the fact that wage differentials between jobs found through formal vs. informal channels disappear with tenure suggests that they probably originate from some kind of mismatch.

The chapter then moves on to presenting a simple model in which firms invest optimally in formal recruitment to improve the probability of being matched to a suitable worker. In this model, even if informal networks also provide useful information about applicants and help forming good matches, jobs created trough formal methods can on average be of better quality, if investment in formal recruitment is large enough. This happens more likely when employers are filling high productivity jobs, because the cost of hiring an unsuitable worker is higher, both in terms of forgone profits and higher wages paid out. Firms also invest more in recruitment when training costs are high, because a new worker will have to be trained again if the hire turns out to be unfit for the job.

In the last part of the chapter, industry level data for several European countries are used to show that, indeed, firms spend more on recruitment when both productivity and training costs are higher. An interesting "discouraged-job" effect is also found: expenditure on recruitment activities is lower in tighter labour markets. Finally, the wage premium to finding a job through personal contacts is shown to be negatively correlated with expenditure in recruitment activities and, consequently, also lower in high productivity occupations and in jobs that require training.

Analysing the role of informal networks in the labour market is interesting in itself, given the extensive use that both firms and workers make of them. It also allows to shed light on some sources of wage dispersion that have not yet been fully explored. Moreover, this chapter takes the rather unconventional approach to look at variation in formal recruitment practices

as a source of wage differentials between jobs found through different search channels. In doing this it touches a field that has received surprisingly little attention by economists: while the search behaviour of jobseekers has been extensively studied, very little is known about how firms look for workers. This chapter is an example of how a deeper understanding of firms' recruitment policies can help answering questions that are still unresolved.

This work could be extended in several directions. As workers are supposed to react to firms recruitment policies, the supply side of the labour market should also be modelled. Intuitively, if workers are unaware of their type, i.e. they don't know ex-ante if they are properly qualified for the job, the main results shown here should not change. However, if workers have some information about their type, some form of self selection could arise, with workers being more likely to apply to vacancies that better fit their characteristics when the screening process is stricter. In such framework, the firms' benefits of investing in recruitment should increase: not only does a stricter recruitment policy allow them to select good candidates (just like in the model presented here), but it also induces more self selection of workers in the first place, thus increasing the average quality of the pool of candidates.

More research is also needed to understand how employers choose their recruitment strategies and how these affect overall labour market performance. To do this more and better firm level data are necessary. The next chapter uses an original dataset of filled vacancies in more than 5,000 British establishments and looks at the determinants and the implications of both the intensity and the types of recruitment practices used by employers.

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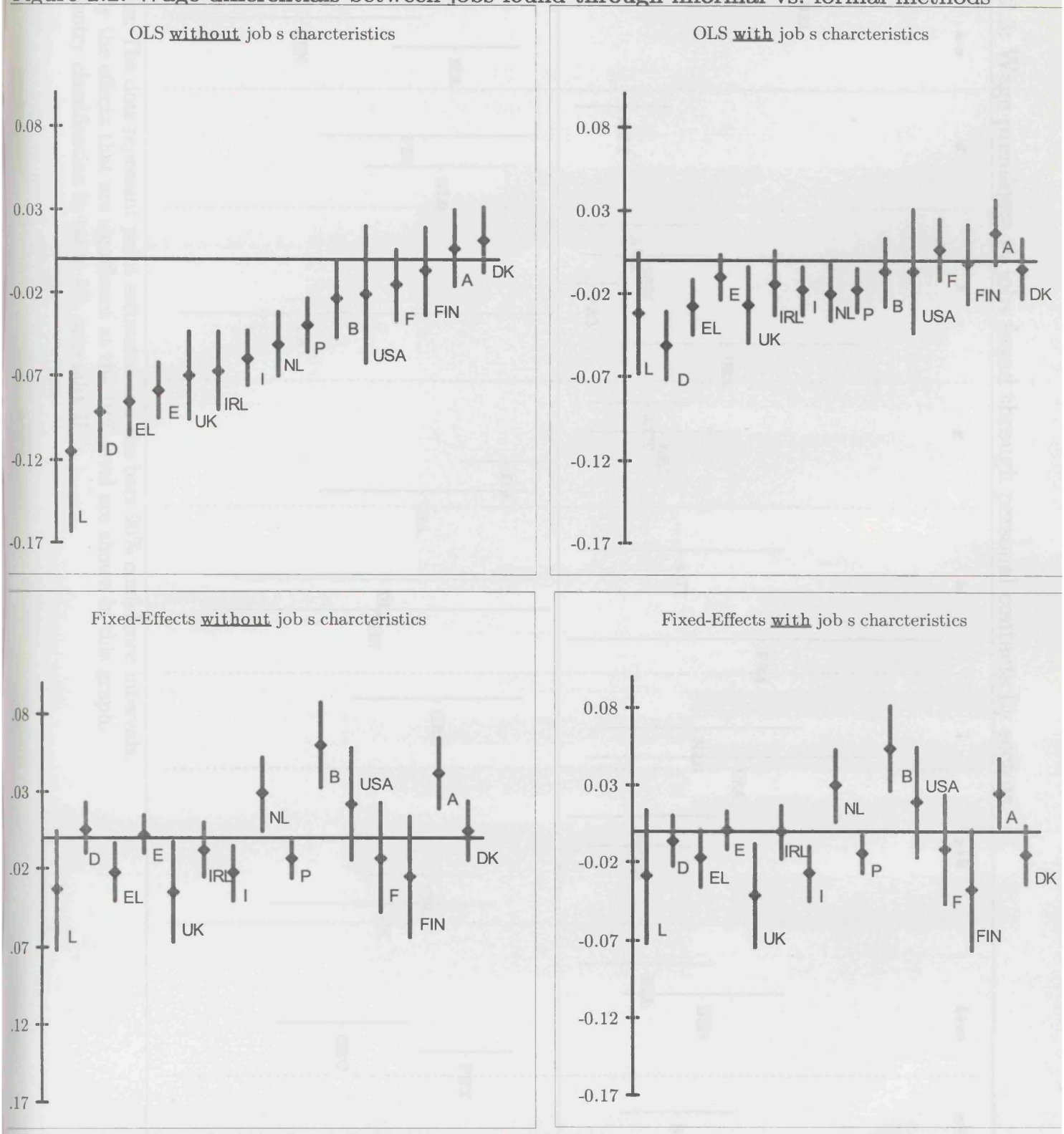
Figures and Tables

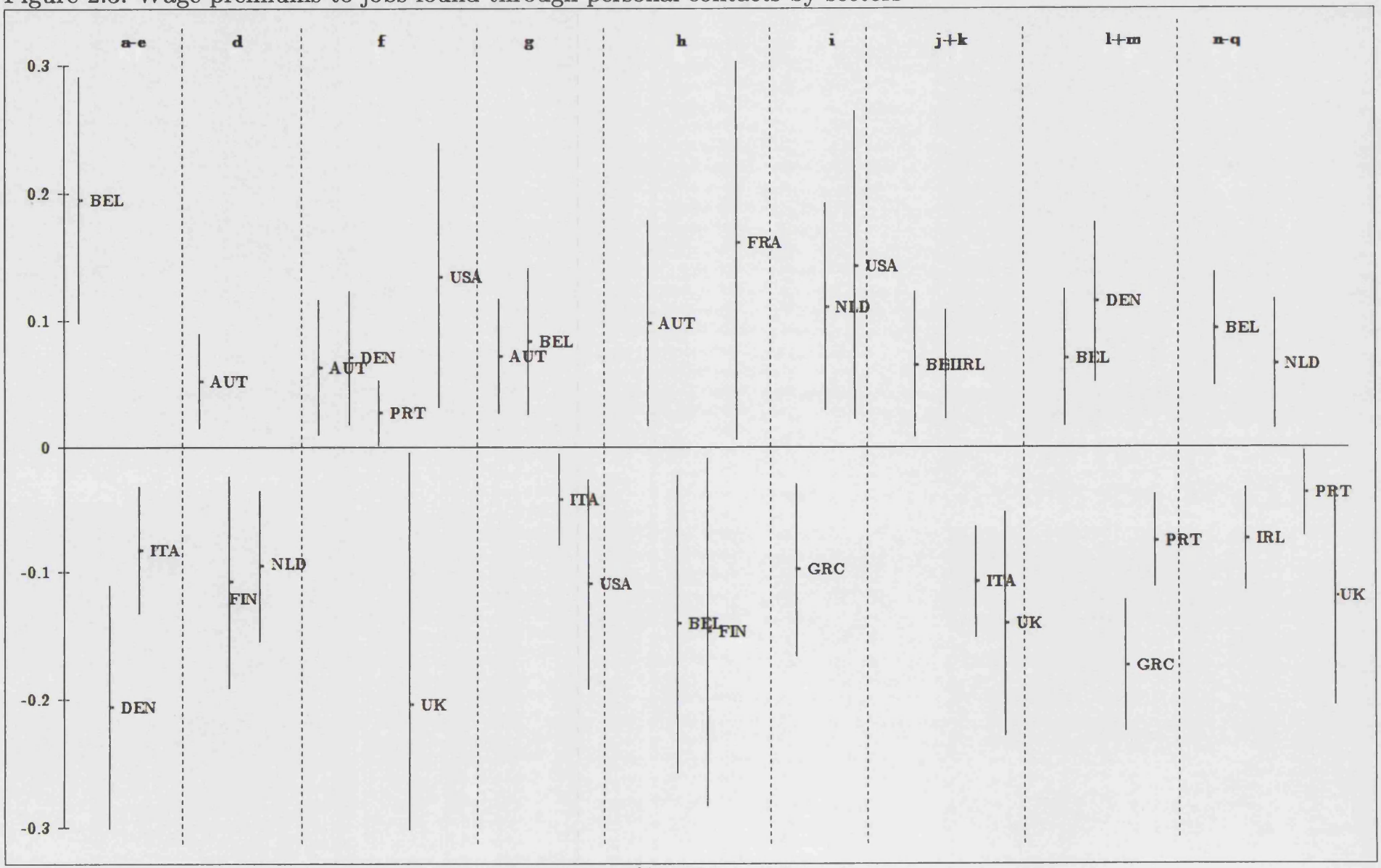
Figure 2.1: Methods used by employed workers to find their current job

Figure 2.2: Wage differentials between jobs found through informal vs. formal methods



ote: The dots represent point estimates and the bars 90% confidence intervals.
ountry abbreviation: A=Austria, B=Belgium, DK=Denmark, FIN=Finland, F=France, D=Germany, EL=Greece, RL=Ireland, I=Italy, L=Luxembourg, NL=Netherlands, P=Portugal, E=Spain, UK=United Kingdom, USA=United States

Figure 2.3: Wage premiums to jobs found through personal contacts by sectors



Note: Note: The dots represent point estimates and the bars 90% confidence intervals.
Only the effects that are significant at the 10% level are shown in this graph.
Industry classification in table A6, appendix II.

Table 2.1: Sample composition by country and year

A: European Community Household Panel

Country	sample size *(# of individuals)*	1994	1995	1996	1997	1998	1999	2000
Austria	2364							
Belgium	1555							
Denmark	2387							
Finland	1913							
France	2658							
Germany	3573	(1)	(1)	(1)	(1)	(1)	(1)	
Greece	2364							
Ireland	2627							
Italy	3240							
Luxembourg	596							
Netherlands	3715							
Portugal	3785							
Spain	4277							
United Kingdom	2223							
United States	1574	(2)		(2)		(2)		(2)

data available — data unavailable

(1) German Socio-Economic Panel
(2) National Longitudinal Survey of Youths (NLSY79)

B: Eurostat Labour Costs Survey

Country	1992	1996
Austria		
Belgium		
Germany		
Denmark		
Finland		
France		
Greece		
Luxembourg		
Portugal		
United Kingdom		

data available — data unavailable

Table 2.2. Recruitment costs in European countries

Country	Sector	% of total annual labour costs		spending per employee in current ECU	
		1992	1996	1992	1996
Austria	industry	-	0.50	-	204.45
	services	-	1.05	-	471.66
Belgium	industry	0.07	-	22.60	-
	services	0.24	-	78.85	-
Germany	industry	-	0.06	-	24.99
	services	-	0.13	-	45.66
Denmark	industry	0.08	-	24.83	-
	services	0.11	-	32.39	-
Finland	industry	-	0.11	-	35.72
	services	-	0.17	-	48.88
France	industry	0.09	0.05	27.52	18.20
	services	0.14	0.06	42.62	20.36
Greece	industry	0.01	-	1.32	-
	services	0.01	-	1.27	-
Luxembourg	industry	0.02	0.04	5.74	13.25
	services	0.07	0.21	22.85	77.93
Portugal	industry	0.03	0.02	2.96	2.14
	services	0.06	0.08	8.24	11.19
United Kingdom	industry	0.30	-	74.81	-
	services	0.42	-	81.62	-

Note: only establishments with 10 employees or more were included in the Eurostat Labour Costs Surveys

Source: Eurostat

Table 2.3: Probit estimates for jobs found through personal contacts

	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK[2]	USA[3]
Mean of dependent variable	*0.268*	*0.264*	*0.174*	*0.135*	*0.345*	*0.323*	*0.417*	*0.275*	*0.253*	*0.385*	*0.180*	*0.387*	*0.454*	*0.226*	*0.130*
Individual and household characteristics															
1=female	-0.030	-0.004	-0.031	-0.015	-0.002	-0.001	0.042	-0.034	-0.013	-0.133**	-0.007	0.005	-0.044*	-0.010	-0.018
	(0.024)	(0.030)	(0.020)	(0.018)	(0.024)	(0.022)	(0.028)	(0.026)	(0.018)	(0.054)	(0.018)	(0.021)	(0.023)	(0.025)	(0.025)
Age	0.012	0.009	-0.008	-0.011	-0.003	-0.007	0.000	-0.003	0.002	0.051**	0.010	0.001	-0.014*	0.008	-0.148
	(0.007)	(0.013)	(0.007)	(0.007)	(0.009)	(0.007)	(0.010)	(0.008)	(0.007)	(0.021)	(0.006)	(0.006)	(0.007)	(0.007)	(0.154)
Age squared	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.001**	-0.000	-0.000	0.000	-0.000	0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
# adults in the HH	0.000	-0.004	-0.016	0.002	-0.008	0.009	-0.000	0.010	-0.011	0.018	-0.010	0.013	-0.001	0.014	-0.009
	(0.010)	(0.019)	(0.016)	(0.013)	(0.015)	(0.013)	(0.013)	(0.011)	(0.008)	(0.033)	(0.011)	(0.009)	(0.009)	(0.015)	(0.007)
HH income (log)	0.004	-0.016	-0.031	-0.024	0.029	-0.051**	0.027	-0.047	0.008	-0.133**	-0.002	0.037*	-0.000	0.008	0.009
	(0.025)	(0.034)	(0.028)	(0.023)	(0.026)	(0.025)	(0.025)	(0.030)	(0.018)	(0.064)	(0.015)	(0.022)	(0.020)	(0.026)	(0.013)
1=tertiary edu.	-0.035	-0.075*	-0.016	-0.026	-0.150***	-0.025	-0.063	-0.030	-0.121***	-0.207***	-0.035	-0.126**	-0.103***	-0.108***	
	(0.047)	(0.041)	(0.030)	(0.028)	(0.032)	(0.035)	(0.043)	(0.039)	(0.029)	(0.063)	(0.025)	(0.053)	(0.030)	(0.030)	-0.006
1=second. edu.	-0.021	-0.038	0.012	-0.020	-0.065***	-0.056**	0.033	-0.009	-0.035*	-0.079	-0.028	-0.067**	-0.040	-0.071***	(0.006)
	(0.028)	(0.035)	(0.024)	(0.023)	(0.025)	(0.027)	(0.035)	(0.027)	(0.020)	(0.055)	(0.019)	(0.030)	(0.027)	(0.024)	
Job's characteristics															
1=temporary	-0.044	0.023	0.014	0.000	-0.030	0.023	0.038	0.066*	-0.047*	-0.100	-0.067**	0.004	-0.054***	-0.089	-0.019
	(0.034)	(0.036)	(0.027)	(0.022)	(0.033)	(0.029)	(0.045)	(0.035)	(0.025)	(0.115)	(0.033)	(0.028)	(0.020)	(0.057)	(0.084)
1= part time	0.084**	0.048	0.087**	0.001	0.005	0.040	0.018	0.001	0.070*	0.028	-0.004	0.005	0.114***	0.093***	-0.006
	(0.038)	(0.043)	(0.041)	(0.034)	(0.038)	(0.039)	(0.062)	(0.035)	(0.036)	(0.079)	(0.022)	(0.062)	(0.041)	(0.035)	(0.036)
1=first job	-0.066**	0.042	-0.018	-0.040	-0.061	0.010	0.008	-0.099***	0.034*	0.008	-0.010	0.032	0.003	0.008	-
	(0.027)	(0.033)	(0.034)	(0.024)	(0.049)	(0.038)	(0.030)	(0.028)	(0.019)	(0.062)	(0.021)	(0.023)	(0.026)	(0.041)	
1= public sector	-0.063**	0.030	-0.095***	-0.045**	-0.136***	-0.102***	-0.314***	-0.214***	-0.155***	-0.350***	-0.065**	-0.152***	-0.313***	-0.047	0.065
	(0.025)	(0.049)	(0.026)	(0.018)	(0.030)	(0.032)	(0.047)	(0.034)	(0.031)	(0.096)	(0.026)	(0.033)	(0.032)	(0.046)	(0.047)
Occupations[4]															
1= higher. occup.	-0.067**	-0.138***	-0.036	-0.016	-0.067**	-0.143***	-0.149***	-0.072**	-0.040	-0.058	-0.120***	-0.059	-0.073**	-0.097***	-0.050*
	(0.029)	(0.040)	(0.027)	(0.025)	(0.032)	(0.025)	(0.043)	(0.036)	(0.029)	(0.075)	(0.022)	(0.043)	(0.034)	(0.030)	(0.029)
1= interm. occup.	-0.047*	-0.030	-0.036	0.014	-0.052*	-0.151***	-0.072*	0.009	-0.004	0.016	-0.078***	0.061**	-0.017	-0.087***	-0.002
	(0.028)	(0.037)	(0.026)	(0.026)	(0.028)	(0.023)	(0.037)	(0.033)	(0.023)	(0.064)	(0.020)	(0.026)	(0.027)	(0.027)	(0.031)
Firm's size[5]															
1=small	0.014	0.095**	-0.045**	0.082***	0.143***	0.080**	0.032	0.079**	0.123***	0.069	0.041*	0.008	0.116***	0.057*	0.009
	(0.026)	(0.039)	(0.022)	(0.024)	(0.033)	(0.033)	(0.062)	(0.034)	(0.026)	(0.065)	(0.022)	(0.031)	(0.028)	(0.034)	(0.027)
1=medium	0.015	0.077*	-0.034	0.074***	0.050	0.033	0.052	0.056	0.050*	0.013	0.021	-0.027	0.054*	0.007	0.028
	(0.027)	(0.040)	(0.022)	(0.026)	(0.034)	(0.029)	(0.069)	(0.034)	(0.029)	(0.064)	(0.021)	(0.033)	(0.032)	(0.030)	(0.029)
Industries															
1= manufacturing	-0.198**	0.150	0.052	0.192**	-0.121	-	-0.020	0.038	0.141***	-0.195	-0.155***	-0.029	-0.057	0.012	-0.136***
	(0.077)	(0.163)	(0.069)	(0.098)	(0.084)		(0.117)	(0.081)	(0.054)	(0.153)	(0.034)	(0.044)	(0.051)	(0.118)	(0.041)
1=services	-0.220**	0.176	0.057	0.130***	-0.070	-	0.044	0.053	0.137***	-0.249	-0.173***	-0.017	-0.035	-0.011	-0.256**
	(0.092)	(0.123)	(0.058)	(0.049)	(0.091)		(0.115)	(0.076)	(0.047)	(0.176)	(0.063)	(0.043)	(0.051)	(0.118)	(0.102)
Observations	1959	1201	1837	1710	2181	2587	1625	1580	2610	529	2618	2611	2746	1593	907

(1) Industry dummies not available for confidentiality reasons

(2) Size of organisation rather than local unit. Different classification: small= less than 20 employees; medium=between 20 and 2000 employees; large (reference group)=more than 2000 employees.

(3) Education measured in years of schooling; household size instead of number of adults; non-standard contract instead of temporary contracts.

(4) Occupational group: higher = legislators, senior officials and managers, professionals, technicians and associate professionals; intermediate = clerks, service workers and shop and market sales workers, skilled agriculture and fishery workers; lower (reference group) = craft and related trades workers, plant and machine operators and assemblers, other elementary occupations.

(5) Firms' size: small=less than 20 employees; medium=between 20 and 100 employees; large (reference group)=more than 100 employees.

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Source: ECHP 1994-1999 for European countries. NLSY 1996-2000 for the USA.

Table 2.4: The wage premium to finding a job through personal contacts.

Dependent variable = log hourly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
PANEL A: OLS REGRESSIONS															
Sample size	8943	6042	8877	4437	11096	14632	9441	9631	13508	1687	15610	15817	16138	5889	3507
Without job characteristics															
1=personal contacts	0.007	-0.024*	0.012	-0.007	-0.015	-0.092***	-0.086***	-0.067***	-0.060***	-0.115***	-0.051***	-0.040***	-0.079***	-0.070***	-0.021
	(0.014)	(0.014)	(0.012)	(0.016)	(0.013)	(0.014)	(0.011)	(0.014)	(0.010)	(0.029)	(0.012)	(0.010)	(0.010)	(0.016)	(0.025)
With job characteristics[2]															
1=personal contacts	0.017	-0.007	-0.005	-0.002	0.007	-0.051***	-0.028***	-0.014	-0.018**	-0.032	-0.020*	-0.018**	-0.010	-0.027*	-0.007
	(0.012)	(0.012)	(0.011)	(0.014)	(0.011)	(0.013)	(0.010)	(0.012)	(0.009)	(0.022)	(0.010)	(0.008)	(0.008)	(0.014)	(0.023)
PANEL B: FIXED-EFFECT REGRESSIONS															
Sample size	8943	6042	8877	4437	11096	14632	9441	9631	13508	1687	15610	15817	16138	5889	3507
Individuals	2364	1555	2387	1913	2658	3573	2364	2627	3240	596	3715	3785	4277	2223	1574
Without job characteristics															
1=personal contacts	0.042***	0.060***	0.005	-0.025	-0.013	0.006	-0.022*	-0.008	-0.022**	-0.033	0.029**	-0.013*	0.002	-0.035*	0.022
	(0.014)	(0.016)	(0.012)	(0.024)	(0.022)	(0.010)	(0.011)	(0.011)	(0.011)	(0.024)	(0.014)	(0.008)	(0.008)	(0.020)	(0.022)
With job characteristics[2]															
1=personal contacts	0.025*	0.054***	-0.015	-0.038	-0.011	-0.006	-0.017	-0.000	-0.027***	-0.029	0.030**	-0.014*	0.001	-0.041**	0.019
	(0.013)	(0.016)	(0.012)	(0.024)	(0.022)	(0.010)	(0.011)	(0.011)	(0.011)	(0.026)	(0.014)	(0.008)	(0.008)	(0.021)	(0.022)

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
(1) Industry dummies not available for confidentially reasons
(2) Occupational (22) and industry (18) dummies, contract types (permanent vs. temporary, full-time vs. part-time), public sector, 7 dummies for firm's size.
The set of controls includes: experience and experience squared, tenure and tenure squared, a dummy for first job, a dummy for job-to-job movers. OLS regressions also have a gender dummy and education dummies (tertiary and secondary).
Source: ECHP 1994-1999 for all European countries. NLSY 1996-2000 for the USA.

Table2.5: The tenure profile of the premium to finding a job through personal contacts

Dependent variable = log hourly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
						FIXED-EFFECT REGRESSIONS									
Sample size	*1758*	*689*	*1935*	*916*	*1352*	*2186*	*1488*	*3002*	*1901*	*271*	*2810*	*3961*	*6010*	*888*	*542*
Individuals	*754*	*288*	*803*	*414*	*612*	*960*	*651*	*1204*	*828*	*129*	*1135*	*1579*	*2317*	*423*	*255*
coefficients on the interaction of the dummy for "jobs found through personal contacts" and the following tenure dummies:															
Without job characteristics															
tenure<=6 months	0.062*	0.085*	0.060**	-0.010	-0.008	-0.013	-0.037	-0.002	-0.054**	-0.098**	0.011	-0.003	-0.006	-0.059	-0.046
	(0.032)	(0.051)	(0.026)	(0.056)	(0.050)	(0.029)	(0.030)	(0.020)	(0.026)	(0.048)	(0.035)	(0.016)	(0.014)	(0.039)	(0.107)
tenure>6 months	0.022	0.045	0.027	-0.112**	-0.003	0.030	-0.020	-0.020	-0.037	0.016	0.012	0.007	0.004	-0.037	-0.039
	(0.028)	(0.049)	(0.027)	(0.057)	(0.051)	(0.029)	(0.028)	(0.020)	(0.027)	(0.049)	(0.033)	(0.015)	(0.015)	(0.040)	(0.080)
With job characteristics[2]															
tenure<=6 months	0.048	0.069	0.029	-0.012	0.012	-0.037	-0.033	0.015	-0.060**	-0.068	0.016	-0.011	-0.004	-0.054	-0.020
	(0.032)	(0.052)	(0.025)	(0.058)	(0.052)	(0.028)	(0.030)	(0.019)	(0.026)	(0.051)	(0.035)	(0.016)	(0.013)	(0.042)	(0.109)
tenure>6 months	0.005	0.007	0.001	-0.111*	0.023	0.012	-0.018	-0.020	-0.033	0.019	0.022	0.015	0.007	-0.027	-0.020
	(0.027)	(0.051)	(0.026)	(0.058)	(0.053)	(0.028)	(0.027)	(0.020)	(0.027)	(0.053)	(0.033)	(0.014)	(0.014)	(0.042)	(0.082)

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
(1) Industry dummies not available for confidentially reasons
(2) occupational and industry dummies, contract types, public sector
The set of controls includes: experience and experience squared, a dummy for first job, a dummy for job-to-job movers, 2 dummies for tenure<=6months and for tenure>6 months.
Source: ECHP 1994-1999 for all European countries. NLSY 1996-2000 for the USA.

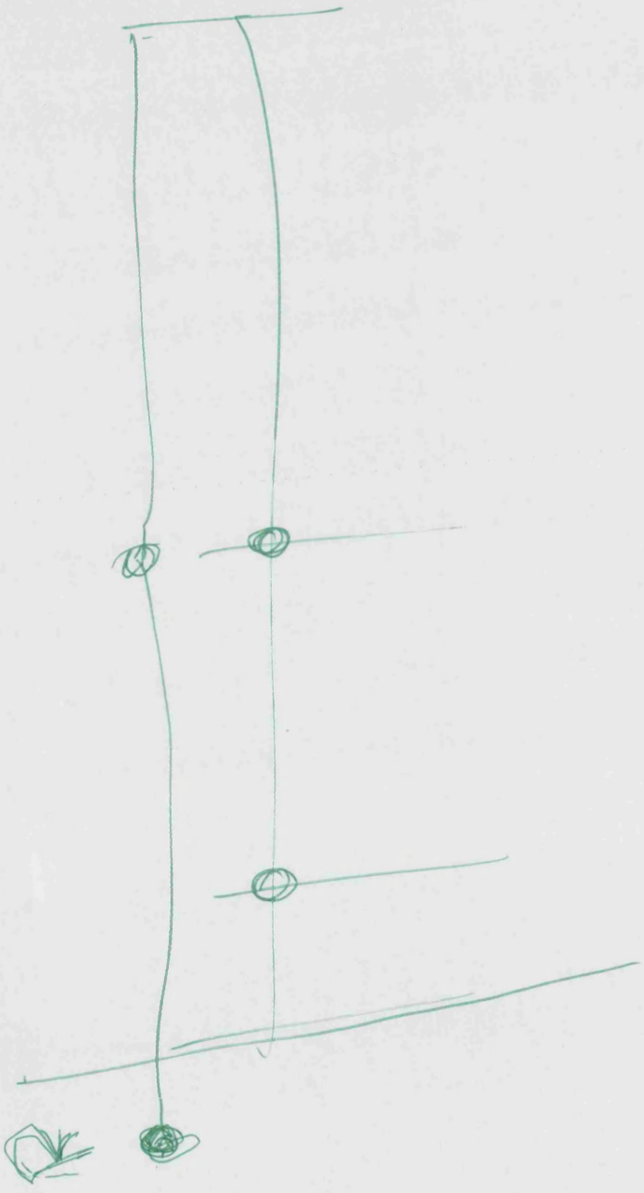


Table 2.6: The determinants of recruitment costs

Dependent variable: (log) recruitment costs per employee	industry and services [1]	manufacturing only [2]	manufacturing only [3]	*predicted sign*
(log) productivity(1)	0.432***	0.365**	0.371**	(+)
	(0.099)	(0.173)	(0.165)	
(log) training costs per employee	0.482***	0.372***	0.629***	(+)
	(0.112)	(0.061)	(0.143)	
employment trend(2)			-0.015**	(-)
			(0.007)	
Country dummies	yes	yes	yes	
Year dummies	yes	yes	yes	
Observations	175	474	114	
R-squared	0.81	0.41	0.88	

(1) productivity is measured as output per employee (in ECU at current prices) – annual values. Source: Eurostat.
(2) difference between % of firms expecting to increase and decrease employment in the following 3 months. Annual averages. See text for details. Source: OECD.

Countries included: Austria, Germany, Denmark, Finland, France, Greece, Luxembourg, Portugal, United Kingdom

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.7: Wage differentials and recruitment costs

Dependent variable: (log) hourly wage	*Basic model*(1) [1]	*Fully interacted model*(2) [2]	*predicted sign*
...interaction with [1=personal contacts]			
(log) recruitment costs per employee	-0.009*	-0.008*	(-)
	(0.005)	(0.005)	
Observations	19474	19474	
Individuals	5477	5477	
R-squared	0.20	0.21	

(1) Estimates come from fixed-effect (log) wage regressions on all individuals in all countries. The reported coefficients are the estimates for the interaction terms between the dummy for jobs found through personal contacts and average recruitment costs observed in the industry in which the single individual is currently working (in 1996). The set of controls includes experience and experience squared, tenure and tenure squared, a dummy for job-to-job movers, a dummy for first job, 18 industry dummies, year dummies and individual fixed effects. Wages are PPP-adjusted.

(2) As in model [1] with all controls interacted with country dummies.

Countries included: Austria, Finland, France, Luxembourg and Portugal

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.8: Reduced form model for the wage differentials

Panel A: industry-level regressors

	Basic model[1] *[1]*		*Fully interacted model*[2] *[2]*		
Dependent variable: (log) hourly wage	industry and services	manufacturing only	industry and services	manufacturing only	*predicted sign*
..interactions with [1=personal contacts]					
(log) productivity[3]	0.003	0.007	0.003	0.010	(-)
	(0.009)	(0.020)	(0.009)	(0.020)	
(log) training costs per employee	-0.001	0.009	0.002	0.002	(-)
	(0.004)	(0.007)	(0.003)	(0.008)	
employment trend[4]		0.014		0.011	(+)
		(0.017)		(0.016)	
Observations	55941	13824	55941	13824	
Individuals	15169	3885	15169	3885	
R-squared	0.21	0.23	0.23	0.26	

[1] Estimates come from fixed-effect (log) wage regressions on all individuals in all countries. The reported coefficients are the estimates for the interaction terms between the dummy for jobs found through personal contacts and the variable of interest (productivity, training costs, business trend in 1996) associated to the industry in which each individual is currently working. The set of controls includes experience and experience squared, tenure and tenure squared, a dummy for job-to-job movers, a dummy for first job, a dummy for part-time jobs, a dummy for jobs in the public sector, 22 occupational dummies, 18 industry dummies, year dummies and a constant. Wages are PPP-adjusted.

[2] As in model [1] with all controls interacted with country dummies

[3] productivity is measured as output per employee (in ECU at current prices) – annual values. Source: Eurostat.

[4] difference between % of firms expecting to increase and decrease employment in the following 3 months. Annual averages. See text for details. Source: OECD.

Countries included: Austria, Belgium, Denmark, Finland, France, Greece, Italy, Luxembourg, Portugal, Spain.

Panel B: individual-level regressors

	Basic model[1] [1]	Fully interacted model[2] [2]	*predicted sign*
..interactions with [1=personal contacts]			
Higher occupations	-0.023***	-0.022***	(-)
	(0.008)	(0.008)	
Intermediate occupations	-0.010	-0.003	(-)
	(0.006)	(0.006)	
Training	-0.012***	-0.004	(-)
	(0.004)	(0.004)	
Observations	117147	117147	
Number of id	30511	30511	
R-squared	0.19	0.21	

[1] The set of controls includes experience and experience squared, tenure and tenure squared, a dummy for job-to-job movers, a dummy for first job, a dummy for part-time jobs, a dummy for jobs in the public sector, 22 occupational dummies, 18 industry dummies (9 in model [2]), regional and year dummies and individual fixed-effects. Wages are PPP-adjusted.

[2] As in model [1] with all controls interacted with country dummies.

Occupational groups

higher = legislators, senior officials and managers, professionals, technicians and associate professionals.

intermediate = clerks, service workers and shop and market sales workers, skilled agriculture and fishery workers.

lower (reference group) = craft and related trades workers, plant and machine operators and assemblers, other elementary occupations.

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

All countries included.

Table 2.9: Incidence of jobs found through informal networks and recruitment costs

Dependent variable *=1 if job found through personal contacts (0 otherwise)*	basic model	fully interacted model[(1)]	*predicted sign*
(log) recruitment costs per employee	-0.032***	-0.002	(-)
	(0.012)	(0.055)	
Country dummies	yes	yes	
Observations	3734	3695	
Log Likelihood	-2264.86	-2181.55	

(1) In the fully interacted model all controls are interacted with country dummies.
Both specifications include a set of controls with the following variables: a gender dummy, age, age squared, # of adults in the household, (log) household income, a dummy for first job, a dummy for temporary jobs, a dummy for part-time jobs, a dummy for public sector jobs, 22 occupational dummies and 18 industry dummies.
Robust standard errors (clustered by country and industry) in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Countries included: Austria, Finland, France, Luxembourg, Portugal.

Table 2.10: Reduced form for the incidence of jobs found through personal contacts

Panel A: industry-level regressors

Dependent variable (=1 if job found through personal contacts 0 otherwise)	*Basic model*		*Fully interacted model*[1]		predicte sign
	industry and services	manufacturing only	industry and services	manufacturing only	
log) productivity[2]	-0.048***	-0.042**	0.037	1.086***	(-)
	(0.018)	(0.019)	(0.029)	(0.112)	
log) training costs per mployee	0.035***	0.017	-0.013	-0.327*	(-)
	(0.012)	(0.024)	(0.061)	(0.188)	
mployment trend[3]		-0.001		-0.002*	
		(0.001)		(0.001)	
Country dummies	yes	yes	yes	yes	
Observations	9605	2611	9537	2521	
Log Likelihood	-5879.53	-1534.18	-5661.29	-1384.68	
Countries included	all EU	A-B-D -FI-GR-I-L-P-ES	all EU	A-B-D-FI-GR-I-L-P-ES	

1) In the fully interacted model all controls are interacted with country dummies.
2) productivity is measured as output per employee (in ECU at current prices) – annual values. Source: Eurostat.
3) difference between % of firms expecting to increase and decrease employment in the following 3 months. Annual averages. See ext for details. Source: OECD.
The set of controls includes: a gender dummy, age, age squared, # of adults in the household, (log) household income, a dummy fo rst job, a dummy for temporary jobs, a dummy for part-time jobs, a dummy for public sector jobs, 22 occupational dummies, 18 industry dummies and regional dummies.
Country abbreviations:
A=Austria; B=Belgium; D=Germany; FI=Finland; GR=Greece; I=Italy; L=Luxembourg; P=Portugal; ES=Spain

Panel B: individual-level regressors

	Basic model	*Fully interacted model*[1]	*predicte sign*
=higher occupations	-0.053***	-0.052***	(-)
	(0.016)	(0.015)	
=intermediate occupations	-0.021	-0.022	(-)
	(0.020)	(0.019)	
=received training	-0.060***	-0.082***	(-)
	(0.009)	(0.025)	
Observations	19385	19373	
Log Likelihood	-10909.20	-10619.81	

1) In the fully interacted model all controls are interacted with country dummies.
The set of controls includes: a gender dummy, age, age squared, # of adults in the household, (log) household income, a dummy fo rst job, a dummy for temporary jobs, a dummy for part-time jobs, a dummy for public sector jobs, 22 occupational dummies, 18 industry dummies and regional dummies.
Occupational groups:
higher = legislators, senior officials and managers, professionals, technicians and associate professionals.
intermediate = clerks, service workers and shop and market sales workers, skilled agriculture and fishery workers.
lower (reference group) = craft and related trades workers, plant and machine operators and assemblers, other elementary occupations.
Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All countries included.

APPENDIX 2.A: Comparative Statics

This section provides detailed proofs of the comparative statics effects described in the main text in section 2.4.

Proposition 1 $\frac{dR_f}{dp} > 0$

Proof. *The first partial differential of equation (2.8) with respect to* $\widehat{R}_f$ *and* p *yields:*

$$0 = \zeta''(\widehat{R}_f)\left[c\widehat{R}_f + \frac{q}{1+r}kp + (1-\beta)(1+r+q)p\right]d\widehat{R}_f + \\ + \zeta'(\widehat{R}_f)\left[\frac{q}{1+r}k + (1-\beta)(1+r+q)\right]dp$$

which, given the properties of $\zeta(\cdot)$*, proves the proposition.* ■

Proposition 2 $\frac{dR_f}{dk} > 0$

Proof. *The first partial differential of equation (2.8) with respect to* R_f *and* k *yields:*

$$0 = \zeta''(\widehat{R}_f)\left[c\widehat{R}_f + \frac{q}{1+r}kp + (1-\beta)(1+r+q)p\right]d\widehat{R}_f + \left[\zeta'(\widehat{R}_f)\frac{q}{1+r}p\right]dk$$

which, given the properties of $\zeta(\cdot)$*, proves the proposition.* ■

Proposition 3 $\frac{dR_f}{dq} > 0$

Proof. *The first partial differential of equation (2.8) with respect to* R_f *and* q_f *yields:*

$$0 = \delta\zeta''(\widehat{R}_f)\left[c\widehat{R}_f + \frac{q}{1+r}kp + (1-\beta)(1+r+q)p\right]d\widehat{R}_f + \\ + \left\{\frac{\delta}{1+r}\zeta'(\widehat{R}_f)kp + (1-\beta)p + \frac{rc}{q^2}(1+r)\right\}dq$$

which, given the properties of $\zeta(\cdot)$*, proves the proposition.* ■

Proposition 4 $\frac{dR_f}{dR_i} < 0$

Proof. *The first partial differential of equation (2.8) with respect to* $\widehat{R}_f$ *and* R_i *yields:*

$$0 = \zeta''(\widehat{R}_f)\left[c\widehat{R}_f + \frac{q}{1+r}kp + (1-\beta)(1+r+q)p\right]d\widehat{R}_f - \left[\frac{1-\delta}{\delta}c\zeta'(R_i)\right]dR_i$$

which, given the properties of $\zeta(\cdot)$*, proves the proposition.* ■

Proposition 5 $\frac{dR_f}{d\delta} > 0$

Proof. *The first partial differential of equation (2.8) with respect to* $\widehat{R}_f$ *and* R_i *yields:*

$$0 = \zeta''(\widehat{R}_f)\left[c\widehat{R}_f + \frac{q}{1+r}kp + (1-\beta)(1+r+q)p\right]d\widehat{R}_f + \left[\frac{cr}{q}(1+r+q) + (1-\delta)\zeta(R_i)\right]d\delta$$

which, given the properties of $\zeta(\cdot)$*, proves the proposition.* ■

Appendix 2.B: Detailed tables

Table 2.B.1: Summary statistics

Country	Sample size observations *individuals*	female	age	experience (in years)	tenure (in years)	# adults in the household	household size	household income (in US$)	hourly wage (in US$)	tertiary education	secondary education	first job
Austria	8943	0.44	32.36	15.38	5.06	2.89	3.66	36347.37	6.54	0.08	0.70	0.27
	2364	(0.50)	(10.11)	(10.40)	(4.34)	(1.34)	(1.58)	(17929.37)	(2.94)	(0.27)	(0.46)	(0.44)
Belgium	6042	0.48	34.39	13.64	6.06	2.21	3.26	35463.67	7.66	0.47	0.33	0.26
	1555	(0.50)	(7.42)	(8.43)	(4.54)	(0.79)	(1.23)	(17311.94)	(3.08)	(0.50)	(0.47)	(0.44)
Denmark	8877	0.47	37.28	18.96	5.02	2.05	2.94	32556.05	8.17	0.37	0.45	0.07
	2387	(0.50)	(10.05)	(10.85)	(4.49)	(0.71)	(1.29)	(13272.80)	(2.63)	(0.48)	(0.50)	(0.26)
Finland	4437	0.50	37.60	17.89	5.30	2.18	3.19	31143.52	6.88	0.44	0.40	0.09
	1913	(0.50)	(9.05)	(9.76)	(4.30)	(0.76)	(1.36)	(17892.32)	(2.40)	(0.50)	(0.49)	(0.29)
France	11096	0.45	37.13	18.45	6.30	2.23	3.18	30122.36	7.83	0.26	0.41	0.05
	2658	(0.50)	(9.04)	(10.43)	(4.49)	(0.85)	(1.30)	(21620.44)	(4.90)	(0.44)	(0.49)	(0.22)
Germany	14632	0.44	36.75	17.34	4.03	2.31	3.06	30105.64	6.91	0.24	0.60	0.08
	3573	(0.50)	(9.74)	(10.21)	(3.41)	(0.89)	(1.28)	(13039.20)	(3.16)	(0.43)	(0.49)	(0.27)
Greece	9441	0.41	34.92	13.32	5.08	2.78	3.57	7725.05	1.82	0.29	0.37	0.32
	2364	(0.49)	(9.48)	(10.26)	(4.71)	(1.10)	(1.23)	(4416.63)	(0.95)	(0.46)	(0.48)	(0.47)
Ireland	9631	0.46	33.08	14.90	4.49	3.11	4.17	34515.05	7.75	0.22	0.47	0.21
	2627	(0.50)	(10.54)	(11.35)	(4.47)	(1.45)	(1.83)	(19209.92)	(4.06)	(0.42)	(0.50)	(0.41)
Italy	13508	0.42	33.95	13.11	6.12	2.84	3.53	28317.44	6.59	0.10	0.48	0.38
	3240	(0.49)	(8.78)	(9.45)	(4.61)	(1.21)	(1.27)	(14344.17)	(2.75)	(0.30)	(0.50)	(0.49)
Luxembourg	1687	0.45	33.48	14.69	5.42	2.34	3.24	45377.11	10.76	0.22	0.29	0.27
	596	(0.50)	(8.38)	(9.34)	(4.02)	(0.95)	(1.38)	(24835.44)	(5.63)	(0.41)	(0.45)	(0.44)
Netherlands	15610	0.45	36.17	16.40	5.61	2.16	2.94	29804.09	8.58	0.18	0.37	0.18
	3715	(0.50)	(9.04)	(10.25)	(4.47)	(0.75)	(1.27)	(17364.76)	(6.38)	(0.38)	(0.48)	(0.38)
Portugal	15817	0.43	33.08	15.29	5.02	3.10	3.97	21177.84	3.98	0.07	0.15	0.31
	3785	(0.50)	(10.72)	(11.90)	(4.43)	(1.32)	(1.62)	(12822.95)	(2.53)	(0.26)	(0.35)	(0.46)
Spain	16138	0.37	33.82	15.13	4.33	2.98	3.70	25885.20	6.49	0.30	0.21	0.22
	4277	(0.48)	(9.56)	(11.01)	(4.51)	(1.31)	(1.41)	(15866.34)	(3.60)	(0.46)	(0.41)	(0.41)
United Kingdom	5889	0.52	37.36	20.06	5.06	2.27	3.06	31854.20	7.50	0.29	0.39	0.11
	2223	(0.50)	(10.88)	(11.59)	(3.84)	(0.83)	(1.24)	(19907.26)	(3.73)	(0.45)	(0.49)	(0.31)
United States	3507	0.46	35.34	17.94	2.30	n.a.	3.03	44226.15	12.38	0.67	0.23	0.01
	1574	(0.50)	(3.08)	(2.88)	(3.33)		(1.59)	(69398.09)	(14.12)	(0.47)	(0.42)	(0.07)

Table 2.B.1: Summary statistics (continued)

Country	job-to-job movers	part time job	temporary job[1]	public sector job	higher occupation[2]	intermediate occupation[2]	small working unit[3]	medium working unit[3]	manufacturing sector	service sector	job changers[4]	identifying sample[5]
Austria	0.74	0.11	0.06	0.24	0.25	0.35	0.39	0.29	0.37	0.62	0.80	0.14
	(0.44)	(0.32)	(0.23)	(0.42)	(0.43)	(0.48)	(0.49)	(0.45)	(0.48)	(0.48)	(0.40)	(0.34)
Belgium	0.62	0.13	0.12	0.31	0.39	0.33	0.25	0.23	0.29	0.70	0.86	0.11
	(0.49)	(0.34)	(0.32)	(0.46)	(0.49)	(0.47)	(0.43)	(0.42)	(0.46)	(0.46)	(0.35)	(0.31)
Denmark	0.69	0.08	0.06	0.40	0.42	0.28	0.27	0.22	0.28	0.70	0.80	0.11
	(0.46)	(0.27)	(0.24)	(0.49)	(0.49)	(0.45)	(0.44)	(0.42)	(0.45)	(0.46)	(0.40)	(0.31)
Finland	0.73	0.06	0.16	0.38	0.49	0.24	0.41	0.31	0.28	0.69	0.85	0.07
	(0.44)	(0.24)	(0.37)	(0.49)	(0.50)	(0.43)	(0.49)	(0.46)	(0.45)	(0.46)	(0.36)	(0.26)
France	0.61	0.10	0.08	0.26	0.31	0.32	0.17	0.13	0.31	0.67	0.78	0.05
	(0.49)	(0.29)	(0.27)	(0.44)	(0.46)	(0.47)	(0.38)	(0.33)	(0.46)	(0.47)	(0.41)	(0.21)
Germany	0.70	0.07	0.08	0.26	0.34	0.27	0.25	0.48	0.00	0.00	0.71	0.12
	(0.46)	(0.26)	(0.27)	(0.44)	(0.47)	(0.44)	(0.43)	(0.50)	(0.00)	(0.00)	(0.45)	(0.33)
Greece	0.64	0.05	0.08	0.33	0.24	0.34	0.58	0.19	0.32	0.67	0.80	0.19
	(0.48)	(0.22)	(0.27)	(0.47)	(0.43)	(0.47)	(0.49)	(0.39)	(0.46)	(0.47)	(0.40)	(0.39)
Ireland	0.67	0.15	0.06	0.25	0.28	0.32	0.36	0.26	0.35	0.63	0.80	0.19
	(0.47)	(0.35)	(0.24)	(0.43)	(0.45)	(0.47)	(0.48)	(0.44)	(0.48)	(0.48)	(0.40)	(0.39)
Italy	0.45	0.07	0.08	0.30	0.21	0.36	0.43	0.23	0.37	0.60	0.81	0.08
	(0.50)	(0.25)	(0.27)	(0.46)	(0.41)	(0.48)	(0.50)	(0.42)	(0.48)	(0.49)	(0.39)	(0.28)
Luxembourg	0.91	0.12	0.04	0.27	0.29	0.32	0.27	0.20	0.27	0.72	0.82	0.08
	(0.29)	(0.32)	(0.20)	(0.44)	(0.45)	(0.47)	(0.45)	(0.40)	(0.44)	(0.45)	(0.39)	(0.27)
Netherlands	0.77	0.21	0.04	0.28	0.51	0.27	0.19	0.22	0.23	0.75	0.85	0.10
	(0.42)	(0.41)	(0.19)	(0.45)	(0.50)	(0.44)	(0.39)	(0.41)	(0.42)	(0.43)	(0.35)	(0.31)
Portugal	0.70	0.03	0.13	0.20	0.13	0.32	0.53	0.23	0.38	0.56	0.81	0.16
	(0.46)	(0.17)	(0.34)	(0.40)	(0.34)	(0.47)	(0.50)	(0.42)	(0.49)	(0.50)	(0.39)	(0.37)
Spain	0.44	0.07	0.39	0.22	0.23	0.29	0.44	0.25	0.34	0.62	0.86	0.25
	(0.50)	(0.25)	(0.49)	(0.41)	(0.42)	(0.45)	(0.50)	(0.43)	(0.47)	(0.49)	(0.35)	(0.43)
United Kingdom	0.80	0.18	0.05	0.32	0.37	0.36	0.14	0.16	0.26	0.73	0.81	0.06
	(0.40)	(0.38)	(0.21)	(0.47)	(0.48)	(0.48)	(0.35)	(0.37)	(0.44)	(0.44)	(0.39)	(0.23)
United States	0.48	0.12	1.02	0.10	0.29	0.22	0.34	0.28	0.26	0.73	0.87	0.26
	(0.50)	(0.32)	(0.14)	(0.29)	(0.45)	(0.41)	(0.47)	(0.45)	(0.44)	(0.45)	(0.34)	(0.44)

Notes:
summary statistics refer average values for each individual during the sample period. Standard errors in parentheses.
(1) Non-standard job contracts in the US

(2) Occupational groups:
lower = craft and related trades workers, plant and machine operators and assemblers, other elementary occupations.
intermediate = clerks, service workers and shop and market sales workers, skilled agriculture and fishery workers.
higher = legislators, senior officials and managers, professionals, technicians and associate professionals.

(3) Firm s size (in all countries but Germany this refers to the size of the local working unit. In Germany it is the size of the organisation):
small = less than 20 employees
medium = between 20 and 100 employees (between 20 and 2000 in Germany)
big = more than 100 employees (more then 2000 in Germany)
(4) individuals who are observed in at least two different jobs during the sample period
(5) individual who are observed in at least two different jobs found through different channels (personal contacts vs. others) during the sample period.
Source: ECHP, 1994-1999 for EU countries. NLSY, 1994-2000 for the United States.

Table 2.B.2: OLS wage regressions

Panel A: without job's characteristics

Dependent variable = log hourly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
Personal Characteristics															
1=Female	-0.154***	-0.060***	-0.094***	-0.171***	-0.175***	-0.209***	-0.125***	-0.169***	-0.092***	-0.125***	-0.098***	-0.170***	-0.129***	-0.171***	-0.159***
	(0.013)	(0.013)	(0.009)	(0.011)	(0.013)	(0.013)	(0.013)	(0.013)	(0.010)	(0.029)	(0.009)	(0.011)	(0.011)	(0.014)	(0.022)
Age	0.081***	0.035***	0.055***	0.043***	0.035***	0.099***	0.058***	0.033***	0.038***	0.124***	0.052***	0.024***	0.053***	0.040***	0.028
	(0.010)	(0.013)	(0.011)	(0.009)	(0.009)	(0.011)	(0.007)	(0.011)	(0.005)	(0.027)	(0.006)	(0.005)	(0.007)	(0.013)	(0.056)
Age squared	-0.001***	-0.000	-0.000***	-0.000**	-0.000*	-0.001***	-0.001***	-0.000	-0.000***	-0.002***	-0.000***	-0.000**	-0.000***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	-0.011*	0.010**	0.001	-0.005	0.008**	-0.019***	0.013***	0.022***	0.014***	-0.008	0.015***	0.017***	0.013***	-0.001	-0.030*
	(0.006)	(0.004)	(0.006)	(0.004)	(0.003)	(0.005)	(0.003)	(0.005)	(0.002)	(0.011)	(0.002)	(0.003)	(0.003)	(0.006)	(0.017)
Experience sq.	-0.000	-0.000***	-0.000*	-0.000**	-0.000***	0.000*	-0.000***	-0.001***	-0.000***	0.000	-0.001***	-0.000***	-0.000***	-0.000***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
1=second. edu.	0.212***	0.074***	0.133***	0.060***	0.127***	0.048***	0.173***	0.160***	0.174***	0.215***	0.062***	0.372***	0.182***	0.133***	0.140***
	(0.016)	(0.017)	(0.017)	(0.018)	(0.014)	(0.017)	(0.013)	(0.015)	(0.010)	(0.034)	(0.011)	(0.017)	(0.013)	(0.016)	(0.033)
1=tertiary edu.	0.367***	0.269***	0.243***	0.235***	0.499***	0.178***	0.447***	0.492***	0.469***	0.496***	0.261***	0.986***	0.492***	0.382***	0.625***
	(0.039)	(0.020)	(0.021)	(0.020)	(0.019)	(0.022)	(0.018)	(0.024)	(0.022)	(0.051)	(0.013)	(0.024)	(0.016)	(0.024)	(0.041)
1=job-to-job mover	0.055***	0.047***	0.043***	0.089***	0.095***	0.159***	0.070***	0.055***	0.060***	0.112***	0.082***	0.071***	0.090***	0.103***	0.155***
	(0.014)	(0.012)	(0.010)	(0.012)	(0.013)	(0.013)	(0.012)	(0.013)	(0.010)	(0.042)	(0.009)	(0.010)	(0.010)	(0.016)	(0.019)
1=first job	-0.055***	0.016	-0.018	-0.007	0.011	-0.133***	0.027*	0.027	0.018	0.024	0.004	-0.008	0.040***	-0.009	0.151*
	(0.017)	(0.015)	(0.018)	(0.021)	(0.027)	(0.027)	(0.014)	(0.017)	(0.011)	(0.031)	(0.011)	(0.012)	(0.014)	(0.024)	(0.078)
Current job found through...															
1=personal contacts	0.007	-0.024*	0.012	-0.007	-0.015	-0.092***	-0.086***	-0.067***	-0.060***	-0.115***	-0.051***	-0.040***	-0.079***	-0.070***	-0.021
	(0.014)	(0.014)	(0.012)	(0.016)	(0.013)	(0.014)	(0.011)	(0.014)	(0.010)	(0.029)	(0.012)	(0.010)	(0.010)	(0.016)	(0.025)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of contract[2]	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Firm size dummies(7)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Occup. dummies (22)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Industry dummies (18)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8943	6042	8877	4437	11096	14632	9441	9631	13508	1687	15610	15817	16138	5889	3507
R-squared	0.34	0.27	0.40	0.31	0.35	0.22	0.41	0.37	0.37	0.41	0.30	0.47	0.40	0.36	0.22

Table 2.B.2: continued

Panel A: with job's characteristics

Dependent variable = log hourly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
Personal Characteristics															
1=Female	-0.141***	-0.068***	-0.079***	-0.117***	-0.129***	-0.217***	-0.123***	-0.179***	-0.115***	-0.076**	-0.110***	-0.122***	-0.129***	-0.142***	-0.138***
	(0.016)	(0.014)	(0.011)	(0.012)	(0.014)	(0.013)	(0.012)	(0.013)	(0.009)	(0.034)	(0.010)	(0.011)	(0.010)	(0.015)	(0.023)
Age	0.024***	0.020*	0.031***	0.025***	0.018**	0.047***	0.034***	0.022**	0.024***	0.088***	0.044***	0.013***	0.024***	0.023**	0.080
	(0.009)	(0.011)	(0.010)	(0.008)	(0.008)	(0.008)	(0.006)	(0.009)	(0.004)	(0.025)	(0.005)	(0.004)	(0.005)	(0.011)	(0.050)
Age squared	-0.000	-0.000	-0.000**	-0.000	-0.000	-0.001***	-0.000***	-0.000	-0.000***	-0.001***	-0.000***	-0.000	-0.000***	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	0.004	0.011***	0.006	0.001	0.008***	-0.005	0.014***	0.020***	0.013***	-0.001	0.011***	0.014***	0.011***	0.004	-0.028*
	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.009)	(0.002)	(0.002)	(0.002)	(0.005)	(0.016)
Experience sq.	-0.000**	-0.000***	-0.000**	-0.000**	-0.000***	0.000	-0.000***	-0.000***	-0.000***	-0.000	-0.000***	-0.000***	-0.000***	-0.000***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
1=second. edu.	0.074***	0.041***	0.082***	0.027*	0.067***	-0.030**	0.088***	0.090***	0.061***	0.073***	0.024**	0.154***	0.078***	0.069***	0.098***
	(0.014)	(0.015)	(0.015)	(0.016)	(0.013)	(0.014)	(0.012)	(0.013)	(0.009)	(0.026)	(0.010)	(0.015)	(0.011)	(0.015)	(0.027)
1=tertiary edu.	0.156***	0.158***	0.127***	0.086***	0.225***	-0.011	0.169***	0.212***	0.235***	0.200***	0.112***	0.453***	0.164***	0.217***	0.419***
	(0.036)	(0.019)	(0.022)	(0.019)	(0.019)	(0.022)	(0.017)	(0.021)	(0.021)	(0.042)	(0.012)	(0.032)	(0.014)	(0.027)	(0.037)
1=job-to-job mover	0.037***	0.041***	0.024***	0.034***	0.072***	0.093***	0.063***	0.025**	0.048***	0.067*	0.051***	0.045***	0.045***	0.068***	0.113***
	(0.012)	(0.012)	(0.009)	(0.011)	(0.011)	(0.011)	(0.010)	(0.011)	(0.008)	(0.035)	(0.009)	(0.009)	(0.008)	(0.014)	(0.017)
1=first job	-0.037**	0.000	-0.024	-0.017	-0.050*	-0.081***	0.004	0.003	0.002	-0.032	-0.015	-0.013	0.000	-0.020	0.119*
	(0.015)	(0.013)	(0.016)	(0.018)	(0.026)	(0.021)	(0.011)	(0.013)	(0.009)	(0.025)	(0.010)	(0.010)	(0.010)	(0.021)	(0.070)
Current job found through...															
1=personal contacts	0.017	-0.007	-0.005	-0.002	0.007	-0.051***	-0.028***	-0.014	-0.018**	-0.032	-0.020*	-0.018**	-0.010	-0.027*	-0.007
	(0.012)	(0.012)	(0.011)	(0.014)	(0.011)	(0.013)	(0.010)	(0.012)	(0.009)	(0.022)	(0.010)	(0.008)	(0.008)	(0.014)	(0.023)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of contract[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size dummies(7)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occup. dummies (22)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies (18)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8943	6042	8877	4437	11096	14632	9441	9631	13508	1687	15610	15817	16138	5889	3507
R-squared	0.47	0.37	0.51	0.43	0.47	0.40	0.56	0.53	0.50	0.60	0.39	0.59	0.57	0.49	0.36

(1) Industry dummies not available for confidentially reasons.
(2) Dummies for part-time, temporary and public sector jobs.
Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Source: ECHP 1994-1999 for all European countries. NLSY 1996-2000 for the USA.

Table 2.B.3: Fixed-effect wage regressions

Panel A: without job's characteristics

Dependent variable = log monthly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
Personal Characteristics															
Experience	0.032***	-0.259	0.008**	0.012**	0.000	0.070***	0.006	0.014***	0.008***	0.018**	0.017***	0.014*	0.014***	0.070***	-0.034
	(0.006)	(0.264)	(0.003)	(0.005)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.008)	(0.002)	(0.007)	(0.003)	(0.007)	(0.075)
Experience sq.	-0.001***	-0.000	-0.001***	-0.001***	-0.000	-0.001***	-0.000***	-0.001***	-0.000***	-0.001**	-0.001***	-0.000***	-0.001***	-0.001***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Tenure	0.016***	0.006*	0.006***	0.013**	0.014***	0.008***	0.003	0.007**	0.001	0.001	0.013***	-0.001	0.018***	0.016***	0.033***
	(0.003)	(0.004)	(0.002)	(0.006)	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.007)	(0.003)	(0.002)	(0.002)	(0.005)	(0.009)
Tenure squared	-0.001***	-0.000	-0.000***	-0.001*	-0.001***	-0.000**	-0.000	-0.001***	-0.000***	-0.000	-0.001***	-0.000	-0.001***	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
1=job-to-job mover	0.010	0.022	-0.007	0.075***	0.007	0.034***	0.039***	0.016	0.025***	0.023	0.032**	0.007	0.017**	0.064***	0.061***
	(0.014)	(0.016)	(0.010)	(0.020)	(0.019)	(0.011)	(0.012)	(0.011)	(0.009)	(0.046)	(0.013)	(0.008)	(0.008)	(0.021)	(0.017)
1=first job	-0.137***	-0.104***	-0.108***	-0.152***	-0.054	-0.154***	-0.016	-0.075***	-0.070***	-0.160***	-0.113***	-0.034***	-0.089***	-0.045	0.052
	(0.021)	(0.021)	(0.018)	(0.038)	(0.041)	(0.019)	(0.015)	(0.015)	(0.013)	(0.037)	(0.016)	(0.011)	(0.012)	(0.038)	(0.169)
Current job found through...															
1=personal contacts	0.042***	0.060***	0.005	-0.025	-0.013	0.006	-0.022*	-0.008	-0.022**	-0.033	0.029**	-0.013*	0.002	-0.035*	0.022
	(0.014)	(0.016)	(0.012)	(0.024)	(0.022)	(0.010)	(0.011)	(0.011)	(0.011)	(0.024)	(0.014)	(0.008)	(0.008)	(0.020)	(0.022)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of contract[2]	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Firm size dummies (7)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Occup. dummies (22)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Industry dummies (18)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8943	6042	8877	4437	11096	14632	9441	9631	13508	1687	15610	15817	16138	5889	3507
Subjects	2364	1555	2387	1913	2658	3573	2364	2627	3240	596	3715	3785	4277	2223	1574
R-squared	0.17	0.13	0.36	0.11	0.12	0.15	0.30	0.22	0.19	0.16	0.18	0.28	0.20	0.08	0.08

Table 2.B.3: continued...

Panel B: with job's characteristics

Dependent variable = log monthly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
Personal Characteristics															
Experience	0.024***	-0.344	0.001	0.016***	-0.001	-0.015***	0.010**	0.012***	0.008***	0.011	0.015***	0.014*	0.013***	0.023	-0.055
	(0.005)	(0.267)	(0.003)	(0.005)	(0.002)	(0.004)	(0.004)	(0.004)	(0.002)	(0.009)	(0.002)	(0.007)	(0.003)	(0.038)	(0.074)
Experience sq.	-0.001***	-0.000	-0.001***	-0.001***	-0.000	-0.001***	-0.001***	-0.001***	-0.000***	-0.000	-0.001***	-0.000***	-0.000***	-0.001***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Tenure	0.016***	0.008**	0.006***	0.006	0.014***	0.009***	0.010***	0.009***	0.001	0.010	0.013***	-0.000	0.018***	0.017***	0.027***
	(0.003)	(0.004)	(0.002)	(0.006)	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.008)	(0.003)	(0.002)	(0.002)	(0.005)	(0.009)
Tenure squared	-0.001***	-0.000	-0.000***	-0.000	-0.001***	-0.001***	-0.001***	-0.001***	-0.000**	-0.000	-0.001***	-0.000	-0.001***	-0.001*	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
1=job-to-job mover	0.008	0.030*	-0.005	0.073***	0.032*	0.030***	0.033***	0.017	0.026***	0.106**	0.035***	0.008	0.020***	0.041*	0.052***
	(0.014)	(0.016)	(0.010)	(0.020)	(0.019)	(0.011)	(0.012)	(0.011)	(0.009)	(0.053)	(0.013)	(0.008)	(0.008)	(0.022)	(0.017)
1=first job	-0.062***	-0.096***	-0.107***	-0.119***	-0.062	-0.096***	-0.013	-0.074***	-0.066***	-0.165***	-0.113***	-0.032***	-0.088***	-0.031	0.066
	(0.020)	(0.021)	(0.018)	(0.038)	(0.040)	(0.019)	(0.015)	(0.015)	(0.013)	(0.043)	(0.016)	(0.011)	(0.012)	(0.039)	(0.167)
Current job foun through...															
1=personal contacts	0.025*	0.054***	-0.015	-0.038	-0.011	-0.006	-0.017	-0.000	-0.027***	-0.029	0.030**	-0.014*	0.001	-0.041**	0.019
	(0.013)	(0.016)	(0.012)	(0.024)	(0.022)	(0.010)	(0.011)	(0.011)	(0.011)	(0.026)	(0.014)	(0.008)	(0.008)	(0.021)	(0.022)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of contract[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size dummies (7)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occup. dummies (22)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies (18)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8943	6042	8877	4437	11096	14632	9441	9631	13508	1687	15610	15817	16138	5889	3507
Subjects	2364	1555	2387	1913	2658	3573	2364	2627	3240	596	3715	3785	4277	2223	1574
R-squared	0.25	0.19	0.41	0.15	0.16	0.22	0.34	0.26	0.23	0.24	0.19	0.30	0.24	0.11	0.11

(1) Industry dummies not available for confidentially reasons;
(2) Dummies for part-time, temporary and public sector jobs.
Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Source: ECHP 1994-1998 for all European countries. NLSY 1996-2000 for the USA.

Table 2.B.4: The tenure profile of the premium to finding a job through personal contacts

Panel A: without job's characteristics

Dependent variable = log monthly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
Personal Characteristics															
Experience	0.018	0.038**	0.022***	0.018	-0.007	0.107***	-0.028*	0.026***	0.019**	0.085***	0.026***	0.009	0.028***	0.142***	0.240
	(0.013)	(0.016)	(0.008)	(0.014)	(0.009)	(0.012)	(0.016)	(0.007)	(0.008)	(0.032)	(0.008)	(0.015)	(0.006)	(0.024)	(0.218)
Experience sq.	-0.002***	-0.001	-0.001***	-0.001**	0.000	-0.002***	-0.002***	-0.001***	-0.001**	-0.001	-0.001***	-0.001***	-0.001***	-0.001***	-0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
Tenure<= 6months	-0.024	-0.036	0.000	-0.048*	-0.040	0.000	0.033	0.000	-0.003	0.062*	0.000	-0.011	-0.016	0.000	-0.010
[TEN_L]	(0.019)	(0.028)	(0.000)	(0.028)	(0.029)	(0.000)	(0.024)	(0.000)	(0.017)	(0.037)	(0.000)	(0.011)	(0.012)	(0.000)	(0.045)
Tenure>6 months	0.000	0.000	-0.027**	0.000	0.000	0.000	0.000	-0.013	0.000	0.000	0.016	0.000	0.000	-0.029	0.000
[TEN_H]	(0.000)	(0.000)	(0.013)	(0.000)	(0.000)	(0.019)	(0.000)	(0.013)	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.025)	(0.000)
1=job-to-job mover	0.037	-0.006	-0.006	0.049	0.007	0.025	0.062***	-0.012	0.044**	0.038	0.023	-0.011	0.019	0.043	0.064
	(0.023)	(0.036)	(0.018)	(0.037)	(0.040)	(0.028)	(0.023)	(0.015)	(0.022)	(0.080)	(0.023)	(0.013)	(0.012)	(0.036)	(0.044)
1=first job	-0.126***	-0.186***	-0.043	-0.157**	-0.077	-0.060	0.029	-0.101***	-0.056*	-0.170**	-0.069**	-0.055***	-0.076***	-0.041	0.000
	(0.045)	(0.055)	(0.038)	(0.074)	(0.098)	(0.054)	(0.032)	(0.024)	(0.029)	(0.067)	(0.030)	(0.018)	(0.018)	(0.069)	(0.000)
Current job found through...															
[1=CONT]*[TEN_L]	0.062*	0.085*	0.060**	-0.010	-0.008	-0.013	-0.037	-0.002	-0.054**	-0.098**	0.011	-0.003	-0.006	-0.059	-0.046
	(0.032)	(0.051)	(0.026)	(0.056)	(0.050)	(0.029)	(0.030)	(0.020)	(0.026)	(0.048)	(0.035)	(0.016)	(0.014)	(0.039)	(0.107)
[1=CONT]*[TEN_H]	0.022	0.045	0.027	-0.112**	-0.003	0.030	-0.020	-0.020	-0.037	0.016	0.012	0.007	0.004	-0.037	-0.039
	(0.028)	(0.049)	(0.027)	(0.057)	(0.051)	(0.029)	(0.028)	(0.020)	(0.027)	(0.049)	(0.033)	(0.015)	(0.015)	(0.040)	(0.080)
Individual fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of contract[2]	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Firm size dummies(7)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Occup. dummies (22)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Industry dummies(18)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1758	689	1935	916	1352	2186	1488	3002	1901	271	2810	3961	6010	888	542
Subjects	754	288	803	414	612	960	651	1204	828	129	1135	1579	2317	423	255
R-squared	0.21	0.09	0.27	0.16	0.04	0.12	0.27	0.22	0.10	0.24	0.21	0.19	0.19	0.10	0.06

Table 2.B.4: continued...

Panel B: with job's characteristics

Dependent variable = log monthly wage	AUT	BEL	DEN	FIN	FRA	GER[1]	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK	USA
Personal Characteristics															
Experience	0.022*	-0.014	0.014*	0.034**	-0.013	0.003	-0.018	0.021***	0.018**	0.017	0.023***	0.000	0.022***	0.020	0.181
	(0.012)	(0.022)	(0.008)	(0.014)	(0.009)	(0.015)	(0.016)	(0.007)	(0.008)	(0.064)	(0.008)	(0.015)	(0.006)	(0.097)	(0.217)
Experience sq.	-0.002***	-0.001	-0.001***	-0.001**	0.000	-0.001***	-0.002***	-0.001***	-0.001**	-0.000	-0.001***	-0.001***	-0.001***	-0.001*	-0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
Tenure<= 6months	-0.044**	0.000	0.000	-0.036	-0.029	0.000	0.032	0.000	0.000	0.035	0.000	-0.004	-0.018	0.029	-0.012
[TEN_L]	(0.019)	(0.000)	(0.000)	(0.029)	(0.030)	(0.000)	(0.024)	(0.000)	(0.000)	(0.043)	(0.000)	(0.011)	(0.012)	(0.027)	(0.046)
Tenure>6 months	0.000	0.036	-0.021	0.000	0.000	0.008	0.000	-0.005	0.002	0.000	0.013	0.000	0.000	0.000	0.000
[TEN_H]	(0.000)	(0.029)	(0.013)	(0.000)	(0.000)	(0.018)	(0.000)	(0.013)	(0.017)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)	(0.000)
1=job-to-job mover	0.043*	-0.007	-0.015	0.072*	0.023	0.026	0.060***	-0.009	0.039*	0.006	0.022	-0.010	0.020*	0.027	0.027
	(0.023)	(0.038)	(0.018)	(0.038)	(0.042)	(0.026)	(0.023)	(0.015)	(0.022)	(0.099)	(0.023)	(0.012)	(0.011)	(0.040)	(0.045)
1=first job	-0.036	-0.181***	-0.083**	-0.135*	-0.082	-0.064	0.046	-0.107***	-0.049*	-0.134*	-0.080***	-0.045**	-0.081***	-0.025	0.000
	(0.046)	(0.058)	(0.037)	(0.076)	(0.100)	(0.051)	(0.031)	(0.023)	(0.029)	(0.077)	(0.030)	(0.018)	(0.018)	(0.074)	(0.000)
Current job foun through...															
[1=CONT]*[TEN_L]	0.048	0.069	0.029	-0.012	0.012	-0.037	-0.033	0.015	-0.060**	-0.068	0.016	-0.011	-0.004	-0.054	-0.020
	(0.032)	(0.052)	(0.025)	(0.058)	(0.052)	(0.028)	(0.030)	(0.019)	(0.026)	(0.051)	(0.035)	(0.016)	(0.013)	(0.042)	(0.109)
[1=CONT]*[TEN_H]	0.005	0.007	0.001	-0.111*	0.023	0.012	-0.018	-0.020	-0.033	0.019	0.022	0.015	0.007	-0.027	-0.020
	(0.027)	(0.051)	(0.026)	(0.058)	(0.053)	(0.028)	(0.027)	(0.020)	(0.027)	(0.053)	(0.033)	(0.014)	(0.014)	(0.042)	(0.082)
Individual fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of contract[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size dummies(7)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occup. dummies (22)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies(18)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1758	689	1935	916	1352	2186	1488	3002	1901	271	2810	3961	6010	888	542
Subjects	754	288	803	414	612	960	651	1204	828	129	1135	1579	2317	423	255
R-squared	0.31	0.26	0.38	0.28	0.17	0.25	0.36	0.31	0.19	0.54	0.24	0.27	0.26	0.21	0.17

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
(1) Industry dummies not available for confidentially reasons; (2) Dummies for part-time, temporary and public sector jobs
Source: ECHP 1994-1998 for all European countries. NLSY 1996-2000 for the USA.

Table 2.B.5: Probit regressions for being in the "identifying sample"(1)

	AUT	BEL	DEN	FIN	FRA	GER(2)	GRC	IRL	ITA	LUX	NLD	PRT	ESP	UK(3)	USA(4)
Mean of dependent variable	*0.14*	*0.11*	*0.11*	*0.07*	*0.05*	*0.12*	*0.19*	*0.19*	*0.08*	*0.08*	*0.10*	*0.16*	*0.25*	*0.06*	*0.26*
1=female	-0.010	-0.011	-0.019	-0.021**	0.000	-0.010	-0.009	-0.004	-0.011	-0.033**	-0.019*	-0.013	-0.000	0.000	0.006
	(0.017)	(0.017)	(0.014)	(0.010)	(0.009)	(0.012)	(0.017)	(0.017)	(0.010)	(0.015)	(0.011)	(0.013)	(0.015)	(0.010)	(0.027)
Age	-0.010*	-0.010	-0.005	-0.005	-0.012***	0.003	-0.016***	-0.023***	-0.010***	-0.011**	-0.008*	-0.018***	-0.016***	-0.006**	-0.128
	(0.005)	(0.007)	(0.005)	(0.004)	(0.003)	(0.005)	(0.006)	(0.005)	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.110)
Age squared	0.000	0.000	0.000	0.000	0.000***	-0.000	0.000*	0.000***	0.000**	0.000*	0.000	0.000***	0.000**	0.000	0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
# adults in the HH	0.005	0.004	0.026**	0.002	0.001	-0.002	0.020**	0.009	0.004	-0.001	-0.009	0.005	0.014**	0.007	-0.002
	(0.006)	(0.011)	(0.011)	(0.007)	(0.004)	(0.007)	(0.008)	(0.006)	(0.004)	(0.009)	(0.007)	(0.005)	(0.006)	(0.006)	(0.008)
HH income (log)	-0.039***	-0.015	-0.034*	-0.033***	-0.008	-0.019*	-0.043***	-0.049***	-0.014*	0.003	0.001	-0.019*	-0.029***	-0.001	0.017
	(0.014)	(0.017)	(0.017)	(0.011)	(0.006)	(0.011)	(0.013)	(0.017)	(0.008)	(0.012)	(0.009)	(0.011)	(0.011)	(0.010)	(0.016)
1=tertiary edu.	0.027	-0.012	-0.009	0.003	-0.007	0.009	0.032	0.023	0.014	0.030	0.009	-0.004	-0.015	-0.008	
	(0.019)	(0.020)	(0.015)	(0.014)	(0.009)	(0.015)	(0.021)	(0.018)	(0.011)	(0.020)	(0.012)	(0.019)	(0.018)	(0.010)	-0.010
1=second. edu.	0.015	-0.003	0.005	0.018	-0.025**	0.024	0.054*	0.020	-0.005	0.015	0.001	-0.015	-0.033	0.001	(0.006)
	(0.039)	(0.023)	(0.020)	(0.017)	(0.010)	(0.021)	(0.028)	(0.028)	(0.024)	(0.028)	(0.017)	(0.036)	(0.021)	(0.014)	
1=temporary	0.029	0.078**	-0.003	0.031**	0.056***	0.077***	0.108***	0.109***	0.033	-0.028	-0.008	-0.006	0.099***	0.051	-0.024
	(0.026)	(0.033)	(0.044)	(0.012)	(0.016)	(0.018)	(0.038)	(0.036)	(0.021)	(0.065)	(0.025)	(0.020)	(0.023)	(0.056)	(0.101)
1= part time	0.011	-0.042**	0.012	0.023	0.029*	0.006	0.021	0.055**	0.009	0.024	0.067***	0.034	0.077***	0.031**	-0.035
	(0.026)	(0.019)	(0.022)	(0.020)	(0.015)	(0.020)	(0.031)	(0.024)	(0.018)	(0.031)	(0.016)	(0.033)	(0.026)	(0.016)	(0.037)
1=first job	-0.038**	0.009	-0.049***	-0.026**	0.002	0.008	-0.031*	-0.040**	-0.043***	-0.010	-0.018	-0.051***	-0.051***	-0.026**	-0.095
	(0.018)	(0.018)	(0.015)	(0.011)	(0.014)	(0.020)	(0.017)	(0.017)	(0.010)	(0.016)	(0.011)	(0.013)	(0.016)	(0.010)	(0.129)
1= public sector	-0.078***	-0.013	-0.097***	-0.026**	-0.036***	-0.008	-0.140***	-0.122***	-0.027	-0.056**	-0.037**	-0.076***	-0.155***	-0.056***	-0.074*
	(0.015)	(0.030)	(0.028)	(0.011)	(0.009)	(0.018)	(0.029)	(0.025)	(0.020)	(0.026)	(0.018)	(0.019)	(0.023)	(0.020)	(0.040)
1= higher. occup.	-0.022	-0.035	-0.027	-0.017	0.030**	0.001	-0.036	-0.058**	-0.037***	-0.052***	-0.028**	-0.046**	-0.051**	-0.046***	-0.077**
	(0.020)	(0.022)	(0.018)	(0.015)	(0.014)	(0.015)	(0.027)	(0.023)	(0.013)	(0.017)	(0.014)	(0.023)	(0.023)	(0.011)	(0.032)
1= interm. occup.	-0.040**	0.014	-0.034**	-0.009	-0.000	-0.001	-0.019	-0.043**	-0.030***	-0.008	-0.028**	-0.024*	-0.048***	-0.026**	-0.017
	(0.018)	(0.021)	(0.016)	(0.013)	(0.010)	(0.014)	(0.022)	(0.020)	(0.011)	(0.017)	(0.013)	(0.015)	(0.017)	(0.010)	(0.033)
1=small	0.012	0.107***	-0.003	0.019	0.028**	0.075***	-0.007	0.066***	0.035**	0.019	0.057***	0.041**	0.054***	0.033*	0.065**
	(0.018)	(0.028)	(0.017)	(0.013)	(0.013)	(0.021)	(0.041)	(0.022)	(0.015)	(0.023)	(0.016)	(0.019)	(0.020)	(0.018)	(0.030)
1=medium	-0.010	0.029	0.008	-0.002	0.015	0.028	0.030	0.026	0.016	0.063*	0.037**	0.031	0.067***	0.040**	0.005
	(0.018)	(0.025)	(0.018)	(0.014)	(0.014)	(0.017)	(0.048)	(0.023)	(0.017)	(0.033)	(0.015)	(0.022)	(0.023)	(0.017)	(0.031)
1= manufacturing	-0.067	-0.049	0.002	0.003	0.027	-	0.100	-0.029	-0.016	0.984***	-0.034	-0.054**	-0.097***	0.017	-0.183**
	(0.055)	(0.048)	(0.043)	(0.031)	(0.050)		(0.096)	(0.046)	(0.022)	(0.064)	(0.030)	(0.023)	(0.030)	(0.046)	(0.078)
1=services	-0.046	-0.089	0.033	0.027	0.027	-	0.062	-0.018	-0.005	0.414*	-0.016	-0.008	-0.128***	0.026	-0.270**
	(0.063)	(0.072)	(0.037)	(0.024)	(0.033)		(0.078)	(0.048)	(0.023)	(0.217)	(0.036)	(0.023)	(0.034)	(0.033)	(0.125)
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	2353	1555	2334	1913	2611	3572	2348	2624	3128	596	3703	3775	4251	2223	1258
Pseudo R2	0.04	0.08	0.06	0.11	0.12	0.05	0.09	0.07	0.11	0.16	0.06	0.07	0.09	0.08	0.03

(1) individual who are observed in at least two different jobs found through different channels (personal contacts vs. others) during the sample period.
(2) Industry dummies not available for confidentiality reasons
(3) Size of organisation rather than local unit. Different classification: small= less than 20 employees; medium=between 20 and 2000 employees; large (reference group)=more than 2000 employees.
(4) Education measured in years of schooling; household size instead of number of adults; non-standard contract instead of temporary contracts.
(5) Occupational group: higher = legislators, senior officials and managers, professionals, technicians and associate professionals; intermediate = clerks, service workers and shop and market sales workers, skilled agriculture and fishery workers; lower (reference group) = craft and related trades workers, plant and machine operators and assemblers, other elementary occupations.
(6) Firms' size: small=less than 20 employees; medium=between 20 and 100 employees; large (reference group)=more than 100 employees.
Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Source: ECHP 1994-1999 for European countries. NLSY 1996-2000 for the USA.

Table 2.B.6: Industry classification

Statistical Classification of Products by Activity in the European Economic Community, CPA

Code	Description
A+B	Agriculture, hunting and forestry + Fishing
C+E	Mining and quarrying + Electricity, gas and water supply
DA	Manufacture of food products, beverages and tobacco
DB+DC	Manufacture of textiles, clothing and leather products
DD+DE	Manufacture off wood and paper products; publishing and printing
DF-DI	Manufacture of coke, refined petroleum/chemicals/rubber & plastic/products etc
DJ+DK	Manufacture of metal products, machinery and equipment n.e.c.
DL-DN	Other manufacturing
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal/household goods
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defense; compulsory social security
M	Education
N	Health and social work
O-Q	Other community, social and personal service activities; private households with employed persons; extra-territorial organizations and bodies

Chapter 3

Employers' Search and the Efficiency of Matching

Introduction[1]

High levels of workers' mobility characterise the labour markets of virtually all industrialised economies. Large numbers of workers constantly flow across labour market states. This issue has been the focus of a huge literature that has identified at least two sources of labour mobility. The first is reallocation of workers due to changes in preferences and technology, which make some sectors grow and other shrink (Farber (1999), Jovanovic(1979a)). The second is labour mismatch, that is the search of both workers and employers for the best possible partner in an employment relation (Jovanovic 1979a and 1979b, Flinn 1986). Due to information asymmetries, a labour relationship terminates whenever a better partner becomes available for either of the two parties. The existing evidence (Jovanovic et al. 1990) suggests that, of these two sources, mismatch is likely to be the most important factor in explaining the observed large labour market flows, especially since they mostly occur within rather than

[1]I would like to thank Jon Hales who kindly provided some additional data and clarified to me several data issues. All errors are my own responsibility.

across industrial sectors.

Despite this important result, relatively little attention has been paid to the analysis of the enormous efforts both workers and employers put into looking for a good partner. This chapter contributes to the literature on labour mobility by developing and empirically testing a simple model that describes how employers choose the level of investment in advertisement and screening activities and how this investment affects the quality of matches.

Understanding the determinants of match quality is important for explaining the overall level of labour turnover as well as differences across jobs and workers. In fact, another well documented, but less analysed, finding is that labour turnover is usually higher in lower occupations compared to more productive jobs. For example, table 3.1 shows the fraction of employed workers who experienced a job change (i.e. moved to a different job or to unemployment or to inactivity) between two adjacent quarters in the United Kingdom for the years 1992 and 2003 by occupation in the starting job[2]. As it is evident from the figures in the first two columns, labour turnover is constantly higher at the bottom than at the top of the jobs' distribution. About 8% to 9% of workers in elementary occupations change job or move into non-employment between two adjacent quarters, while this fraction is about 3-4% for managers.

Few explanations have been explicitly put forward for this empirical regularity. A popular one suggests that people try to climb up the jobs' ladder, moving from lower level, lower paying jobs up to better ones. Workers who already hold good jobs tend to move less and this leads to the observed patterns. Alternatively, it has also been argued that young workers, who normally occupy jobs at a lower occupational level, change employment frequently during their first years in the labour market in an attempt to explore their capabilities and to find jobs that meet their tastes (Topel et al. 1992).

However, these explanations don't seem to satisfactorily conform with some additional

[2]2003 is the most recent year for which this exercise is possible and 1993 is the closest one to the period covered by the data used in the rest of the chapter.

evidence. In fact, if workers at the bottom of the occupations' distribution would leave their jobs more often to look for better ones, we should observe more job-to-job than job-to-unemployment transitions at the bottom than at the top. As columns 3 and 4 in table 3.1 illustrate, this is not at all clear in the data. Although the numbers show some variation across occupations, it is hard to argue that there exists a clear trend towards a lower incidence of job-to-unemployment transitions at the bottom than at the top of the jobs' distribution.

Moreover, the same explanations would also suggest that workers from the lowest occupational groups would move more frequently to another, possibly higher, group. Unfortunately, the data (column 5 and 6) don't show any particular trend in the fraction of job-to-job movers who also change occupational group. This figure ranges between 50% and 80% with unclear patterns across occupations. Oi (1962) and McCall (1990) find similar results for the US during the early 30s and early 80s respectively.

Other explanations can be indirectly extrapolated from the work of the many authors that contributed to the literature on labour turnover. For example, Moscarini (2001) argues that the wedge of productivity over the opportunity cost of labour is larger for skilled than unskilled workers, thus reducing their incentive to change job. Also, the observed negative correlation between tenure and mobility is often explained by match-specific training: with tenure one acquires a knowledge (of the environment, familiarity with co-workers, with the procedures, etc.) which makes that specific match more valuable to both the worker and the firm than the average alternative (Mortensen (1978)). As a consequence, longer tenure is associated with a lower probability of job ending (Farber 1999). This result, together with the suggestion (Parsons (1972)) that the incidence of match-specific training is higher in top, managerial jobs, would be sufficient to generate higher turnover in lower occupations.

This idea is also supported by the recent work of Hayes et al. (2004), who look at the implications for labour turnover of the introduction of team-work. When people work in teams, their complementarities make the departure of one team member a plausible reason for the others to leave as well, thus generating higher turnover. Since the practice of team-

work appears to be more common in managerial jobs, this would also lead to the observed pattern in turnover across jobs. Furthermore, women are more prone to change labour market status due to family reasons. Hence, female dominated occupations are likely to show higher levels of turnover.

However, figure 3.1 shows that, even when one controls for all these effects (age, education, tenure, gender), labour turnover still differs substantially across occupations. The bars in figure 3.1, in fact, represent the coefficients on the occupational dummies obtained from a probit model for the probability of experiencing a job change between two adjacent quarters in the United Kingdom in 1993 and 2003. The visual inspection of figure 3.1 already indicates that the probability of a job separation, conditional on individual characteristics, is still higher in lower occupations and the tests reported at the bottom of each panel confirm that the hypothesis of all identical coefficients is rejected.

These results have been presented to show that the existing research on the sources of labour mobility is unable to satisfactorily explain the patterns of turnover across occupations. This chapter contributes to the literature in this direction. It takes the suggestion in Jovanovic et al. (1990) that mismatch is likely to be the main cause of labour turnover and shows that the matching process is less efficient for low productivity jobs, which will consequently be more prone to separation (both voluntary and involuntary). The focus of the analysis is primarily on the employers' side of the labour market.

The theoretical section of the chapter shows that firms find it optimal to invest relatively little in recruitment and screening activities for low productivity jobs, while they are much more careful in the hiring of top level workers. Hence, matches of unskilled workers in low productivity jobs are more likely to be "bad", in the sense that the same worker (job) can be paired with another job (worker) into a more productive match. This leads to more separations and more job instability for unskilled workers in lower level occupations.

The empirical implementation of the theory is carried out exploiting a unique dataset of recruiting establishments in Britain. Using these data it is possible to construct several

measures of recruitment intensity, distinguishing between advertisement and screening activities. Various econometric estimates will then show that employers invest more in both types of recruitment for top level jobs and relatively little at the bottom of the occupations' distribution. Finally, these measures of recruitment intensity will be correlated with various indicators of the quality of the match, such as satisfaction of the employer with the recruit, initial wages and tenure. Results support the motivating idea of this chapter: matches created through more intensive screening last longer, pay higher wages and make employers more satisfied with the person taken on.

From the normative viewpoint, this chapter documents that the allocation of unskilled workers in low-productivity jobs might be subject to more serious mismatch than other workers and jobs. As a consequence, these workers are likely to experience greater job and income instability. Although this chapter does not attempt to conduct a general equilibrium analysis, policy intervention aimed at improving the quality of matching at the bottom end of the jobs' distribution might lead to overall efficiency and equity gains.

I have already discussed how this chapter takes the move from the existing literature on labour turnover. However, it also contributes to another, small but growing, strand of the literature: the analysis of employers' search. The widely accepted search and matching approach to the study of the labour market has fostered an enormous amount of empirical work on the search behaviour of workers. Mainly due to the scarcity of data, however, very little is known about the corresponding behaviour of employers. In fact, individual level data on recruitment activities are extremely rare. A few exceptions are Brown et al. (1999) and Manning (2000) on British data, Barron et al. (1987) and Holzer (1994) using US data, van Ours et al. (1991 and 1992) and Gorter et al. (1999 and 2003) using Dutch data. These papers address important issues, like the cyclical behaviour of the vacancy rate, the shape of the hazard of vacancy filling and the optimal recruitment strategies of employers, all issues that can only be explored with detailed data at the vacancy level. This chapter is another example of how a better knowledge of the firm's side of the labour market can contribute to

our understanding of many phenomena.

The chapter is organised as follows: section 2 presents a simple model of optimal employers search, section 3 describes the data which will be used in section 4 to test empirically the implications of the model. Section 5 concludes.

3.2 Employer's search: a theoretical framework

The model in this section is both a simplification and an extension of the theory in section 2.4 in the previous chapter. The starting point is a simple matching model in which firms with unfilled vacancies and workers who need a job (or want to change job) look for each other. The existence of frictions in the labour market prevents them from meeting instantaneously and leads to positive rents associated with formed matches. For simplicity and clarity, the model is partial equilibrium and formalised in discrete time.

The first departure from the standard matching model consists in the introduction of heterogeneity in the market, a crucial ingredient to make recruitment and screening activities play a meaningful role. Jobs differ in the technology employed and, consequently, in the skill requirements. Each job j in the model should be seen as an occupation in its empirical implementation. Vacancies are unfilled jobs. For each vacancy of type j there exists two types of workers, *suitable* and *unsuitable*. This implies that a given worker might be unsuitable for one job but suitable for another. A suitable worker in job j produces a positive amount of output, p_j, while an unsuitable worker is totally unproductive. As already noted in section 2.4, this assumption captures the idea that recruiting the wrong person for a top job is more costly than for low productivity job. The type of the match is unknown to both the worker and the firm until production takes place and output can be observed.

In each period, a firm with an unfilled vacancy j meets a jobseeker with probability $q(\theta_j)$, where θ_j represents labour market tightness, i.e. the ratio between vacancies and unemployment, $\theta_j = \frac{v_j}{u_j}$. According to the standard matching literature, $q(\theta_j)$ is assumed to

be decreasing in θ_j: $\frac{\partial q(\theta_j)}{\partial \theta_j} < 0$. The subscript j on θ indicates that labour market tightness can vary by occupation with v_j representing vacancies of the same type (occupation) and u_j jobseekers with the skills required by the job.

In order to focus on the choice of the recruitment strategy by the employer, the supply side of the market - the search behaviour of workers - and the wage negotiation process are taken as exogenous and modelled as follows: firms offer wages equal to a fraction β of expected productivity in the first period of work. If the worker then turns out to be suitable for the job, wages are updated to the same fraction β of actual productivity p_j, otherwise the match is destroyed (by either of the two parties) and the vacancy re-opened. If the match is continued, a separation will only occur due to exogenous shocks with per-period probability λ. For tractability, the parameters β and λ are assumed to be constant across all jobs.

There exist two types of recruitment activities. Extensive recruitment (E_j) concerns all the actions taken by the employer to improve the probability of meeting a candidate (or to increase the number of applications received). These activities include mostly advertisement but also asking employees, holding career events at colleges and professional schools, use of public or private employment agencies, etc. Formally, extensive recruitment requires a linear cost cE_j and improves the probability of meeting a job candidate. Hence, we need to rewrite $q(\theta_j)$ as $q(E_j|\theta_j)$, where E_j is a control variable for the firm and θ_j is an exogenous parameter. For an internal solution, we also need to assume $\frac{\partial q(E_j|\theta_j)}{\partial E_j} > 0$ and $\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial E_j} < 0$. Extensive recruitment and labour market tightness can be either substitutes ($\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial \theta_j} > 0$) or complements ($\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial \theta_j} < 0$). This is left as an empirical issue.

Intensive recruitment (I_j) has to do with all the actions taken by the employer to improve her knowledge about the worker's unobservable type. These actions include interviewing and screening candidates and take place once contact has been established and before deciding whether to hire or reject a candidate. Formally, intensive recruitment is modelled as follows: upon meeting a candidate the employer receives a signal about the type of the worker. The signal can take two values, *"suitable"* or *"unsuitable"*, and it is correct with probability $\xi(I_j)$.

In other words, if the signal is *"suitable"* the candidate is suitable with probability $\xi(I_j)$ and unsuitable with probability $1-\xi(I_j)$. Similarly if the signal is *"unsuitable"*. The function $\xi(I_j)$ needs to be increasing and concave in I_j: $\frac{\partial \xi(I_j)}{\partial I_j} > 0$ and $\frac{\partial \xi(I_j)}{\partial I_j \partial I_j} < 0$. Moreover, when $I_j = 0$ the signal is totally uninformative and $\xi(0) = 1/2$. For simplicity, let us assume that the cost functions of E and I are identical - i.e. they are both linear with marginal cost c - however the cost of I is only paid if a candidate is actually met in a given period while E has to be financed ex-ante.

Let us also assume that, for any vacancy j, there exists an exogenous fraction π_j of suitable jobseekers in the economy. Under these assumptions, only two hiring strategies are possible: hiring when the signal is *"suitable"* and rejecting otherwise or hiring anyone regardless of the signal received. The latter strategy obviously leads to a corner solution with $I_j = 0$ and becomes optimal only in uninteresting cases, such as when $\pi_j = 1$: when all candidates are equally good for the job investing in screening is useless and employers simply hire the first available candidate. In all other cases, employers find it optimal to hire only candidates who are signalled to be *"suitable"* for the job. We will then focus on this hiring strategy only, even if this restricts the range of parameter values within which the following analysis is valid.

Given the above assumptions, the value of an unfilled vacancy of type j for a representative firm can be written as follows:

$$\begin{aligned} V_j &= -cE_j + \frac{q(E_j|\theta_j)}{1+r}\left[-cI_j + \pi_j \xi(I_j) J(p_j) + (1-\pi_j)(1-\xi(I_j))J(0) + (1-\pi_j)\xi(I_j)V_j + \right. \\ &\quad \left. + \pi_j(1-\xi(I_j))V_j\right] + \frac{1-q(E_j|\theta_j)}{1+r}V_j \end{aligned} \tag{3.1}$$

where $J(p_j)$ and $J(0)$ are the value of a vacancy j filled with a suitable (who produces p_j)

and an unsuitable (who produces 0) candidate and can be written as:

$$J(p_j) = p_j - w_j^e + \frac{1}{1+r} J_j \tag{3.2}$$

$$J(0) = -w_j^e + \frac{1}{1+r} V_j \tag{3.3}$$

where w_j^e is the initial wage, paid as a fraction of expected productivity given that the signal is *"suitable"*[3]*:*

$$w_j^e = \frac{\pi_j \xi(I_j)}{\pi_j \xi(I_j) + (1-\pi_j)(1-\xi(I_j))} \beta p_j \tag{3.4}$$

and J_j is the continuation value of a job j filled with a suitable candidate:

$$(\frac{r+\lambda}{1+r}) J_j = (1-\beta) p_j + \lambda V_j \tag{3.5}$$

Substituting (3.5) and (3.4) into (3.2) and (3.3) and then everything into (3.1), one obtains:

$$V_j \left[r + q(E_j|\theta_j) - \frac{\pi_j \lambda}{\lambda + r} \frac{q(E_j|\theta_j)}{1+r} \xi(I_j) - q(E_j|\theta_j)(1-\pi_j) \frac{1 + r\xi(I_j)}{1+r} - \pi_j q(E_j|\theta_j)(1-\xi(I_j)) \right] =$$

$$= -c(1+r)E_j - cq(E_j|\theta_j) I_j + \pi_j \frac{1+r+\lambda}{r+\lambda} q(E_j|\theta_j) \xi(I_j)(1-\beta) p_j \tag{3.6}$$

The optimal choice of $\widehat{E}_j$ and $\widehat{I}_j$ by the firm is described by the first order conditions of equation (3.6) with respect to these two control variables. The algebra is greatly simplified by imposing the usual free-entry equilibrium condition $V_j = 0$:

$$\pi_j \frac{1+r+\lambda}{r+\lambda} q'(\widehat{E}_j|\theta_j) \xi(\widehat{I}_j)(1-\beta) p_j = c \left[1 + r + q'(\widehat{E}_j|\theta_j) \widehat{I}_j \right] \tag{3.7}$$

$$\pi_j \frac{1+r+\lambda}{r+\lambda} \xi'(\widehat{I}_j)(1-\beta) p_j = c \tag{3.8}$$

[3] *Only in this case the match would be actually formed.*

where $q'_E(\widehat{E}_j|\theta_j) = \frac{\partial q(E_j|\theta_j)}{\partial E_j}$ and $\xi'(\widehat{I}_j) = \frac{\partial \xi(I_j)}{\partial I_j}$. Combining equation (3.7) and (3.8) yields:

$$q'(\widehat{E}_j|\theta_j)\frac{\widehat{I}_j}{1+r} = \frac{\eta_\xi(\widehat{I}_j)}{1-\eta_\xi(\widehat{I}_j)} \tag{3.9}$$

where $\eta_\xi(\widehat{I}_j)$ is the elasticity of the precision of the signal $\xi(I_j)$: $\eta_\xi(I_j) = \frac{\partial \xi(I_j)}{\partial I_j}\frac{I_j}{\xi(I_j)}$.

Let us now describe intuitively the comparative statics effects of the parameters of the model. Appendix 3.A contains the formal derivation of these effects.

Equation (3.9) contains the first important result of the model. It shows that there is a positive (non negative) correlation between $\widehat{E}_j$ and $\widehat{I}_j$. In other words, employers invest more in extensive recruitment when they also invest more in intensive screening. The intuition for this result is rather simple: as intensive recruitment increases the probability of eventually hiring a suitable candidate also increases, thus improving the marginal benefit of extensive recruitment.

From equation (3.9) it is also immediate to show that the effect of labour market tightness on $\widehat{E}_j$ depends on whether $\widehat{E}_j$ and θ_j are substitutes or complements in the matching process. If they are substitutes ($\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial \theta_j} > 0$), an increase in θ_j leads to a lower probability of meeting a candidate and induces lower effort in $\widehat{E}_j$. The opposite happens if $\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial \theta_j} < 0$. To anticipate here the empirical results of the next section, the evidence suggests that $\widehat{E}_j$ and θ_j are substitutes.

Note incidentally, that investment in intensive recruitment, being incurred on only if a candidate is actually met, is not influenced by labour market conditions. This is evident from equation (3.8).

Inspection of equation (3.8) allows to derive the effects of two other interesting parameters: productivity, p_j, and the proportion of suitable workers, π_j. They are both positively correlated with $\widehat{I}_j$. Intuitively, the effect of productivity is relatively simple: employers invest more in screening when recruiting for highly productive jobs. In this case, in fact, failing

to hire the right worker is very costly: not only does it require paying a high wage without getting any output in return, but it also means re-opening the vacancy later on with high losses in terms of forgone output. As for the fraction of suitable workers, an increase in this parameter also increases the marginal benefit of intensive recruitment and therefore leads to more expenditure in screening activities. Note, however, that this argument holds only for values of π_j that are consistent with the optimal hiring strategy assumed so far, i.e. hiring when the signal is good and rejecting otherwise.

So far we have discussed the implications of the model regarding the determinants of extensive and intensive recruitment and their correlation. However, the simple theory developed in this section also allows to draw empirically testable implications about various measures of match quality as well. For example, equation (3.4) shows that more intensive recruitment and a higher fraction of suitable workers both have a positive impact on initial wages, w_j^e.

More interesting for the initial motivation of this chapter is the effect on the separation rate. The model contains two separation processes, one endogenous and one exogenous. The latter one (exogenous) hits "good" matches (i.e. jobs filled with suitable workers) with exogenous probability λ every period and it is unaffected by the endogenous variables of the model. This process can be seen as the effect of exogenous changes in consumers' preferences and firms' technologies. The endogenous separation process refers to "bad" matches (jobs filled with unsuitable candidates) being immediately destroyed as soon as production is observed. The probability that a newly created match is endogenously destroyed corresponds to the probability of its being a "bad" match:

$$\Pr\{\text{endogenous separation of job } j\} = \frac{(1-\pi_j)(1-\xi(\widehat{I}_j))}{\pi_j\xi(\widehat{I}_j) + (1-\pi_j)(1-\xi(\widehat{I}_j))} \tag{3.10}$$

Empirically, equation (3.10) suggests that the probability of a separation occurring close to the engagement decreases with intensive screening.

Extensive recruitment, on the other hand, has a direct effect on $q(\widehat{E}_j|\theta_j)$, the probability of meeting a candidate and therefore on vacancy duration.

To summarise, the model delivers three sets of empirical implications. First, it predicts that extensive and intensive recruitment are positively correlated. Second, it allows to identify the determinants of intensive recruitment effort (implication (3.8)), which should be positively correlated with productivity, the availability of good candidates and should be unaffected by labour market tightness. Third, it indicates that recruitment effort, in the form of both extensive and intensive recruitment, is correlated with various outcome measures. In particular, extensive recruitment positively affects the meeting probability and, consequently, vacancy duration. Intensive recruitment directly affects initial wages and the overall quality of the match, reducing the probability of a separation (equation (3.10)).

In the remaining of the chapter, after describing the data in the next section, these implications will be tested empirically.

3.3 The 1992 Survey of Employers' Recruitment Practices (SERP)

The data used for the empirical implementation of the model come from an original survey conducted in the United Kingdom in 1992, the Survey of Employers' Recruitment Practices (SERP). This study was carried out by the British Social and Community Planning Research (SCPR) on behalf of the Employment Service. It was mainly aimed at investigating the use of public employment services by private employers compared to alternative recruitment methods[4].

To this end, one would ideally like to have information about a representative sample of engagements occurred in a determined time window. However, since the total population of all engagements is not easily recorded anywhere, it is rather difficult to extract such a

[4]An earlier survey was conducted in 1978 but the study as not been replicated after 1992.

sample. The approach taken by researchers at SCPR consisted in drawing a sample of 10,000 establishments from the 1989 Census of Employment, where an establishment is defined as *"the activities of a single employer at a single set of premises"*. The 1989 Census covered all existing establishments with 25 or more employees and was supplemented by a random sample of smaller establishments.

The subsample of 10,000 establishments extracted from the Census was designed to contain enough observations to conduct statistical analyses by region and establishment size. A purely random sample would have led to too many establishments located in London and the South East and too few establishments of small size (below 20-25 employees). For this reason, small firms and firms outside London and the South East were oversampled. Moreover, since the purpose of the study was the analysis of recruitment practices, which are usually similar across establishments belonging to the same organisation, another sampling adjustment was made in order to limit the number of units belonging to the same large firm (e.g. large food stores, etc.).

These 10,000 establishments were first contacted in Autumn 1991 via a brief preliminary telephone interview to collect the information necessary to categorize them along two dimensions: *in-scope* versus *out-of-scope* and *recruiting* versus *non-recruiting* establishments. Out-of-scope establishments were firms that had closed down or moved between the census in 1989 and the date of the telephone interview. They were excluded from the study. Recruiting establishments were defined as establishments that either had recruited one or more employees in the previous 12 months or had unfilled vacancies at the time of the interview. A recruit or engagement was defined as *"recruiting an employee, where a new contract of employment is involved"*.

All in-scope recruiting establishments were then contacted for a longer face-to-face interview, which formed the main source of information for the final survey. For budgetary reasons, only about half of the non-recruiting firms were contacted for a second short telephone interview. Eventually, the final survey contains information about 5,635 recruiting and

614 non-recruiting establishments. The interviews took place between May and November 1992. Within each establishment, the respondents were selected to be the main person responsible for the recruitment process. They were either personnel specialists (16%), general managers (27%), branch-depot managers (20%) or professional staff (9%).

Only the sample of recruiting establishments is needed for the purpose of this chapter. Few observations have been dropped due to missing or incorrect values, leading to 5,343 valid establishments, which, corrected for the weights provided by the SCPR to recover the representativeness for the entire population, represent 6083 firms. The questions regarding the establishments were grouped into 3 sections of the questionnaire. The first one contains general enquires about the type of firm and activity as well as questions about the role of the respondent. The second section asks about the characteristics of the workforce, including information about current vacancies and recruits that were taken on in the previous 12 months. The third section includes detailed questions about the recruitment practices usually adopted by the firm. The descriptive statistics for the sample of establishments are reported in table 3.2.

A sample of engagements was then constructed from the 5,635 recruiting establishments according to the following rules. The total number of engagements that took place in the 12 months prior to the interview was recorded and divided into the 9 major groups of the Standard Occupational Classification (SOC). If there had been engagements in more than 5 occupational groups, the most recent one in each of the 5 groups in which the largest number of engagements had been made were selected. Otherwise, if recruitment only occurred in fewer than 5 occupational groups but in total more then 5 new recruits were taken on, the most recent in each group was selected, then, the second most recent starting with the most numerous group and so on until 5 engagements were selected. Finally, if fewer than 5 engagements were made in the previous 12 months, all of them were selected, regardless of the occupational group. This led to a sample of 22,707 engagements.

A set of detailed questions for each of the selected engagements was asked, including

the characteristics of the job that was offered, those of the successful applicant, accurate information about the duration of the vacancy, the recruitment methods activated and their sequence, whether the recruit was still employed at the firm and how satisfied the employer was with him/her. However, in order to limit the length of the interview and not to discourage employers' participation in the survey, not all questions were asked for all engagements. The most complete set of information was collected for the most recent engagement in each establishment.

For this chapter some observations had to be dropped from the original sample due to missing or incorrect values, resulting in a valid sample of 14,609 engagements, which, rescaled using the weights provided by SCPR to recover the representativeness of all engagements, represent 10,980 new employment contracts. The descriptive statistics for the sample of engagements used in this chapter are reported in table 3.3.

3.4 Testing the empirical implications of the model

Before moving on to the empirical test of the model, it is worth checking the level of labour turnover by occupation in our sample. Respondents to the SERP report the composition of employment at their establishment by occupation, also indicating the fraction of employees in each group that have been continuously employed at the firm for more than 12 months. The responses are coded in intervals and are shown in table 3.4. The last line of the table gives an overall estimate of labour turnover by taking the mid point in each interval. These numbers are also plotted in figure 3.2.

Results from table 3.4 and figure 3.2 broadly confirm the discussion over table 3.1: there seems to be a general trend towards more unstable employment relationships in lower occupations. Apart from managers, craft/skilled service workers and operatives/assembly workers, higher occupations typically display a higher incidence of long-lasting employment contracts.

Once confirmed that data from the SERP support the basic empirical fact that motivates

this chapter, we can move on to the test of the various empirical implications of the theory presented in section 3.2. For clarity, let us classify these implications into three groups.

First, the relationship between extensive and intensive recruitment: equation (3.9) shows that extensive recruitment is fully determined by labour market tightness and intensive recruitment. Employers search more when they also screen more, while the effect of labour market tightness depends on whether $\widehat{E}_j$ and θ_j are complements or substitutes in the matching process, an issue that was left as an empirical question.

The second set of implications concerns the determinants of intensive recruitment effort (equations (3.8)): employers invest more in intensive screening when recruiting for highly productive jobs, i.e. when p_j is higher.

Finally, the third set of implications addresses the initial question of the chapter and relates the quality of the match to the effort exerted in recruiting: the probability of a separation soon after hiring is lower when intensive screening is stronger (equation (3.10)) and vacancy duration is shorter when extensive recruitment is stronger.

Given the difficulty in observing π_j, the composition of workers' types in the economy, this parameter is assumed to be constant within regions. Regional dummies will be introduced in the estimation to control for different levels of π_j, as well as for other region specific factors.

Before testing these implications, it is crucial to find empirically measurable indicators of extensive and intensive recruitment. Respondents to the SERP survey are shown a list of 17 possible recruitment channels and they are asked to indicate how many of them were activated for each specific engagement, which channel was the first one used and which of them led to contact with the successful applicant. Using this wealth of information, I construct two measures for E_j and three for I_j. The distributions of these measures are shown in figures 3.3 and 3.4 respectively. Below is a description of how they are constructed.

The first indicator of extensive recruitment is the number of search channels activated for a single vacancy (figure 3.3, upper panel). For intensive recruitment we use the length of the screening process, measured as the number of days between contact with the successful

applicant is first made and his/her first day of work (figure 3.4, upper panel). This measure, however, could be affected by a number of factors, others than mere screening time, like the need for the selected applicant to give notice to a previous employer or to complete an educational course. In order to avoid these problems, when the length of the screening process is used as a measure of intensive recruitment, additional controls will be introduced for the employment status of the successful applicant (employed, unemployed, in full-time education) and the situation of the vacancy (whether the previous person was still working in the post, whether it was a new position, etc.) at the time of recruitment.

A second measure of intensive recruitment can be constructed as the number of screening procedures normally applied at the firm. However, this measure is only available at the establishment level (i.e. it is identical for all engagements taking place at the same establishment). The establishment section of the questionnaire, in fact, contains questions about how recruitment normally takes place. In this occasion, the respondents indicate whether formal screening procedures are used and, if the answer is positive, what they cover from the following list: definition of job requirements, requirement to use particular recruitment channels, use of application forms, short-listing procedures, interview procedures, selection procedures (tests, medical checks, etc.), other procedures. The number of these procedures normally used at each establishment is used as a second measure of intensive recruitment (figure 3.4, middle panel).

Additional indicators of both E and I can be constructed using a set of questions regarding the importance of various factors in the choice of the recruitment methods used. These questions are asked only for one engagement in each establishment, however the available answers will be used to compute a "grade" for each method and then associate it to each engagement according to either the first or the successful method used for that hiring. In this way, the measures described below are available for all engagements in the sample.

For extensive recruitment, the following question gives an indication of the cost effectiveness of the channels activated for a particular vacancy: *"...how important a factor in your*

use of the recruitment method(s) was keeping down the cost of announcing/advertising the vacancy?". The answers are ordered on a scale from 1 (not at all important) to 7 (very important). Each method can then be ranked by its advertisement cost effectiveness measured as the average answer to this question given by respondents who activated it first. Formally, the measure of extensive recruitment as cost effectiveness (E_j^c) for engagement j in which method m was the first channel to be activated, can be defined as follows:

$$E_j^c = \frac{\sum_{f \in F_m} (cost\ effectiveness)_f \cdot \omega_f}{|F_m|}$$

where F_m is the set of all hirings where method m was activated first and where a valid answer to the cost effectiveness question is available. $(cost\ effectiveness)_f$ is the importance of "*keeping down the cost of announcing/advertising the vacancy*" (on a scale 1 to 7) in engagement f. $|F_m|$ is the size of F_m. ω_f is the sample weight of engagement f. The higher E_j^c the lower investment in extensive recruitment.

This is our second measure of extensive recruitment and its distribution by method is described in the lower panel of figure 3.3. Not surprisingly, posting notices on the streets, using Jobcentre (i.e. the British public employment service), receiving a direct application from the candidate and re-employing a former employee are among the cheapest recruitment channels, while the most expensive methods are fee-charging agencies, keeping on a participant to a youth/employment training programme and approaching a candidate directly. However, some results are surprising. For example, advertising on local free sheets and recommendation are not chosen particularly for their low cost. This result could be due to the fact that often these methods are used in combination with others and respondents give an evaluation of the overall combination of channels used.

A similar indicator is constructed for intensive screening using the following question: *"...how important a factor in your use of the recruitment method(s) was attracting only the most suitable candidates?"*. In this case, however, the ranking is made using the successful

method instead of the first one used. Formally and analogously to E_j^c, a measure of intensive recruitment as accuracy in attracting good candidates (I_j^a) in engagement j, where contact with the successful applicant was obtained through method m, can be defined as follows:

$$I_j^a = \frac{\sum_{s \in S_m} (accuracy)_s \cdot \omega_s}{|S_m|}$$

where S_m is the set of all hirings where method m led to contact with the successful applicant and where a valid answer to the accuracy question is available. $(accuracy)_s$ is the importance of *"attracting only the most suitable candidates"* (on a scale 1 to 7) in engagement s. $|S_m|$ is the size of S_m. ω_s is the sample weight of engagement s. The higher I_j^a the higher investment in intensive recruitment.

This is our third measure of intensive recruitment and its distribution by method is described in the lower panel of figure 3.4. Advertising on specialised trade press, fee-charging agencies, approaching a candidate directly and reemploying a previous employee are among the most "accurate" recruitment methods, while advertising on local free sheets, posting notices on the streets and using the Jobcentres rank very poorly.

To summarise and fix ideas, for each engagement there will be two measures of extensive recruitment - the number of channels activated and the "cost effectiveness" of the first method used. Both these measures are available for all engagements. Intensive recruitment will be measured by three indicators - the length of the screening process, the number of formal screening procedures normally applied at the establishment and the accuracy of the method that led to contact with the successful applicant. The first indicator is only available for the most recent engagement in each establishment, the second one is available for all engagements but it only varies at the establishment level, the third is available for all engagements and varies both by establishment and by engagement within the same establishment.

Test 1: the correlation between extensive and intensive recruitment The empirical counterpart of equation (3.9) is a regression of extensive recruitment on intensive screening, controlling for labour market tightness. In table 3.5 this correlation is tested using our two measures of E and three measures of I.

The first four columns of table 3.5 use the number of activated channels as a measure of extensive recruitment. The estimates are obtained from an ordered probit regression, alternating the three measures of intensive recruitment as explanatory variables. Labour market tightness is measured, here as well as in all the other regressions reported below, as the ratio between the number of unfilled vacancies and the number of unemployment benefit claimants in the region where the establishment is located and in the month during which the engagement took place. Additionally, regional dummies are also introduced to control for variation in the availability of qualified applicants in the area (π_j).

The estimates of columns 1 and 2 confirm the prediction of equation (3.9): employers use more methods to advertise a vacancy when they also take more time to screen applicants and when they use more formal screening procedures. However, in contrast with the predictions, results in column 3 show that the number of activated channels is negatively correlated with the accuracy of the successful method. This contradicting result is robust to the introduction of establishments' fixed-effects.

Remember that these could not be introduced in column 1 and 2 because the length of the screening process is only available for one observation in each establishment while the number of screening procedures is constant within establishments. However, our indicator of "accuracy" of recruitment does vary by both establishment and engagement, hence its effect on extensive recruitment can be identified even with the introduction of establishment's fixed-effects. Nevertheless, ordered probit models do not easily allow to control for unobserved fixed-effects, thus, in order to facilitate the estimation, the results in column 4 of table 3.5 are obtained with a simple linear regression with fixed-effects.

The last 4 columns of table 3.5 repeat the same estimation using our measure of "cost

effectiveness" as a dependent variable. Remember that now higher investment in extensive recruitment is associated with a lower value of the dependent variable. Moreover, given the nature of the dependent variable, the estimation can now be carried out with a simple linear model. In this case, results confirm the predicted positive correlation between E and I when the length of the screening process and the accuracy of recruitment are used as measures of I. Opposite results emerge using the number of formal screening procedures.

The theory of section 3.2 leaves the effect of labour market tightness as an empirical issue as it all depends on the complementarity or substitutability of E and θ in the matching process. Ideally, one would like to use a measure of θ that varies by region, occupational groups as well as over time. Unfortunately, reliable data on vacancies and unemployment during the years covered by the SERP exist only by region and month. A change in the occupational classification that occurred in the middle of 1992 makes it difficult to reconstruct data on vacancies by occupation for this period. This implies that our measure of θ only varies by region and month. Moreover, due to the presence of regional dummies in all the equations, the effect of θ is eventually identified only by the time-variation across months. Given the short time span of our analysis, this variation is often limited and the effect of labour market tightness is rarely significant. However, the coefficient on θ is significant in 3 out of the 4 last columns of table 3.5, where extensive recruitment is measured as cost effectiveness, and the point estimate is consistently positive. This implies that in tighter labour markets employers spend less on announcing and advertising their vacancies, suggesting that E and θ might be complements in the matching process[5].

Overall, most of the results in table 3.5 seem to support the predicted positive correlation between extensive and intensive recruitment, however, the difficulties in measuring these two variables lead to contrasting conclusions for some indicators.

[5]This result is consistent with the *"discouraged job"* effect, described in Pissarides (2000) and discussed in chapter 2.

Test 2: the determinants of intensive recruitment Equation (3.8) describes the determinants of investment in intensive recruitment, in particular it predicts that I should be positively correlated with productivity (p). This implication is tested in table 3.6, where our three measures of intensive recruitment are regressed on regional labour market tightness and a set of indicators of the productivity of the match, such as the occupational group, the type of contract and whether the job requires supervising other workers. A set of additional controls is also introduced in the regressions, including regional dummies and all observable characteristics of the establishment and of the successful applicant. The estimation method is linear in all columns but column 2, where the dependent variable is the number of formal screening procedures applied at the establishment and an ordered probit is used. Moreover, in this case the dependent variable only varies across firms and the estimation is performed on the sample of establishments rather than engagements. Here the occupational dummies are replaced by the fraction of employees in each occupational groups over total employment at the firm.

In the last two columns the "accuracy" of recruitment is used as a measure of I and, as already noted above, this allows to introduce establishment's fixed-effects in the estimation. Hence, column 3 reports results without fixed-effects (but with standard errors corrected to account for correlation between observations within the same establishment) while these are included in column 4.

Results strongly confirm the implication that intensive recruitment effort is stronger when employers are filling high-productivity jobs. This is clearly indicated by the coefficients on the occupational dummies, which grow in size and significance moving from low to high occupations. These coefficients are also shown in figure 3.5, where they visually confirm the presence of a statistically significant trend towards more intensive recruitment in top occupations. Additionally, jobs that require supervising co-workers are typically associated with higher recruitment effort while the effect of non-permanent contracts is more ambiguous.

Finally, results seem to confirm the prediction that labour market tightness does not affect

investment in intensive recruitment. Only in one of the columns of table 3.6 its coefficient is marginally significant and the signs of the various point estimates differ. However and as already noted above, we cannot rule out the possibility that this result is merely due to the limited time-variation in our measure of θ. It also interesting to note the effect of the establishment's size: larger firms tend to exert more recruitment effort.

Test 3: recruitment effort and the quality of matches The final set of empirical implications relates recruitment effort to various outcomes. Let us start with the effects of extensive recruitment. In the model E is assumed to be positively correlated with the meeting probability. Empirically, this implies that when more recruitment channels are activated for the same vacancy, more applications are received and vacancy duration is shorter.

Unfortunately, data from the SERP only allow to test the effect on the number of applications received. In fact, although data about vacancy duration are available, they are collected in such a way that the resulting sample is inevitably biased towards short durations. The SERP is a sample of engagements, i.e. of all completed durations. A random sample of vacancy durations would ideally include all vacancies posted on a given date and would follow them over time. Suppose that from this ideal sample we keep only vacancies that have been filled by a later date. The resulting sample would necessarily over-represent short durations. This is precisely the problem with the SERP: there certainly are vacancies that were posted together with those present in our data and which were still open at the time of the survey. This problem is similar in nature, but of opposite direction, to the more common *"stock sampling"*, which leads to oversampling of long durations instead. As a consequence, any estimation of vacancy duration made using the SERP data is doomed to be incorrect. For this reason, the estimations in table 3.7 only look at the correlation between extensive recruitment and the number of applications received[6].

[6]The number of applications per vacancy in this dataset is much higher than similar statistics from other studies (Brown et al. (1999), Holzer et al. (1991), Manning (2000 and 2003), van Ours et al. (1992)). This is probably due to the overrepresentation of large establishments in the SERP which often have multiple vacancy openings.

To account for the discrete nature of the dependent variable, these equations are estimated using a Poisson regression. The set of explanatory variables alternates our measures of extensive recruitment and always includes additional controls: all observable characteristics of the vacancy and of the establishment, occupational and regional dummies. Unfortunately, information about the number of applications received is only available for the most recent engagement and only for those cases when contact with the successful applicant is made through a formal method (i.e. newspaper advertisement, internal and/or external notices, agencies). This reduces the sample to 1863 unweighted engagements and makes it impossible to control for unobservable fixed-effects at the firm level.

In the first 2 columns of table 3.7 extensive recruitment is measured with the number of activated recruitment channels and it is introduced linearly in column 1 and with a separate dummy for each cumulative number of activated methods in column 2. In both cases the results are uncontroversial: activating more recruitment channels leads to more applications being received for the same vacancy. The dummies in column 2, however, indicate the presence of some non-linearities: using more than 4 methods does not increase the application rate any more.

In the third column, the number of activated methods is replaced by our indicator of cost effectiveness as a measure of extensive recruitment. The estimated coefficient is not significant but the point estimate confirms the previous results: when using cheaper recruitment channels, employers receive less applications.

Finally, it is interesting to note two more results from table 3.7. First, large firms systematically receive more applications. This is consistent with findings from various previous papers (Holzer at al. (1991)). Second, vacancies for supervisory jobs and jobs in the top occupational groups receive significantly less applications. This is consistent with the theory in Moscarini (2001) where it is argued that *"...workers with specialized skills search selectively and contact few vacancies where they have very high chances of beating competing applicants. The other workers search more randomly and apply to any vacancy they hear of..."* (pag.

594).

Let us now move on to the empirical analysis of the effects of intensive recruitment. The results, reported in table 3.8, strongly support the motivating idea of this chapter: more intensive recruitment effort leads to matches of higher quality. The estimations reported in table 3.8 apply our three measures of intensive recruitment to three measures of match quality: satisfaction of the employer with the recruit, the initial wage and tenure.

In the SERP employers are asked whether they are satisfied with the person hired. This information is available for all engagements, even for those that are already terminated at the time of the interview. However, in several cases (12%) the respondent could not answer the question because the recruit had been at the firm for a too short period. These observations have been dropped from the sample. The first three columns of table 3.8 explore the correlation between intensive recruitment and satisfaction of the employer with the recruit. This is done by estimating a logit model for the probability of being "very satisfied" on intensive recruitment, controlling for all other observables characteristics of the vacancy and of the recruit. When possible, unobservable firm fixed-effect are also included[7]. The estimates indicate that two measures of intensive recruitment - the number of formal screening procedures and the "accuracy" of the recruitment method - are strongly and positively correlated with employer's satisfaction. This result is robust to the introduction of firm fixed-effects in column 3, where the accuracy of the successful recruitment method is used as a measure of I. The length of the screening process, used in column 1, appears to have no effect on satisfaction.

In the following three columns of table 3.8 - columns 4, 5 and 6 - the same exercise is repeated using the initial wage paid to the recruit as a measure of match quality. In this case a simple linear model is estimated including the same set of controls and introducing firm fixed-effects in column 6, when intensive recruitment is measured with the accuracy of

[7]Here, the logit specification is preferred to the probit, because it easily allows the introduction of unobservable fixed-effects.

the successful method, an indicator that varies across both establishments and engagements. Results unambiguously point towards higher wages paid to recruits that have been screened more accurately.

Finally, the last three columns of table 3.8 explore the effect of intensive recruitment on tenure, i.e. on the probability of a separation occurring shortly after the creation of the match. This is the correct empirical counterpart of equation (3.10): separations occurring soon after hiring are more likely than later separations to be due to inefficient matching. As already described in section 3, the SERP collects information about a set of engagements that took place within 12 months before the interview. Some of these matches, namely 7% of the total, had already been destroyed by the time of the survey. One can use the variation in job tenure generated by these matches to identify the effect of recruitment practices on the probability of a job separation occurring soon after hiring. Variation in the duration of matches that are still active also helps the identification of the parameters.

This is done using a proportional hazard model in discrete time, which will need to be adjusted for the peculiar way data on tenure are collected in the SERP. Uncompleted durations, i.e. tenure for continuing matches, can be computed in days using information about the date of the interview and the date when the recruit started his/her job. Uncompleted durations, however, are recorded in intervals: when the person has already left the firm the responded is only asked to indicate whether he/she had been employed less than a week, between a week and a month, between 1 and 3 months, etc.

For simplicity, we take a week as the basic time unit and the duration of uncompleted spells is reaggregated from days to weeks. Then, adopting a standard proportional hazard model, the likelihood contribution of a continuing match, j, lasting for T_j weeks is defined by the following survivor function:

$$\Pr\{t > T_j \mid X_j\} = S(T_j \mid X_j, \gamma) = \exp\left[-H(T_j) \cdot e^{\gamma' X_j}\right]$$

where X_j is a set of controls, including all observable characteristics of the firm and the worker, and γ is the corresponding set of parameters. $H(T_j)$ is the so-called "integrated hazard", i.e. $H(T_j) = \int_0^{T_j} h_0(u)du$, where $h_0(u)$ is the baseline hazard at time u. Using this definition, it is customary to derive a discrete time hazard as follows:

$$h(T_j \mid X_j) = \Pr\{T_j - 1 > t > T_j \mid t > T_j, X_j, \gamma\} =$$
$$= \frac{S(T_j - 1 \mid X_j, \gamma) - S(T_j \mid X_j, \gamma)}{S(T_j - 1 \mid X_j, \gamma)} = 1 - \exp\left\{e^{\gamma' X_j}\left[H(T_j - 1) - H(T_j)\right]\right\}$$

Rearranging this equation one can derive the following useful expression:

$$\log\left[1 - h(T_j \mid X_j, \gamma)\right] = e^{\gamma' X_j}\left[H(T_j - 1) - H(T_j)\right]$$

and:

$$\log(-\log\left[1 - h(T_j \mid X_j, \gamma)\right]) = e^{\gamma' X_j} + \log\left[H(T_j - 1) - H(T_j)\right]$$

Notice that now $H(T_j - 1) - H(T_j)$ is a function of the baseline hazard only:

$$\log\left[H(T_j - 1) - H(T_j)\right] = \log\left[\int_{T_j - 1}^{T_j} h_0(u)du\right] = \tau_j$$

which allows to rewrite the previous expression as:

$$\log(-\log\left[1 - h(T_j \mid X_j, \gamma)\right]) = e^{\gamma' X_j} + \tau_j$$

hence:

$$h(T_j \mid X_j, \gamma) = 1 - \exp\left[-\exp\left[e^{\gamma' X_j} + \tau_j\right]\right]$$

which is usually called *complementary log-log* transformation of the hazard. Writing the hazard in this form is useful for our purposes because it easily allows to account for differences in the coding of tenure by simply defining different τ_j's.

For destroyed matches that lasted between, say, T_l and T_u the corresponding τ_j can be written as:

$$\tau_j = \log \left[\int_{T_l}^{T_u} h_0(u)du \right]$$

This means that introducing a set of dummies for each coding of tenure (i.e. a dummy for matches that lasted less than a week, another for those lasting between a week and a month, and so on) allows to control for differences in time intervals.

Results are reported in the last three columns of table 3.8. While the length of the recruitment process appears to have no effect on the probability of a job separation and the number of screening procedures is only mildly and positively correlated with it, the strongest result is in column 9, where the accuracy of the successful method is used as a measure of intensive recruitment. The estimated coefficient points towards a strong and significant effect of intensive recruitment in the direction of lowering the probability of a job separation.

Theoretically, it would be possible to introduce firm unobservable heterogeneity in this estimation. However, this is not done here for two reasons. First, when the baseline hazard is fully non-parametric the role of unobserved heterogeneity is minimal (Heckman at al. (1984)). Second, given the small fraction of completed spells in our sample, imposing further restrictions on the likelihood function makes it difficult to identify all the parameters[8].

Overall, the results of table 3.8 support the basic idea of this chapter: more intensive recruitment leads to matches of better quality that pay higher wages, last longer and make employers more satisfied with the person taken on.

[8]In fact, the maximum likelihood estimation of the model with unobserved heterogeneity does not converge easily.

3.5 Conclusions

The available evidence for various countries and time periods indicates that employment relationships are far less stable in low- than in high-productivity jobs. This regularity remains true after controlling for a number of personal and job characteristics, making it an interesting theoretical and empirical puzzle. This chapter offers an explanation for this finding based on the idea that employers find it less profitable to invest in search and screening activities when recruiting for low-productivity jobs. As a consequence, matches at the lower end of the jobs' distribution are more likely to be of poor quality, in the sense that the same worker (job) can be paired with another job (worker) into a more productive match, hence they are destroyed more frequently.

This idea is formalised in a simple model in which employers optimally choose their investment in extensive (search and advertisement) and intensive (screening) recruitment, and the effects of such investment on match quality can be analysed. A unique dataset of hirings that took place in the United Kingdom in 1992 is used to test the model empirically. Results show that (i) investment in extensive and intensive recruitment are positively correlated, (ii) employers screen more intensively when recruiting for jobs in higher occupational groups and (iii) matches created through more intensive screening last longer, pay higher wages and make employers more satisfied with the person taken on.

Understanding the causes of differentials in labour turnover is important in itself, to improve our knowledge of the functioning of the labour market, but it is also interesting from a policy perspective. Unstable employment relationships for certain categories of workers and jobs can generate large inequalities both in income levels and in its variability. Most people spend their entire working life in the same occupation and industry and if the quality of matches in these jobs is constantly low they will experience higher job and earnings instability, leading to higher inequality and possibly higher poverty. Policies aimed at improving the quality of matching are, thus, likely to have positive effects on both equity and efficiency, particularly if they are focused on unskilled workers and elementary occupations.

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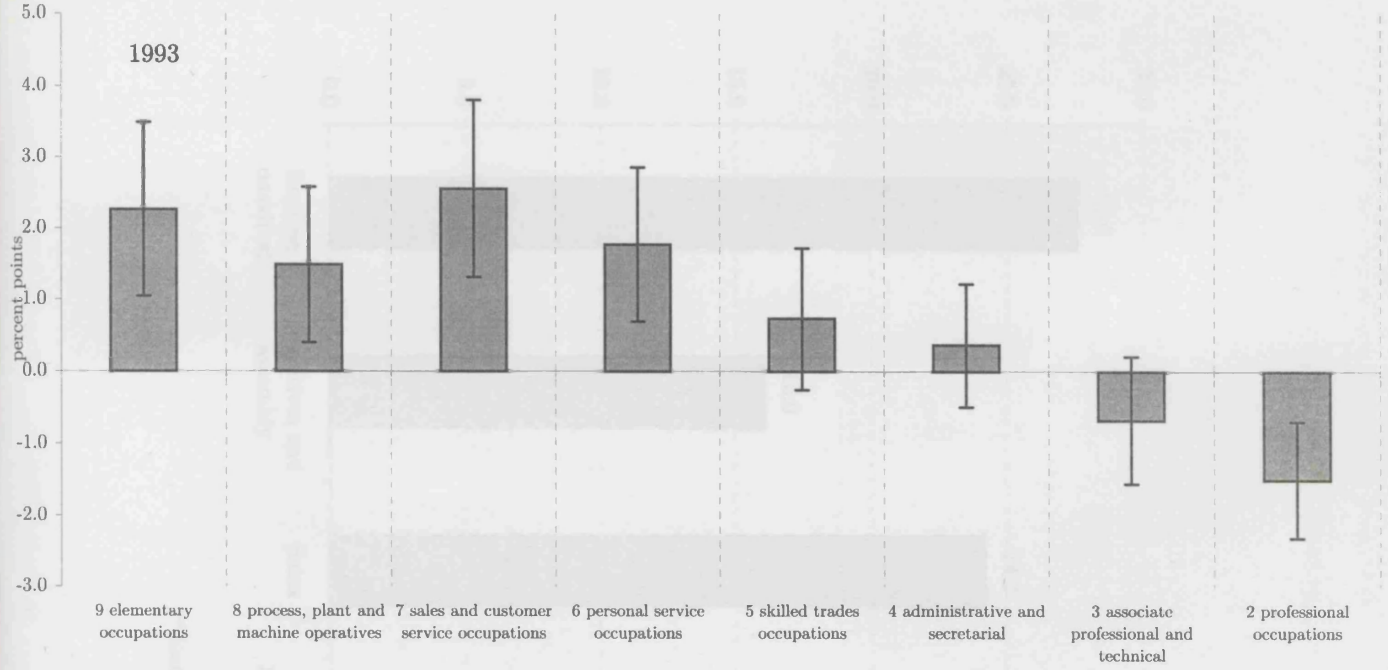
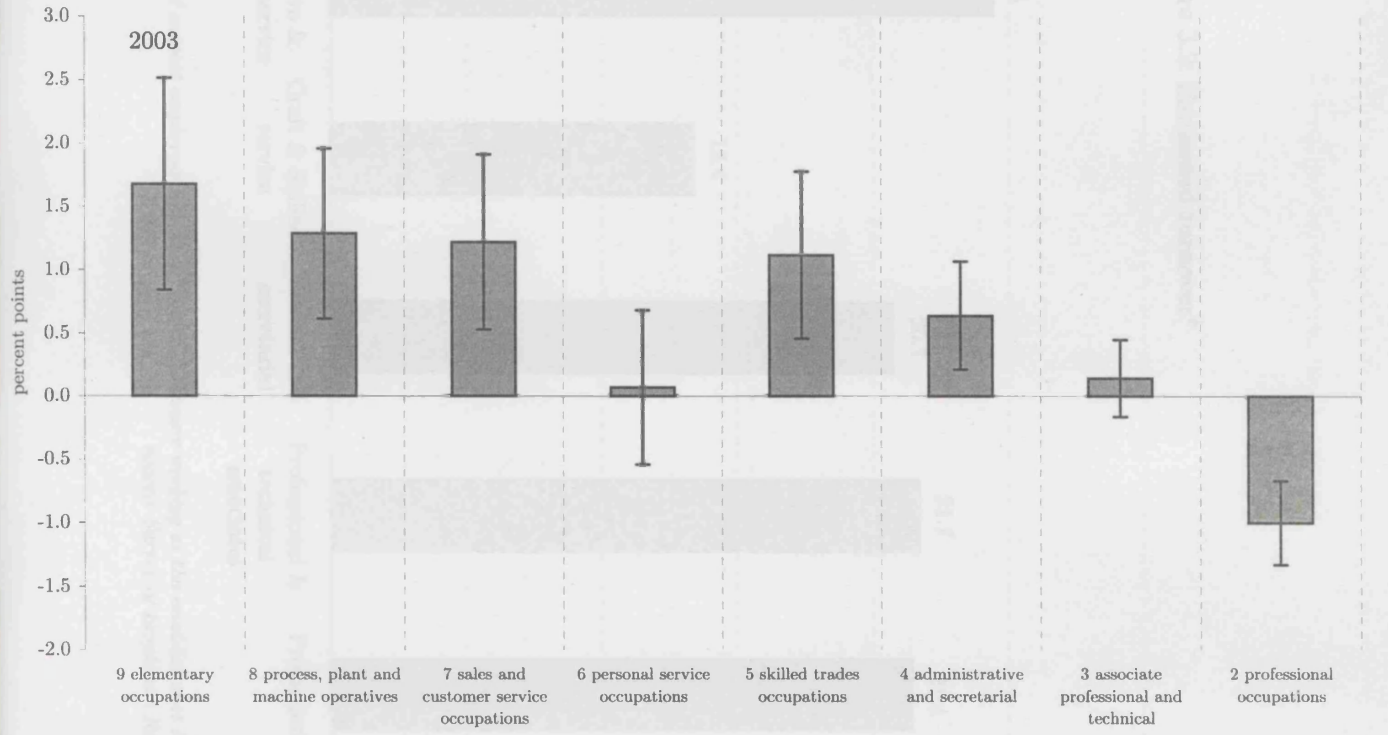
Figures and Tables

Figure 3.1: Conditional differences in labour turnover by occupation



test joint identity: Ho: occup2=...=occup9

$\chi^2(7) = 71.03$; Prob>$\chi^2(7)$=0.0000



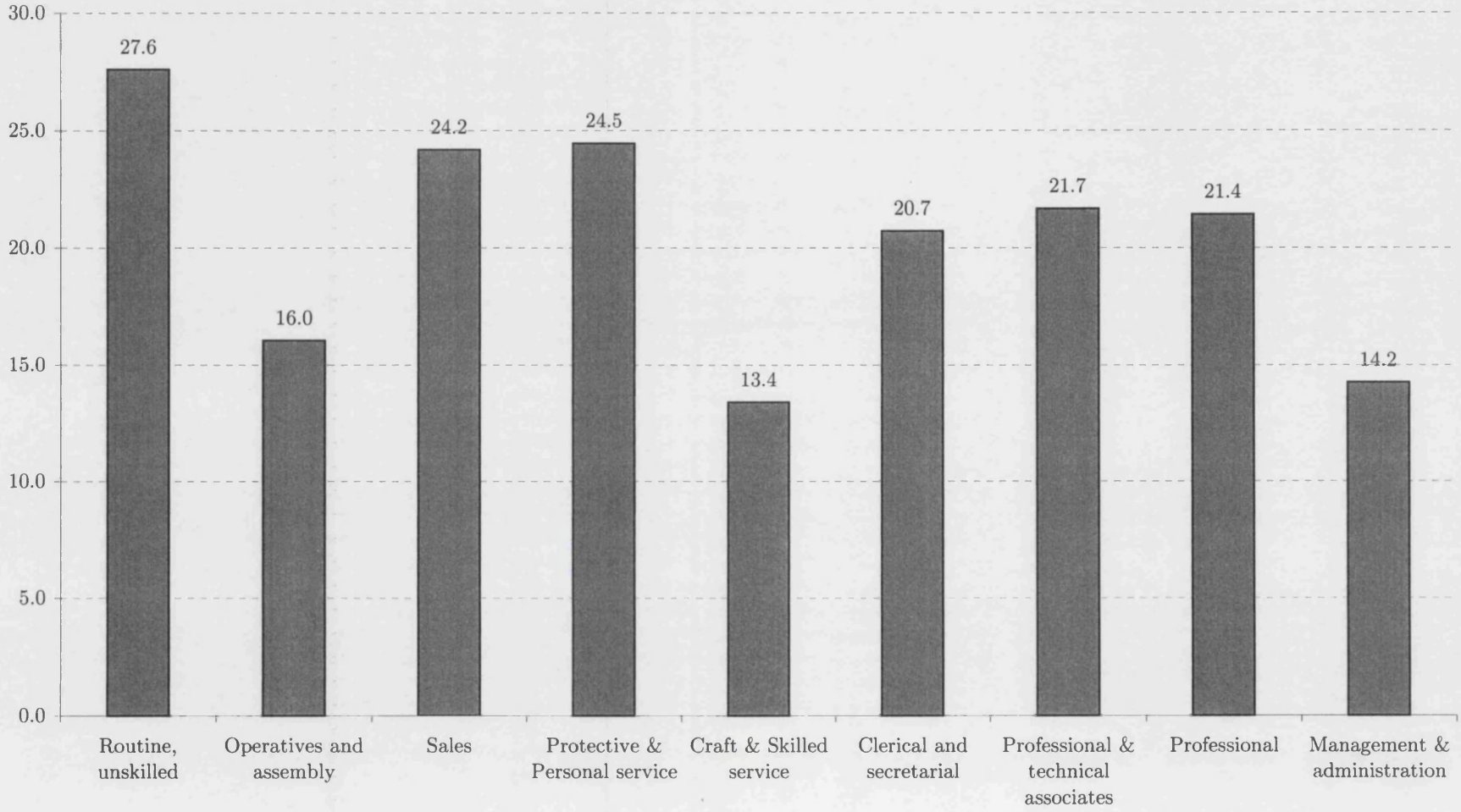
test joint identity: Ho: occup2=...=occup9

$\chi^2(7) = 437.70$; Prob>$\chi^2(7)$=0.0000

NOTE: Marginal effects of the occupational dummies obtained from a probit regression for the probability of job separation (to a new job, to unemployment or to inactivity) between the first and the second quarter of 1993 and 2003. The set of regressors includes gender, age, education, tenure, dummies for part-time and temporary jobs and for jobs in the public sector, industry and regional dummies. The vertical bars represent 95% confidence intervals. The reference category is "managers and senior officials".

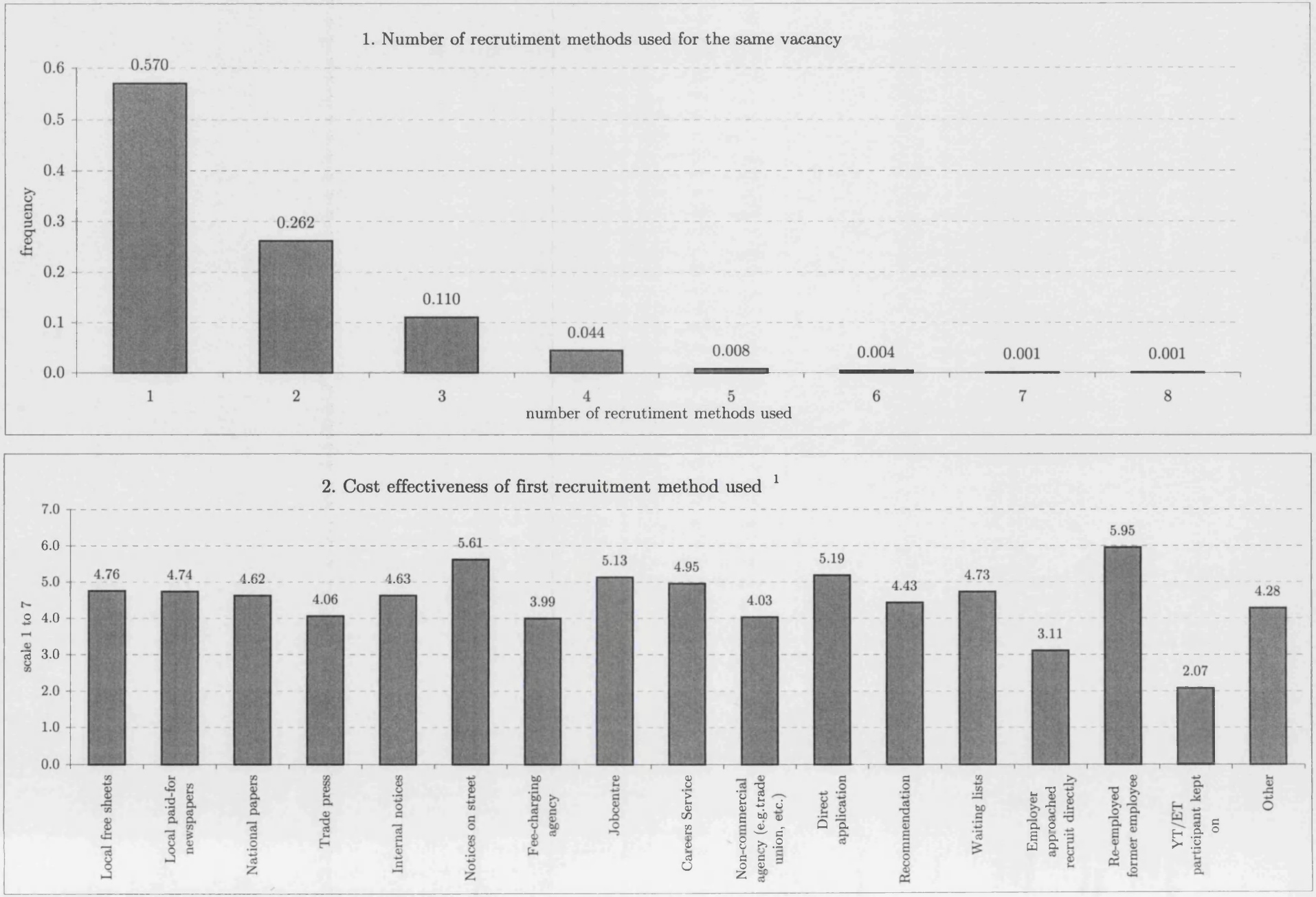
Source: British LFS, 1993 and 2003.

Figure 3.2: Estimated turnover*



** Estimated % of current employees who have been continuously working at the establishment for longer than 12 months.*
source: Survey of Employers Recruitment Practices, 1992

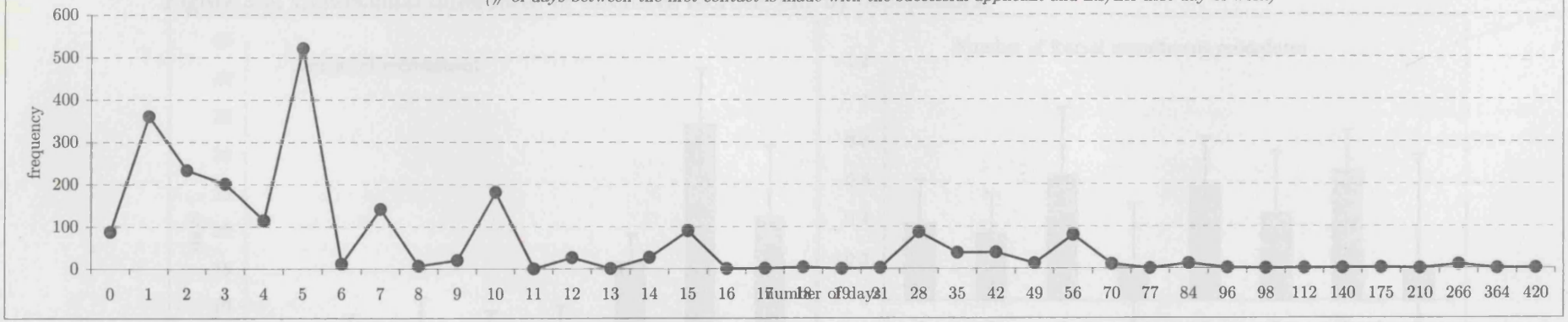
Figure 3.3: Measures of Extensive recruitment



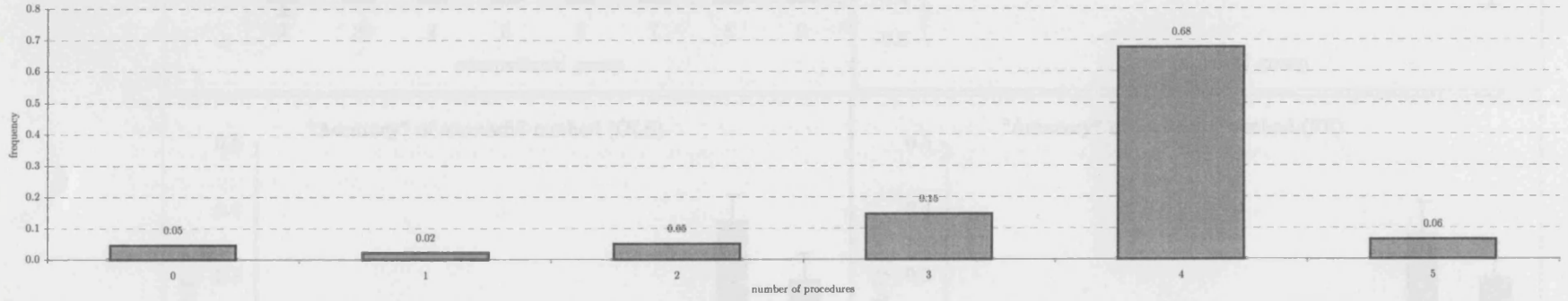
1. See text for a description of how this variable is constructed.

1. Lenght of the screening process [1]

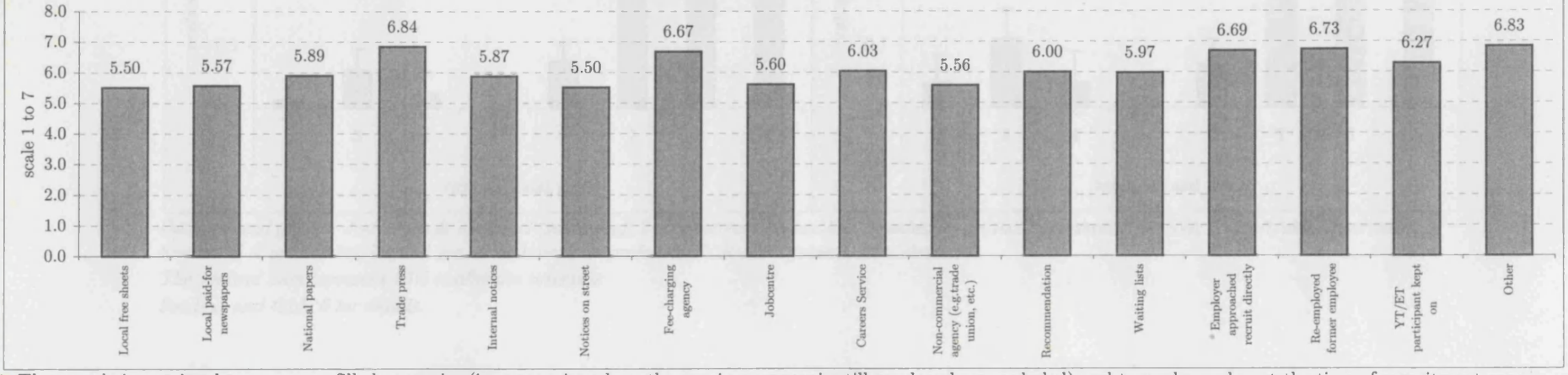
(# of days between the first contact is made with the successful applicant and his/her first day of work)



2. Number of screening procedures normally used at the establishment



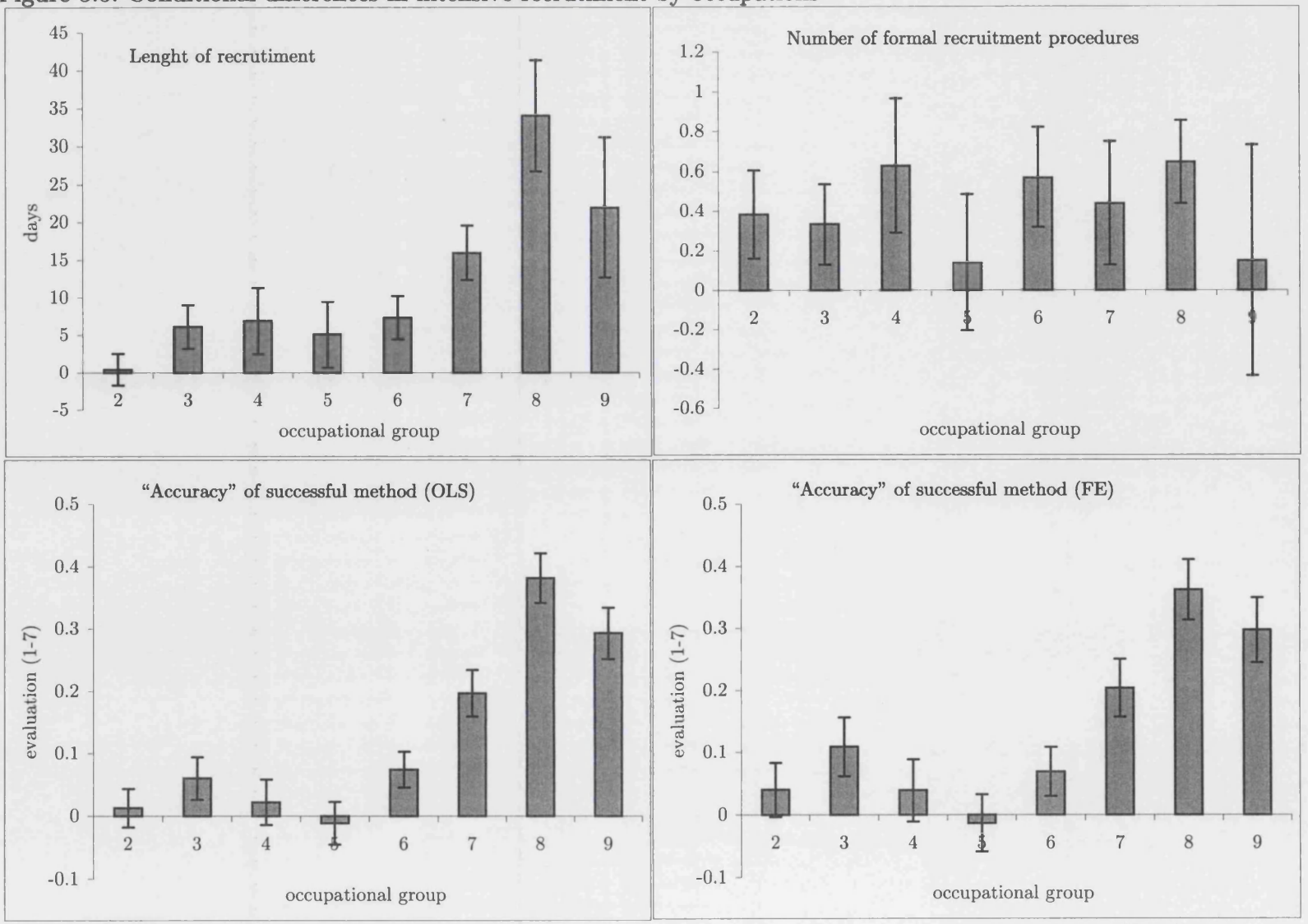
3. "Accuracy" of successful recruitment method [2]



1. The sample is restricted to new or unfilled vacancies (i.e. vacancies where the previous person is still employed are excluded) and to workers who, at the time of recruitment were either unemployed or inactive (i.e. job-to-job and education-to-job movers are excluded)

2. See text for a description of how this variable is constructed

Figure 3.5: Conditional differences in intensive recrutiment by occupations



Occupational groups: 1=routine & unskilled (reference); 2=operatives & assembly; 3=sales; 4=protective/personal services; 5=craft/skilled services; 6=clerical & secretarial; 7=prof. ass. & technical; 8=professional; 9=management/administration.

The vertical bars represent 95% confidence intervals

See text and table 6 for details.

Table 3.1: Labour turnover by occupation

	Turnover		% of movers into unemployment		% of industry stayers *among the emp.-to-emp. movers*	
Occupation	1993	2003	1993	2003	1993	2003
1 managers and senior officials	3.05	3.83	26.77	25.44	63.73	59.12
2 professional occupations	2.91	3.40	19.38	13.85	83.82	76.46
3 associate professional and technical	3.51	4.62	23.77	16.86	80.60	64.03
4 administrative and secretarial	4.71	5.52	22.34	15.47	68.64	63.06
5 skilled trades occupations	4.80	6.26	44.10	24.09	74.08	73.43
6 personal service occupations	7.01	5.30	19.19	14.48	73.06	64.51
7 sales and customer service occupations	8.38	9.73	21.51	15.81	55.97	51.12
8 process, plant and machine operatives	5.47	6.49	37.06	21.77	76.78	49.53
9 elementary occupations	7.56	9.01	29.08	22.26	61.47	55.19
Total	5.09	5.84	26.84	19.11	69.29	60.56

Note: turnover is computed as the fraction of dependent employees in the first quarter of the year who experienced a job change (to another job, to unemployment or to inactivity) by the time they were re-interviewed 3 moths later in the second quarter. The sample excludes transitions to retirement.
The % of occupation stayers is computed as the fraction of dependent employees in the first quarter of the year who are observed in another job but in the same occupation
Source: *Quarterly Labour Force Survey*

Table 3.2: Descriptive statistics for the sample of establishments

	unweighted	weighted
Sample size	5343	6083
Variable	Mean	Mean
employment	314.83 (778.56)	40.53 (0.96)
manual workers[1]	0.30 (0.30)	0.21 (0.01)
professionals[2]	0.26 (0.24)	0.28 (0.01)
Labour intensity (labour costs as % of total costs)		
less than 25%	0.22 (0.41)	0.23 (0.01)
25% to 50%	0.29 (0.45)	0.31 (0.01)
50% to 75%	0.19 (0.39)	0.17 (0.01)
more than 75%	0.30 (0.46)	0.29 (0.01)
Industry		
energy, water, etc.	0.01 (0.11)	0.00 (0.00)
metal, minerals, etc.	0.04 (0.20)	0.02 (0.00)
metal goods, engineering, etc.	0.11 (0.32)	0.06 (0.01)
other manufacturing	0.13 (0.33)	0.06 (0.00)
construction	0.03 (0.18)	0.03 (0.00)
distribution, catering, etc.	0.22 (0.41)	0.33 (0.01)
transport and communication	0.04 (0.19)	0.05 (0.01)
Banking, insurance, etc.	0.15 (0.36)	0.17 (0.01)
other services	0.26 (0.44)	0.28 (0.01)
Trend in activity in the past 12 months		
expanding	0.41 (0.49)	0.43 (0.01)
contracting	0.20 (0.40)	0.16 (0.01)
Capital utilisation		
below full capacity	0.47 (0.50)	0.49 (0.01)
overloaded	0.01 (0.11)	0.02 (0.00)
1= change of ownership in the past 3 years	0.13 (0.33)	0.10 (0.01)
Region		
London	0.07 (0.25)	0.11 (0.01)
rest of South East	0.10 (0.30)	0.19 (0.01)
East Anglia	0.04 (0.19)	0.04 (0.00)
South West	0.10 (0.30)	0.09 (0.01)
West Midlands	0.11 (0.31)	0.09 (0.01)
East Midlands	0.07 (0.26)	0.07 (0.01)
York/Humbershire	0.10 (0.30)	0.09 (0.01)
North West	0.12 (0.32)	0.12 (0.01)
North	0.10 (0.29)	0.04 (0.00)
Wales	0.09 (0.29)	0.05 (0.00)
Scotland	0.10 (0.30)	0.09 (0.01)
Establishments by number of engagements		
One	0.15 (0.35)	0.29 (0.01)
Two	0.13 (0.34)	0.20 (0.01)
Three	0.14 (0.35)	0.14 (0.01)
Four	0.20 (0.40)	0.16 (0.01)
Five	0.38 (0.48)	0.21 (0.01)

Standard erros in paretheses

1. routine, unskilled, operatives and assembly workers

2. professional and technical associates, professionals, managers and administrators

Source: Survey of Employers Recruitment Practices, 1992

Table 3.3: Descriptive statistics for the sample of recruits

	unweighted		weighted	
	Mean (sd)	valid obs.	Mean (sd)	valid obs.
The vacancy				
supervisory job	0.18 (0.38)	14609	0.16 (0.01)	10980
non permanent contract[3]	0.21 (0.41)	14609	0.35 (0.02)	10980
Occupation				
Routine, unskilled	0.15 (0.35)	14609	0.15 (0.01)	10980
Operatives and assembly	0.14 (0.34)	14609	0.21 (0.01)	10980
Sales	0.11 (0.31)	14609	0.06 (0.01)	10980
Protective/Personal service	0.07 (0.26)	14609	0.07 (0.01)	10980
Craft/Skilled service	0.09 (0.29)	14609	0.06 (0.01)	10980
Clerical and secretarial	0.20 (0.40)	14609	0.21 (0.01)	10980
Professional and technical associates	0.09 (0.28)	14609	0.10 (0.01)	10980
Professional	0.08 (0.27)	14609	0.10 (0.01)	10980
Management/administration	0.08 (0.27)	14609	0.04 (0.00)	10980
The succesful applicant				
female	0.50 (0.50)	14609	0.54 (0.02)	10980
Age				
16 - 18	0.08 (0.27)	14609	0.06 (0.01)	10980
19 - 24	0.25 (0.43)	14609	0.27 (0.02)	10980
25 - 34	0.34 (0.47)	14609	0.39 (0.02)	10980
35 - 44	0.21 (0.40)	14609	0.19 (0.01)	10980
45 - 54	0.10 (0.30)	14609	0.07 (0.01)	10980
55 or over	0.03 (0.16)	14609	0.01 (0.00)	10980
Ethinc group				
White	0.96 (0.21)	14609	0.92 (0.01)	10980
Black, etc	0.02 (0.12)	14609	0.03 (0.01)	10980
Asian	0.02 (0.15)	14609	0.05 (0.01)	10980
Other	0.01 (0.08)	14609	0.01 (0.00)	10980
disable	0.02 (0.13)	14609	0.02 (0.01)	10980
Outcome variables				
Hourly pay (gross)	5.31 (3.52)	14609	5.60 (0.11)	10980
Satisfaction				
not at all satisfied	0.01 (0.11)	14609	0.01 (0.00)	10980
not very satisfied	0.02 (0.15)	14609	0.01 (0.00)	10980
fairly satisfied	0.26 (0.44)	14609	0.25 (0.01)	10980
very satisfied	0.62 (0.49)	14609	0.47 (0.02)	10980
too ealy to say	0.09 (0.29)	14609	0.26 (0.02)	10980
number of applications received[2]	43.75 (98.62)	1855	59.32 (9.81)	2338
The labour market				
Labour market tightness[3] (*100)	4.79 (1.80)	14609	4.68 (0.06)	10980

1. Temporary, casual, part-time contracts

2. This question is only asked for the most recent engagement and only when contact with the successful applicant was made through a formal recruitment method (i.e. newspaper advertisment, notices, agencies)

3. Ratio between unfilled vacancies and unemployment benefit claimants in the quarter in which the recruit started working. (Source: Nomis)

Source: Survey of Employers Recruitment Practices, 1992.

Table 3.4: Turnover by Occupational Groups

% of existing employees who have been working for the same organisation continuously over the past 12 months

	Routine, unskilled	Operatives and assembly	Sales	Protective & Personal service	Craft & Skilled service	Clerical and secretarial	Professional & technical associates	Professional	Management & administration
0%	0.59	0.57	1.34	1.48	0.95	0.49	0.82	0.83	1.49
1% - 9%	1.34	0.93	0.71	1.14	1.38	0.90	1.31	0.71	0.86
10% - 19%	0.32	0.51	0.79	0.60	0.29	0.86	2.13	1.51	0.57
20% - 39%	3.68	1.12	5.92	1.77	0.84	1.16	1.14	2.16	1.02
40% - 59%	14.45	5.02	8.93	3.31	1.83	2.55	4.09	2.62	0.71
60% - 79%	16.57	10.04	15.68	23.52	5.33	12.52	14.65	18.33	4.10
80% - 89%	17.24	16.91	22.45	28.68	11.44	24.68	23.19	20.06	10.42
90% or over	40.20	62.99	42.04	34.51	75.83	50.56	48.33	49.30	77.26
not stated	5.61	1.92	2.14	5.00	2.12	6.28	4.34	4.48	3.57
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Estimated turnover[1]	27.60	16.05	24.19	24.46	13.41	20.72	21.67	21.42	14.25

1. The overall % of employees with tenure longer than 12 months is computed by taking the mid point in each band. Estimated turnover is 100 minus this overall estimate.

Source: Survey of Employers Recrutiment Practices, 1992

Table 3.5: Correlation between intensive and extensive recruitment

Dependent variable	# of methods used				cost effectiveness of first method used[1]			
Estimation method	ord. probit	ord. probit	ord. probit	FE	OLS	OLS	OLS	FE
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
length of recruitment (days)[2]	0.005***	-	-	-	-0.001***	-	-	-
	(0.001)				(0.000)			
# of formal screening procedures[3]	-	0.195***	-	-	-	0.009**	-0.512***	-
		(0.010)				(0.005)	(0.017)	
"Accuracy" of successful method[4]	-	-	-0.346***	-0.151***	-	-	-	-0.469***
		-	(0.028)	(0.019)				(0.016)
Labour market tightness (v/u)[5]	2.146	2.191	2.428	2.485**	3.209**	2.210**	1.691*	1.469
	(2.676)	(1.753)	(1.739)	(1.256)	(1.241)	(0.925)	(0.879)	(1.093)
Regional dummies	yes	yes	yes	yes	yes	yes	yes	no
Additional controls[6]	yes	no	no	no	yes	no	no	no
Establishment fixed-effects	no	no	no	yes	no	no	no	yes
Observations	3435	14520	14520	10489	3435	14520	14520	10489
Number of establishments	3435	4658	4658	3990	3435	4658	4658	3990
Log Likelihood	-3423.65	-13204.21	-13443.88	-7310.47	-3192.86	-14444.68	-13418.84	-5848.95

1. Average employers' evaluation of the cost effectiveness of recruitment methods (see text and figure 3).
2. # of days between the first contact is made with the successful applicant and his/her first day of work
3. Formal procedures include: use of application forms, short-listing procedures, interviews, selection procedures (medical, security checks, tests, references, trial periods, etc.), other procedures.
4. Average employers' evaluation of the accuracy of recruitment methods (see text and figure 4).
5. Ratio between unfilled vacancies and unemployment benefit claimants in the month in which the recruit started working. (Source: Nomis)
6. These include a set of dummies for the employment status of the successful candidate (employed, unemployed, inactive, student, etc.) and for the status of the vacancy (vacant, filled by previous worker, etc.) at the time of recruitment.

Robust standard errors in parentheses (clustered at the establishment level in columns [2], [3], [6], [7] and the regional level in columns [1] and [5]).
* significant at 10%; ** significant at 5%; *** significant at 1%

'able 3.6: The determinants of screening intensity

lependent variable	lenght of recrutiment (days)[1]	# of formal screening procedures[2]	"Accuracy" of successful method[3]	
stimation method	OLS	Ordered probit	OLS	FE
lean of dep. variable	19.3	2.9	6.0	6.0
	[1]	[2]	[3]	[4]
lccupational category[4]				
operatives & assembly	0.405	0.384***	0.013	0.040*
	(0.951)	(0.114)	(0.016)	(0.022)
sales	6.130***	0.333***	0.060***	0.109***
	(1.305)	(0.104)	(0.017)	(0.024)
protective/personal services	6.894***	0.628***	0.022	0.039
	(1.973)	(0.173)	(0.018)	(0.026)
craft/skilled service	5.080**	0.140	-0.011	-0.013
	(1.972)	(0.176)	(0.017)	(0.023)
clerical & secretarial	7.337***	0.569***	0.074***	0.069***
	(1.291)	(0.128)	(0.014)	(0.020)
prof. ass. & techinical	15.957***	0.438***	0.197***	0.204***
	(1.626)	(0.158)	(0.019)	(0.024)
professional	34.095***	0.646***	0.382***	0.362***
	(3.271)	(0.106)	(0.020)	(0.025)
management/administration	21.927***	0.148	0.293***	0.297***
	(4.156)	(0.297)	(0.021)	(0.027)
'ype of job				
supervisory	0.380	-	0.067***	0.078***
	(1.009)		(0.013)	(0.016)
non-permanent	-7.577***	-	0.060***	0.044***
	(0.776)		(0.011)	(0.016)
egional labour market tightness	-175.870	-	-1.150*	0.468
/u)[5]	(102.074)		(0.603)	(0.795)
stablishment's size				
# of employees	0.736***	0.061***	0.003**	-
	(0.195)	(0.008)	(0.001)	
# of employees^2	-0.008**	-0.001***	-0.000	-
	(0.003)	(0.000)	(0.000)	
ecruit's characteristics[6]	yes	no	yes	yes
ob's characteristics[7]	yes	no	yes	yes
stablishment's characteristics[8]	yes	yes	yes	no
stablishment's fixed effects	no	no	no	yes
egional dummies	yes	yes	yes	no
dditional controls[9]	yes	no	no	no
bservations	3435	-	14520	10489
stablishments	3435	3985	4658	3990
og Likelihood	-16356.77	-4783.24	-8621.87	-2458.32

# of days between the first contact is made with the successful applicant and his/her first day of work

Formal procedures include: use of application forms, short-listing procedures, interviews, selection procedures (medical, security checks, tests, eferences, trial periods, etc.), other procedures.

Average employers' evaluation of the accuracy of recruitment methods (see text and figure 4).

The reference group is *routine & unskilled workers.*

Ratio between unfilled vacancies and unemployment benefit claimants in the month in which the recruit started working. (Source: Nomis)

Gender dummy, age dummies, ethnic group dummies, disable dummy, employment status at the time of recruitment (employed, unemployed, nactive, student, etc.).

Dummies for supervisory and non-permanent jobs, status of the vacancy (vacant, filled by previous worker, etc.) at the time of recruitment.

Establishment's size (linear and squared), occupational composition of the workforce, labour intensity (% of labour costs over total costs), capa tilization (below full capacity, overloaded), activity trend (expanding vs. contracting), a dummy for change of ownership in the past 3 years, ummies for company type (limited, partnership, charity, et.), dummies for establishment type (administrative vs. production, headquarter vs. n eadquarter), industry dummies.

These include a set of dummies for the employment status of the successful candidate (employed, unemployed, inactive, student, etc.) and for atus of the vacancy (vacant, filled by previous worker, etc.) at the time of recruitment.

obust standard errors in parentheses (clustered by region in column [1] and by establishment in column [2], [3], [4]).

significant at 10%; ** significant at 5%; *** significant at 1%

Table 3.7: The effects of extensive recruitment

Dependent variable	# of applications received[1]		
Estimation method	poisson regression		
Mean of dep. Variable	43.7		
	[1]	[2]	[3]
# of recruitment methods used	0.231***		
	(0.045)		
2 methods used	-	0.165**	-
		(0.070)	
3 methods used	-	0.297***	-
		(0.100)	
4 methods used	-	1.080***	-
		(0.165)	
5 methods used	-	-0.005	-
		(0.414)	
6 methods used	-	0.777	-
		(0.748)	
Cost effectiveness of first method used[2]	-	-	-0.097
			(0.186)
Regional labour market tightness (v/u)[3]	6.044	6.537	5.533
	(9.665)	(9.624)	(10.287)
Type of job			
supervisory	-0.319*	-0.352**	-0.306*
	(0.185)	(0.178)	(0.169)
non-permanent	-0.053	-0.046	-0.094
	(0.136)	(0.131)	(0.134)
Establishment's size			
# of employees	0.113***	0.107***	0.125***
	(0.026)	(0.025)	(0.028)
# of employees^2	-0.003***	-0.003***	-0.004***
	(0.001)	(0.001)	(0.001)
Occupational dummies	yes	yes	yes
Establishment's characteristics[4]	yes	yes	yes
Regional dummies	yes	yes	yes
Observations	1855	1855	1855
Individuals	1855	1855	1855
Log Likelihood	-71577.71	-70618.82	-73366.60

1. The sample is restricted to vacancies filled through a "formal" recruitment method (i.e. the successful applicant is first contacted through newspaper advertisement, internal or external notices, recruitment agencies, both public and private).
2. Average employers' evaluation of the cost effectiveness of recruitment methods (see text and figure 3).
3. Ratio between unfilled vacancies and unemployment benefit claimants in the month in which the recruit started working. (Source: Nomis)
4. Composition of the workforce (% of employees in each occupational group), labour intensity (% of labour costs over total costs), capital utilization (below full capacity, overloaded), activity trend (expanding vs. contracting), a dummy for change of ownership in the past 3 years, dummies for company type (limited, partnership, charity, et.), dummies for establishment type (administrative vs. production, headquarter vs. non-headquarter), industry dummies, regional dummies.
Robust standard errors (clustered by regions) in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3.8: Intensive recruitment and the quality of the match

Dependent variable	1=very satisfied with the recruit			(log) initial wage[1]			Tenure (weeks)		
Estimation method	logit	logit	conditional logit	OLS	OLS	FE	proportional hazard		
Mean of dep. Variable	0.67	0.68	0.69	1.47	1.50	1.53	20.31[2]	20.45[2]	20.45[2]
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
length of recruitment (days)[3]	-0.000	-	-	0.001***	-	-	0.000	-	-
	(0.001)			(0.000)			(0.002)		
# of formal screening procedures[4]	-	0.081***	-	-	0.013***	-	-	0.050*	-
		(0.017)			(0.003)			(0.029)	
"Accuracy" of successful method[5]	-	-	0.591***	-	-	0.082***	-	-	-0.405***
			(0.093)			(0.008)			(0.100)
Regional labour market tightness (v/u)[6]	1.164	1.851	1.404	-0.562	-0.935**	-1.467***	-5.458	-0.135	-33.456***
	(6.191)	(3.070)	(5.471)	(0.675)	(0.422)	(0.487)	(14.074)	(0.650)	(5.566)
Occupational dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Recruit's characteristics[7]	yes	yes	yes	yes	yes	yes	yes	yes	yes
Job's characteristics[8]	yes	yes	yes	yes	yes	yes	yes	yes	yes
Establishment's characteristics[9]	yes	yes	no	yes	yes	no	yes	yes	yes
Establishment's fixed effects	no	no	yes	no	no	yes	no	no	no
Regional dummies	yes	yes	no	yes	yes	no	yes	yes	no
Additional controls[10]	yes	no	no	yes	no	no	yes	no	no
Duration dependence[11]	-	-	-	-	-	-	yes	yes	yes
Observations	2910	13168	9493	3557	14520	10489	11713	65327	65327
Establishments	2910	4529	3857	3557	4658	3990	3251	14332	14332
Log Likelihood	-1714.56	-7867.12	-	-	-	-	-313.12	-1898.67	-1889.73

1. Gross and hourly.
2. Most observations (95%) are right censored, the mean is heavily underestimated.
3. # of days between the first contact is made with the successful applicant and his/her first day of work
4. Formal procedures include: use of application forms, short-listing procedures, interviews, selection procedures (medical, security checks, tests, references, trial periods, etc.), other procedures.
5. Average employers' evaluation of the accuracy of recruitment methods (see text and figure 4).
6. Ratio between unfilled vacancies and unemployment benefit claimants in the month in which the recruit started working. (Source: Nomis)
7. Gender dummy, age dummies, ethnic group dummies, disable dummy, employment status at the time of recruitment (employed, unemployed, inactive, student, etc.).
8. Dummies for supervisory and non-permanent jobs, status of the vacancy (vacant, filled by previous worker, etc.) at the time of recruitment.
9. Establishment's size (linear and squared), occupational composition of the workforce, labour intensity (% of labour costs over total costs), capital utilization (below full capacity, overloaded), activity trend (expanding vs. contracting), a dummy for change of ownership in the past 3 years, dummies for company type (limited, partnership, charity, et.), dummies for establishment type (administrative vs. production, headquarter vs. non-headquarter), industry dummies.
10. These include a set of dummies for the employment status of the successful candidate (employed, unemployed, inactive, student, etc.) and for the status of the vacancy (vacant, filled by previous worker, etc.) at the time of recruitment.
11. To control for the specific design of the tenure data, duration dummies for each possible exit time (from week 1 to week 24) have been included. See text for details.
Robust standard errors (clustered by region in columns [1] and [4]) in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

APPENDIX 3.A: Derivation of the comparative statics effects

Proposition 6 $\frac{\partial E_j}{\partial I_j} \geq 0$

Proof. Equation (3.9) can be rewritten as:

$$q'_E(\widehat{E}_j|\theta_j)\xi(\widehat{I}_j) = (1+r)\xi'(\widehat{I}_j) + \xi'(\widehat{I}_j)q'_E(\widehat{E}_j|\theta_j)\widehat{I}_j \tag{3.11}$$

Taking the first partial differential with respect to $\widehat{E}_j$ and $\widehat{I}_j$ yields:

$$\frac{q''_{EE}(\widehat{E}_j|\theta_j)}{\xi(\widehat{I}_j)}\left[1-\eta_\xi(\widehat{I}_j)\right]d\widehat{E}_j = \xi''(\widehat{I}_f)\left[1+r+q'_E(\widehat{E}_j|\theta_j)\widehat{I}_j\right]d\widehat{I}_j$$

which, given the properties of $q(\cdot)$ and $\xi(\cdot)$, implies:

$$\frac{d\widehat{E}_j}{d\widehat{I}_j} \geq 0$$

■

Proposition 7 $\frac{dI_j}{d\theta_j} = 0$

Proof. The result is immediate from equation (3.8), which fully determines $\widehat{I}_j$ and where θ_j does not appear. ■

Proposition 8 *If* $\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial \theta_j} > 0$ *then* $\frac{\partial E_j}{\partial \theta_j} < 0$. *If* $\frac{\partial q(E_j|\theta_j)}{\partial E_j \partial \theta_j} < 0$ *then* $\frac{\partial E_j}{\partial \theta_j} > 0$.

Proof. Taking the first partial differential from equation (3.11) with respect to $\widehat{E}_j$ and θ_j yields (knowing that $\frac{dI_j}{d\theta_j} = 0$):

$$\left[q''_{EE}(\widehat{E}_j|\theta_j)\xi(\widehat{I}_j)\right]d\widehat{E}_j + \left[q''_{E\theta}(\widehat{E}_j|\theta_j)\xi(\widehat{I}_j)\right]d\theta_j = 0$$

and:

$$\frac{d\widehat{E}_j}{d\theta_j} = \frac{q''_{E\theta}(\widehat{E}_j|\theta_j)\xi(\widehat{I}_j)}{q''_{EE}(\widehat{E}_j|\theta_j)\xi(\widehat{I}_j)}$$

which, given the properties of $q(\cdot)$ and $\xi(\cdot)$, proves the proposition. ■

Proposition 9 $\frac{dI_j}{dp_j} > 0$

Proof. Taking the first partial differential of equation (3.8) yields:

$$\left[\xi''(\widehat{I}_j)\pi(1-\beta)(1+r+\lambda)\frac{p}{r+\lambda}\right]d\widehat{I}_j + \left[\pi\xi'(\widehat{I}_j)(1-\beta)(1+r+\lambda)\frac{1}{r+\lambda}\right]dp_j = 0$$

which, given the properties of $\xi(\cdot)$, proves the proposition. ■

Proposition 10 $\frac{dI_j}{d\pi_j} > 0$

Proof. Taking the first partial differential of equation (3.8) yields:

$$\left[\xi''(\widehat{I}_j)\pi(1-\beta)(1+r+\lambda)\frac{p}{r+\lambda}\right]d\widehat{I}_j + \left[\xi'(\widehat{I}_j)(1-\beta)(1+r+\lambda)\frac{p}{r+\lambda}\right]d\pi_j = 0$$

which, given the properties of $\xi(\cdot)$, proves the proposition. ■