The effects of fixed-term contracts on labour market performance

Thesis submitted for the degree of
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Abstract

During the 1980's, many European countries introduced flexibility measures in their labour market to fight high and persistent levels of unemployment. In particular, in many countries reforms consisted of the introduction of more flexible labour contracts (fixed-term contracts) in comparison to the predominant ones (permanent contracts). The purpose of this thesis is to analyse the effects of such contracts on the overall performance of the labour market.

First, an economy with firing costs is analysed theoretically. Firing costs are generally considered one of the most important elements in making a labour market rigid. This chapter stresses the fact that it is not just the level of severance payments what matters, but a wider view of employment protection. In particular, dismissal conflicts are modeled explicitly and their cost is derived.

In the second chapter, the effects on employment of introducing fixed-term contracts in an economy with only permanent contracts are analysed theoretically. Our findings are that higher employment at the expense of segmentation of the labour market only arises if wages are very flexible. Otherwise, employment is not necessarily higher than in a system with only permanent contracts. Moreover, from the social point of view, market segmentation is too large.

The last two chapters are empirical work applied to Spain. The Spanish experience appears to be particularly useful in this context to draw some lessons of these policies because the unemployment rate is the highest among OECD economies despite the several "policy experiments" implemented in the last two decades.

In Chapter 3 the duration pattern of fixed-term contracts and the determinants of the transformation of these into permanent ones are analysed. Evidence is found that fixed-term contracts are used as a screening device instrument. Also, employers use fixed-term contracts until their legal limit.

In Chapter 4, we study the effects of fixed-term contracts on the duration distribution of unemployment. It is found that the chances of leaving unemployment for a reference group have increased at short durations, while they have decreased at long durations of unemployment.

DECLARATION

1. No part of this work has been presented to any University for any degree.
2. Chapter 3, "The transition of workers from temporary to permanent employment: The Spanish case", was undertaken as joint work with Barbara Petrongolo. My contribution in this paper was 65%. A statement from my coauthor confirming this is given below.

I confirm the above declaration referring to joint work carried out with Maia Güell Rotllan.

Barbara Petrongolo

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0.1 Introduction

Most European countries are considered economies with highly regulated labour markets, particularly when compared to the US. At the same time, the fact that Europe has had very high and persistent unemployment levels since the mid-1970's has reinforced this belief among both employers and policy makers (see OECD (1995), for instance). As a consequence, during the 1980's, many European countries introduced *flexibility measures* in their labour markets trying to overcome these problems. Typically, European labour markets have been characterised by a wide use of permanent contracts with, what appear to be, high firing costs. Therefore, a common way in which many countries have increased *flexibility* has been to allow employers the option of hiring workers using *more flexible* labour contracts (fixed-term contracts[1]) leaving permanent contracts unaffected. Fixed-term contracts have much lower requirements in terms of firing indemnities, wages and social security charges than permanent contracts (see Grubb and Wells (1993)). The purpose of this thesis is to analyse the effects of such contracts on the overall performance of the labour market.

The thesis contains some general theoretical considerations (Chapters 1 and 2) and some empirical work applied to Spain (Chapters 3 and 4). In this context, Spain appears to be a striking case: Spain is considered an economy with one of the most regulated labour markets among OECD countries (see OECD (1994b)). At the same time, there have been several labour market reforms in this country, which were among the most radical ones. Despite these reforms, the unemployment rate is still the highest of the OECD countries, around 20% of the labour force. And it also has the highest proportion of fixed-term employees among Europe (around 33%) as a result of the implemented policies[2]. The Spanish experience appears to be particularly useful to draw some lessons about the effects of these types of policies.

The first chapter proposes a framework of a firing costs economy. Firing costs are generally considered one of the most important elements in making a labour market *rigid*. The goal of the first chapter is to understand why firing costs can negatively affect employment. The market outcome of the model that is presented will be used as the "pre-reform" situation when the

[1]The terms fixed-term contracts and temporary contracts will be used equivalently.

[2]See Blanchard, Jimeno *et al.* (1995) and Toharia (1997).

introduction of fixed-term contracts is analysed in the second chapter.

The model of firing costs of the first chapter departs from most of the existing literature in two ways. Most existing work on firing costs focuses on labour demand models where wages are assumed exogenous[3]. In our model, firing costs are introduced in an efficiency wage model and therefore we capture their effects on employment though wages. Second, it is stressed that it is not just the level of severance payments what matters, but a wider view of employment protection legislation. In particular, dismissal conflicts are modeled explicitly and their cost is derived. These two elements are put together and linked. In this way, our model integrates very different views put forward by different economists depending on the model used: the view that firing costs reduce employment as in the insider-outsider theory (Lindbeck and Snower (1988)), the idea that firing costs are neutral on employment put forward by Lazear (1990) and, also the possibility that firing costs are chosen voluntarily by firms (Booth and Chatterji (1989), Booth (1997), or Saint-Paul (1996a)).

In particular, firing costs are modelled in a shirking efficiency wage model which allows us to distinguish cases in which workers are fired without right of firing indemnities (when they are caught shirking, that is a disciplinary dismissal) from other ones in which the firm has to compensate fired workers (in case of redundancies or shocks[4]). Employers and employees have conflicting interests in these two types of dismissals[5]. In general, whenever firms face a redundancy, they want to use disciplinary dismissals in order to avoid paying firing costs. We model firing costs in a context where worker effort is not perfectly observable which implies that firms can get away with such strategy. At the same time, workers will then tend to deny any disciplinary case to get a compensation, again, because of the difficulty in observing worker effort. As it will be discussed, a double moral hazard problem could arise. Our claim in this chapter is that the resolution of this problem by a third party will be imperfect given the information problem. This will in turn imply that disciplinary dismissals will not be costless (because the court

[3]See, for example, Bentolila and Bertola (1990), Bentolila and Saint-Paul (1994), Bertola (1992) and Nickell (1978).

[4]The terms redundancies and shocks are used interchangeably in this chapter.

[5]The existing literature has typically only considered one type of dismissals (redundancies).

can erroneously declared them "unfair"[6]). Therefore, firing costs will reduce the cost of shirking and will have a negative effect on aggregate employment. Some policy implications are discussed. In particular, it is found that the solution to the problem does not necessarily imply the elimination of firing costs.

In Chapter 2, the effects on employment of introducing fixed-term contracts in an economy with only permanent contracts are analysed. This "pre-reform" economy works like the one described in Chapter 1, where firing costs reduce employment. The objective of this chapter is to understand the apparent lack of success of fixed-term contracts, especially in bringing down the level of unemployment, despite the wide use of these contracts by most employers. We have used an efficiency wage model to investigate this issue theoretically. This family of models are best suited for introducing two types of contracts, and to analyze them in a tractable manner. At the same time, these models highlight an important difference between both contracts, that is, their duration. The main contribution of carrying out this analysis is that wages are endogenous, overcoming the shortcut of the first works on these issues where wages were fixed[7]. It is often stated that the reason for introducing fixed-term contracts is that this is "the price to pay to get full employment". Our findings are that higher employment at the expense of segmentation of the labour market only arises if wages are completely flexible. If this is not the case, when fixed-term contracts are introduced, employment is not necessarily higher than it is in a system with only permanent contracts. Firms do not take into account that the increase in outflows from unemployment results in higher wages for permanent contracts. The pitfall is that a two-tier system is generated in the labour market. Moreover, from the social point of view, we find that the market segmentation is too large and that a higher share of permanent contracts could lead to higher employment levels. This means that the segmentation of the labour market not only has obvious welfare costs, but also does not always allow the economy to be efficient.

Chapters 3 and 4 are empirical work applied to Spain. As mentioned, important lessons can be derived from the Spanish experience since the *flexibility measures* introduced were very extreme. In 1984, there was the first

[6]An "unfair" case is a case where the court considers that the firm is wrong and the worker is right and therefore he must be compensated with an indemnity.

[7]See Bentolila and Saint-Paul (1992).

reform which consisted of the implementation of the experiment of *flexibility at the margin*, that is, it allowed a new type of very *flexible* contract while leaving existing (permanent) contracts unaffected[8]. Permanent contracts implicitly assume an indefinite duration and they are provided with important indemnities in case the worker is dismissed. Fixed-term contracts in Spain are essentially characterized as follows[9]: they can cover relatively short periods of time; they have negligible firing indemnities; the wage to be paid can sometimes be below the national minimum wage; social charges are financed by the state; and, most important, the job for which the contract is signed does not necessarily need to be of temporary nature (like for particular projects, e.g. building, or seasonal jobs, e.g. tourism). Therefore, fixed-term contracts can be signed for the regular and permanent activity of the firm. This is in sharp contrast with the situation before the reform, where fixed-term contracts were only allowed for temporary jobs. In addition, fixed-term contracts cannot be used forever, after 3 years they have to become permanent contracts or be destroyed.

Chapter 2 highlights the importance of the renewal rate of fixed-term contracts into permanent ones from a theoretical point of view. In Chapter 3 the duration pattern of fixed-term contracts and the determinants of the transformation of these into permanent ones are analysed using Spanish data. This issue is particularly important in Spain because, since the introduction of fixed-term contracts, around 98% of new contracts are fixed-term ones with only around 15% of them being transformed into permanent ones at their expiration date. At the same time, the widespread use of fixed-term contracts in Spain is mainly attributed to non-seasonal jobs. The main focus of the chapter is to investigate other reasons why firms opt for temporary hirings than for covering jobs whose underlying nature is seasonal (as it was the case in Spain before the 1984 reform).

We estimate a duration model for temporary employment with flexible duration dependence for exit into permanent employment using the longitudinal Spanish Labour Force Survey for the period from 1987 to 1996. We find that the shape of the baseline hazard is suggestive of two possible uses of fixed-term contracts by employers. The fact that there are important spikes

[8]Saint-Paul (1993 and 1996b) argues that this type of reform can be understood as the outcome of political influence by incumbent employees (permanent workers).

[9]A more detailed description of the legal framework in Spain is done in the next subsection.

at durations around 1 year is supporting the idea that fixed-term contracts are used by employers as a screening device instrument. "Successful workers" have their fixed-term contract transformed into a permanent one much before the legal limit of their contract (3 years). We also find that this use of fixed-term contracts seems to apply more to women than to men and to the more skilled workers than to less skilled ones.

At the same time, a much pronounced spike at 3 years is found. That is, employers also use fixed-term contracts until their legal limit. This is suggestive that employers opt for fixed-term contracts just because these are a cheaper option.

We also find that the probability of obtaining a contract conversion is quite disconnected to the state of the Spanish business cycle. Time fixed-effect imply in turn a roughly monotonically decreasing trend in the proportion of fixed-term contracts being renewed on a permanent basis over the whole sample period.

In Chapter 4, we study the effects of fixed-term contracts on the duration distribution of unemployment with particular emphasis to the changes in duration dependence. Along with the high rates of unemployment, another worrying feature of European labour markets is the high proportion of unemployment workers who have been unemployed for a long period of time. Spain has one of the highest shares of long-term unemployment among OECD economies, around 50%. Since the introduction of fixed-term contracts in the mid 1980's, the Spanish labour market has become *more dynamic*, i.e. there has been an increase in inflows and outflows from unemployment to employment. This chapter analyses how this is captured in the duration of unemployment.

The chapter focuses on how the presence of fixed-term contracts changes the chances of leaving unemployment at different durations of unemployment. In particular, if the greater employment chances given by fixed-term contracts are not equally distributed among all the unemployed workers, and there is strong duration dependence[10], then the duration of those who remain stuck in unemployment will be higher than before.

We estimate a parametric duration model using cross-sectional data drawn from the Spanish Labour Force Survey from a very long period of time, from 1980 to 1996 which allows us to analyse the chances of leaving unemployment

[10]See Alba (1996a), Bover *et al.*(1997) and Machin and Manning (1998).

before and after the introduction of fixed-term contracts. We find evidence that the probability of leaving unemployment for a reference category at different durations has changed substantially over time. For very short durations, until six months, the probability has become larger and larger in years where the incidence of temporary contracts in the economy has become more and more important. For longer durations, more than 6 months, the reverse is true. The probability of finding a job has become lower and lower in the years where the presence of temporary contracts in the economy has become more and more important.

We also find that the chances of finding a job are significantly higher for those unemployed workers who became unemployed due to the end of a temporary contract in the previous job than for those unemployed workers who became unemployed for other reasons. And there is a stronger duration dependence for this latter group. These results are again suggestive that temporary contracts have implied an important increase in outflows from unemployment but that only some of the unemployed have enjoyed these greater chances at the expense of the others.

0.1.1 Labour legislation in Spain

The empirical part of this thesis (Chapters 3 and 4) is applied to Spain. As mentioned, Spain appears to be a striking case in this context and so it appears particularly useful in order to draw some lessons about the effects of the several "policy experiments" implemented in the last 15 years. Below, a more detailed description of Spanish labour market legislation and the different reforms regarding the introduction of fixed-term contracts is given[11].

Current legislation regarding labour contracts is contained in the Worker's Statute (*Estatuto de los Trabajadores*, ET) of 1980 which has since been modified on three occasions in the 1984, the 1994 and 1997 reforms. The ET of 1980 established priority to contracts of indefinite duration (permanent contracts) and allowed fixed-term contracts only for jobs which were temporary in their nature (like for particular projects, *e.g.* building, or seasonal jobs, *e.g.* tourism). Other situations in which fixed-term contracts were allowed was for eventual increases of demand or replacement of a permanent

[11]For a comparison of fixed-term contracts regulation across European countries see Grubb and Wells (1993), OECD (1993 and 1994a).

worker in case of absence or temporary suspension of contract. It also established the possibility for the Government to use fixed-term contracts as an incentive to promote employment. In other words, except for this last situation, in general it was required that there was a specific cause in order to sign a fixed-term contracts ("causal" fixed-term contracts).

The 1984 reform exploits this last possibility in an extreme way[12]. It introduces flexibility by extending the applicability of fixed-term contracts. After the reform, any worker can be hired on a temporary basis without the requirement of a specific cause. This implies that for any job, employers can either choose a permanent or a fixed-term contract.

There are two main types of "non-causal" fixed-term contracts: a general one (*contratos temporales de fomento del empleo*) and a specific one for youths. In this last category we can differentiate among training employment contracts (*contratos en prácticas*) and apprenticeship contract (*contratos para la formación*).

These contracts can be characterised according to: *i)* required conditions for workers and firms in order to sign the contract, *ii)* limits on duration and *iii)* indemnities at termination.

(i) Required conditions for workers and firms in order to sign the contract

For the general fixed-term contract, workers that can sign it must have not exhausted in total the maximum limit of fixed-term contract duration (3 years) with one or several employers. If a worker has already been employed on a fixed-term contract for this limit period, he needs to wait 12 months in order to be eligible for a new one. Similarly, for firms this limit binds for a given vacancy, that is, firms cannot fill the same vacancy for more than 3 years with one (or several) temporary worker(s). Also, firms cannot hire a temporary worker if they have reduced its workforce for objective reasons or dismissals declared "unfair" (see below in section *iii)* in the last 12 months[13].

The above principle also applies to fixed-term contracts for youths. In training employment contracts, workers are also required to have a qualification of secondary school level or more obtained within the last 4 years.

[12]Previous uses of fixed-term contracts to promote employment in 1981 and 1982 were restricted to certain types of workers (youth, long term unemployed) and firms could only hire a certain number of workers on fixed-term contracts according to their size.

[13]In practice, it is difficult to assess whether these rules have been effectively enforced.

Apprenticeship contracts are designed for people between 16 and 20 years old that do not have the qualification required in the former contract.

(ii) Limits on duration

General fixed-term contracts can be signed for a minimum of 6 months, and fixed-term contracts for youths for a minimum of 3 months[14]. All of them have a maximum duration of 3 years. The contract cannot be renewed at the end of the maximum length period by another fixed-term contract for the same job, and it is not possible to transfer the worker to a different job within the firm without signing a permanent contract. Upon expiry, the firm can therefore choose to retain the worker by offering him a regular contract of undetermined duration. Otherwise, the job-worker pair needs to be split and the position is destroyed.

(iii) Indemnities at termination

In this paragraph it is useful to introduce first the regulation of dismissals of permanent contracts, in order to assess the change that fixed-term contracts imply in this domain.

It is possible to distinguish three different types of (individual) dismissal within the ET regulation. First, there are disciplinary dismissals, in which the worker is fired without right to indemnities. Second, there are objective dismissals, for legally authorised reasons like lack of adjustment of the worker to the job, recurrent justified absence from work or technological changes. In this case the worker has the right to a severance payment of 10 days' wage per year of seniority, with a maximum of one year's wage. Last, there are redundancies, that is legally authorised dismissals when a job is eliminated for economic or technological reasons. In this last type of dismissal, prior notice of 30 days is required and workers have the right of an indemnity of 20 days' wages per each year worked with a maximum of 12 months' wages.

The worker always has the right to sue the employer if he disagrees with the dismissal case. Once the case is taken to court, it can be declared "fair" or "unfair". In other words, depending if it is the firm or the worker who

[14]In 1992, this minimum was changed to 1 year for any fixed-term contract.

wins the case[15]. In the first case, the worker is fired with no right to any indemnity. In the second case, the worker has the right to indemnities of 45 days' wages per year worked with a maximum of 42 months. He may also be recalled in the same job, but in general this does not occur.

If the dismissal for economic and technological reasons (redundancies) involves a high number of workers it is considered a collective dismissal in which case it requires approval in advance by the Government's labour inspectorate[16]. These cases are negotiated between employers and workers' representatives. Their agreement is important for administrative approval. When there is agreement, administrative approval is automatic and indemnities on dismissal are similar to the individual ones for "fair" cases. When there is no agreement, it is more difficult to have approval and if approved it generally implies indemnities like the ones for individual "unfair" cases.

The 1984 reform leaves unaffected the legal position of permanent workers, but makes it substantially easier to hire workers on a temporary basis. Upon expiry, employers have to pay an indemnity of 12 days' wages per year worked in the case of general fixed-term contracts, while no severance payment is imposed upon expiry of training or apprenticeship contracts.

Ten years after this major reform, the Spanish labour market had become highly segmented without any important reduction in unemployment. Unions and some political parties criticised the introduction of fixed-term contracts because they had created a precarious labour force. Consequently, there was another reform in 1994 which put forward specific limits on the use of fixed-term contracts. The application of general fixed-term contracts was restricted to some categories of workers (over 45 years of age, disabled, or long term unemployed). The minimum and maximum limits for temporary contracts for the youth were changed to 6 months and 2 years, respectively. Also, subsidies and incentives to promote fixed-term contracts for youths were cut, and replaced by others that would promote the conversion of fixed-term contracts into permanent ones. There were also subsidies to promote

[15]The terms "fair" and "unfair"are defined from the worker's perspective. That is, an "unfair" case is when the court considers that the firm is wrong and the worker is right and therefore he receives the firing cost. In the case of a "fair" dismissal, the court considers that the firm is right and the worker does not receive any indemnity.

[16]For firms that employ less than 100 workers, it has to affect at least 10 workers; for firms that employ between 100 and 300 employers, it has to affect at least 10% and for bigger firms, at least 30 workers.

the conversion of fixed-term contracts into permanent contracts for workers older than 45 years old, women in professions or jobs where they are underepresented and for disabled people.

Finally, the 1997 reform again tried to implement new measures to modify the excessive precarious employment created since 1984. As in the previous reform, subsidies to promote the transition from temporary to permanent contracts were agreed. And more importantly, a new typology of permanent contract was introduced, targeted at "protected categories" of workers (young people younger than 30 years old, long-term unemployed, people older than 45 years old and disabled workers), and carrying lower firing costs than existing ones. The effects of this last reform are not analysed in this thesis because there is no data available for the most recent years.

0.2 Overall Conclusions

Overall, the evidence from this thesis is suggestive of the following:

- When assessing the effect of firing costs on employment, it is crucial to stress that it is not just the level of severance payments.what matters, but a wider view of employment protection. In particular, in this thesis, dismissal conflicts have been considered and their cost has been derived.

- A crucial feature for an employment protection system to work is that a minority of the dismissal cases are taken to court and, if so, the exception are declared "unfair" by court. For this, it is important to set a gap wide enough between severance payments for cases declared "unfair" and cases declared "fair". And, second, different indemnities should be set for "unfair" cases depending on whether it is considered that it is the worker's or the firm's initiative.

- Higher employment at the expense of segmentation of the labour market only arises if wages are very flexible. Otherwise, when introducing fixed-term contracts, employment is not necessarily higher than in a system with only permanent contracts.

- Moreover, from the social point of view, market segmentation is too large. Higher renewal rates of fixed-term contracts into permanent contracts lead to higher employment levels.

- In Spain, after the introduction of fixed-term contracts, the large increase in the proportion of these in total employment can be mainly attributed to non-seasonal jobs. We find evidence that employers use fixed-term contracts as an screening device instrument. We also find that these contracts provide a cheaper option for employers and, in this case, they are used until their legal limit.

- After the introduction of fixed-term contracts, there has been a big increase in the inflows and outflows from unemployment in Spain. We find evidence that the greater employment chances given by fixed-term contracts have increased the probability of leaving unemployment at short durations of unemployment while the reverse is true at long durations of unemployment.

- The overall policy conclusion of this thesis is that policies aimed at improving labour market flexibility and, more generally, at facing the European unemployment problem, should be targeted at the *core* rather than at the *fringe* of labour contracts.

Chapter 1

Employment Protection and Unemployment in an Efficiency Wage Model

1.1 Introduction

Firing costs are often blamed for unemployment in Europe (see OECD (1995), for instance). The aim of this chapter is to investigate this widespread belief from a theoretical point of view. The model we build makes two main points. First, firing costs are introduced in an efficiency wage model to capture their effects on employment through wages. Second, dismissal conflicts are modeled explicitly and their cost is derived. In particular, two types of dismissals are considered, redundancies and disciplinary dismissals, where employers and employees have conflicting interests[1].

Most of the existing work on firing costs focuses on labour demand models and the only type of dismissals considered are redundancies[2]. These models are very useful for understanding the effects of firing costs on the dynamic functioning of the labour market. However, the effects on aggregate employment are ambiguous and remain in partial equilibrium. The implicit

[1]The firm has to compensate the worker when facing a redundancy while no compensation is required in a disciplinary dismissal.

[2]See, for example, Bentolila and Bertola (1990), Bentolila and Saint-Paul (1994), Bertola (1990 and 1992) and Nickell (1978).

assumption of labour demand models is that wages are exogenous and do not change in the presence of firing costs[3]. In our model, wages are endogenous and firing exogenous. In this way, the model highlights another dimension of firing costs which is not captured by labour demand models. To focus on the effects of firing costs on the wage-setting is particularly important for those unemployment models in which in the long-run the unemployment rate is determined entirely by long-run supply factors (see Layard *et al.* (1991)).

Despite the prevalent idea of the (negative) effect of firing costs on employment, specially among policy makers and employers, there are very different views among economists depending on the model used. For instance, according to the insider-outsider theory put forward by Lindbeck and Snower (1988), firing costs are a source of market power for incumbent workers (the insiders) *vis-a-vis* the unemployed (the outsiders). Insiders use their market power to exercise upward pressure on their wages and thereby generating unemployment. According to this view, the higher the firing costs, the higher the unemployment.

A completely different view of firing costs is the one by Lazear (1990). He shows that if markets are perfect and complete, then flexible wages can undo all the effects of firing costs and, therefore, firing costs are neutral on employment. Workers pay ex-ante a fee which is equal to the severance payment they get in case they are fired. If they keep the job, they get their fee back with higher wages. In such a world, for any level of firing costs, it is always possible to write an optimal contract that undoes all the effects of severance payments.

A third view of firing costs highlights the possibility of firing costs arising endogenously. This approach is motivated by the fact that sometimes firms and workers negotiate severance payments which do not coincide with the ones legally set; or even, some firms offer severance payments in the absence of employment protection legislation. Several authors have investigated this idea in different contexts. For instance, Booth and Chatterji (1989) construct a model of firm-specific training where the returns to training are uncertain as well as the outside options for workers. In such a context, the costs of training are shared between the firm and the worker because there exists the possibility that workers quit. In case of being dismissed, workers are compensated by this cost with a redundancy payment. Also, Booth (1997)

[3]An exemption of this is Bertola (1990).

argues that in a two-period model, where it is in the interest of firms to have long-term employment relationships, if workers are risk-averse they prefer a contract with redundancy payment, and risk-neutral firms find it optimal to offer it. Finally, in Saint-Paul (1996a), in a dynamic efficiency wage model, explores how firing costs arise endogenously. Firms may chose to voluntarily offer firing costs in their labour contracts because these help firms to credibly commit to more stable employment policies in an uncertain environment.

These three views exposed above have radically different ideas of firing costs. One could summarise crudely that firing costs are "bad" according to the first view, "neutral" according to the second view or even "good" according to the third view since they can be an optimal instrument for firms. Consequently, these three frameworks summarise all possible effects of firing costs over employment. The model presented here is an efficiency wage model where dismissal conflicts are costly. As it will be seen, modelling firing costs in this way allows to integrate the three different views mentioned above.

There is a commonly held idea that firing costs are high because they involve large administrative and legal costs and that these lead to higher labour costs. Although this point is often made, it is usually modeled in a simplistic way: firing costs paid by firms are assumed to be higher than the indemnity that firms have to pay to workers[4]. But this is not actually the case in most European countries. Instead, the source of higher firing costs has to do more with the fact that there exist dismissal conflicts between employers and employees and that the law sets different severance payments depending on the case being declared "fair" or "unfair" by court. In other words, depending if it is the firm or the worker who wins the case[5]. For instance, in Spain, the cost of a case declared "fair" is 20 days' wages per each year worked with a maximum of 12 months' wages. But if the case is declared "unfair", the cost is more than double, 45 days' wages per year worked with a maximum of 42 months[6].

[4]See Burda (1990) for a model of this sort.

[5]The terms "fair" and "unfair"are defined from the worker's perspective. That is, an "unfair" case is when the court considers that the firm is wrong and the worker is right and therefore he receives the firing cost. In the case of a "fair" dismissal, the court considers that the firm is right and the worker does not receive any indemnity.

[6]See Grubb and Wells (1993) for a comparison of these indemnities in different European countries.

In this chapter, we explicitly model dismissal conflicts and their cost. Conflicts between employers and employees can arise for very different reasons. In general, whenever firms face a redundancy, they want to use disciplinary dismissals in order to avoid paying firing costs. We model firing costs in a context where worker effort is not perfectly observable. This actually provides a rationale for the existence of workers' right to sue their employers in case of disagreement. In such a context, workers can be in a weaker position because firms can get away with the use of disciplinary dismissals whenever they need to adjust their workforce (i.e. in case of redundancy). Therefore, there is a reason for job protection legislation to include the right for employees to take cases to court. The drawback is that workers will then tend to deny any disciplinary case to get a compensation (specially if the indemnity is higher when the case is declared "unfair"), again, because of the difficulty in observing worker effort. As it will be discussed, a double moral hazard problem could arise. Our claim in this chapter is that the resolution of this problem by a third party will be imperfect given the information problem.

The existence of imperfect resolutions of dismissal cases will in turn imply that disciplinary dismissals will not be costless and firing costs will have a negative effect on aggregate employment. As it will be discussed at the end of the chapter, the solution does not necessarily imply the elimination of firing costs. Rather, what will appear to be important is the gap between the severance payment for cases considered "unfair" and those "fair".

We concentrate on dismissal conflicts of small/medium firms for which "individual" dismissal regulation applies. In case of large firms, redundancies are generally under the "collective" dismissal regulation which implies that the number of redundancies and their total cost are bargained with a third party (generally, unions)[7].

In our model, firms will bear a firing cost that is exactly the same as the indemnity received by the worker. This is the case for most European countries. In countries in which the administrative approval processes are very complex[8], many of the cases are settled by the worker and the firm out of court, precisely to avoid these costs. Therefore, again, firms do not bear a

[7]See Booth (1996 and 1997) for a model of firing costs in unionised sectors of the economy.

[8]Typically, this is case in southern European countries (see Grubb and Wells (1993) for several indicators of the "strictness" of employment protection legislation).

higher cost than the indemnity received by workers. The worker receives a settlement which amount lies between the legal severance payment and the (expected) cost had the case gone to court. In this sense, the firing costs due to dismissal conflicts that are derived in the model can be thought as the upper bound of what a worker could receive from bargaining with the firm.

The rest of the chapter is organised as follows. First, firing costs are described, and their implications for (efficiency) wages and employment are derived. In the last section, we discuss some policy implications.

1.2 The model

The model is a version of the shirking model of Shapiro and Stiglitz (1984) with firing costs. As in Shapiro and Stiglitz, a worker's effort is not perfectly observable and there is a detection technology that catches shirking workers (never erroneously) with some probability q (where $q < 1$). When a worker is found shirking, he is fired and becomes unemployed. Workers also have an exogenous probability, b, of being separated from their job for redundancy reasons[9]. In the next section we describe how firing costs are modeled.

1.2.1 Redundancies and disciplinary dismissals in conflict

Most industrialised countries have a job protection legislation framework that protects workers against redundancies. The idea is that a redundancy is an exogenous event to the worker and imposes a cost to him and thus he must be compensated for it. At the same time, employers are allowed to fire workers for disciplinary reasons without having to pay any compensation.

A framework where worker's effort is imperfectly observable is best suited for considering another common feature of job protection legislation, namely the right for workers to sue employers in case of disagreement.

Whenever firms need to adjust their workforce, they want to use disciplinary dismissals to avoid paying firing costs. And the difficulty in observing worker effort means there is some chance that firms can get away with such

[9]The terms adverse economic shocks and redundancies are used interchangeably here.

strategy[10]. The right for workers to sue employers in case of disagreement can compensate for this imperfection. But then, similarly to firms, workers will deny any reasons for disciplinary dismissal to get a compensation based on unjust grounds. In such a context, both true disciplinary cases and hidden redundancies arrive to court as disciplinary cases. Court's decision is based on whatever evidence (if any) is presented by the agents, which is not perfectly correlated with reality given the information problem. So, in general, courts are not able to distinguish perfectly between true disciplinary cases and hidden redundancies. Thus, the resolution by a third party will tend to be imperfect given the information problem.

In the model, this is represented by the fact that some (true) disciplinary dismissal cases could be considered "unfair" and some hidden redundancies could be declared "fair" by court. In other words, in the first case, workers may be compensated when they should not. And in the second case, firms avoid paying firing costs when they should have paid them. We define d as the probability that a (true) disciplinary dismissal is declared "unfair". Firms have a greater chance to prove that a real disciplinary case was such than to prove that a redundancy was a disciplinary case. But still, given the information problem, it is possible that the court declares a dismissal to be disciplinary when it was a redundancy (i.e. the "hidden" redundancy is declared "fair"). Let $(1-z)$ be the probability of this happening. Therefore, when the firm faces a redundancy and claims that is a disciplinary case, it will have to pay firing costs with probability z, where $z \geq d$. That is, the probability that the case is declared in favour of the worker (i.e., "unfair") is lower when the case was originally a disciplinary case. Or, in other words, the firm is more likely to end up paying firing indemnities in a declared disciplinary case when it was originally a redundancy. We assume that the legislation fixes a severance payment of c for redundancies and a severance payment of C if the case is taken to court and is declared "unfair" (where $c < C$). Then, given the double moral hazard problem, the firm's expected firing cost of a (true) disciplinary dismissal is dC and of a redundancy is zC. Table 1.1 below summarises firing costs described[11].

[10]Malo (1998) considers the case where firms use disciplinary dismissals in cases of redundancies in a model where firing costs are bargained in the shadow of the law between employer and employee.

[11]Let's assume that in case of redundancies presented as disciplinary cases, the firm can never show evidence of the case and the cost is zC. In the case of real disciplinary cases,

Table 1.1: Firing costs for redundancies and disciplinary cases

Reality	Declaration of firm	Declaration of worker	Expected Cost
Redundancy	Redundancy	accepts	c
Redundancy	Disciplinary	denies	zC
Disciplinary	Disciplinary	denies	dC

To sum up, given the context described above, there is always an incentive for firms to declare redundancies as disciplinary cases and for the worker to deny any disciplinary case. A further discussion of this double moral hazard problem is done in the last section of the chapter.

1.2.2 Non-shirking condition

In this section, the non-shirking condition of workers is analysed. Workers are risk neutral[12]. Their instantaneous utility function is: $U(w, e) = w - e$, where w is the wage and e is the effort. Workers effort choices are discrete. If they shirk, they expend zero effort and production is zero. The effort required to perform in the job is $e > 0$.

Workers choose the level of effort that maximises their utility actualised at rate r. By V_E^i, we denote the present discounted utility of an employed worker when shirking (i=S) or non shirking (i=N). Firms want to offer a contract such that workers expend the optimal effort. In what follows, the condition under which a worker will choose not to shirk is studied (the non-shirking condition, NSC).

When a worker does not shirk, he gets a utility equal to:

$$rV_E^N = w - e + b(V_U + zC - V_E^N) \tag{1.1}$$

while if the worker decides to shirk his utility is:

$$rV_E^S = w + b(V_U + zC - V_E^S) + q(V_U + dC - V_E^S) \tag{1.2}$$

if the firm is able to proof the case with probability k, then the cost is dC where $dC \equiv 0(1-k) + kzC$. Thus $z \geq d$.

[12]For a model where workers are risk averse, see Booth (1997).

As in Shapiro and Stiglitz (1984), shirking saves the current disutility of effort but it implies a higher risk of becoming unemployed. This risk is proportional to the probability of being caught shirking. Firing costs also influence the effort decision here because of the imperfect court decisions. With probability d, shirking workers may be compensated with a severance payment. This reduces the cost of shirking.

The worker will choose to provide an effort e, if and only if $V_E^N \geq V_E^S$. We can write this condition using equations (1.1) and (1.2) and get the NSC in form of utilities:

$$V_E^S - V_U \geq \frac{e}{q} + dC \equiv K \tag{1.3}$$

This condition states that in order to provide incentives, the punishment of losing a job must be at least equal to the opportunity cost of shirking, denoted by K. Substituting this condition in equation (1.1), we get the incentive compatible wage:

$$w \geq e - bzC + rV_u + K(r+b) \equiv \widehat{w} \tag{1.4}$$

In this wage equation, we can distinguish between the reservation wage (first three terms) and the rent linked to the incentive problem (last term). For $C = 0$, this condition is the same as in the original Shapiro and Stiglitz (1984). In order to provide incentives, wages need to exceed the reservation wage by a rent, K. This rent is proportional to the opportunity cost of not shirking weighted by the term $(r + b)$. The higher the discount rate, the more a worker values the saving of effort today. The higher the probability of being fired for other reasons than (truly) shirking cases (i.e. shocks), the more costly it is to expend effort today.

For $C > 0$, we can distinguish two types of effects of firing costs: those directly related with the incentive problem and those that are not. Firing costs affect the incentive problem because to the extent that (truly) disciplinary dismissals are declared "unfair" (i.e., $d > 0$), legal severance payments reduce the punishment associated with being fired when caught shirking. This implies that firms have to pay higher rents in order to prevent shirking, as can be seen in the above non-shirking conditions (see equation (1.3)). This effect of firing costs has the same flavour as that in the insider-outsider theory, where firing costs increase market power of incumbent workers.

At the same time, independently of the incentive problem, the introduction of mandated severance payments allows the employer to reduce the wage exactly by the same proportion that the present discounted utility of an employee is increased, without affecting incentives. This can be seen in the firing cost element of the reservation wage (see equation (1.4)). The idea is that lower wages today, together with compensation when being fired for shocks, leave the present discounted utility of being employed unchanged. This effect of firing costs is the same as proposed by Lazear (1990)[13].

Although this last mechanism is not directly related with the incentive problem, it has very interesting links with efficiency wages in models in which firing is not exogenous. As mentioned, in the standard efficiency wage model without severance payments, workers are paid a "firing premium" in order to prevent shirking because expending effort is more costly the higher the probability of being fired due to adverse economic shocks. When a severance payment is imposed, firms face two opposite effects in the presence of shocks: they have to pay an implicit firing cost to avoid shirking (the "firing premium"), but they can lower wages because workers are being compensated when fired after a shock[14]. An important further insight is made by Saint-Paul (1996a): in a dynamic efficiency wage model, it is in the interest of firms to voluntarily include a severance pay in the labour contract that they offer. This is one possible way for the firm to credibly commit to have a more stable employment policy when facing shocks, which then allows the firm to reduce directly the "firing premium" to be paid. The optimal severance payment is such that the "firing premium" of the efficiency wage is completely compensated. In the present model, the imperfect court resolutions imply that firms do not want to offer severance payments to workers[15].

Back to the Non-Shirking Condition, if a contract satisfies the NSC, that is, if the worker is paid at least $\widehat{w}$ or, if being unemployed is a sufficiently large punishment ($V_E^S > V_U$), the worker will choose to expend the effort e.

[13]So, for $d = 0$, the two models have the same predictions (see section (1.2.4) where the market equilibrium is solved).

[14]See Katsimi (1998) for a more detailed derivation of this mechanism in a fully stochastic efficiency wage model.

[15]If $d = 0$, firms would offer firing costs in the present model. In the case of $d = 0$, for $C = e/q$ the two models would coincide. Still, in the present model, severance payments are set legally while in Saint-Paul they are endogenous. See Booth (1997) for a discussion where the level of mandated firing costs may differ from those bargained.

We define V_E as the expected utility in equilibrium. The firm chooses the minimum wage at which the worker will not shirk, so that in equilibrium the NSC is binding and $V_E = V_E^N = V_E^S$.

1.2.3 Hiring decisions

All firms in the model are identical and infinitely lived. They chose employment so as to maximise the expected present value of profits discounted at rate r. We denote by Π the present discounted value of marginal profits. We have:

$$r\Pi = f'(L) - w - b(zC + \Pi)$$

where $f(L_t)$ is the production function with $f'(L_t) > 0$ and $f''(L_t) < 0$.

In the presence of firing costs, the marginal cost of hiring a worker is given by the wage plus the future expected cost of being fired. There is no cost of posting vacancies, so firms hire workers to the point where the marginal profit is zero, i.e. $\Pi = 0$. Labour demand in steady state is given by:

$$f'(L) = w + bzC \tag{1.5}$$

This equation shows that, for given wages, firing costs reduce labour demand proportionally to their expected present value.

1.2.4 Market equilibrium

Equilibrium occurs when each firm, taking as given all other firms' wages and employment, finds it optimal to offer the going wage rather than a different wage. The key market variable that determines firm individual behaviour is the present value of the utility of an unemployed worker, V_U. Let a be the rate of exit from unemployment. To simplify, we suppose that unemployment benefits are zero.

We have:

$$rV_U = a(V_E - V_U)$$

Given that the NSC is satisfied, we have that in equilibrium:

$$rV_U = aK \tag{1.6}$$

Now, substituting equation (1.6) in equation (1.4), we get the efficiency wage curve in equilibrium:

$$\widehat{w} = e - bzC + K(r + b + a) \tag{1.7}$$

In equilibrium, the incentive compatible wage is higher the higher the exit rate from unemployment. This result is also found in Shapiro and Stiglitz (1984). The rent linked with the incentive problem is weighted by a because the higher a, the less becoming unemployed is a penalty.

We derive employment, L, from the steady state flows condition: in steady state inflows to unemployment are given by bL. Outflows are given by $a(N - L)$, where N is the total of workers in the economy. Thus,

$$a(N - L) = bL \tag{1.8}$$

Therefore,

$$L = \frac{aN}{a + b}$$

Combining equations (1.5) and (1.7), we get that the equilibrium outflow rate of unemployment, a^*, is given by:

$$f'(L) = e - bzC + K(r + b + a^*) + bzC \tag{1.9}$$

In equation (1.9), it can be seen that the second type of effect of severance payments mentioned before can be fully undone: the second and the forth element of this equation cancel out. The idea is that if markets are complete and perfect, and firing costs are fully transferred to workers, then they are neutral on employment because the wage is reduced by the same proportion as the increased shadow cost of labour (see Lazear (1990)).

However, in this model, even if firing costs are fully received by workers, they are not neutral because they affect the rent, K. The effects of severance payments on the efficiency wage setting have no counteracting effects through the non-wage component of the shadow cost of labour. Therefore, the wage schedule is shifted to the left and it has a negative impact effect on employment. It is interesting to note that even if the wage is set by the firm, it is not possible to fully endogenize the severance payments in the workers'

wage. As mentioned, this result is due to the presence of a double moral hazard problem that can only be resolved imperfectly by a third party. This implies that firing costs have a real effect because they reduce the cost of shirking.

The aggregate NSC can also be written in terms of the unemployment rate, u. Replacing equation (1.8) into equation (1.7), we get:

$$\begin{aligned} \widehat{w} &= e - bzC + K\left[r + \frac{bN}{N-L}\right] \\ &= e - bzC + K\left[r + b/u\right] \end{aligned}$$

where $u = (N - L)/N$.

This expression can be represented in the (w, L) space. Figure 1.1 shows the labour market effects of neutral and non-neutral firing costs. The case where firing costs are neutral corresponds to the case where there is not such a double moral hazard problem[16]. A further discussion is developed in the next section.

[16]In such a case, disciplinary dismissals have zero cost and therefore they do not affect the rent to be paid to workers. Consequently, firing costs are neutral on employment.

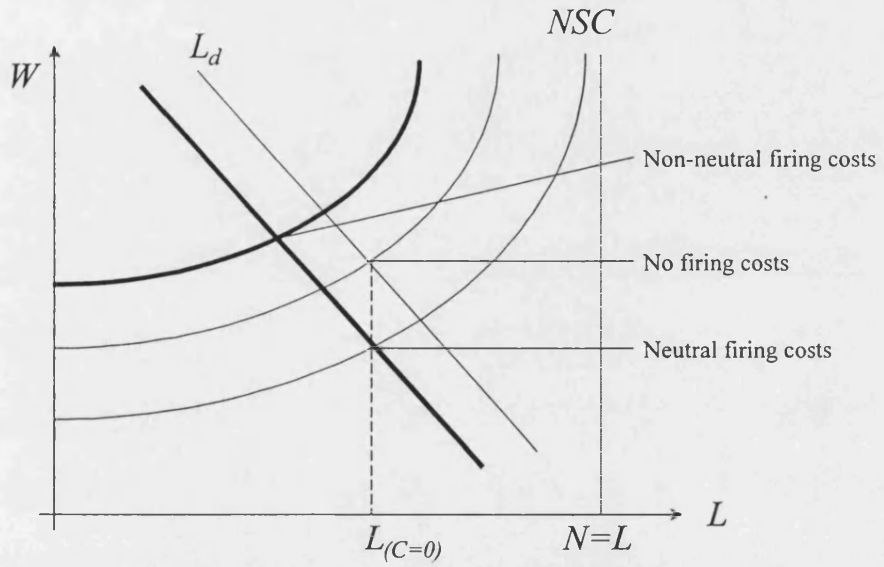

Figure 1.1: Market equilibrium with neutral and non-neutral firing costs

1.2.5 Policy implications

In the model presented above, the existence of job protection legislation in a context in which worker effort is not perfectly observable implied that firing costs had a negative effect on employment. As explained, the problem in such a system is that there is always an incentive for conflict between employer and employee, i.e. for the employer to claim any dismissal to be disciplinary and for the worker to deny any disciplinary case. This, in turn, implies imperfect resolutions by third parties. The goal of this section is to discuss some possible policy implications derived from the model above.

The mechanism that generates such a double moral hazard problem is that, for firms, the expected cost of a redundancy is higher than the expected cost of a declaring such a case as a disciplinary dismissal. And, in turn, for workers, the expected benefit of denying a disciplinary dismissal becomes positive. Following the model presented above (see Table 1.1), when firms declare redundancies as disciplinary cases and workers deny all disciplinary cases, the court is not able to perfectly detect all the real disciplinary cases. The court is able to catch a hidden redundancy with probability z. And it

is able to discover real disciplinary cases with probability $(1-d)$. Therefore, firms find it worth it to declare disciplinary cases when facing redundancies if :

$$c \geq zC \tag{1.10}$$

If firms misuse disciplinary cases, then workers have an incentive to deny any of them because:

$$dC \geq 0 \tag{1.11}$$

If these two conditions are met, then the double moral hazard is an equilibrium. That is, all dismissals are taken to court as disciplinary cases. As shown in the previous section, in such a case, firing costs are not neutral on employment. As can be seen from conditions (1.10) and (1.11), policies that concentrate on undoing the double moral hazard problem do not necessarily imply the complete removal of severance payments.

As mentioned, in general, most employment protection legislation systems set higher severance payments for the cases being declared "unfair" than for those considered "fair". The idea behind this goes in the right direction in the sense that it tries to punish for unjust dismissals. For large enough C, the incentive of firms to cheat could be undone (see equation (1.10)) and therefore, there would be no double moral hazard[17]. In such a case, high severance payments for "unfair" dismissals have a punishment role for firms who would use disciplinary dismissals when facing a redundancy. However, such a policy may not be sufficient. If C fails to be high enough, it motivates cheating from both agents which in turn generates imperfect court decisions. And the resulting average cost of firing is higher because some dismissals are paid at the "unfair" rate[18]. Moreover, this does not seem to be the most efficient policy since it does not have any punishment role for the worker when he denies true disciplinary cases.

A more efficient policy would be one that punishes any agent found lying. That is, on the one hand, to set a severance payment that firms have to pay,

[17]If the firm does not cheat, then the worker does not cheat either since such strategy would become self-revealing.

[18]See Polinsky and Shavell (1979 and 1991) for a discussion on the optimal tradeoff between the probability of catching cheating individuals and the magnitude of fines.

C_F, when the court catches a hidden redundancy. On the other hand, to set a penalty for workers, C_w, whenever caught denying a true disciplinary dismissal. Table 1.2 summarises the expected costs of firing for the firm and worker under such policy proposal.

Table 1.2: Firing costs: a policy proposal

Reality	Declaration		Expected Cost	
	of firm	of worker	for firm	for worker
Redundancy	Redundancy	accepts	c	
Redundancy	Disciplinary	denies	zC_F	
Disciplinary	Disciplinary	denies		dC_w

Under such a policy, taking d and z as given, truth-telling of both agents is an equilibrium if the following two conditions are satisfied:

$$c - zC_F \leq 0$$

and

$$-dC_w \leq 0$$

Note that for any given d and z, a high enough gap between severance payments for cases declared "unfair" and cases declared "fair", that is for a large $C_F - c$, and for any positive penalty to the worker, that is C_w, the above conditions would hold.

This policy highlights that for an employment protection system to work, specially when worker effort is not observable, two things are important. First, the difference between the level of firing costs set for cases declared "unfair" and "fair" has to be high enough. Second, different indemnities should be set for "unfair" cases depending on whether it is considered that it is the worker's or the firm's initiative.

1.3 Conclusion

Firing costs are often blamed for depressing employment levels. But there are very different views of firing costs among economists: some models indeed

predict that firing costs reduce employment while in other contexts firing costs have no effect on employment. Also, in some other environments, firing costs are actually instruments chosen voluntarily by firms. In this chapter, we have proposed a model that stresses that it is not just the level of severance payments what matters, but a wider view of employment protection. In particular, dismissal conflicts and their cost have been considered. As discussed before, the model presented integrates the different existing views of firing costs.

More precisely, we have analysed the problem behind the conflict between employer and employee in cases of disciplinary dismissals and redundancies, in a context where effort is imperfectly observable. There is a double moral hazard problem that can only be resolved imperfectly by a third party. The conclusion is that firing costs would have a negative effect on employment because they modify the rent to be paid to workers in order to prevent those workers from shirking.

The main policy conclusions are two. First, to set a gap wide enough between severance payments for cases declared "unfair" and cases declared "fair". Second, any agent caught lying should be punished. In our model, different severance payments should be set for hidden redundancies declared "unfair" and for truly disciplinary cases declared "unfair". With such a policy, the different firing costs for "unfair" dismissals have a punishment role for both employer and employee and, therefore, its implementation should eliminate the double moral hazard problem.

Chapter 2

Fixed-term Contracts and Unemployment: an Efficiency Wage analysis

2.1 Introduction

Most European countries are considered economies with highly regulated labour markets, particularly when compared to the US. At the same time, it is also a well known fact that, since the mid-1970s, Europe has had much higher unemployment levels than the US. It has often been suggested that the different degrees of flexibility of their labour markets could be responsible for the differences in their labour market performances. Even if there is an ongoing debate on the possible causes of European unemployment and, in particular, on the possible effect of labour market flexibility[1], it has been persuasive enough for many European countries to start implementing reforms in their labour markets: more flexible regulations have been introduced to fight high and persistent levels of unemployment.

Typically, European labour markets have been characterised by a wide use of permanent contracts with, what appear to be, high firing costs. A common way to increase flexibility has been to allow employers the option

[1]See Bean (1994) and Layard *et al.* (1991) for a survey on unemployment. See Jackman *et al.* (1996), Nickell and Layard (1998) and Piore (1986) for the debate on labour market flexibility.

of hiring workers using fixed-term contracts with negligible firing costs. For most countries, these fixed-term contracts cannot be used continuously and forever. They require a conversion into permanent contracts after a specific amount of time[2]. In addition, for most countries, the job for which the worker is hired with a fixed-term contract is not required to be a seasonal one[3].

After their introduction, fixed-term contracts have been widely used. More surprisingly, they have been used for all types of jobs and occupations. However, unemployment has remained as high as before the reforms[4]. At the same time, this type of reform has created a two-tier system and the labour market has become highly segmented.

This chapter builds a theoretical model to reconcile these facts: unchanged unemployment levels despite the wide use of fixed-term contracts. The introduction of fixed-term contracts is analysed in the framework of an efficiency wage model. Permanent contracts are the standard way to provide incentives with high wages, but fixed-term contracts are cheaper. The firm's choice of hiring with one contract or the other is analysed. As in chapter 1, firing will be given exogenously. So, in the terminology of labour demand models, firms would be operating in the hiring regime. Fixed-term incentive compatible contracts are then characterised. We will show that the instrument that allows the provision of incentives with fixed-term contracts is not their wage but the renewal rate of these contracts into permanent ones. Fixed-term contracts are chosen by firms when they are cheap enough. But this can imply an externality which can make aggregate employment, in the system with only permanent contracts, be higher. Firms do not take into account, in the two-tier system, that the increase in outflows from unemployment results in higher wages for permanent contracts. In this case, the optimal renewal rate of fixed-term contracts from the social point of view is one. That is, employment can be increased by reducing the inflows back to unemployment.

There is a growing literature on the impact of fixed-term contracts on

[2]For Ireland, United Kingdom and Denmark this does not apply since their labour markets are more flexible. Also it does not apply to Germany, where there is a complete separation of permanent contracts and temporary contracts (only to be used for temporary jobs). See Segura *et al.* (1991) for a detailed study.

[3]Except for France and Portugal.

[4]See Alogoskoufis *et al.* (1995).

several aspects of the labour market[5]. In relation to the effects on aggregate employment, the literature has been dominated by partial equilibrium models of labour demand[6]. These models have the same characteristics as those of labour demand with firing costs[7]. As mentioned in the previous chapter, these models are very useful to understand the effects of these firing restrictions on the dynamic functioning of the labour market. But the effects on aggregate employment are ambiguous and remain in partial equilibrium.

Bentolila and Dolado (1994) studied the effects of fixed-term contracts on wages in a wage bargaining model. Here, we choose an efficiency wage model to study the impact of fixed-term contracts on employment through their effect on wages[8]. As mentioned in Chapter 1, this kind of model is best suited for considering a broader view of employment protection legislation and not just severance payments.

One additional characteristic of fixed-term contracts is that they differ in duration with respect to permanent contracts. The existing literature has not taken this into account explicitly. In a competitive labour market, the duration of contracts does not matter. In an efficiency wage model, duration of contracts is an important source of incentives. Studying fixed-term contracts in an efficiency wage model allows us to explicitly address the question of how incentives may be provided in short duration contracts. This, in turn, would answer the previously mentioned striking fact that fixed-term contracts are even used for jobs where duration matters. So in the model, the share of fixed-term contracts will be endogenous.

This chapter highlights the links between different rigidities in the labour market. Employment and the share of temporary contracts are affected in the same way by the firing costs associated with permanent contracts and the flexibility of wages in fixed-term contracts. The mechanism by which the creation of employment and, more precisely, permanent employment is

[5]See, for example, Aguirregabiria and Alonso-Borrego (1999), Alba (1994, 1996 and 1998), Bentolila and Dolado (1994), Bentolila and Saint–Paul (1992), Jimeno and Toharia (1993 and 1996) and Saint-Paul (1996a).

[6]Exceptions of this are Cabrales and Hopenhayn (1997) and Alonso-Borrego *et al.* (1999).

[7]See, for example, Bentolila and Bertola (1990), Bentolila and Saint-Paul (1994), Bertola (1990 and 1992) and Nickell (1978).

[8]In Saint-Paul (1996a), chapter 7, this is also studied although it is assumed that temporary workers are paid at the competitive wage.

discouraged is the combination of these last two. The introduction of fixed-term contracts does not remove completely the effect of firing costs unless the wages of fixed-term contracts are perfectly flexible. For this reason, two extreme situations could generate higher employment than a two-tier system with unchanged firing costs and less than perfectly flexible fixed-term contracts' wages. One would be a situation where the wages of fixed-term contracts are very high. In this system, permanent contracts alone would generate higher employment than the two-tier system. The other situation would be the case with perfectly flexible fixed-term contracts' wages. In this case, full employment would arise.

The chapter is organised as follows. In section 2.2 the model is introduced. First, we solve it for an economy where only permanent contracts are available. Then, we solve it for the case in which fixed-term contracts are also available. That is, the optimal incentive compatible contract is described, and then the market outcome is analysed and compared to the situation where only permanent contracts are available.

2.2 The model

The model is a version of the shirking model of Shapiro and Stiglitz (1984) with two types of contracts. Firms can choose to hire new workers with a permanent contract (PC) or with a fixed-term or temporary contract[9] (TC). Contracts differ in length and firing costs. To make the model as simple as possible, we assume that fixed-term contracts last one period and that permanent contracts can last an infinite number of periods. A worker can only be hired once on a fixed-term contract by the same firm. Thus, after the one period fixed-term contract, the firm has to decide whether to renew the worker into a permanent contract or to fire him[10]. Temporary contracts are going to be renewed into permanent contracts with a probability R.

The model is set in discrete time and workers decide in each period whether or not to shirk. As in Shapiro and Stiglitz, a worker's effort is not

[9]The terms fixed-term and temporary contract are used interchangeably here.

[10]This is only a simplifying assumption. Assuming that fixed-term contracts can be renewed into further fixed-term contracts does not change the results because, as it will be shown, it is crucial that at some point fixed-term contracts are renewed into permanent ones.

perfectly observable and there is a detection technology that catches shirking workers (never erroneously) with some probability q (where $q < 1$). When a worker is found shirking, he is fired and becomes unemployed. To simplify, we suppose that unemployment benefits are zero.

As in Chapter 1, we assume that the legislation fixes a severance payment for permanent contracts, but no severance payment for fixed-term contracts[11]. Modelling mandated severance payments in a shirking efficiency wage model allows us to distinguish cases in which workers are fired without right of firing indemnities (when they are caught shirking, that is a disciplinary dismissal) from other ones in which the firm has to compensate fired workers (in case of redundancies or shocks[12]). Since we focus on hiring decisions of firms, the modelling of the second case is kept simple: workers have an exogenous probability b of being separated from their job, in that case they are protected by the legislation.

Another difference between permanent and fixed-term contracts is that while a worker in a PC has the right to sue employers in every case of dismissal, workers with a TC cannot do it when they are not renewed[13]. As in Chapter 1, in a context where effort is imperfectly observable, the court resolutions cannot be perfect because firms misuse disciplinary cases and workers deny any disciplinary case. This is represented in the model by the fact that disciplinary cases are declared "unfair" with probability d and therefore disciplinary cases are not costless, they cost dC, where C is the severance payment for dismissals declared "unfair". So, in our model, the parameter d will only affect permanent contracts[14].

In this model, all workers are identical. Therefore, we are not considering the possible use of TC to observe worker's characteristics. We assume

[11] We are considering that indemnities, when the contract expires, are zero. Also, as temporary contracts can be made sufficiently short, we can assume realistically that they do not involve firing costs, because the firm always waits for the end of the contract whenever it wants to adjust employment.

[12] The terms redundancies and shocks are used interchangeably in this chapter.

[13] As mentioned before, being TC sufficiently short, temporary workers are actually not renewed rather than being fired for other reasons. This implies that, in practice, temporary workers can never sue employers in court.

[14] In Chapter 1, we also had that redundancies cost was zC, where $z \geq d$ because firms had greater chances to proof a truly disciplinary case than a hidden redundancy. As shown in Chapter 1, this cost is neutral on employment. Therefore, for simplicity, in this chapter we assume that $z = 1$.

implicitly that the "trial" period of the contract has already elapsed and has been useful for this matter. As a consequence, there is no adverse selection problem but only a moral hazard one[15].

In addition, workers are risk neutral and their instantaneous utility function is: $U(w,e) = w - e$, where w is the wage and e is the effort. Workers' effort choices are discrete. If they shirk, they expend zero effort and production is zero. The effort required to perform in the job is $e > 0$. The effort is the same in any contract because there is only one type of job.

Every period, workers choose the level of effort that maximises their utility actualised at rate r. We denote by V_{jt}^{i}, $i = \{s,n\}$, $j = \{P,T\}$, the present discounted utility of an employed worker with contract j (P for permanent contracts and T for temporary contracts) at period t when shirking (i=s) or non shirking(i=n).

We analyse first a situation where only permanent contracts are available (section 2.2.1) and then a situation where both types of contracts are available (section 2.2.2).

2.2.1 Only permanent contracts available

In this section, permanent contracts have the same characteristics as the contracts considered in Chapter 1. This model is just a discrete time version of that in the first chapter. In what follows, only the main equations will be displayed.

Non-shirking condition

Note that, since in our model, permanent contracts are assumed to have a stationary form[16], we can omit time indices. When a worker does not shirk in a permanent contract, he gets a utility equal to:

$$V_P^n = w_P - e + \frac{1}{1+r}\left[(1-b)V_P^n + b(V_U + C)\right] \tag{2.1}$$

where w_P is the wage of a permanent contract and V_U is the present value of utility of an unemployed worker.

[15] In most countries, TC include a "trial" period with no costs of separation on either part, as in PC.

[16] For discussions of possible forms of bonding see Katz (1986).

If the worker decides to shirk in a permanent contract, his utility is:

$$V_P^s = w_P + \frac{1}{1+r}\left[(1-b-q)V_P^s + b(V_U + C) + q(V_U + dC)\right] \tag{2.2}$$

The worker will choose to provide an effort e if and only if $V_p^n \geq V_p^s$. We can write this condition with equations (2.1) and (2.2) and get the non-shirking condition for a permanent contract, NSC_P, in form of utilities:

$$V_P^n - V_U \geq \frac{e(1+r)}{q} + dC \equiv K \tag{2.3}$$

Substituting this condition in equation (2.1), we get the incentive compatible wage in a permanent contract:

$$w_P \geq e - \frac{bC}{1+r} + \frac{rV_u}{1+r} + K\frac{(r+b)}{(1+r)} \equiv \widehat{w}_P \tag{2.4}$$

If the permanent contract satisfies the NSC_P, that is, if the worker is paid at least $\widehat{w}_P$, or if being unemployed a is sufficiently large punishment ($V_P^n > V_U$), the worker will choose to expend the effort e. We define V_P as the expected utility of a PC in equilibrium. The firm chooses the minimum wage at which the worker will not shirk, so that in equilibrium the NSC_P is binding and $V_P = V_P^n = V_P^s$.

Many countries have legal minimum wage constraints. Implicitly, we are assuming here that the legislated minimum wage would be a slack constraint. This will become more relevant in the next section where temporary contracts, which will be paid at the minimum wage level, are considered.

Hiring decisions

In this model, all firms are identical and infinitely lived. They chose employment to maximise the present discounted value of profits:

$$\underset{L_{Pt}}{Max} \sum_{t=0}^{t=\infty} \left[f(L_{Pt}) - w_P L_{Pt} - bCL_{P(t-1)}\right] \frac{1}{(1+r)^t}$$

where L_P is employment in the system with only permanent contracts and $f(L_P)$ is a CRS production function with $f'(L_P) = m$. In steady state[17], labour demand is given by:

$$m = w_P + \frac{bC}{1+r} \tag{2.5}$$

Market equilibrium

Equilibrium occurs when each firm, taking as given all other firms' wages and employment, finds it optimal to offer the going wage rather than a different wage. The key market variable that determines firm individual behaviour is the present value utility of an unemployed worker, V_U. Let a be the rate of exit from unemployment. We have:

$$V_U = \frac{1}{1+r}\left[aV_P + (1-a)V_U\right]$$

Given that the NSC_P is satisfied, we have that in equilibrium:

$$rV_U = aK \tag{2.6}$$

Now, substituting equation (2.6) into equation (2.4), we get the efficiency wage curve in equilibrium:

$$\widehat{w}_P = e - \frac{bC}{1+r} + K\frac{(r+b+a)}{(1+r)} \tag{2.7}$$

We derive aggregate employment, L_P, from the steady state flow condition. In steady state, inflows to unemployment are given by bL_P. Outflows are given by $a(N - L_P)$, where N is the total of workers in the economy. Thus,

$$a(N - L_P) = bL_P \tag{2.8}$$

Therefore,

$$L_P = \frac{aN}{a+b} \tag{2.9}$$

[17]The steady state is reached after one period. For $t = 0$, employment is simply given by $m = w_P$ since there are no workers to be fired.

Combining equations (2.5) and (2.7), we get that the equilibrium outflow rate of unemployment, a^*, is given by:

$$m = e + K\frac{(r+b+a^*)}{(1+r)} \tag{2.10}$$

The aggregate NSC_P can also be written in terms of the unemployment rate, u. Replacing equation (2.8) into equation (2.7),we get:

$$\begin{aligned} \widehat{w}_P &= e - \frac{bC}{1+r} + K\frac{(r+\frac{bN}{N-L_P})}{(1+r)} \\ &= e - \frac{bC}{1+r} + K\frac{(r+b/u)}{(1+r)} \end{aligned} \tag{2.11}$$

where $u = (N - L_p)/N$.

As in Shapiro and Stiglitz (1984), this expression shows the incompatibility of full employment with incentives[18]. This expression can be represented in the (w_P, L_P) space. Figure 2.1 below shows the labour market equilibrium in the presence of (non-neutral) firing costs and compares it with the no firing cost situation. As discussed in the first chapter, firing costs reduce labour demand exactly by the expected cost of firing. In the context of imperfectly observable effort, a double moral hazard can arise. This makes shirking less costly and therefore the wage-setting curve shifts to the left. As a result, employment is lower than it would have been if there were no firing costs.

[18]As it will be shown, this is not necessarily the case when fixed-term contracts are introduced.

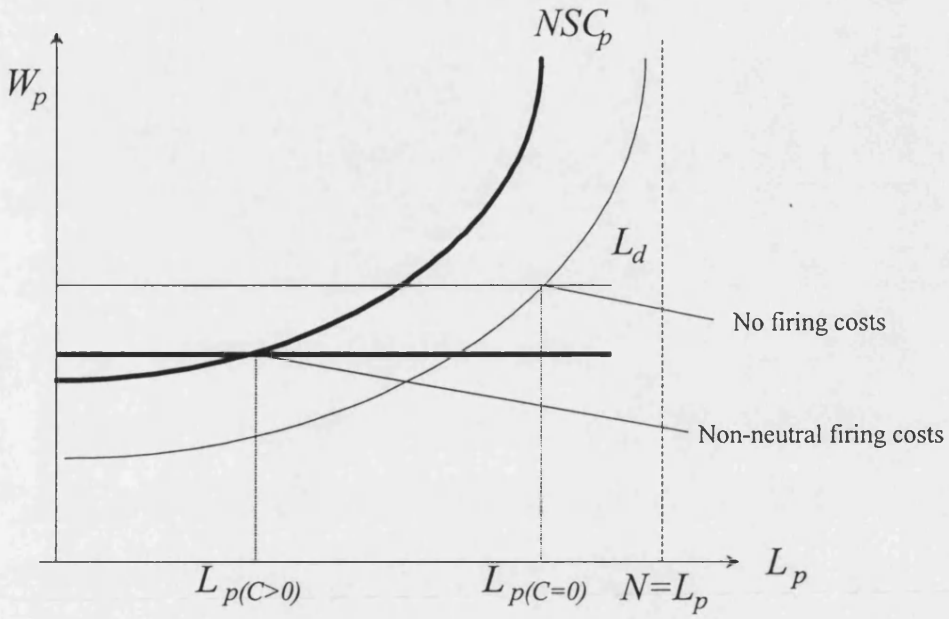

Figure 2.1: Market equilibrium with non-neutral firing costs

2.2.2 Temporary and permanent contracts available

For a given vacancy, firms can now choose among TC and PC. Permanent contracts look exactly the same as in the previous section. We now turn to the analysis of fixed-term contracts.

Non-shirking condition in a fixed-term contract

Since fixed-term contracts have a non stationary form and this is precisely what will drive the results, it is convenient to use time indices to start analysing them. We now examine the incentive problem of a worker holding a fixed-term contract at period t which can be renewed into a permanent contract at period $(t+1)$ with probability R. If the contract is not renewed, the worker becomes unemployed. Thus, the incentive problem at $(t+1)$ is exactly the same as in a permanent contract. So, the non-shirking constraint of a fixed-term contract at $(t+1)$, $NSC_{T(t+1)}$, is just the non-shirking constraint of a permanent contract, i.e. $NSC_{T(t+1)} = NSC_P$.

Provided that the $NSC_{T(t+1)}$ is satisfied, then expected present discounted

utility of being employed with a fixed-term contract at period t of not shirking and of shirking is given respectively by:

$$V_{Tt}^{n} = w_{Tt} - e + \frac{1}{1+r}\left[R(1-b)V_{P(t+1)} + (b+(1-R)(1-b))V_{U(t+1)}\right] \quad (2.12)$$

$$V_{Tt}^{s} = w_{Tt} + \frac{1}{1+r}\left[\begin{array}{c} R(1-b-q)V_{P(t+1)} + \\ (b+(1-R)(1-b-q))V_{U(t+1)} + qV_{U(t+1)} \end{array}\right] \quad (2.13)$$

where w_T is the wage of the fixed-term contract and R is the probability in which temporary contracts get renewed into permanent ones.

Again, shirking implies saving the disutility of effort today but implies a higher risk of becoming unemployed tomorrow. Moreover, in a fixed-term contract, not being caught shirking is a necessary condition in order to be renewed into a permanent contract. It has been assumed that all workers are identical and that there is a "hidden action" problem but not a "hidden information" one. Thus, in fixed-term contracts, expenditure of effort does not give any additional information about the worker's characteristics that could influence renewal. But, expenditure of effort in a TC makes renewal more likely than when shirking. Not shirking reduces the probability to become unemployed directly.

A first important remark is that if there is no renewal of fixed-term contracts into permanent contracts at the end of period t, then shirking is always strictly preferred (if $R = 0$, then $V_{Tt}^{n} - V_{Tt}^{s} = -e(1+r) < 0$). The idea behind this is very simple: if a worker always becomes unemployed independently of the effort expended, there is no way to give incentives to the worker by paying him a higher wage. The only way to induce workers not to shirk in a fixed-term contract is that the firm commits to a sufficiently high renewal rate. In other words, firing won't be automatic after the end of TC.

We are considering an extreme case where fixed-term contracts last only one period and thus the wage paid does not affect incentives[19]. But still, in

[19]Note that in the model we have assumed that TC last one period. This form of contract is not in itself restrictive. It allows permanent contracts to start with a TC. An incentive compatible contract would be in general one of stationary form. Firms could be choosing a chain of temporary contracts. But this contract would be equivalent to a PC of stationary form.

a more general case, even if the fixed-term contract was longer, when unemployment is certain at the end of the contract, wages have no incentive role. Instead, the prospects of renewal do. When it is uncertain for a worker that he will keep the job tomorrow, his preoccupation is with its renewal rather than its wage. Once there is no uncertainty about ending one's contract (except for exogenous reasons), then workers are motivated by the wage they get paid.

We can now calculate the condition that guarantees incentives to expend the effort in a fixed-term contract at period t, the non-shirking condition of a temporary contract at t, i.e. NSC_{Tt} :

$$V_{Tt}^{n} - V_{Tt}^{s} \geq 0 \text{ if and only if } R(V_{P(t+1)} - V_{U(t+1)}) \geq \frac{e(1+r)}{q} \qquad (2.14)$$

This condition states that incentives in a TC can be given by the renewal rate of fixed-term contracts into permanent contracts (R) and/or by the rent associated with holding a PC. Incentives given with future wages is the standard idea of efficiency wages. We can also study easily how the role of the renewal rate is related to the incentive problem: for given $(V_{P(t+1)} - V_{U(t+1)})$, we need R to be higher, the higher the required effort (e); the more inefficient the control technology (q); the higher the interest rate (r); and the higher the probability of exogenous redundancies(b).

So, we can see that, similarly to the efficiency wage of PC, the NSC_{Tt} in terms of the renewal rate R (given the rent of PC) is stronger the higher the effort, the higher the interest rate, the lower the probability of detection of shirkers, the higher the exogenous shocks.

Note that the two mechanisms that can give incentives in a TC are substitutes: the higher the renewal rate, the lower the wage can be in PC given the incentive problem. And vice versa. However, note that for given permanent wages, the renewal rate cannot be zero, as we thought intuitively. Also, for given R, workers in a PC must enjoy some rent, as in the standard efficiency wage models. In figure 2.2, we represent the NSC_{Tt} in the space $(R, V_P - V_U)$.

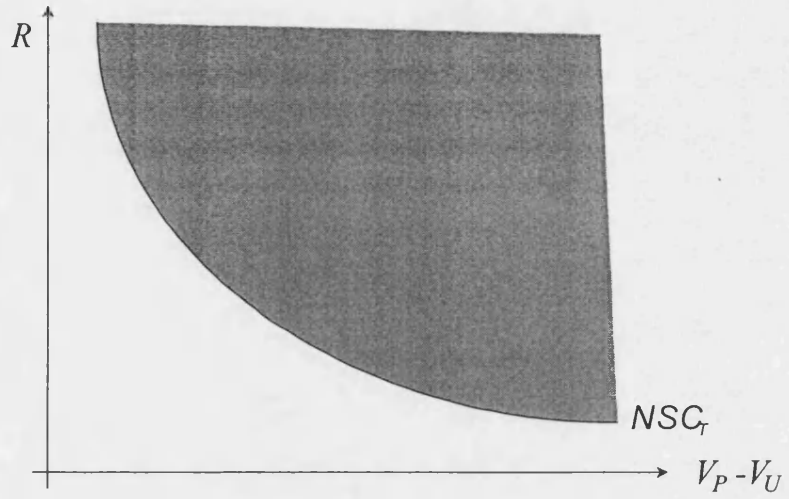

Figure 2.2: Non-shirking condition of a temporary contract

An incentive compatible fixed-term contract must satisfy the NSC_{Tt} and the NSC_P. We know from the previous section that in permanent contracts, workers are paid the minimum rent compatible with incentives, that is, the NSC_P is binding. This reduces the possible values of R to:

$$R \geq \frac{e(1+r)}{e(1+r)+qdC} = R^* \tag{2.15}$$

In Figure 2.3, we represent the two non-shirking constraints of a fixed-term contract. The thicker line in the graph represents the combinations of $(R, V_P - V_U)$ where the two NSC are satisfied. And R^* is the renewal rate for which both NSC are binding. Note that for the case where $d > 0$, $R^* < 1$. That is, if firing costs are non-neutral on permanent employment, the minimum incentive compatible renewal rate is less than one.

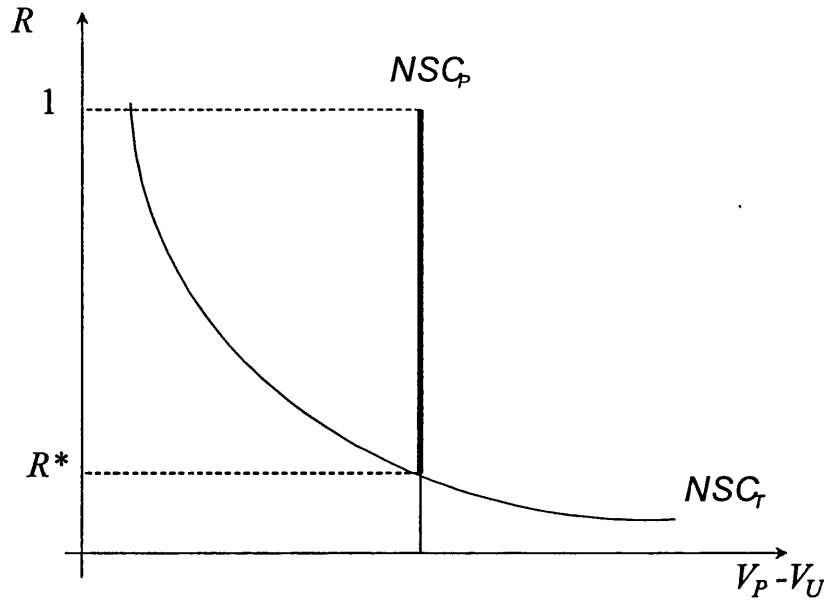

Figure 2.3: Non-shirking conditions of a temporary contract

To conclude this section, it has been found that incentives in a TC are provided with a combination of a non-zero renewal rate into a PC and a non-zero rent paid in a PC. The rent is the minimal rent compatible with incentives given by the NSC_P, and the renewal rate R can take any value within the NSC_{Tt} compatible with such rent, that is $R \geq R^*$. Let this condition be NSC_T. Let V_T be the expected utility in equilibrium of a TC. Since V_T satisfies the NSC_T, then $V_T = V_T^n$.

In the next section we introduce the firm's objective function and study the determination of R.

Choice of contracts in a two-tier system

We first analyse the choice of contracts for a given vacancy and then calculate in the next section the firm's labour demand for the given (optimal) contract chosen.

When the firm hires a new worker, it can choose between a permanent contract or a fixed-term contract. The firm compares the present discounted value of marginal profits with the two different types of contracts taking into account their respective incentive constraints. Let Π_{it} be the present

discounted value of marginal profits with type i contract ($i = T, P$). We have:

$$\Pi_{it} = f'(L_i) - w_{it} + \frac{1}{1+r}\left[\Pi_{i(t+1)}\right]$$

$$s.t.\ NSC_{it} \text{ and } NSC_{i(t+1)}$$

$$\text{where } \Pi_{i(t+1)} = \begin{cases} (1-b)(1-R)\Pi_{T(t+1)} + (1-b)R\Pi_{P(t+1)} & \text{for } i = T \\ -bC + (1-b)\Pi_{P(t+1)} & \text{for } i = P \end{cases}$$

Firms always get the net product instantaneously with any type of contract. Then, with a permanent contract, the firm incurs the firing cost if there is a redundancy, otherwise the contract continues. Fixed-term contracts end after one period. If there is a shock, the contract does not continue and this is not costly for the firm. Otherwise, the contract continues, becoming a permanent one (with probability R) or restarting with a new worker with another fixed-term contract (with probability $(1 - R)$).

Lemma 1. *The optimal contract in a two-tier system is a fixed-term contract that is renewed into a permanent contract with probability R.*

Proof: It is easy to note that the permanent contract problem ($i = P$) is just the subproblem at $(t + 1)$ of the temporary contract problem ($i = T$) at t. Since the wage in fixed-term contracts, w_T, has no incentive role (implying that it will not be higher than the efficiency wage in a permanent contract) and there are no firing costs, the firm cannot be made worse off by starting with a fixed-term contract[20]. ■

Therefore, the optimal strategy for the firm is to start with a fixed-term contract and after one period renew it into a permanent contract with a certain probability R. The renewal rate is chosen to maximise the present discounted value of marginal profits of a TC (Π_T) subject to the NSC_T. The

[20]If the wage in a TC is higher than in a PC then the two-tier system would not be an equilibrium (see Proposition 2).

firm also chooses the wage to be paid during the fixed-term contract. For reasons that will become apparent, we consider two cases: (1) where w_T is flexible and the firm only has to consider a participation constraint and (2) where there is some legislation that sets the wage at least at a minimum level, say $w_{\min}$. In this case, the participation constraint is slack[21].

The complete characterisation of the (optimal) TC is given by:

$$\underset{R,w_T}{Max}\ \Pi_T(R, w_T)$$

$$s.t. \begin{cases} R^* \leq R \leq 1 \\ \begin{cases} \text{case (1): } V_T \geq V_U \\ \text{case (2): } w_T \geq w_{\min} \end{cases} \end{cases}$$

The resolution of this problem leads to the following proposition.

Proposition 1 *If wages in fixed-term contracts are perfectly flexible, then the firm is indifferent among any incentive compatible renewal rate of fixed-term contracts into permanent contracts, that is $R \in (R^*, 1)$. But if there are minimum wage restrictions, then the firm chooses the minimum renewal rate, that is, R^*.*

Proof: see appendix.

The idea behind this result is simple. If wages in fixed-term contracts are perfectly flexible, all the effects of firing costs on the wage setting of the permanent contract can be undone with the wage of the first period while the worker is in a fixed-term contract. Thus the firm is indifferent among any renewal rate because profits can always be kept constant. In this case, the economy would be at full employment[22]. Instead, if wages are not

[21] As mentioned, the legislated minimum wage would be a slack constraint in the world with only permanent contracts. A further discussion on this is done in section (2.2.3) when the two systems are compared.

[22] To see how full employment can be reached in an efficiency wage model see Remark 1 in section 2.2.2 where employment in a two-tier system is derived.

perfectly flexible, the optimal rate of renewal is the minimum compatible with incentives, that is R^*, where $R^* < 1$. The mechanism that is preventing higher renewal rates is the non-neutral effect of firing costs on the efficiency wage. Figure 2.4 represents the iso-profits curves for the two cases in the space $(R, V_P - V_U)$.

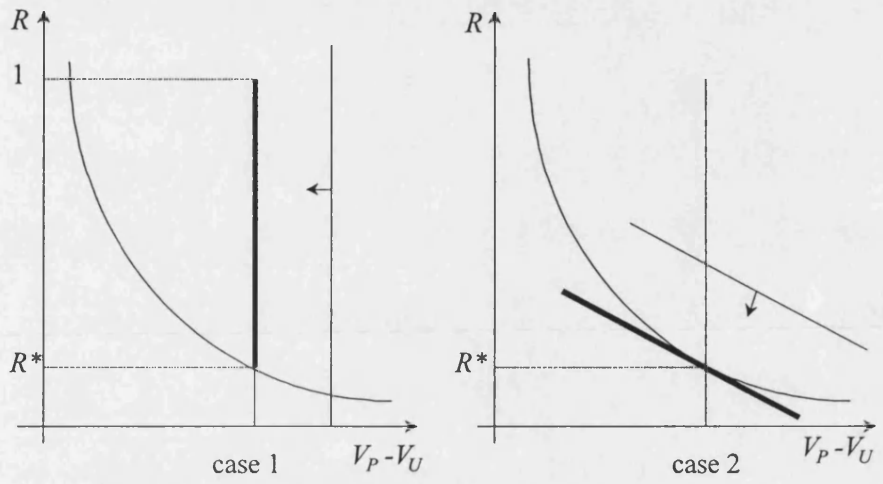

Figure 2.4: Optimal renewal rate with flexible and non flexible wages

Back to our initial question, note that this result provides an interesting and paradoxical explanation of the use of fixed-term contracts: when fixed-term contracts are very "cheap", the firm is actually indifferent among TC or PC. While when TC are more "expensive", the firm actually chooses the minimum share of PC given the incentive constraints.

Hiring decisions

In this section we derive the labour demand for the optimal type of contract described in Proposition 1 (case 2)[23]. Firms maximise employment given the wage of TC ($w_{\min}$) and renewal rate (R^*) of this contract. Such a contract implies that the total workforce will be the sum of those workers with a TC

[23]As mentioned, there is full employment in case 1.

(those who are in the first period of their contract) and those with a PC. Workers with a PC are either those who have just been renewed from a TC or those who already had a PC and were not fired. To differentiate from the system in which only PC were available, we denote with "~" the value of variables that were also present in that system (i.e. L_P, w_p, a, V_U). Thus we have:

$$\widetilde{L}_{Pt} = (1-b)\widetilde{L}_{P(t-1)} + R^*(1-b)L_{T(t-1)} \qquad \forall t, t = 1, ..., +\infty \qquad (2.16)$$

and $\widetilde{L}_{P0} = 0$.

Firms maximise the present discounted value of profits subject to (2.16):

$$\underset{L_T, L_P}{Max} \sum_{t=0}^{t=+\infty} \left[f(\widetilde{L}_t) - w_{\min} L_{Tt} - w_P \widetilde{L}_{Pt} - bC\widetilde{L}_{p(t-1)} \right] \frac{1}{(1+r)^t}$$

$$s.t. \begin{cases} \widetilde{L}_{Pt} = (1-b)\widetilde{L}_{P(t-1)} + R^*(1-b)L_{T(t-1)} & (\lambda_t) \\ \widetilde{L}_t = \widetilde{L}_{Pt} + L_{Tt} \end{cases}$$

The first order conditions of this problem are:

$$[m - w_{\min}] \frac{1}{(1+r)^t} - R^*(1-b)\lambda_{(t+1)} = 0 \qquad t = 0, ..., +\infty \qquad (2.17)$$

and

$$\left[m - w_P - \frac{bC}{1+r} \right] \frac{1}{(1+r)^t} + \lambda_t - (1-b)\lambda_{(t+1)} = 0 \qquad t = 1, ..., +\infty \quad (2.18)$$

Combining equations (2.17) and (2.18) we can get an expression for the steady state labour demand:

$$m = \beta w_{\min} + (1-\beta) \left[w_P + \frac{bC}{1+r} \right] \qquad (2.19)$$

$$\text{where} \qquad \beta = \frac{r+b}{r+b+R^*(1-b)}$$

In a two-tier system, the marginal product of labour is equalised to a weighted sum of the marginal cost of a fixed-term contract and the marginal cost of a permanent contract. The weights correspond to the actualised share of TC, (β), and PC, ($1-\beta$), respectively. A more detailed discussion on β is done in the next section.

Market equilibrium

As before, the key market variable is $\widetilde{V}_U$. In a two-tier system, all contracts start with a TC. Therefore,

$$\widetilde{V}_U = \frac{\widetilde{a}}{r+\widetilde{a}} V_T \tag{2.20}$$

Replacing equation (2.20) into equation (2.12), we can solve for $\widetilde{V}_U$ in equilibrium:

$$\frac{r\widetilde{V}_U}{1+r} = \frac{\widetilde{a}}{1+r+\widetilde{a}} \left[(w_{\min} - e) + \frac{(1-b)}{(1+r)} \frac{e(1+r)}{q} \right] \tag{2.21}$$

where the term $e(1+r)/q$ denotes the importance of the shirking problem in a TC, that is, $R^*(V_P - V_U)$, given by (2.14).

Now, going back to equation (2.4) we can get the efficiency wage of permanent contracts in a two-tier system:

$$\widetilde{w}_P = e - \frac{bC}{1+r} + K\frac{(r+b)}{1+r} + \frac{\widetilde{a}}{(1+r+\widetilde{a})} \left[(w_{\min} - e) + \frac{e(1-b)}{q} \right] \tag{2.22}$$

As before, we derive $\widetilde{L}$ from the steady state flows conditions. The optimal contract described above implies that the steady state equilibrium can be reached in two periods. Let $\widetilde{L}$ be total employment in the two-tier system, which equals temporary employment, L_T plus permanent employment, $\widetilde{L}_P$. Inflows and outflows into employment have basically the same structure as in the system only with PC. There are also the flows from the renewal and non-renewals of TC. Figure 2.5 represents all these flows.

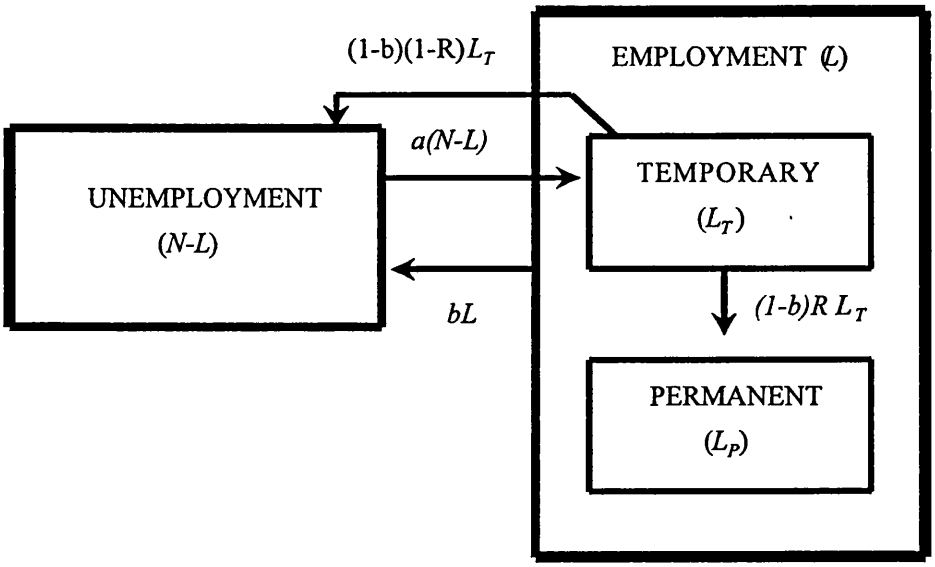

Figure 2.5: Flows of the labour market in a two-tier system

In the steady state, the flow out of unemployment is given by $\widetilde{a}(N - \widetilde{L})$ workers. The flow into unemployment comes from those whose fixed-term contract are not renewed, $(1 - b)(1 - R^*)L_T$, and from all those who lost their jobs for exogenous reasons, $b\widetilde{L}$. We can thus write,

$$\widetilde{a}(N - L_T - \widetilde{L}_P) = (1 - R^*)(1 - b)L_T + b(L_T + \widetilde{L}_P) \qquad (2.23)$$

At any time, a proportion R^* of those fixed-term contracts that are not finished for exogenous reasons, are renewed into permanent contracts, while a proportion b of those already in permanent contracts become unemployed. So,

$$(1 - b)R^*L_T = b\widetilde{L}_P \qquad (2.24)$$

Combining these two conditions we get:

$$L_T = \frac{\widetilde{a}bN}{b + \widetilde{a}\,[b + (1 - b)R^*]}$$

$$\widetilde{L}_P = \frac{(1 - b)R^*}{b} L_T$$

and

$$\widetilde{L} = \frac{\widetilde{a}N\left[b + (1-b)R^*\right]}{b + \widetilde{a}\left[b + (1-b)R^*\right]}$$

Then we have that the proportion of fixed-term contracts is given by:

$$\alpha = \frac{b}{b + (1-b)R^*} \tag{2.25}$$

and $(1-\alpha)$ is the proportion of permanent contracts.

Combining (2.19) and (2.22) we get that the equilibrium outflow rate of unemployment in a two-tier system, $\widetilde{a}^*$, is given by:

$$m = \beta w_{\min} + (1-\beta)\left[e + K\frac{r+b}{1+r} + \frac{\widetilde{a}^*}{(1+r+\widetilde{a}^*)}\left(w_{\min} - e + \frac{e(1-b)}{q}\right)\right] \tag{2.26}$$

Going back to the efficiency wage in the two-tier system, we can express (2.22) in terms of the unemployment rate. This allows us to do the following remark. Replacing (2.24) into (2.23), we get:

$$\widetilde{a} = \frac{\alpha(1-\widetilde{u})}{\widetilde{u}}$$

where $\widetilde{u} = (N - L_T - \widetilde{L}_P)/N$ is the unemployment rate in the two-tier system. So, the efficiency wage curve in equilibrium is given by:

$$\widetilde{w}_P^* = e - \frac{bC}{1+r} + K\frac{(r+b)}{(1+r)} + \frac{\alpha(1-\widetilde{u})}{\alpha(1-\widetilde{u}) + \widetilde{u}(1+r)}\left(w_{\min} - e + \frac{e(1-b)}{q}\right) \tag{2.27}$$

Remark 1 *Full employment is not incompatible with the incentive problem in a two-tier system as it is in the system with only one type of contract (as in Shapiro and Stiglitz (1984)). But it would always be a "mixed" full employment, i.e. full employment in which TC and PC coexist.*

This can be seen directly from expression (2.27): the incentive compatible wage for zero unemployment rate is finite[24]. This is in sharp contrast from the situation with only permanent contracts (see equation (2.11)). However, this full employment would be 'mixed', in other words, with both types of contracts coexisting[25]. In this case, full employment is compatible with incentives. The reason is that each type of employment gives incentives to the other: temporary workers are motivated by the possibility of getting a permanent contract and permanent workers are motivated to work in order to avoid restarting with a fixed-term contract.

2.2.3 Comparing two systems: two-tier vs. only permanent contracts

In this section we compare employment levels and the effects of firing costs in each system. We start with the equilibrium conditions for each system.

For a system to be an equilibrium, it has to be the case that firms cannot make higher profits by offering the other type of contract within that system.

Lemma 2. *The equilibrium conditions for each system depend on the level of minimum wages.*

Proof: see appendix.

Proposition 2 *For $w_{\min} > m$, the system with only permanent contracts is the only equilibrium. For $w_{\min} < m$, the two-tier system is the only equilibrium. For $w_{\min} = m$, any of the two systems can be an equilibrium.*

Proof: see appendix

The idea behind this result is that given that in the system with only PC workers are paid their marginal product, when the minimum wage is above m, fixed-term contracts are more costly than permanent contracts so firms would offer permanent contracts only. On the contrary, when the minimum wage is below m, offering fixed-term contracts is profitable and firms end up in a two-tier system. For the case where the minimum wage is exactly m, any contract has the same cost and both systems generate the same profits so either of the two systems could be an equilibrium.

[24] From Proposition 1, we have that in case 1, for any combination of (w_T, R), $a \longrightarrow \infty$.

[25] All jobs start with a TC and then become a PC.

Employment levels

It is important to know if the introduction of TC generates higher employment or not despite the fact that, in general, it creates a higher segmentation of the labour market (except for $R = 1$ where TC can be just considered as a "first step" to PC).

Comparing (2.26) with (2.10), it is possible to distinguish two effects at play. On the one hand, for given wages, due to the composition effect mentioned before, employment is higher in a two-tier system. Note that the weight β corresponds to an actualised share of TC given by α (equation(2.25))[26].

On the other hand, $\widetilde{w}_P^*$ is not necessarily equal to $\widehat{w}_P^*$. This also has an effect on employment. If wages of permanent contracts are higher in a two-tier system than in a system with only PC, *ceteris paribus,* employment would be lower in a two-tier system.

Lemma 3. *The difference in employment levels in the two systems depends on* $w_{\min}$.

Proof: see appendix

Intuitively, the composition effect is lower the higher the minimum wage is. Note that for any $w_{\min} > 0$, the share of TC in the economy is constant (from Proposition 1) and therefore increases of the minimum wage are not compensated by a reduction of fixed-term contracts. At the same time, the difference in permanent contract wages in the two systems also depends on the level of minimum wages. The higher the minimum wage, the higher the permanent wage in the two-tier system[27]. This, in turn, also reduces employment in the two-tier system.

So, the effect of TC on employment depends crucially on the level of minimum wages. Therefore, a two-tier system does not guarantee higher levels of employment. More precisely, we can formulate the following proposition:

[26]Notice that if $r = 0$, then $f'(\widetilde{L}) = \alpha w_{\min} + (1-\alpha)\left[wp + \dfrac{bC}{1+r}\right]$. Also, if $r = +\infty$, then $f'(\widetilde{L}) = w_{\min}$. That is, if firms are patient, they equalise the marginal product of labour to the average cost of labour. In the opposite extreme case, firms only perceive the cost of the present labour force which is always holding a TC.

[27]This comes from the fact that in the two-tier system all contracts start being TC which are paid at the minimum wage.

Proposition 3 *For $w_{\min} > w^*_{\min}$, employment is higher in the system with only permanent contracts. Moreover, there is a range of values of $w_{\min}$, namely $w_{\min} \in (w^*_{\min}, m)$, for which employment is higher in a system with only permanent contracts, and the minimum wage constraint corresponding to $w_{\min}$ is slack in the system with only PC.*

Proof: see appendix.

The idea is that for high enough minimum wages, the fact that a two-tier system has less permanent workers is not compensated by their higher labour cost. The interest of the result is that the $w_{\min}$ is high enough to make employment in the two-tier system lower, but it is not so high to as to make directly labour costs higher in the two-tier system. Indeed, it is possible to have higher employment in the system with only PC even though PC are still paid above the minimum wage constraint. That is, the composition effect is not eliminated.

Now, the question is: Is it always the case that a system is an equilibrium when employment is higher in that system? The study of this question gives the following proposition:

Proposition 4 *When the system with only PC is an equilibrium, employment is always higher in such a system. But there is a range of minimum wages, $w_{\min} \in (w^*_{\min}, m)$, for which employment is higher in a system with only PC even though a two-tier system is the resulting equilibrium. In this range, the minimum wage constraint corresponding to $w_{\min}$ is always slack in the system with only PC.*

Proof: see appendix.

When firms chose PC it is because TC are too expensive. By the same token, the two-tier system would generate lower employment and the system with only PC (which generates higher employment) is the only equilibrium. The mechanism behind is that when the minimum wage is low enough, firms do not take into account that by using TC (and not PC directly) they hire more, increasing $\widetilde{a}$, and therefore increasing $\widetilde{w}_p$ so much that total employment turns out to be lower than it would have been with only PC.

Effects of firing costs in a two-tier system

In the system with only PC, the effect of firing costs was clear-cut: their non-neutral effect on the wage setting reduced employment. Given the results on employment in a two-tier system found in the last section, it is interesting to analyse the effects of firing costs in the two-tier system. That is, are firing costs neutral in a two-tier system despite the fact that the sign of employment is ambiguous?

In the two-tier system, firing costs also reduce employment, but it is important to distinguish two effects. First, they reduce employment just like in the system with only PC because of their positive effect on permanent contract wages. Note that this effect is lower than in the other system since the proportion of permanent employment is in general lower. Second, firing costs also play a role in the determination of the renewal rate. The higher the rent in PC (due to the effect of firing costs), the lower incentive compatible renewal rate, R^*, needs to be[28]. This reduces the above effect. That is, employment is less reduced. The question then is: does it eliminate it completely?

Proposition 5 *The neutrality of firing costs cannot be restored with the introduction of fixed-term contracts for any imperfectly flexible temporary wage.*

Proof: see appendix.

The intuition is that the incentive problem imposes a minimum proportion of permanent employment and that its costs can only be compensated at the expense of lower wages for temporary workers. But, as it is shown, there is no positive temporary wage that can undo the effect of firing costs.

This means that the introduction of TC may imply higher employment despite the fact that it does not remove the inefficiency of firing costs completely. What happens then when the non-neutrality effect of firing costs is reduced? That is, what happens if d is reduced? In the system with only PC, employment increases. In the two-tier system, employment also increases as well as the renewal rate of fixed-term contracts. So, the labour market is less segmented. This explains why the introduction of TC keeping PC unchanged

[28]This effect could make insiders holding a PC push for higher firing costs and firms accept it since it would allow them to offer lower renewal rates to new entrants with TC.

(that is,leaving the non–neutral effects of firing costs unchanged) leads to a substitution of TC for PC without a necessary increase of total employment. Therefore, the removal of the non-neutrality effects of firing costs is an efficient policy. Whether it would have more impact effect in one system or the other depends again in the level of minimum wages that determine the difference in employment in both systems.

2.2.4 Welfare Analysis

We want to see if the equilibrium allocation is constrained Pareto efficient or not. The social planner maximises aggregate welfare:

$$W = L_P(V_P + \Pi_P) + L_T(V_T + \Pi_T) + (N - L)V_U$$

In steady state, the inflows and outflows from each group are such that maximising aggregate welfare across agents is equivalent as maximising the expected utility of a representative individual that gets all the resources in the economy, that is:

$$L_P(w_P - e) + L_T(w_T - e) + L_P(m - w_P) + L_T(m - w_T)$$

which in turn equals:

$$L_P(m - e) + L_T(m - e) = L(m - e)$$

that is, total output minus the social cost of production (the effort, e).

Thus, the central planner is only concerned with total employment. Therefore, from Proposition 3, the market outcome is not efficient because choosing the PC only system implies higher employment but the market equilibrium is the two-tier system. Then, in a two-tier system, what is the optimal social renewal rate of TC?

The social planner maximises employment in a two-tier system subject to the NSC's and the minimum wage constraint. Moreover, the social allocation must be profitable from the private point of view, that is aggregate profits must be non-negative. So, the social planner solves:

$$\underset{R,a,w_T,w_p}{Max}\ (m-e)\widetilde{L}_{(a,R)}$$

$$s.t.\begin{cases} R \geq R^* \ (\lambda_1) \\ R \leq 1 \ \ (\lambda_2) \\ w_P - e + \dfrac{bC}{1+r} - K\dfrac{(r+b)}{(1+r)} - \dfrac{a}{1+r+a}\left[w_T - e + \dfrac{R(1-b)K}{1+r}\right] \geq 0 \ (\lambda_3) \\ m - \beta w_T - (1-\beta)w_P \geq 0 \ (\lambda_4) \\ w_T \geq w_{\min} \ (\lambda_5) \end{cases}$$

The resolution of this problem leads to the following proposition:

Proposition 6 *For $w_{\min} \in (w^*_{\min}, m)$, the market equilibrium is not efficient from a social point of view. In this interval, the optimal renewal rate of fixed-term contracts is $R = 1$.*

Proof: see appendix.

Thus from the social point of view, there are gains from reducing the segmentation of the labour market because this increases total employment. The intuition is the following. Firms do not take into account that when they increase the rate of renewal, permanent wages will fall. Thus, they chose the minimum incentive compatible renewal rate because they take as given permanent wages.

2.3 Conclusion

We have analysed the introduction of fixed-term contracts in an economy where firing costs reduce employment. The chapter has shown that the choice of fixed-term contracts is understandable even in a context of efficiency wages. The idea is that the renewal rate into permanent contracts has an incentive role. In addition, renewal rates are lower the higher the (negative) effect of firing costs on employment.

It is often stated that the argument for introducing fixed-term contracts is that this is "the price to pay to get full employment". But higher employment at the expense of segmentation of the labour market only arises if wages are very flexible. Otherwise, employment is not necessarily higher than in

a system with only permanent contracts while the labour market becomes segmented. The idea is that perfect wage flexibility would be required in order for fixed-term contracts to eliminate the non-neutrality effect of firing costs.

This can explain why the introduction of fixed-term contracts keeping permanent contracts unchanged (that is, leaving the non–neutral effects of firing costs unchanged) leads to a substitution of fixed-term for permanent contracts without a necessary increase of total employment as we have seen in some European countries.

Moreover, from the social point of view, market segmentation is too large. Higher renewal rates of fixed-term contracts into permanent contracts lead to higher employment levels. This analysis suggests that, policies on the employment protection legislation tackling the core labour contracts can be more efficient in motivating the creation of employment and, more precisely, the creation of permanent employment.

Once the effects of introducing fixed-term contracts on employment have been analysed it remains to study their effects on other dimensions of the labour market. This is important in order to understand if the introduction of fixed-term contracts help the labour market work better despite their impact on employment. The next two chapters study empirical issues of the introduction if fixed-term contracts. In particular, the next chapter looks at the determinants of the transition of fixed-term contracts into permanent ones for the Spanish case.

2.4 Appendix

2.4.1 Proof of proposition 1

Proof. We first analyse case 1 and then case 2.

• In **case 1**, the firm chooses to pay the lowest wage that satisfies the participation constraint, that is w_T such that $V_T = V_U$. Using equation (2.12) we have that, in equilibrium, this wage is given by:

$$w_T = e - \frac{(1-b)}{1+r} R(V_P - V_U)$$

So, $w_T = w_T(R, V_U, V_P)$.

Therefore, $\frac{d\Pi_T(R, w_T(R,.),.)}{dR} = \frac{\partial \Pi_T}{\partial R} + \frac{\partial \Pi_T}{\partial w_T}\frac{\partial w_T}{\partial R}$.

And, $sign\left(\frac{d\Pi_T(R, w_T(R,\cdot),.)}{\partial R}\right) = sign\left((\Pi_P - \Pi_T) + (V_P - V_U)\right)$.

The first element $(\Pi_P - \Pi_T)$ shows the direct effect of the renewal rate on temporary profits: every contract renewed gives Π_P instead of Π_T. The second element shows the indirect effect of the renewal rate through the wage setting in fixed-term contracts: an increase in the renewal rate implies an increase of the utility of holding a fixed-term contract proportional to the rent in permanent contracts, $(V_P - V_U)$, which allows to reach the participation constraint with a reduction of the wage in fixed-term contracts (and therefore increase profits) by the same amount.

We can rewrite the above expression in terms of total surplus, S_i, of a match with the current worker on a PC or on a TC, that is, $S_i = \Pi_i + V_i$ for $i = \{P, T\}$.

$sign\left((\Pi_P - \Pi_T) + (V_P - V_U)\right) = sign\left(S_P - S_T + V_T - V_U\right)$

where,

$S_P = m - e + \frac{1}{1+r}\left[bV_U + (1-b)S_P\right]$ and

$S_T = m - e + \frac{1}{1+r}\left[bV_U + (1-b)RS_P + (1-b)(1-R)(V_U + \Pi_T)\right]$

The difference in surplus among the different contracts depends crucially on the renewal rate and on the fact that TC can only be used once on the same worker. If the renewal rate is 1, then fixed-term contracts and permanent

contracts generate the same total surplus. Their difference is just in the distribution of this surplus among current worker and employer. Secondly, the fact that fixed-term contracts can only be used once on the same worker implies a change of utility (from holding a TC to becoming unemployed) for current workers holding a fixed-term contract whenever they are not renewed. Therefore we get:

$sign\,(S_P - S_T) = sign\,[(1-b)(1-R)\,(V_T - V_U)]$

and therefore,

$sign((\Pi_P - \Pi_T) + (V_P - V_U)) = sign\,[(1-b)(1-R)\,(V_T - V_U)]$

The fact that firm chooses the wage such that $V_T = V_U$, implies that

$$sign\left(\frac{d\Pi_T(R, w_T(R))}{\partial R}\right) = 0$$

Therefore, the firm is indifferent among any incentive compatible R. ■

Note that from the whole economy point of view the two types of contracts also generate the same surplus because when a fixed-term contract is not renewed, the firm starts a new one with another worker. The intuition for this is simple: there is only one type of job in the economy and workers are all homogeneous. Globally, the different contracts just determine a different distribution of surplus among workers and employers.

• In **case 2**, the wage for fixed-term contracts is fixed exogenously and we only have a direct effect of the renewal rate on temporary profits. That is:

$$sign\left(\frac{\partial\Pi_T(R, w_T)}{\partial R}\right) = sign\,(\Pi_P - \Pi_T)$$

$sign\,(\Pi_P - \Pi_T) = sign(w_T - w_P - \frac{bC}{1+r}) < 0$, since $w_T \leq w_P$.

So, the firm chooses the minimal rate of renewal that is incentive compatible. ■

2.4.2 Proof of lemma 2

Proof. :

• A system with only PC is an equilibrium iff:

$$\Pi_P(\widehat{w}_P) \geq \Pi_T(w_{\min}, R^*, \Pi_P(\widehat{w}_P)) \tag{2.28}$$

• A two-tier system is an equilibrium iff:

$$\Pi_T(w_{\min}, R^*, \Pi_P(\widetilde{w}_P)) \geq \Pi_P(\widetilde{w}_P) \tag{2.29}$$

Condition (2.28) is satisfied iff $w_{\min} \geq \widehat{w}_p^* \iff w_{\min} \geq m$

Condition (2.29) is satisfied iff $w_{\min} \leq \widetilde{w}_p^* \iff w_{\min} \leq \dfrac{m - \beta w_{\min}}{1-\beta} \iff w_{\min} \leq m$ ■

2.4.3 Proof of proposition 2

Proof. : From lemma 2 we have that for every value of $w_{\min}$ the equilibrium is defined as follows:

- if $w_{\min} < m$, the two-tier system is an equilibrium.
- if $w_{\min} = m$, any of the two systems can be an equilibrium.
- if $w_{\min} > m$, the system with only PC is an equilibrium.

■

2.4.4 Proof of lemma 3

Proof. : Employment in each system is given, respectively:

$$L_P = \frac{aN}{b+a}$$

and

$$\widetilde{L} = \frac{\widetilde{a}N\left[b + (1-b)R^*\right]}{b + \widetilde{a}\left[b + (1-b)R^*\right]}$$

From equation (2.10), $a = \dfrac{(m-e)(1+r) - K(r+b)}{K} \equiv \dfrac{J}{K}$.

From equation (2.26), $\widetilde{a} = \dfrac{X(1+r)}{1-X}$, where

$$X \equiv \frac{J - \beta\widehat{J}}{\left[(w_{\min} - e)(1+r) + (1-b)RK\right](1-\beta)}$$

and $\widehat{J} \equiv J + (m - w_{\min})(1+r)$.

The difference in employment in the two systems is given by:
$sign(L_P - \widetilde{L}) = sign(a - \widetilde{a}\left[b + (1-b)R\right])$, where $\widetilde{a} = \widetilde{a}(w_{\min})$.

We have that: if $w_{\min} = w^*_{\min} \Longrightarrow \left[L_P - \widetilde{L}(w^*_{\min})\right] = 0$, where

$$w^*_{\min}(R) = \frac{JG + [\beta e(1+r) + \beta K(r+b)]\, G + Je(1-\beta)(1+r) - J(1-\beta)RK(1-b)}{(1+r)\,[J(1-\beta) + \beta G]}$$

and $G \equiv K\,[b + (1-b)R]\,(1+r) + J$.

So,

- if $w_{\min} > w^*_{\min}$, $L_P > \widetilde{L}$
- if $w_{\min} < w^*_{\min}$, $L_P < \widetilde{L}$

■

- It is easy to check that $w^*_{\min} > 0$.

First, note that since $K > 0$ then $J > 0$. Then, the sign of $w^*_{\min}$ depends on whether its numerator is positive or not. Let's just take the first and the last elements of the numerator (the rest is a positive number):

$sign\,[w^*_{\min}(R)] = sign\,[JG - J(1-\beta)RK(1-b)] =$
$sign\,[Kb(1+r) + KR(1-b)(1+r) - (1-\beta)RK(1-b)] =$
$sign\,[Kb(1+r) + \beta RK(1-b) + K(1-b)(1+r-1)] =$
$sign\,[Kb(1+r) + \beta RK(1-b) + K(1-b)r] > 0$
So, $w^*_{\min} > 0\ \forall R \in (R^*, 1)$.

2.4.5 Proof of Proposition 3

Proof. :

- From Lemma 3, if $w_{\min} > w^*_{\min} \Longrightarrow L_P > \widetilde{L}$
- To check if the minimum wage constraint is binding in the system with only permanent contracts, we need to calculate: $\widehat{w}^*_P - w^*_{\min}$.

$sign(\,\widehat{w}^*_P - w^*_{\min}) = sign(m - w^*_{\min}) =$

$$sign\begin{bmatrix} mJ(1+r)(1-\beta) + m\beta(1+r)G - GJ - \beta Ge(1+r) - \beta GK(r+b) \\ -Je(1-\beta)(1+r) + J(1-\beta)RK(1-b) \end{bmatrix} =$$

$$sign\begin{bmatrix} mJ(1+r)(1-\beta) + m\beta(1+r)G - GJ - \beta Ge(1+r) - \beta GK(r+b) \\ +J(e/q-e)(1+r)(1-\beta) \end{bmatrix} =$$

$sign\,[Jm(1+r)(1-\beta) + \beta GJ - GJ + J(e/q-e)(1+r)(1-\beta)] =$
$sign\,[m(1+r) - G + (e/q-e)(1+r)] =$
$sign\,[(e/q)(1+r) - K(1+r)\,[b + (1-b)R] + K(r+b)] =$
$sign\,[(e/q)(1+r) + Kr(1-b) - KR^*(1-b)(1+r)] =$
$sign\,[(e/q)(1+r) + Kr(1-b)(1-R^*) - KR^*(1-b)] =$
$sign\,[(e/q)(1+r)b + Kr(1-b)(1-R^*)] > 0$

Since $\widehat{w}_P^* - w_{\min}^* > 0$, then for $w_{\min} \in (w_{\min}^*, m)$, we have that $L_P > \widetilde{L}$ and $w_{\min}$ not binding in the system with only PC. ■

2.4.6 Proof of Proposition 4

• From proposition 2, the system with PC only is an equilibrium if $w_{\min} > m$. From lemma 3, employment in is this system is higher if $w_{\min} > w_{\min}^*$. From proposition 3, we know that $m > w_{\min}^*$. This implies that whenever the system with PC only is an equilibrium, employment is always higher in that system. ■

• From proposition 2, the two-tier system is an equilibrium if $w_{\min} < m$. From lemma 3, if $w_{\min} \in (w_{\min}^*, m)$ employment is lower in this system. Therefore it is this same range of $w_{\min}$ for which the two-tier system is an equilibrium despite the fact that employment in the two-tier system is lower and the minimum wage constraint is not binding in the system with only PC. ■

2.4.7 Proof of Proposition 5

Proof. : We analyse the effects of F (the non-neutral firing cost, $F = dC$) on employment in the two-tier system:

• $sign(\frac{\partial \widetilde{L}}{\partial F}) = sign\left[\widetilde{a}(1-b)\frac{\partial R^*}{\partial F} + (b+(1-b)R^*)\frac{\partial \widetilde{a}}{\partial F}\right]$

• $\frac{\partial R^*}{\partial F} < 0$

• $sign(\frac{\partial \widetilde{a}}{\partial F}) =$

$$sign\left[-\left[(r+b)(1-\beta) - \frac{\partial \beta}{\partial F}\frac{(m-w_{\min})(1+r)}{1-\beta}\right]\left[(1-\beta)(1+r)\begin{pmatrix} w_{\min}-e \\ +(1-b)e/q \end{pmatrix}\right]\right]$$

For all the cases where the two-tier system is an equilibrium, we have that $m - w_{\min} \geq 0$. Also, we have that $\frac{\partial \beta}{\partial F} > 0$. Therefore, the first term in square brackets is non-negative. Note that from proposition 1 we can write: $w_{\min} = e - (1-b)e/q + A$, where $A > 0$ in case 2 (and $A \leq 0$ in case 1). This

makes the second term in square brockets be positive in case 2. Therefore, $\frac{\partial \widetilde{a}}{\partial F} \leq 0$ in case 2.

Thus, $\frac{\partial \widetilde{L}}{\partial F} < 0$, in case 2. That is, for all $w_{\min}$ in case 2, firing costs reduce employment. ■

2.4.8 Proof of Proposition 6

The first order conditions of the social planner problem are:

$$(1)\ R: \quad (m-e)\frac{\partial \widetilde{L}}{\partial R} + \lambda_1 - \lambda_2 - \lambda_3 \frac{a}{1+r+a}\frac{(1-b)R}{1+r} + \\ + \lambda_4 \frac{\partial \beta}{\partial R}(w_P - w_T) = 0$$

$$(2)\ a: (m-e)\frac{\partial \widetilde{L}}{\partial a} - \lambda_3 \frac{\left[w_T - e + \frac{(1-b)RK}{1+r}\right](1+r)}{(1+r+a)^2} = 0$$

$$(3)\ w_P: \lambda_3 - \lambda_4(1-\beta) = 0$$

$$(4)\ w_T: \lambda_5 - \lambda_3 \frac{a}{1+r+a} - \lambda_4 \beta = 0$$

where,

$$\frac{\partial \widetilde{L}}{\partial R} = \frac{a(1-b)Nb}{(b+ab+a(1-b)R)^2}\ ,\ \frac{\partial L_T}{\partial R} = -a\frac{\partial \widetilde{L}}{\partial R}\ ,\ \frac{\partial L_P}{\partial R} = (1+a)\frac{\partial \widetilde{L}}{\partial R}$$

$$\frac{\partial \widetilde{L}}{\partial a} = \frac{[b+(1-b)R]Nb}{(b+ab+a(1-b)R)^2}\ ,\ \frac{\partial L_T}{\partial a} = \frac{Nb^2}{(b+ab+a(1-b)R)^2}$$

$$\frac{\partial L_P}{\partial a} = \frac{Nb(1-b)R}{(b+ab+a(1-b)R)^2}$$

• Conditions (3) and (4) imply that either $\lambda_3 = \lambda_4 = \lambda_5 = 0$ or $\lambda_3 > 0$, $\lambda_4 > 0$, and $\lambda_5 > 0$. The first case implies a contradiction (from (2), R would be negative). Therefore these multipliers are positive implying that the three constraints associated are binding.

• It then is easy to check that for $w_{\min} \in (w^*_{\min}, m)$, $\widetilde{L}(1, a(1)) > \widetilde{L}(R^*, a(R^*))$. Therefore, the optimal renewal rate from a social point of view is $R = 1$. ■

Chapter 3

The transition of workers from temporary to permanent employment: the Spanish case

3.1 Introduction

In this chapter we study the use of fixed-term (or temporary, TC) contracts[1] in Spain. This country is often thought of as an economy with highly regulated labour markets, and most aggregate indices of flexibility tend to rank the country at the bottom of the list of OECD economies (see Grubb and Wells, 1993 and 1994b). Spanish unemployment, at over 20% of the labour force, reinforced this belief among both experts and employers. This situation probably triggered the implementation of the experiment of *flexibility at the margin*, which started in 1984 with the introduction of a new typology of labour contract, characterised by limited duration and negligible firing costs. The idea behind this policy was to introduce *more flexible* contracts than the existing (permanent) ones, in order to fight high and persistent levels of unemployment[2].

These contracts have been massively used for nearly all types of jobs

[1]These two terms will be used equivalently.

[2]Saint-Paul (1993, 1996b) discusses the political economy of labour market institutions and argues how two-tier systems are policies which generate consensus between the employed and the unemployed.

and sectors of the economy. Soon after their introduction - coinciding with the expansion of the late 1980s - 98% of newly registered contracts have been of this type (see Bentolila and Saint-Paul, 1992). But, at the same time, unemployment has remained as high as before the reform. Within a decade, the Spanish labour market has experienced record rates of gross job creation, but little permanent employment has been created because only a small proportion of fixed-term contracts has been converted on a permanent basis[3]. The labour market has gradually evolved towards a dual structure[4], with two thirds of employees retaining a permanent status and the rest working in a highly mobile market. Indeed, the share of temporary workers has increased to approximately one third by the early 1990s - which is more than three times the European average (see OECD 1987, 1993 and Toharia 1997).

The recent literature has evaluated various labour market effects of the introduction of fixed-term contracts. Jimeno and Toharia (1993) and Bentolila and Dolado (1994) point at the perverse effects of fixed-term contracts on wage formation. Their argument is that, when wage setting is dominated by insider employees, protected by substantial turnover costs, permanent workers may be able to obtain higher wages, "since the presence of a buffer of flexible employees lowers the likelihood that insiders will lose their jobs". Jimeno and Toharia (1996) look instead at the effects of fixed-term contracts on labour productivity. On the one hand, with shorter employment relationships, firms' and workers' incentive to invest in specific human capital are reduced. On the other hand, the dependence of severance payments on the tenure of the contract may lead temporary employees to exert higher effort than permanent ones.

Here we propose to investigate whether the limited success of higher flexibility at the margin is linked to a growing labour market segmentation, with nearly 35% of workers reshuffling themselves among a given number of temporary jobs. If this is the case, policies aimed at improving labour market flexibility in Spain as well in the rest of Europe and, more generally, at facing the European unemployment problem, should be targeted at the *core* rather than at the *fringe* of labour contracts. This also seems to be the view of

[3]See Figure 3.4.

[4]See Bentolila and Dolado (1994), Castillo *et al.* (1998), Saint-Paul (1996a), Segura *et al.* (1991), and Toharia (1997).

Figure 3.1: The share of fixed-term contracts (%) in total employment, 1987-1997. Source: EPA.

Spanish policy makers, that more recently tried to limit the applicability of fixed-term contracts (1994 reform) and created a new type of permanent contract with lower firing costs (1997 reform).

More specifically, we study the duration pattern of fixed-term contracts using micro data drawn from the Spanish Labour Force Survey (EPA). This should shed some light on the kind of use that employers make of this instrument[5].

Before 1984, the use of fixed-term contracts was only allowed in Spain for covering jobs whose underlying nature was seasonal, or linked to specific (temporary) activities. One key feature of the 1984 reform was to remove the seasonal requirement for the applicability of fixed-term contracts. And indeed they spread rapidly to non-seasonal jobs (see Figure 3.1). This leads us to analyse alternative reasons why firms opt for temporary hirings.

[5]See also OECD (1993) for a discussion on this issue.

First, fixed-term contracts can be used as a screening device, that allows employers to observe the productivity of the job-worker pair during the maximum probation period of three years. In this perspective, job matches are interpreted as "experience goods", in the tradition of Jovanovic (1979, 1984). These models precisely assume that "the only way to determine the quality of a particular match is to form the match and experience it". In a high-firing-cost scenario, the introduction of fixed-term contracts would therefore provide employers with the adequate instrument for experiencing the quality of a match by means of hiring.

Second, even when the quality of a job-worker pair is directly observable before forming the match, employers can opt for fixed-term contracts as a more flexible option for adjusting employment in the face of adverse shocks to the firm, and as a cheaper factor of production. Jimeno and Toharia (1993) find in fact that temporary workers earn approximately 10% less than permanent ones, after controlling for observable personal and job characteristics.

We can in principle discriminate between these two different uses of temporary contracts by analysing the time pattern of the rate at which firms convert fixed-term into permanent contracts within the (legal) maximum spell of 3 years since their start. This reveals whether temporary employment is used as a genuine probation period that may end up in permanent employment at any time during the 3 years, or whether firms opt for permanent employment only when there is no other way to retain the worker. In the latter case we would observe that fixed-term contracts tend to be transformed into permanent ones towards the 3 years' duration limit. The technique that we use for this task is a duration model for temporary employment, with competing risks of flowing into permanent employment versus non-employment or a new temporary contract, and sufficiently flexible duration dependence for the exit into permanent employment. This highlights the behaviour of the hazard during the whole duration of temporary employment.

The contribution of this chapter to the existing literature is both methodological and related to the use of the EPA data base. We believe that the use of duration models best describes the dynamics of the transition process between temporary and permanent employment. Such models in fact exploit the potential strength of a cohort panel study, which is the possibility of being able to track individuals over time and observe exactly how long they take to make an employment change. Moreover, the use of individual infor-

mation on workers' human capital that can be obtained from the EPA shows whether the prospect of permanent employment is shared among temporary workers, and to what extent there are some categories that are more likely than others to remain trapped in temporary jobs.

The existing literature has not put both these things together. Existing contributions on renewal rates (see Toharia 1996 and Alba 1998) generally use logit models to analyse the determinants of the probability of receiving a permanent contract, conditional on being initially hired on a temporary basis. Logit specifications may prove rather inflexible when applied to the analysis of the dynamic path of transition rates. Garcia-Fontes and Hopenhayn (1996) estimate a duration model of job tenure using the Social Security records. These data avoid the use of self-reported information on the duration of contracts, and therefore have the advantage of reducing measurement error, but on the other hand they provide very little information on workers' characteristics, and do not allow to identify the temporary/permanent nature of the contract held.

The chapter maps out as follows. Section 3.2 describes the data that we use, extracted from the panel version of the EPA. Section 3.3 provides a discrete time duration model, that applies to the transition of workers out of temporary employment. Section 3.4 presents our results. Section 3.5 finally concludes.

3.2 The data

The data used in this chapter is drawn from the Spanish Labour Force Survey (Encuesta de la Población Activa), which is carried out every quarter on a sample of some 60,000 households. The EPA is designed to be representative of the total Spanish population, and contains very detailed information about labour force status of individuals. Each household can remain in the survey for a maximum of six consecutive quarters: each quarter a new cohort is selected, and one sixth of households leave the sample. Labour force transitions can be analysed by using the panel structure of the survey (*EPA enlazada*), available for all cohorts that entered the survey since 1987.

Our sample includes individuals belonging to cohorts that entered the survey between 1987:2 and 1996:3, covering (more than) a full cycle of the Spanish economy. We select all respondents who completed six quarterly

interviews, and declared to hold a fixed-term contract in any of the six interviews.

We disaggregate our observations in four broad sectors: agriculture, manufacturing, construction and services. Figure 3.2 plots the share of fixed-term contracts over time of each sector[6]. It shows that the share of seasonal contracts among all fixed-term ones is only significant in agriculture.

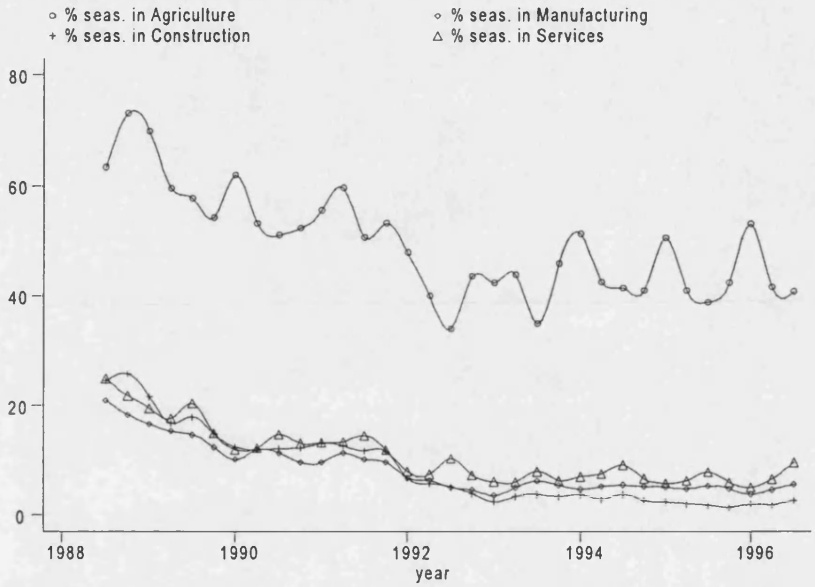

Figure 3.2: The share of seasonal contracts in total fixed-term contracts, by sectors. Source: EPA.

Another way to check for any evident pattern of seasonality is by looking at the absolute number of existing fixed-term contracts within each sector. This is done in Figure 3.3. Again, except in agriculture, seasonality does not play too strong a role in shaping the evolution of temporary employment.

[6]The plot refers to the sample period 1988:3-1996:3, in order to have 6 cohorts of workers present in the survey at all times.

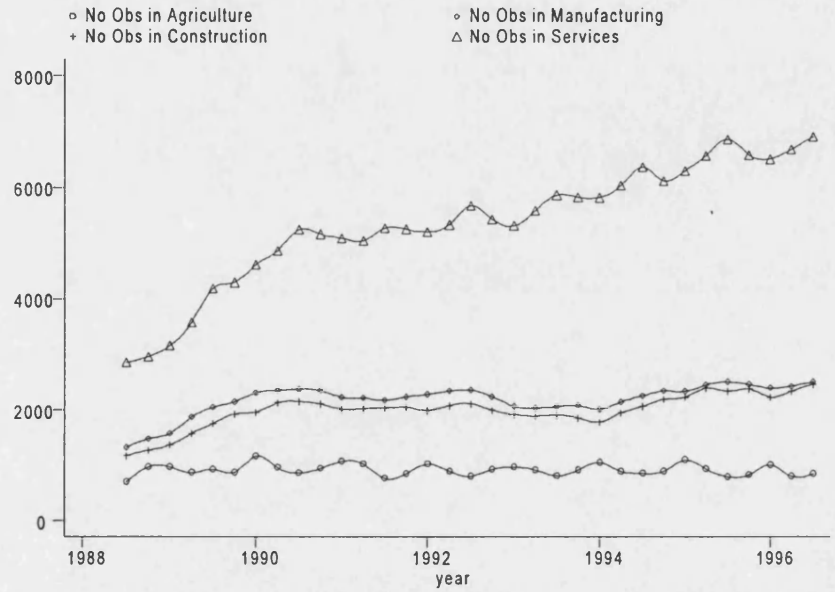

Figure 3.3: The number of existing fixed-term contracts, by sector. Source: EPA.

In order to give a flavour of labour market transitions in our sample, Tables 3.1 and 3.2 report quarterly and yearly transition probabilities across three labour market states: non-employment, permanent employment, and temporary employment. Both tables display extremely strong persistence in the non-employment and the permanent employment states. As expected, the temporary employment category displays significant turnover, although most of such mobility represents reshuffling across temporary contracts, as shown in the bottom row of Table 3.2.

Table 3.1: Quarterly transitions across labour market states

		quarter $t+1$			
		NE	PC	new TC	same TC
quarter t	NE	96.64	0.67	2.69	
	PC	1.94	95.12	2.94	
	TC	18.24	6.49	16.9	58.37

Notes. Transition rates are computed according to the distribution of individuals across labour market states at quarter $t+1$, conditional on their status at quarter t (Source: EPA).

Table 3.2: Yearly transitions across labour market states

		year $t+1$			
		NE	PC	new TC	same TC
year t	NE	93.67	1.33	5.00	
	PC	7.35	89.47	3.18	
	TC	26.39	10.83	49.91	12.87

Notes. Transition rates are computed according to the distribution of individuals across labour market states at quarter $t+4$, conditional on their status at quarter t (Source: EPA).

In our duration model, we concentrate on individual transitions out of the first fixed-term contract that is observed during the survey period. This leaves us with 118,197 temporary employment spells.

The duration of each contract is constructed in the following way. Given that no contract identifier is supplied, in order to follow each single fixed-term contract across interviews we rely on self-reported information on (i) the type of contract held and (ii) the uncompleted duration of the present contract. The type of contract held can be permanent or fixed-term. The uncompleted duration of the present contract is expected to rise across interviews with calendar time, and to drop to zero whenever there is a contract switch. We therefore consider a spell of temporary employment as completed when either there is a change in the type of contract or there is a drop in the uncompleted duration of the present contract.[7]

Roughly 65% of temporary employment spells that we observe started during the survey period. The remaining 35% started before the worker was selected for the survey, so that we need to condition on the length of temporary employment at the first interview date, using once more the information on the elapsed duration of the current contract that is reported at the first interview. The self-reported elapsed duration up to the interview date is measured in months if it is lower than one year, and in years if it is longer. Whenever the reported elapsed duration is 1 year, this means anything between 4 and 8 quarters, and we assign to these observations the mean value of 6 quarters. Similarly, we assign the mean value of 10 quarters to reported durations of 2 years. Such data bunching problem could be eliminated by focusing only on entrants into temporary employment, that do not have any rounded measure of elapsed duration attached. However, this would only allow us to observe the time pattern of the renewal probability for at most six quarters of duration, and would leave us without any information on the behaviour of the hazard towards the legal duration limit of fixed-term contracts. We therefore choose to exploit information on all spells, bearing in mind that the data bunching problem will somehow be reflected in the

[7]We also computed the duration of fixed term contracts according to a more restrictive definition of a single spell. In particular, we considered a spell as completed when either (i) there is a change in the type of contract, or (ii) there is a drop in the uncompleted duration of the present contract, or (iii) there is a change in the sector where the worker is employed. No appreciable change was detected with respect to the definition given in the main text, which is the one we adopt in the empirical analysis reported here.

estimated baseline hazard.

Each spell of temporary employment can terminate with a new fixed-term contract, a permanent contract, joblessness, or it can be censored if the worker is last observed holding the fixed-term contract at the sixth interview. The proportion of fixed-term contracts that terminated with a conversion into a permanent started at nearly 20% in 1988 and has declined monotonically until 1994 (7%), experiencing a very weak recovery thereafter, as depicted in Figure 3.4. These proportions look slightly lower than those computed in Toharia (1996, Table 4), although they follow exactly the same trend. It is worth noticing however that the renewal rates computed here refer to the proportion of workers that hold a fixed-term contract at some point in time and hold instead a permanent one at the next interview, i.e. direct transitions from temporary to permanent employment. Toharia (1996) computes instead the proportion of permanent workers that held a fixed-term contract one year back. We prefer to look at direct switches between two subsequent interviews because yearly renewal may conceal additional labour market transitions.

Figure 3.4: The proportion of fixed-term contracts being converted into permanent ones. Source: EPA.

Given that we cannot use an employer identifier, we are not sure that new permanent contracts observed in the survey are renewals of previous

fixed-term contracts with the same employer, rather than newly-created jobs elsewhere in the economy. However, the fact that between 1986 and 1992 almost all (98%) new contracts registered at employment offices have been fixed-term would suggest that the vast majority of permanent contracts that we observe in the survey are created through renewals of fixed-term ones.

Table 3.3 below reports the distribution of observed spells, according to their destination state. The figures reported suggest that, at relatively short durations, fixed-term contracts are more likely to end up into non-employment. As duration proceeds, the probability of non-employment decreases, while the chances of permanent employment increase. The table also shows evidence of temporary contracts continuing beyond the legal limit of 3 years.

Table 3.3: The duration distribution of fixed-term contracts, by state of exit

duration (quarters)	NE	PC	new TC	same TC	Total No. of spells
1	52.56	12.10	12.85	22.49	34599
2	37.44	8.97	36.02	17.56	27790
3	28.85	9.54	45.38	16.24	18113
4	20.44	11.23	49.96	18.36	12079
5	15.93	9.39	49.95	24.72	6516
6	14.96	10.49	28.87	45.68	2660
7	21.06	16.85	35.70	26.39	4415
8	18.68	15.50	29.27	36.55	2238
9	18.87	14.87	31.21	35.05	1224
10	24.39	22.91	52.70	0	611
11	27.60	31.78	40.62	0	1866
12	9.49	15.90	14.09	60.51	1717
13	23.39	38.84	37.77	0	466
14 and over	16.12	3.31	30.39	50.19	3903
Total No. of spells	40863	13245	38031	26058	118197

Notes. Each row sums to 100, with each entry giving the probability to exit into any of the four states, conditional on the contract duration (Source: EPA).

Explanatory variables included in our regressions are personal and family characteristics of the individual such as gender, education, potential labour market experience,[8] marital status and number of dependent children. The effect of job-related variables is also considered. These include an on-the-job training dummy, a dummy that indicates whether the reason for being on a fixed-term contract is the impossibility to find a permanent one in the first place, and a job search dummy that indicates whether the worker is currently looking for another job. Year dummies (referring to the year of entry in the survey) are also included in order to capture any time pattern in renewal probabilities across the Spanish business cycle. Finally, industry dummies and the sectoral unemployment rate (computed at the beginning of the spell) should capture the effect of overall labour market performance (if any) on the renewal of contracts. Average sample values of these variables are reported in Table 3.4, for both the whole sample and each type of destination. As one would have expected, workers who obtain a permanent renewal of their contract tend to be more skilled, either through formal education or on-the-job training. The sector in which the worker is employed also seems to be a good predictor of the type of transition made on termination of the fixed term contract, with agricultural and construction workers being significantly more likely than others to end up out of work.

Alba (1996a and 1998) estimates a logit model for the probability of holding a temporary contract using the EPA, 1987-1996. He finds that women, young and less educated people are more likely to be temporary workers than permanent ones.

[8] Computed as age − years of schooling −6.

Table 3.4: Sample characteristics of temporary workers

	Total sample	NE	PC	new TC	same TC
female	39.77	49.52	39.14	35.18	41.54
primary ed. or below	38.06	43.75	37.96	34.54	34.31
secondary education	52.90	49.48	50.68	56.80	53.71
university education	9.94	6.77	11.36	8.66	11.98
pot. exp. 0-4 yrs	32.34	32.30	27.69	32.03	35.21
pot. exp. 5-15 yrs	31.28	28.42	34.86	34.61	29.08
pot. exp. 16+ yrs	36.38	39.28	37.45	33.36	35.71
married	41.28	41.79	44.89	40.42	39.89
Average No. of kids	0.81	0.86	0.84	0.76	0.78
receiving educ./train.	42.53	43.50	57.05	34.31	45.64
PC not found	88.59	88.39	87.29	89.76	87.83
on the job search	8.53	11.81	5.98	6.36	7.82
agriculture	11.22	19.12	6.24	7.23	7.18
manufacturing	19.45	16.29	20.62	22.67	19.13
construction	17.33	17.00	14.70	18.23	17.88
services	51.99	47.59	58.42	51.86	55.81
Average unemp. rate	19.88	18.67	20.47	20.54	20.50
Total No. of spells	118197	40863	13245	38031	26058

Notes. All entries (except the average number of kids and the average unemployment rate) indicate the percentage of workers with a given characteristic in the sample (Source: EPA).

3.3 Econometric specification

The panel structure of the data set described requires a discrete time hazard function approach, as outlined in Narendranathan and Stewart (1993) and Jenkins (1995).

Suppose that the transition out of temporary employment to permanent employment is a continuous process with hazard:

$$\theta_i(t) = \lambda(t) \exp(x_i'\beta), \tag{3.1}$$

where $\lambda(t)$ denotes the baseline hazard, x is a vector of time-invariant explanatory variables, and β is a vector of unknown coefficients. The discrete time hazard denotes the probability of a spell of temporary employment being completed by time $t+1$, given that it was still continuing at time t. The discrete time hazard is therefore given by:

$$h_i(t) = 1 - \exp\left\{-\int_t^{t+1} \theta_i(u)du\right\} = 1 - \exp\{-\exp(x_i'\beta)\gamma(t)\} \tag{3.2}$$

where,

$$\gamma(t) = \int_t^{t+1} \lambda(u)du \tag{3.3}$$

denotes the integrated baseline hazard. We do not specify any functional form for the $\gamma(t)$, and estimate the model semiparametrically.

The (log) likelihood contribution of a spell of length d_i is:

$$\begin{aligned} L_i &= c_i \left(\ln h_i(d_i) + \sum_{t=1}^{d_i-1} \ln\{1 - h_i(t)\} \right) + (1 - c_i) \sum_{t=1}^{d_i-1} \ln\{1 - h_i(t)\} \\ &= c_i \ln h_i(d_i) + \sum_{t=1}^{d_i-1} \ln\{1 - h_i(t)\} \\ &= c_i \ln\left(1 - \exp\left[-\exp\left\{x_i(d_i)'\beta + \gamma(d_i)\right\}\right]\right) \\ &\quad - \sum_{t=1}^{d_i-1} \exp\{x_i'\beta + \gamma(t)\}, \end{aligned} \tag{3.4}$$

where c_i is a censoring indicator that takes the value 1 if d_i is uncensored and zero otherwise.

We assumed so far that we observe entrants into temporary employment. Assume instead from now on that we also observe spells of temporary employment that started before the survey period, and that we can use self-reported information to find out the quarter in which these spells begun. In order to avoid a stock sample bias (see Lancaster and Chesher, 1983), we need to condition on the length of temporary employment at the first interview date. Suppose that an individual i enters the survey after j_i quarters of temporary employment and keeps the fixed-term contract for another k_i quarters, for a total duration $d_i = j_i + k_i$, that can be either censored or uncensored. The individual likelihood contribution is therefore:

$$\begin{aligned} L_i &= c_i \left[\ln h_i (j_i + k_i) + \sum_{t=1}^{j_i+k_i-1} \ln \{1 - h_i(t)\} - \sum_{t=1}^{j_i} \ln \{1 - h_i(t)\} \right] \\ &\quad + (1 - c_i) \left[\sum_{t=1}^{j_i+k_i-1} \ln \{1 - h_i(t)\} - \sum_{t=1}^{j_i} \ln \{1 - h_i(t)\} \right] \\ &= c_i \ln h_i (j_i + k_i) + \sum_{t=j_i+1}^{j_i+k_i-1} \ln \{1 - h_i (t)\} \\ &= c_i \ln (1 - \exp [- \exp \{x_i'\beta + \gamma (j_i + k_i)\}]) \\ &\quad - \sum_{t=j_i+1}^{j_i+k_i-1} \exp \{x_i'\beta + \gamma (t)\} . \end{aligned} \tag{3.5}$$

The model outlined specifies the likelihood of a single risk: that of terminating fixed-term employment into permanent employment. As we will see below, fixed-term contracts can also terminate into alternative states. Given that we are interested in the first type of transition, we need to estimate a competing risk model, that distinguishes exit into permanent employment from exit into alternative states. It can be illustrated that the parameters of a given cause-specific hazard can be estimated by treating durations finishing for other reasons as censored at time of exit (see Narendranathan and Stewart, 1993). We therefore treat all temporary employment spells that end in a new fixed-term contract or in non-employment as censored at the time the first contract is terminated. Having said this, the semi-parametric hazard specification (3.5) used for the single-risk model can be applied for the permanent job hazard.

In what follows, the effect of possibly omitted regressors in the exit from fixed-term employment is controlled for by conditioning the hazard rate on an individual's unobserved characteristics, summarized into the variable v. The conditional (continuous time) hazard rate is then written as $\theta_i(t) = \lambda(t)\exp(x_i'\beta + v_i)$, with v_i independent of x_i and t. This specification therefore identifies the three sources of variation among individual hazard rates: the duration of fixed-term contract (t), the observable differences among individuals (x) and the unobservable ones (v). However, in a competing risk framework, allowing a random disturbance term in each of the cause-specific hazard requires an additional assumption, that imposes the independence of these disturbance terms across the cause-specific hazards[9].

The unconditional hazard (that depends on observable regressors only) is obtained by integrating the conditional one over v, under the assumption that v is distributed as a Gamma variate[10] of unit mean and variance σ^2. Under these assumptions the likelihood is given by:

$$L_i = \ln\left[\left(1+\sigma^2\sum_{t=j_i+1}^{j_i+k_i-1}\exp\{x_i'\beta+\gamma(t)\}\right)^{-1/\sigma^2} - c_i\left(1+\sigma^2\sum_{t=j_i+1}^{j_i+k_i}\exp\{x_i'\beta+\gamma(t)\}\right)^{-1/\sigma^2}\right]. \quad (3.6)$$

The baseline hazard can be estimated non-parametrically by maximising the log-likelihood $L = \sum_{i=1}^{n} L_i$ with respect to the $\gamma(t)$ terms, the vector β and the variance term σ^2. The vector of controls x_i includes a number of individual and job-related characteristics, that are treated as time invariant, and are measured at the start of the fixed-term contract (or at the time of the first interview if the contract has already started).

[9]The alternative approach would be to assume perfect correlation (as opposed to zero correlation) between the cause-specific disturbance terms (see Narendranathan and Stewart, 1993, for a discussion of advantages and disadvantages of the two methods).

[10]See Lancaster (1979); see also Han and Hausman (1990) and Dolton and O'Neill (1996) for an application of Gamma-distributed unobserved heterogeneity to discrete time hazard models.

3.4 Empirical results

We are now in a position to estimate the econometric model outlined in section 3.3, for the determinants of the permanent renewal hazard. The results of our estimates are reported in Tables 3.5 and 3.6. Two specifications of our regression equation are provided. In the first, we do not allow for unobserved heterogeneity among individuals. In the second we control for the effect of possibly omitted regressors by allowing for a Gamma-distributed disturbance term.

The effect of several individual characteristics on renewal probabilities are fairly standard, and consistent with previous results obtained from logit estimates (see Alba, 1998). Column I of Table 3.5 shows that the probability of a permanent renewal is higher for males than females. This is probably explained by the fact that women tend to have weaker labour market attachment than men, and higher turnover, so that female employment may be perceived as relatively more risky from employers' point of view. Being married positively affects the probability of obtaining a PC, while the number of kids does not. It can also be noted that the probability of a permanent renewal increases monotonically with education but that only college education matters significantly. Also, it is enhanced by potential experience beyond 5 years of labour market attachment.

Those who could not find a permanent job in the first place have lower renewal probabilities on the current job. This sort of correlation between past and current labour market performance may result as an effect of unobserved ability levels, that are not captured by standard human capital indicators included in the regression. Also, those that are already searching for another job have lower renewal prospects. In this case we can plausibly detect a reverse causality between the two facts: once the worker realises that his renewal probabilities are fairly low with the current employer, he starts searching elsewhere[11].

Receiving on the job training hardly affects permanent renewal rates. This is a signal that such training programmes are generally of low quality and anyway do not represent a significant long-term investment in the human

[11]This result relates in an interesting way with the findings of Pissarides and Wadsworth (1994) for Britain. They find that one of the strongest influences of the likelihood of on-the-job search are the characteristics of the job. In particular, long job tenures reduce on-the-job search.

capital of temporary workers. An alternative explanation is that also in this case a reverse causality problem can be detected: firms know ex-ante that renewal prospects are low and therefore decide not to invest too heavily on a temporary factor of production. Alba (1994) studies the determinants of firm-based training in Spain and points out that training is more concentrated among more senior workers in the firm than among newly hired workers because the uncertainty with respect to reaping the benefits of the training investment are lower[12].

Industry dummies show that renewal rates are highest in services and lowest in construction. Time fixed-effect imply in turn a roughly monotonically decreasing trend in the proportion of fixed-term contracts being renewed on a permanent basis over the whole sample period. Overall, this trend does not seem to be at all affected by business cycle fluctuations. Finally, sectoral unemployment has a negative but non-significant impact on renewal rates, suggesting that low renewal rates cannot really be blamed on the fact that high unemployment has been providing employers with abundant outside options of covering their temporary jobs.

The parallel estimation that controls for the effect of unobserved heterogeneity is represented in column II of Table 3.5. The positive and significant variance of the Gamma-distributed disturbance shows that there is some residual heterogeneity among individuals, which is not properly accounted for by included regressors. However, the partial effect of most regressors remains practically unchanged if compared with the case where no unobserved heterogeneity is accounted for, as does the global fit of the regression.

The steps of the baseline hazard are reported in Table 3.6 and plotted in Figure 3.5 for our reference category (see Table 3.5). Controlling for the presence of unobserved heterogeneity in regression II simply scales upward the whole baseline hazard, as it is reasonable to expect, but hardly changes its overall time pattern. It can be noted that, with both specifications, the hazard is significantly higher at durations around one and three years. This result is suggestive that some fixed-term contracts are plausibly used as a screening device, and "successful" workers obtain a permanent renewal much before the legal limit. A spell of roughly one year seems in fact reasonable for adequately assessing the performance of a worker, and in order to retain

[12]Similarly, Arulampalam and Booth (1998) find that workers on short-term employment contracts in Britain are less likely to receive employer-provided training.

those who pass the screening employers choose not to wait until the maximum legal limit of the contract. But there also seem to exist contracts that are only renewed upon expiry of the legal limit of three years: such contracts are probably used as a cheaper/more flexible option to adjust employment, and are only renewed when there is no other legal way to retain the worker.

Additional spikes in the baseline hazard are detected at durations of 7 and 11 quarters, respectively. These spikes are at least partly the effect of bunching in our reported durations. Among all the individuals who started their fixed-term employment spell before the first interview date, as much as 43% are observed to hold a temporary contract just in the first quarter they are interviewed, and to make a transition to a different contract - or to unemployment - in the following quarter. The total duration for these individuals is computed as 1 plus the self-reported previous duration of the contract. Such previous duration is reported in months only if it is lower that one year, otherwise is reported in years. As already mentioned, previous durations of 1 and 2 years imply an average uncompleted employment spell of 6 and 10 quarters, respectively. This finally implies that we are left with a considerable number of individuals that terminate the fixed-term contract at 7 and 11 quarters, these durations being the combination of 6 and 10 quarters of previous employment respectively, and one quarter of employment during the survey period. Such bunching phenomenon is clearly evident in our estimates.

In order to assess how serious the data bunching problem is, we report in the Appendix the baseline hazard estimates obtained on a subsample of workers for whom the rounding problem does not apply, i.e. individuals whose previous uncompleted duration is lower or equal to three quarters. This allows us to identify eight steps in the baseline hazard. As shown in the estimates of Table 3.17, the spike at 7 quarters of durations disappears completely, while the one at 4 quarters remains. In what follows we therefore interpret all spikes at 7 quarters (and, by the same token, at 11 quarters) as an effect of the rounding problem.

Table 3.5: Maximum likelihood estimates of the transition from temporary to permanent employment: Full sample

	I		II	
	Coef.	(Std. err.)	Coef.	(Std. err.)
female	-0.035	(0.020)	-0.037	(0.022)
secondary education	0.026	(0.023)	0.031	(0.026)
university education	0.186	(0.034)	0.209	(0.039)
pot. exp. 5-15 yrs	0.210	(0.024)	0.224	(0.027)
pot. exp. 16+ yrs	0.260	(0.031)	0.283	(0.035)
married	0.081	(0.023)	0.090	(0.026)
number of kids	0.011	(0.009)	0.012	(0.010)
receiving educ./train.	0.031	(0.033)	0.048	(0.037)
PC not found	-0.193	(0.026)	-0.225	(0.029)
on the job search	-0.187	(0.037)	-0.197	(0.040)
manufacturing	0.201	(0.045)	0.181	(0.050)
construction	-0.159	(0.043)	-0.211	(0.047)
services	0.421	(0.100)	0.415	(0.114)
year 1988	-0.173	(0.038)	-0.225	(0.045)
year 1989	-0.420	(0.039)	-0.502	(0.046)
year 1990	-0.638	(0.043)	-0.752	(0.050)
year 1991	-0.635	(0.050)	-0.774	(0.058)
year 1992	-0.804	(0.061)	-0.925	(0.069)
year 1993	-0.895	(0.065)	-1.028	(0.074)
year 1994	-0.955	(0.063)	-1.093	(0.072)
year 1995	-0.890	(0.059)	-1.021	(0.068)
year 1996	-1.013	(0.062)	-1.149	(0.071)
unemployment rate	-0.381	(0.470)	-0.332	(0.530)
σ^2	–		0.717	(0.106)
mean log-likelihood	-0.365		-0.365	
No. of cases	118,197		118,197	

Notes. Reference category: male, not married, with pot. exp.<5 yrs, less than secondary education, not receiving educ./train., reason for being in TC not because did not find PC, not searching for another job, employed in agriculture, entered survey in 1987. Standard errors in brackets. Source: EPA.

Table 3.6: Baseline hazard estimates: Full sample

	I		II	
quarters	Coef.	(Std. err.)	Coef.	(Std. err.)
1	0.157	(0.010)	0.181	(0.014)
2	0.130	(0.009)	0.159	(0.013)
3	0.130	(0.009)	0.164	(0.014)
4	0.161	(0.012)	0.212	(0.018)
5	0.152	(0.012)	0.215	(0.021)
6	0.126	(0.011)	0.189	(0.021)
7	0.180	(0.013)	0.224	(0.019)
8	0.141	(0.012)	0.186	(0.019)
9	0.117	(0.012)	0.159	(0.018)
10	0.086	(0.009)	0.130	(0.016)
11	0.209	(0.016)	0.262	(0.024)
12	0.171	(0.015)	0.218	(0.023)
13	0.125	(0.012)	0.171	(0.020)
14 and over	0.083	(0.009)	0.113	(0.015)

Notes. The estimates report the steps of the baseline hazard for the reference worker, according to regressions I and II of Table 3.5. Standard errors in brakets. Source: EPA.

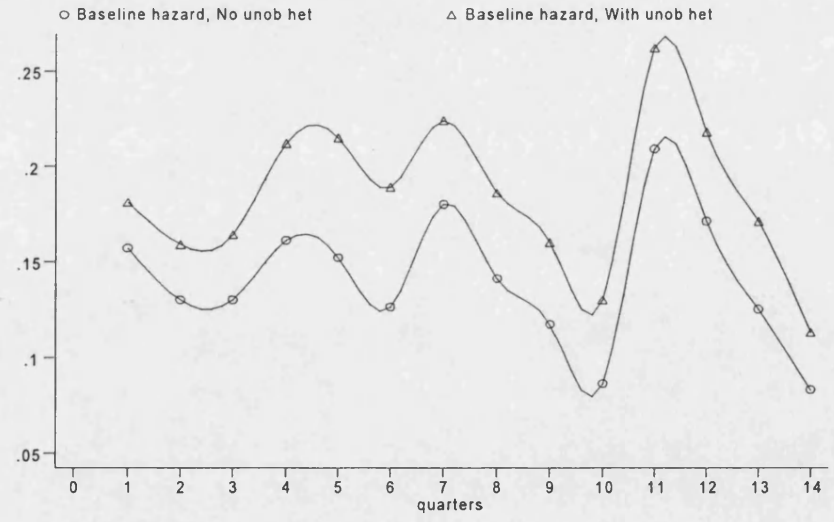

Figure 3.5: Plots of the baseline hazard for the reference category. Source: EPA.

We carry further tests in order to investigate two issues. First, we try to assess whether the 1994 reform has altered the renewal pattern of fixed-term contracts into permanent ones, and whether such an effect, in any, has affected some categories of workers more than others. The reform was in fact aimed at reducing the applicability of general fixed-term contracts and enhancing the renewal rates for labour market groups with supposedly poorer labour market prospects. We saw earlier that, despite the reform, the share of temporary employment did not fall after the reform (see Figure 3.1). However, there was a slight increase in the proportion of fixed-term contracts being converted into permanent ones (see Figure 3.4). It is therefore interesting to document this trend, and check whether such overall tendency conceals diverging patterns for different labour market segments.

Second, we separately estimate renewal rates for different categories of workers over the whole sample period, in order to check for differences in the whole time pattern of renewals, and not just in their levels.

We start, therefore, by splitting our sample in the following way. The first sub-sample includes cohorts that entered the survey between 1987:2 and 1992:3; the second includes cohorts that entered between 1995:1 and 1996:3. In this way, the first sub-sample includes any temporary contract that started before the 1994 reform and the second one includes any temporary contract that started after the 1994 reform. The results are presented in Table 3.7 and 3.8.

Table 3.7 clearly shows that permanent renewal prospects of women and less educated workers have improved after 1994: the female dummy switches sign in regression II, as do education and training dummies. Targeting subsidies to the renewal of contracts for such categories seems in fact to have been effective in enhancing their prospects of accessing permanent employment. Also, renewal prospects after 1994 have deteriorated in construction, falling below those in agriculture. These seem to be the only appreciable changes produced after 1994. The time pattern of renewals is in fact virtually unchanged across the two sub-samples considered, delivering higher renewal rates at one and at three years of temporary employment, respectively, together with the usual bunching spikes.

Table 3.7: Maximum likelihood estimates of the transition from temporary to permanent employment: 1987-1993 and 1995-1996

	I		II	
	1987-1993		1995-1996	
	Coef.	(Std. err.)	Coef.	(Std. err.)
female	-0.077	(0.024)	0.124	(0.050)
secondary education	0.057	(0.029)	-0.016	(0.061)
university education	0.321	(0.042)	-0.214	(0.087)
pot. exp. 5-15 yrs	0.194	(0.028)	0.207	(0.064)
pot. exp. 16+ yrs	0.255	(0.038)	0.103	(0.081)
married	0.099	(0.029)	0.100	(0.059)
number of kids	0.007	(0.011)	0.004	(0.028)
receiving educ./train.	0.124	(0.040)	-0.204	(0.092)
PC not found	-0.237	(0.032)	-0.084	(0.069)
on the job search	-0.316	(0.048)	0.055	(0.085)
manufacturing	0.288	(0.054)	0.126	(0.185)
construction	0.054	(0.051)	-0.666	(0.170)
services	0.501	(0.125)	0.256	(1.023)
year 1988	-0.183	(0.039)		—
year 1989	-0.432	(0.041)		—
year 1990	-0.643	(0.048)		—
year 1991	-0.645	(0.058)		—
year 1992	-0.717	(0.073)		—
year 1993		—		—
year 1994		—		—
year 1995		—		—
year 1996		—	-0.115	(0.051)
unemployment rate	-0.371	(0.674)	-0.091	(4.273)
mean log-likelihood	-0.434		-0.277	
No. of cases	64,235		24,792	

Notes. Reference category: male, not married, with pot. exp.<5 yrs, less than secondary education., not receiving educ./train., reason for being in TC not because did not find PC, not searching for another job, employed in agriculture, entered the survey in 1987 (regression I) or in 1995 (regression II). Standard errors in brackets. Source: EPA.

Table 3.8: Baseline hazard estimates:
1987-1993 and 1995-1996

	I		II	
	1987-1993		1995-1996	
quarters	Coef.	(Std. err.)	Coef.	(Std. err.)
1	0.151	(0.013)	0.052	(0.017)
2	0.110	(0.009)	0.062	(0.021)
3	0.110	(0.010)	0.059	(0.020)
4	0.126	(0.011)	0.095	(0.032)
5	0.110	(0.011)	0.115	(0.039)
6	0.095	(0.010)	0.088	(0.032)
7	0.145	(0.014)	0.105	(0.036)
8	0.120	(0.012)	0.075	(0.028)
9	0.091	(0.011)	0.071	(0.028)
10	0.077	(0.010)	0.036	(0.016)
11	0.176	(0.017)	0.115	(0.041)
12	0.151	(0.016)	0.072	(0.027)
13	0.110	(0.013)	0.054	(0.021)
14 and over	0.088	(0.011)	0.013	(0.007)

Notes. The estimates report the steps of the baseline hazard for the reference worker, according to regressions I and II of Table 3.7. Standard errors in brakets. Source: EPA.

The existence of two main spikes in the renewal hazard, and the consequent interpretation in terms of different uses of fixed-term contracts, leads us to estimate renewal probabilities for different categories of workers, defined over their sector, gender, or educational attainment. This should in fact reveal whether fixed-term contracts provide effective screening devices rather than simply cheaper hirings for some categories of workers more than for others.

First, we concentrate on contracts in the manufacturing sector. As one would have expected, the incidence of seasonality seems in fact to be lowest in this sector, allowing us to focus mainly on general fixed-term contracts. Table 3.9 shows that, besides higher returns to education, the manufacturing sector behaves very much like the rest of the economy as far as the effect of workers' characteristics on renewal are concerned. Interestingly enough, year dummies show that the decreasing trend in renewal rates comes to a half in 1994, the year of the reform. The effect of sectoral unemployment is measured with much less precision than in other regressions, clearly because of insufficient variability in this regressor. When we restrict to manufacturing, sectoral unemployment only varies along the time series dimension, due to different entry times in temporary employment. Table 3.10 confirms a higher renewal hazard for the reference worker in manufacturing than for the rest of the economy, although its time pattern still delivers the conventional twin-peak shape.

Some gender differences in renewal rates are detected in Table 3.11. Human capital accumulation through formal education or training matters more for males than females, as do family variables like marital status and the number of dependent children. It seems moreover that, after 1994, renewal rates keep falling for males, while stabilising for females. Once more, we can detect the effects of the 1994 reform. Another interesting piece of information is delivered in Table 3.12, which shows that the one-year spike in renewal rates is relatively more pronounced for females than males, and the opposite happens for the three-year spike. If anything, this suggests that the screening use of fixed-term contracts applies more to female than male employment. Given low participation rates and high turnover of Spanish women, a temporary employment spell may in fact be used by employers in order to assess the degree of labour market attachment of their female employees.

No substantial differences across educational groups are instead detected, according to the estimates of Tables 3.13, except for the fact that, like for women, the 1994 reform has stabilised the renewal rates of the less-skilled. Table 3.14 suggests moreover that the one-year spike is relatively more important than the three-year spike for the more educated. Screening and early renewal for successful workers plausibly applies to the skilled rather than the unskilled.

The last step consists in estimating the determinants of a different destination of fixed-term contracts, namely non-employment, representing either unemployment or inactivity. Table 3.15 shows that women, less educated or experienced workers, as well as agricultural workers are more likely to end up jobless at the end of their temporary unemployment spell. The time pattern of such transition, reported in Table 3.16, shows the familiar data bunching spikes at durations 7 and 11 quarters. Having said this, the probability to leave employment decreases monotonically with the duration of the fixed-term contract, and rises sharply shortly after the legal limit of three years.

Table 3.9: Maximum likelihood estimates of the transition from temporary to permanent employment: Manufacturing sector

	Coef.	(Std. err.)
female	-0.123	(0.043)
secondary education	0.035	(0.050)
university education	0.481	(0.087)
pot. exp. 5-15 yrs	0.178	(0.050)
pot. exp. 16+ yrs	0.186	(0.072)
married	0.174	(0.055)
number of kids	0.010	(0.021)
receiving educ./train.	0.102	(0.088)
PC not found	-0.341	(0.059)
on the job search	-0.378	(0.121)
year 1988	-0.197	(0.080)
year 1989	-0.449	(0.084)
year 1990	-0.655	(0.103)
year 1991	-0.673	(0.133)
year 1992	-0.864	(0.166)
year 1993	-0.930	(0.196)
year 1994	-0.860	(0.150)
year 1995	-0.785	(0.126)
year 1996	-0.861	(0.132)
unemployment rate	-0.357	(3.140)
mean log-likelihood	-0.388	
No. of cases	22,994	

Notes. Reference category: male, not married, with pot. exp.<5 yrs, less than secondary education., not receiving educ./train., reason for being in TC not because did not find PC, not searching for another job, entered survey in 1987. Standard errors in brackets. Source: EPA.

Table 3.10: Baseline hazard estimates: Manufacturing sector

quarters	Coef.	(Std. err.)
1	0.213	(0.073)
2	0.166	(0.057)
3	0.176	(0.060)
4	0.212	(0.072)
5	0.234	(0.080)
6	0.150	(0.054)
7	0.226	(0.078)
8	0.145	(0.052)
9	0.132	(0.049)
10	0.141	(0.052)
11	0.261	(0.091)
12	0.276	(0.098)
13	0.246	(0.089)
14 and over	0.148	(0.056)

Notes. The estimates report the steps of the baseline hazard for the reference worker, according to the regression of Table 3.9. Standard errors in brakets. Source: EPA.

Table 3.11: Maximum likelihood estimates of the transition from temporary to permanent employment: Males and Females

	I		II	
	Males		Females	
	Coef.	(Std. err.)	Coef.	(Std. err.)
secondary education	0.112	(0.030)	-0.122	(0.039)
university education	0.335	(0.047)	-0.008	(0.051)
pot. exp. 5-15 yrs	0.256	(0.031)	0.139	(0.037)
pot. exp. 16+ yrs	0.285	(0.042)	0.197	(0.048)
married	0.135	(0.031)	0.016	(0.036)
number of kids	0.022	(0.012)	-0.009	(0.015)
receiving educ./train.	0.086	(0.048)	-0.025	(0.047)
PC not found	-0.161	(0.035)	-0.234	(0.039)
on the job search	-0.349	(0.054)	-0.053	(0.050)
manufacturing	0.175	(0.051)	0.269	(0.105)
construction	-0.206	(0.046)	0.213	(0.149)
services	0.360	(0.122)	0.518	(0.199)
year 1988	-0.144	(0.047)	-0.214	(0.066)
year 1989	-0.419	(0.047)	-0.417	(0.070)
year 1990	-0.649	(0.052)	-0.609	(0.081)
year 1991	-0.644	(0.059)	-0.619	(0.096)
year 1992	-0.844	(0.077)	-0.712	(0.111)
year 1993	-0.897	(0.082)	-0.859	(0.120)
year 1994	-0.973	(0.080)	-0.890	(0.117)
year 1995	-0.944	(0.075)	-0.767	(0.109)
year 1996	-1.058	(0.080)	-0.889	(0.111)
unemployment rate	-0.388	(0.588)	-0.179	(0.900)
mean log-likelihood	-0.371		-0.354	
No. of cases	71,193		47,004	

Notes. Reference category: not married, with pot. exp.<5 yrs, less than secondary education., not receiving educ./train., reason for being in TC not because did not find PC, not searching for another job, employed in agriculture, entered survey in 1987. Standard errors in brackets. Source: EPA.

Table 3.12: Baseline hazard estimates:
Males and Females

	I		II	
	Males		Females	
quarters	Coef.	(Std. err.)	Coef.	(Std. err.)
1	0.141	(0.012)	0.162	(0.020)
2	0.119	(0.010)	0.130	(0.017)
3	0.115	(0.010)	0.134	(0.018)
4	0.138	(0.013)	0.178	(0.024)
5	0.129	(0.013)	0.172	(0.024)
6	0.105	(0.012)	0.149	(0.023)
7	0.164	(0.016)	0.178	(0.025)
8	0.120	(0.013)	0.159	(0.024)
9	0.104	(0.013)	0.118	(0.021)
10	0.077	(0.011)	0.087	(0.016)
11	0.178	(0.018)	0.230	(0.032)
12	0.168	(0.019)	0.143	(0.023)
13	0.115	(0.015)	0.122	(0.021)
14 and over	0.082	(0.011)	0.070	(0.014)

Notes. The estimates report the steps of the baseline hazard for the reference worker, according to regressions I and II of Table 3.11. Standard errors in brakets.
Source: EPA.

Table 3.13: Maximum likelihood estimates of the transition from temporary to permanent employment: High and Low education

	I		II	
	High education		Low education	
	Coef.	(Std. err.)	Coef.	(Std. err.)
female	-0.055	(0.024)	0.021	(0.035)
pot. exp. 5-15 yrs	0.181	(0.026)	0.167	(0.067)
pot. exp. 16+ yrs	0.255	(0.039)	0.195	(0.067)
married	0.128	(0.030)	0.066	(0.038)
number of kids	-0.001	(0.014)	0.006	(0.013)
receiving educ./train.	0.033	(0.035)	0.288	(0.117)
PC not found	-0.229	(0.033)	-0.140	(0.044)
on the job search	-0.153	(0.045)	-0.239	(0.064)
manufacturing	-0.009	(0.073)	0.226	(0.062)
construction	-0.347	(0.073)	-0.090	(0.053)
services	0.210	(0.144)	0.348	(0.148)
year 1988	-0.185	(0.052)	-0.143	(0.057)
year 1989	-0.386	(0.053)	-0.470	(0.058)
year 1990	-0.634	(0.059)	-0.661	(0.064)
year 1991	-0.601	(0.068)	-0.711	(0.076)
year 1992	-0.849	(0.079)	-0.519	(0.140)
year 1993	-0.941	(0.086)	-0.622	(0.143)
year 1994	-0.944	(0.082)	-0.766	(0.143)
year 1995	-0.872	(0.076)	-0.701	(0.141)
year 1996	-1.014	(0.079)	-0.768	(0.144)
unemployment rate	-0.361	(0.637)	-0.575	(0.728)
mean log-likelihood	-0.367		-0.360	
No. of cases	73,216		44,981	

Notes. High education: with secondary education or above. Reference category: male, not married, with pot. exp.<5 yrs, not receiving educ./train., reason for being in TC not because did not find PC, not searching for another job, employed in agriculture, entered survey in 1987. Standard errors in brackets. Source: EPA.

Table 3.14: Baseline hazard estimates:
High and Low education

	I		II	
	High education		Low education	
quarters	Coef.	(Std. err.)	Coef.	(Std. err.)
1	0.201	(0.018)	0.114	(0.017)
2	0.173	(0.015)	0.090	(0.014)
3	0.180	(0.017)	0.083	(0.013)
4	0.236	(0.022)	0.093	(0.015)
5	0.204	(0.021)	0.103	(0.017)
6	0.162	(0.019)	0.094	(0.017)
7	0.238	(0.023)	0.125	(0.020)
8	0.186	(0.021)	0.101	(0.018)
9	0.163	(0.021)	0.073	(0.014)
10	0.123	(0.017)	0.052	(0.011)
11	0.283	(0.029)	0.141	(0.023)
12	0.229	(0.027)	0.116	(0.021)
13	0.170	(0.022)	0.083	(0.016)
14 and over	0.127	(0.018)	0.046	(0.010)

Notes. High education: with secondary education or above. The estimates report the steps of the baseline hazard for the reference worker, according to regressions I and II of Table 3.13. Standard errors in brakets. Source: EPA.

Table 3.15: Maximum likelihood estimates of the transition from temporary employment to non-employment

	Coef.	(Std. err.)
female	0.323	(0.011)
secondary education	-0.166	(0.013)
university education	-0.462	(0.023)
pot. exp. 5-15 yrs	-0.159	(0.014)
pot. exp. 16+ yrs	-0.122	(0.018)
married	-0.098	(0.014)
number of kids	0.024	(0.005)
receiving educ./train.	-0.045	(0.017)
PC not found	-0.097	(0.015)
on the job search	0.360	(0.015)
manufacturing	-0.796	(0.021)
construction	-0.655	(0.018)
services	-0.601	(0.053)
year 1988	-0.045	(0.026)
year 1989	-0.242	(0.026)
year 1990	-0.332	(0.027)
year 1991	-0.068	(0.028)
year 1992	-0.095	(0.032)
year 1993	-0.087	(0.033)
year 1994	-0.171	(0.032)
year 1995	-0.136	(0.031)
year 1996	-0.186	(0.032)
unemployment rate	-0.792	(0.243)
mean log-likelihood	-0.748	
No. of cases	118,197	

Notes. Reference category: male, not married, with pot. exp.<5 yrs, less than secondary education., not receiving educ./train., reason for being in TC not because did not find PC, not searching for another job, employed in agriculture, entered survey in 1987. Standard errors in brackets. Source: EPA.

Table 3.16: Baseline hazard estimates for the transition from temporary employment to non-employment

quarters	Coef.	(Std. err.)
1	1.020	(0.036)
2	0.886	(0.032)
3	0.702	(0.026)
4	0.561	(0.023)
5	0.512	(0.024)
6	0.385	(0.024)
7	0.486	(0.023)
8	0.378	(0.023)
9	0.336	(0.025)
10	0.211	(0.019)
11	0.427	(0.024)
12	0.244	(0.021)
13	0.177	(0.018)
14 and over	0.812	(0.046)

Notes. The estimates report the steps of the baseline hazard for the reference worker, according to the regression of Table 3.15. Standard errors in brakets. Source: EPA.

3.5 Conclusion

In this chapter we have examined the determinants of the renewal of fixed-term contracts into permanent contracts in Spain. This analysis was motivated by the observation of a massive use of fixed-term contracts after their introduction at the end of 1984, specially in non-seasonal jobs. The analysis was led in the context of a duration model for temporary employment, with flexible duration dependence for the exit into permanent employment using longitudinal Spanish Labour Force Survey for the period 1987:2 and 1996:3.

The main focus of the chapter was to investigate other reasons why firms opt for temporary hirings than for covering jobs whose underlying nature is seasonal, as has been typically the case for Spain before the 1984 reform.

We find that the shape of the baseline hazard is suggestive of two possible uses of temporary contracts by employers. The fact that there are important spikes at durations around 1 year is supporting the idea that temporary contracts are used as an screening device instrument. That is, "successful workers" get renewed into permanent contracts much before the legal limit of their contracts. In other words, once a "good match" is found, it is retained with a permanent contract much before the legal limit of temporary contracts. This use of fixed-term contracts seems to apply more to women than to men and to the more skilled workers than to less skilled ones.

At the same time, there is a much pronounced spike at 3 years coinciding with the legal limit of temporary contracts. This supports the idea that some employers also use temporary contracts just because these provide a cheaper option.

It is also found that the probability of obtaining a contract conversion is quite disconnected to the state of the Spanish business cycle. Time fixed-effect imply in turn a roughly monotonically decreasing trend in the proportion of fixed-term contracts being renewed on a permanent basis over the whole sample period.

We have also investigated the effects of the 1994 reform, which limited the applicability of fixed-term contracts and enhance the transformation of this contracts into permanent ones. According to our results, this reform has been rather ineffective in reducing the incidence of temporary hirings. But, as far as the transformation of temporary contracts into permanent ones, we find that permanent renewal prospects of women and less educated workers have improved after 1994.

3.6 Appendix: Baseline hazard estimates for durations unaffected by the data-bunching problem.

Table 3.17: Baseline hazard estimates for the transition from temporary employment to permanent employment: Subsample with previous duration ≤ 3 quarters

quarters	Coef.	(Std. err.)
1	0.153	(0.011)
2	0.127	(0.009)
3	0.127	(0.010)
4	0.153	(0.012)
5	0.148	(0.012)
6	0.123	(0.012)
7	0.102	(0.012)
8	0.132	(0.023)

Notes. The estimates report the steps of the baseline hazard for the reference worker, as defined in Table 3.5. Standard errors in brakets. Mean log-likelihood: -0.338. Number of cases: 104,872. Source: EPA.

Chapter 4

The effects of fixed-term contracts on the duration distribution of unemployment: the Spanish case

4.1 Introduction

In 1984, Spain introduced fixed-term contracts as part of the *flexibility measures* implemented to fight high and persistent levels of unemployment that the economy was suffering since the late 1970's. For the last two decades, Spanish unemployment has been around 20% of the labour force, the highest of OECD countries. The fact that Spain is also considered among the most regulated labour markets in the OECD motivated this type of reform (see OECD, 1994b). But, 15 years after of the introduction of this measure, there is a wide consensus among economists and policy makers that this policy has been somehow a disappointing experience in terms of its effects on unemployment (see Jimeno and Toharia (1994)). Indeed, the unemployment rate today is still as high as in the 1980's (see figure 4.1 below).

However, an additional channel by which fixed-term contracts could potentially improve the functioning of the labour market is through their impact on the duration of unemployment. Along with the high rates of unemployment, another worrying feature of European labour markets that also

affects Spain is the high proportion of unemployed workers who have been unemployed for a long period of time (see OECD, 1993). In particular, the proportion of the unemployed workers who have been unemployed for more than 12 months (the long-term unemployed, LTU[1]) is more than 50% of the unemployed pool in Spain (see Figure 4.1). This share of LTU is among the highest in OECD countries (see Machin and Manning, 1998).

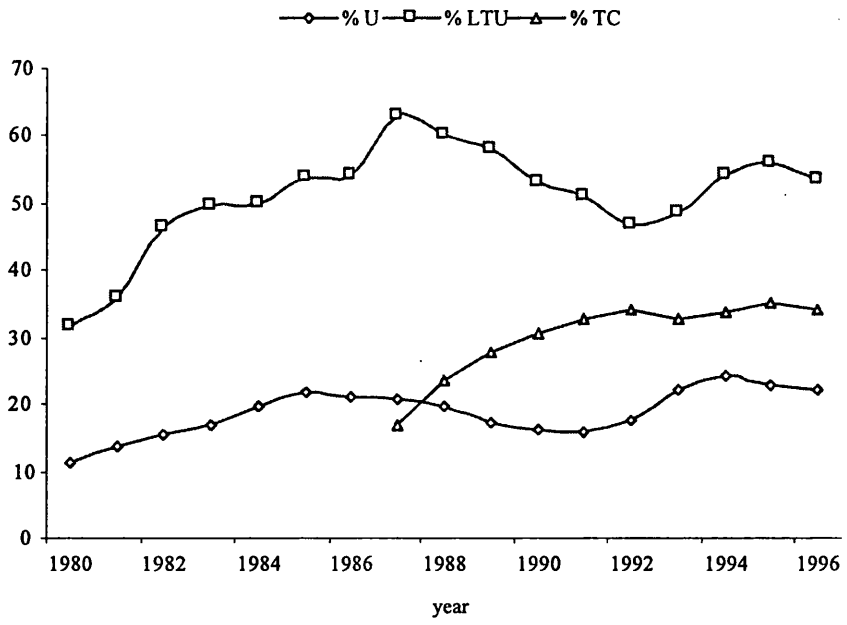

Figure 4.1: Unemployment rate, proportion of LTU and share of temporary contracts, 1980-1996. Source: EPA.

Typically, European labour markets have been characterised by a predominant use of permanent contracts with, what appear to be, high firing costs. Fixed-term contracts are a *more flexible* type of labour contracts since they have much lower requirements in terms of firing indemnities, wages and social security charges than permanent contracts[2]. Since the 1980's, the labour

[1]This is the measure that is commonly used (see Machin and Manning (1998)).

[2]For a comparison of fixed-term contracts regulation across European countries see Grubb and Wells (1993), OECD (1993 and 1994a).

market has become *more dynamic*, i.e. there has been an increase in inflows and outflows from unemployment to employment (see Toharia (1997)). This fact has been mainly driven by fixed-term contracts: after the 1984 reform, around 98% of all newly registered contracts were fixed-term contracts (see Bentolila and Saint-Paul (1992)). Bover *et al.* (1997) find that temporary contracts increase the employment chances of the unemployed in Spain. Finally, Garcia-Serrano (1998) studies the role of fixed-contracts in worker turnover in Spain and concludes that these contracts account for the largest portion of the hiring and separations rates.

As mentioned in Machin and Manning (1998), when the outflow rate increases at any duration of unemployment, the incidence of LTU tends to lower. This can be seen in figure 4.2. In this figure, we plot the proportion of LTU against the unemployment rate. We can see that there is a general positive relation between the unemployment rate and the incidence of LTU, as well as anti-clock wise loops over the cycle. Comparing years which are at the same point in the cycle, say 1983 to 1985 and 1992 to 1994, we can see that there has been a shift in the unemployment rate-LTU relationship. For a given unemployment rate, the incidence of LTU in the early 1990's is lower than in the mid-1980's.

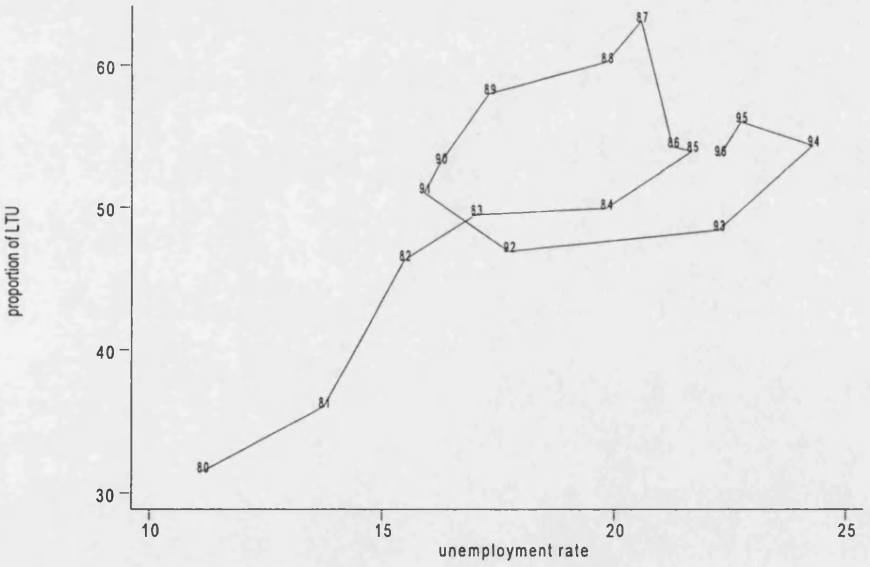

Figure 4.2: The incidence of LTU and the unemployment rate, 1980-1996. Source: EPA.

An important question remains open. That is, if the introduction of temporary contracts (TC)[3] has changed the duration distribution of unemployment and, if so, to try to understand how this has happened. This chapter intends to have a closer look at the duration distribution of unemployment *before and after* the introduction of fixed-term contracts in Spain. In particular, this chapter explores whether the increased chances of employment given by temporary contracts have been shared out equally among all the unemployed or not and the implications for the duration distribution of unemployment.

Previous studies that estimate the probability of leaving unemployment for Spain find that there is a very strong duration dependence (see Alba (1996c), Bover *et al.* (1997), and Machin and Manning (1998)). In other words, *ceteris paribus*, unemployed workers with shorter unemployment durations have higher probabilities of leaving unemployment than those with longer durations. This chapter aims to analyse the changes in duration dependence of the unemployed in the presence of temporary contracts. Given the strong duration dependence, the question that this chapter explores is important because if employment chances have not been equally distributed among all the unemployed, then the duration of those who remain stuck in unemployment will tend to be higher and higher.

The econometric method used in this chapter in order to explore this idea is a parametric hazard model using cross-sectional yearly data drawn from the Spanish Labour Force Survey from 1980 to 1996. We exploit this data following the duration model suggested by Nickell (1979).

The rest of the chapter is organised as follows. Section 4.2 describes the data used. Section 4.3 provides a duration model for the transition from unemployment to employment. Section 4.4 presents the empirical results and section 4.5 concludes.

4.2 The data

We use the Spanish Labour Force Survey (*Encuesta de la Población Activa, EPA*), which is carried out quarterly on a sample of some 60,000 households.

[3]The terms fixed-term contracts and temporary contracts (TC) are used interchangeably here.

It is designed to be representative of the total Spanish population, and contains very detailed information about the labour force status of individuals.

Our sample contains data of all the second quarters from 1980 to 1996. The time span of the sample is an important feature of the data because it will allow us to analyse the characteristics of the unemployed *before and after* the introduction of fixed-term contracts. All the unemployed people in the sample are asked for how long they have been looking for a job. This search time will be used as the individual uncompleted duration of unemployment. Results will be based on this variable. In steady state, the average uncompleted duration of unemployment is proportional to the average completed duration of unemployment[4].

There have been several methodological reforms in the EPA which have implied changes in the way some questions have been asked as well as the inclusion of more variables over time. In particular, the way the surveyed unemployed workers are asked about their duration in unemployment and the possible answers given as options by the EPA questionnaires have changed three times (see appendix (4.6.1), for details). This implies that the precision of the true duration in unemployment reported varies across time. Specifically, the way this question has been set allows more precise answers in the more recent data. In the earlier years, the possible answers were designed in the form of a band (for example, *1 to 3 months*). In order to be able to use the whole sample period in a comparable way, we will aggregate the more recent data into the same bands of the earlier data[5].

In order to carry out our analysis, we will split the sample into 3 different subperiods according to the importance of fixed-term contracts in the economy. Since fixed-term contracts were introduced at the end of 1984, there has been an increasing proportion of this type of contracts in total employment reaching its maximum of 35% in 1995 (see figure 4.1). Since then, this proportion has remained quite stable with a small decreasing trend[6]. Before the 1984 reform, temporary contracts were only allowed for seasonal jobs.

[4]See Layard *et al.* (1991), chapter 5.

[5]In particular, the duration variable will be summarised in the following bands: less than 1 month, 1 to 3 months, 3 to 6 months, 6 to 12 months, 12 to 24 months, 24 months or more.

[6]In 1994, there was a second reform which tried to limit the applicability of fixed-term contracts. But as it can be seen in figure 4.1, the impact of this second reform is negligeable.

One key feature of the reform was that it allowed the use of temporary contracts for jobs whose nature does not need to be seasonal. As was shown in chapter 3 (see figure 3.1), the higher share of TC in total employment should be mainly attributed to their widespread use in non-seasonal jobs.

The sample is divided in the following 3 subperiods. First, the pre-reform period, from 1980 to 1984, where there were no "new" fixed-term contracts in the economy[7]. Second, the period immediately after the reform, from 1985 to 1989, where there is already an important proportion of fixed-term contracts but still not very high[8]. And third, the period 1990-1996, where there is a high proportion of fixed-term contracts in the economy[9].

As mentioned, the EPA has undergone important changes over time. This also concerns the number of variables available. In particular, until 1987 there was no information on unemployment benefits or on the reason for previous job loss. These variables are particularly important for the analysis of the probability of leaving unemployment. In order to fully exploit all the relevant information contained in the data, our analysis will be carried out in two parts. First, we use all the years of the sample, from 1980 to 1996. The analysis is undertaken with those variables common to all sample years. This first part thus exploits information for a very long time period at the expense of some relevant variables only available in the most recent years. These additional variables will be exploited in the second part of the analysis for those fewer years for which it is available, from 1987 to 1996. Performing the empirical analysis in this way allows us to make use of all available relevant information in our data.

For this first part of the analysis, the division of the sample will be done as described above, that is, a period with no "new" temporary contracts will be compared to a period with few temporary contracts and to a period with a high proportion of temporary contracts in the economy. In the second part of the analysis, from 1987 to 1996, more explanatory variables are available throughout the period. We will use them all to compare a period with few temporary contracts (1987 to 1989) with a period with a high proportion of

[7]We refer as "new" temporary contracts to those introduced by the reform at the end of 1984. So, any temporary contract before that refers to a seasonal contract.

[8]It is only possible to calculate the share of TC after 1987 because before that year it was not included in the EPA. The average share of TC in total employment for the period 1987-1989 is 22.78%.

[9]The average share of TC in total employment over this period is 33.28%.

temporary contracts (1990 to 1996).

Our sample includes all individuals who are unemployed and declare how long they have been searching for a job. We will focus on men since there is no information available on children or their partner's labour market situation, which is particularly important in the attachment of women to the labour market. We will also exclude men aged 16 to 19 years old from our sample, given the instability of their attachment to the labour market, and men aged 64 or more because transitions to non-employment are very likely[10]. Since we want to focus on the effects of fixed-term contracts on the existing distribution of unemployment, we will also exclude first-job seekers and people who had never left education[11]. This leaves us with a sample of 84,885 unemployed workers.

Explanatory variables available for the whole sample period are personal characteristics of the individual such as age, education and being head of household. Year dummies (referring to the year interviewed) are also included in our regressions in order to capture any time pattern in the employment probabilities. Finally, the sectoral unemployment rate in which the worker had his previous job (computed at the time of job loss) is also included to capture business cycle effects[12]. For the second part of the analysis (1987 to 1996) two more variables are also available. A dummy variable that indicates if the worker receives unemployment benefits (UI)[13]. And a variable

[10]See Bover *et al.* (1997) for a very similar sample.

[11]Alba (1996b) estimates the determinants of the employment probabilities of first job seekers.

[12]See Bover *et al.* (1997) for a more detailed study of business cycle effects on unemployment duration.

[13]As in most European countries, there are two types of unemployment benefits in Spain. The unemployment insurance system (UI) provides benefits to those workers with tenure in their previous job of at least 6 months (12 months after 1992). Benefit duration is equal to half of the accumulated tenure, with a maximum of two years (one third after 1992). The replacement ratio is reduced with duration of unemployment: it is 80% of the (average) previous wage during the first 6 months, then it is 70% during the following 6 months and it is 60% during the last year (these ratios were reduced after 1992). The unemployment assistance system (UA) is designed to give supplementary income to workers with dependants and whose average family income is below 75% of the minimum wage. Workers who are not eligible to UI or who have exhausted them can receive UA benefits according to the family characteristics mentioned. They receive 75% of the minimum wage during the whole entitled length. Benefit duration depends on tenure and age (those older than 45 have longer benefits after 1989), with a maximum of

that indicates the reason for job loss. From this variable, we construct a dummy that indicates if the reason for separation from the previous job was the end of a temporary contract (end TC). This variable is very important for our purpose since it can potentially capture all the unemployed workers that enjoy the greater employment chances given by this type of contract. Separate estimation of the model will be done for these workers.

The table 4.1 reports average sample values of these variables for the first and second part of our analysis.

Table 4.1: Sample characteristics of unemployed workers

	1980-1996	1987-1996
age 20-30	39.93	41.32
age 30-44	31.95	32.71
age 45-64	28.12	25.97
head of household	52.63	49.32
primary ed. or below	65.28	55.74
second. or univ. ed.	34.72	44.26
UI	—	44.82
end TC	—	70.70
Average unemp. rate	17.04	17.47
Total No. of spells	84885	51303

Notes. All entries (except the average unemployment rate) indicate the percentage of workers with a given characteristic in the sample (Source: EPA).

4.3 Econometric specification

As mentioned, our sample only has cross-sectional data on uncompleted spells of unemployment. We will estimate the hazard rate of leaving unemployment following the method proposed by Nickell (1979).

Suppose that the probability of an unemployed individual i of leaving unemployment from time t to time $t+1$, conditional on having entered unemployment at time $t-s$ and on his being unemployed at t is given by:

2 years.

$$p(x_i(t_i, s), s)$$

where t_i is the date of the interview (that is, in our case, the second quarter of every year) and x_i are the relevant characteristics of the individual i. The particular specification form of p that we will estimate is a simple logit distribution which defines p in the following way[14]:

$$p(x_i(t_i, s), s) = (1 + \exp(-y_i))^{-1} \tag{4.1}$$

where

$$y_i = \beta_0 + \beta x_i + \alpha_1 s + \alpha_2 s^2$$

To write the likelihood, we need to derive the probability for an individual of being unemployed at time t. First, let $f_i(t, v)$ be the probability of individual i being unemployed at time t conditional on having entered unemployed at time $t - v$. We have:

$$f_i(t, v) = \prod_{\tau=1}^{v} (1 - p(x_i(t, \tau), \tau)) \text{ for } v \geq 1$$

By definition, $f_i(t, 0) \equiv 1$, that is, every unemployed of zero duration has survived in unemployment with certainty.

Suppose that the probability of an individual i of having entered unemployment at time τ is given by $u_i(\tau)$. Then the probability of being unemployed at time t, $U_i(t)$, is given by:

$$U_i(t) = \sum_{\tau=0}^{\infty} u_i(t - \tau) f_i(t, \tau)$$

We can now write the likelihood for an unemployed individual in our sample, that is, the probability of having entered unemployment at time $t - v$ conditional on being unemployed at time t:

[14] In the way we have specified p we have assumed that p does not depend on t. This is done essentially to prevent computational problems (see Nickell (1979)).

$$L_i = \frac{u_i(t_i - v)f_i(t_i, v)}{\sum_{v=0}^{\infty} u_i(t_i - v)f_i(t_i, v)}$$

As mentioned, the duration of unemployment is presented in our sample in the form of bands. Therefore given the date of the interview, t_i, the individual could have entered unemployment at any time between $t_i - a_i$ and $t_i - b_i$. Therefore given our data, the likelihood becomes:

$$L_i = \frac{\sum_{v=a_i}^{b_i} u_i(t_i - v)f_i(t_i, v)}{\sum_{v=0}^{\infty} u_i(t_i - v)f_i(t_i, v)}$$

For instance, for someone with unemployment duration between 1 to 3 months, the numerator of L_i has 3 terms.

Obtaining prior estimates of u_i, say $\widehat{u}_i$, then we can write down the likelihood for our unemployed sample, of individuals, $i = 1, ..., I$.

$$L = \prod_{i=1}^{I} \left(\frac{\sum_{v=a_i}^{b_i} \widehat{u}_i(t_i - v)f_i(t_i, v)}{\sum_{v=0}^{\infty} \widehat{u}_i(t_i - v)f_i(t_i, v)} \right) \tag{4.2}$$

The probability of individual i, with current characteristics x_{ci}, of having entered unemployment at time τ is defined by:

$$u_i(\tau) = k_i(x(x_{ci}, \tau), \tau) \frac{\text{aggregate flow into unemployment in month } \tau}{(\text{aggregate employment } + \text{first-job seekers}) \text{in month } (\tau - 1)}$$

where $k_i(x(.), \tau)$ is the proportion of the inflow into unemployment at time τ with characteristics x.

In practice, this probability is estimated by:

$$\widehat{u}_i(\tau) = \text{constant } \frac{\text{aggregate flow into unemployment in month } \tau}{(\text{aggregate employment } + \text{first-job seekers}) \text{ in month } (\tau - 1)}$$

Therefore, we are assuming that the composition of flow into unemployment is fixed over time. But there are two mechanisms by which $k_i(x(.), \tau)$ is

affected over time. First, assuming that $k_i(x(.), \tau)$ is constant means that we are assuming that any changes in relevant characteristics over time are small (the direct effect of time). This is more likely to be the case the shorter the period of time studied. So, to the extent that we do our analysis for different consecutive years, we can safely ignore this. Second, assuming that $k_i(x(.), \tau)$ is constant also means that there are small changes in the proportions of individuals with particular characteristics in the inflow into unemployment. This point is more difficult to test mainly because there is no data on inflows for the different relevant characteristics. On the other hand, the aggregate inflow rate is remarkably stable over time (see figure 4.5 in appendix (4.6.2)).

We are now in the position to estimate the likelihood function specified by (4.2). There is however one last thing to be specified in order to compute such likelihood. This has to do with the infinite sum in the denominator. We will assume that for long enough duration, the conditional probability specified in (4.1) does not depend on duration and that the estimated probability of having entered unemployment is a constant. In particular, we make these assumptions for durations greater than 36 months. The corresponding $\widehat{u}$ is the average inflow rate of the calendar year corresponding to 36 months of duration of unemployment for every individual (u_{36}). Finally, the likelihood to be maximised is as follows:

$$L = \prod_{i=1}^{I} \left(\frac{\sum_{v=a_i}^{b_i} \widehat{u}_i(t_i - v) f_i(t_i, v)}{\sum_{v=0}^{35} \widehat{u}_i(t_i - v) f_i(t_i, v) + \frac{u_{36}}{p_i(35)} f_i(t_i, 36)} \right)$$

4.4 Empirical results

We now estimate the hazard of leaving unemployment as modeled in the previous section. As mentioned, the empirical work is done in two parts: first, for all the years of our sample (from 1980 to 1996) using all the variables common in each of these years (section (4.4.1)). Second, for the years from 1987 to 1996 using the additional variables available from 1987 onwards (section (4.4.2)).

4.4.1 Empirical results for 1980-1996

Table 4.2 reports the estimates for the whole sample, 1980-1996. And table 4.3 reports estimates of separate regressions for the different groups of years according to the incidence of temporary employment in the economy: none (column II), low (column III) and high (column IV).

The effects of the individual characteristics on the probability of exiting unemployment are fairly standard and consistent with previous results obtained from logit estimates (see Alba, 1996c). As can be seen in the four columns, the re-employment probability decreases with age. And the effect is larger for the group of older workers. Being head of household substantially increases the probability of finding a job. This has to do with lower reservation wages of these individuals given their household responsibilities and for the same reason their attachment to the labour market is strong.

The estimated coefficients on education are in general small and insignificant. The only time they are clearly significant is for the period from 1980 to 1984 (column II). This result may be partially explained by the fact that very few high educated people are among the unemployed[15]. Alba (1996c) finds that the variable education increases the likelihood of reemployment only for workers with vocational education. Finally, year dummies follow closely the trend of the economic cycle (see figure 4.1) and sectoral unemployment has the expected negative effect on the probability of finding a job.

The more interesting results come from comparing the hazard of leaving unemployment at different durations and at different moments in time for a reference worker. In figure 4.3, we plot the hazard of leaving unemployment for three different years from each of the separate regressions. In particular, we compare the probability of leaving unemployment for a reference group in 1980, 1989 and in 1996. Figure 4.3 shows very clearly how the chances of leaving unemployment at different durations of unemployment has changed during the 1980's and 1990's. For very short durations (until 6 months), the chances are better and better over these years. And the reverse is true for the unemployment with durations greater than 6 months. In other words, the very short term unemployment have enjoyed greater employment chances at the expense of the long-term unemployed. The hazard function of 1980

[15]In particular, for the period 1980-1984 an average of 18% of the unemployed had high education.

looks flat when compared with the hazard of later years[16]. Then, there is a big shift in 1989 in the direction just described and in 1996 the tendency continues although at a much lower pace.

Thus, throughout the whole period studied there has been an important change in the hazard rates of leaving unemployment such that it has benefited the unemployed with shorter durations at the expense of the workers who have been unemployed for longer durations. A possible explanation for this fact is the introduction of fixed-term contracts. As mentioned, these contracts have implied an increase in the average outflow rate. At the same time, we observe that the outflow rate has increased for the unemployed with shorter durations while it has decreased for the unemployed with longer durations. To the extent that these contracts have implied that higher employment chances have not been shared equally among all the unemployed, then the long term unemployed, who have high duration dependence, have experienced lower chances to get a job. This explanation seems plausible for the Spanish case since in the time period studied the introduction of fixed-term contracts has been the main institutional change.

[16]This is consistent with the finding of Alba and Freeman (1990). Using data from the "Encuesta de Condiciones de Vida y Trabajo" they find that the hazard rate for displaced workers was relatively flat in 1981-85.

Table 4.2: Maximum likelihood estimates of the probability of leaving unemployment: full sample

	I	
	1980-1996	
	Coef.	(Std. err.)
constant	0.887	(0.082)
$s/10$	-1.314	(0.099)
$s^2/100$	0.396	(0.031)
age 30-44	-0.276	(0.020)
age 45-64	-0.633	(0.024)
head of household	0.335	(0.019)
second. or univ. ed.	-0.020	(0.017)
year 1981	-0.176	(0.042)
year 1982	-0.604	(0.048)
year 1983	-0.702	(0.047)
year 1984	-0.978	(0.047)
year 1985	-1.239	(0.053)
year 1986	-1.117	(0.050)
year 1987	-0.779	(0.046)
year 1988	-0.585	(0.041)
year 1989	-0.533	(0.042)
year 1990	-0.398	(0.041)
year 1991	-0.220	(0.040)
year 1992	-0.275	(0.040)
year 1993	-0.752	(0.043)
year 1994	-1.012	(0.047)
year 1995	-0.957	(0.045)
year 1996	-0.840	(0.043)
log unemployment	-0.865	(0.018)
mean log-likelihood	-1.716	
No. of cases	84885	

Notes. Reference category: age: 20-29, not head of household, less than secondary or university education, interviewed in 1980. Standard errors in brackets. Source: EPA.

Table 4.3: Maximum likelihood estimates of the probability of leaving unemployment: 1980-1984, 1985-1989 and 1990-1996

	II		III		IV	
	1980-1984		1985-1989		1990-1996	
	Coef.	(Std. err.)	Coef.	(Std. err.)	Coef.	(Std. err.)
constant	0.396	(0.160)	1.765	(0.177)	-0.015	(0.102)
$s/10$	-0.362	(0.209)	-1.337	(0.206)	-1.533	(0.140)
$s^2/100$	0.162	(0.064)	0.401	(0.065)	0.446	(0.045)
age 30-44	-0.156	(0.039)	-0.230	(0.040)	-0.362	(0.028)
age 45-64	-0.562	(0.045)	-0.460	(0.046)	-0.814	(0.037)
head of household	0.524	(0.038)	0.336	(0.037)	0.273	(0.026)
second. or univ. ed.	-0.121	(0.046)	0.002	(0.037)	-0.037	(0.024)
year 1981	-0.213	(0.043)		—		—
year 1982	-0.708	(0.049)		—		—
year 1983	-0.825	(0.049)		—		—
year 1984	-1.118	(0.050)		—		—
year 1985		—		—		—
year 1986		—	0.191	(0.051)		—
year 1987		—	0.476	(0.049)		—
year 1988		—	0.537	(0.047)		—
year 1989		—	0.478	(0.047)		—
year 1990		—		—		—
year 1991		—		—	0.144	(0.035)
year 1992		—		—	0.007	(0.037)
year 1993		—		—	-0.412	(0.038)
year 1994		—		—	-0.696	(0.043)
year 1995		—		—	-0.629	(0.041)
year 1996		—		—	-0.462	(0.038)
log unemployment	-0.995	(0.031)	-1.748	(0.052)	-0.523	(0.022)
mean log-likelihood	-1.685		-1.708		-1.728	
No. of cases	21329		24392		39164	

Notes. Reference category: age: 20-29, not head of household, less than secondary or university education, interviewed in 1980 (regression II), or in 1985 (regression III), or in 1990 (regression IV). Standard errors in brackets. Source: EPA.

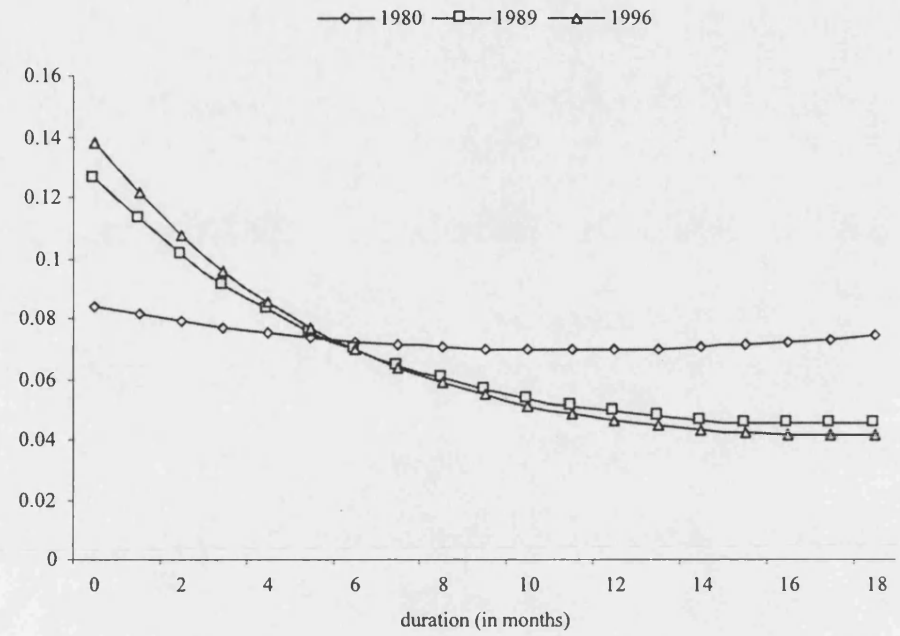

Figure 4.3: Hazard of leaving unemployment for the reference worker in 1980, 1989 and 1996. Source: EPA.

Notes. Reference category according to the regression II (year 1980), regression III (year 1989) and regression IV (year 1996) of Table 4.3.

4.4.2 Empirical results for 1987-1996

As mentioned earlier, the number of variables available in the Spanish Labour Force Survey has increased over time. Therefore, we estimate a second set of regressions where more variables are included for the period 1987-1996. We can still exploit the idea that for the first years of this subsample (1987-1989) the impact of fixed-term contracts was lower than in the later years (1990-1996).

Table 4.4 reports the results for the whole sample period and for the two subsamples. The effects of the variables also included in the previous section remain very similar. The coefficient of high education is again small and insignificant for the years 1990-1996 and significant and positive although small for the years 1987-1989. Two new variables were included: a dummy variable for the recipients of unemployment benefits and another dummy which takes the value 1 if the reason for separation from the last job of the unemployed worker was the end of a TC.

As can be seen, the effect of UI is positive for the first specification and the last, and it is negative for the years 1987-1989, although not significant. At a first glance, this result may be surprising if one has in mind the standard job search theory[17]. According to the job search theory (see Mortensen, 1970 and 1977), unemployment benefits (both their level and their length) have a *disincentive effect* in worker's search intensity which in turn affects the probability of receiving a job offer and therefore of leaving unemployment. This theory also predicts an *entitlement effect* which goes in the opposite direction. More generous benefits increase the expected future utility of an unemployed person since getting a job implies becoming eligible for such benefits. Normally, this effect is thought to be smaller than the first one because there is discounting of future events.

There are several possible reasons behind this result. First, this variable is only an indicator of whether the unemployed person is holding benefits. There is a wide consensus that the effects of unemployment benefit levels are far from robust, being in general not very significant and also of small size, and that other dimensions of unemployment compensation may be more

[17] Although Toharia (1997) reviews different studies on the disincentive effects of UI in Spain and concludes that, on the whole, the studies available are not conclusive.

important, such as duration of benefits[18]. Therefore, little can be expected from the variable included in our estimates since it is less informative than the level of unemployment benefits[19].

Alba (1996c) estimates a multilogit model and includes the same dummy variable we include here. He finds that the effect of unemployment benefits is significant but small. At the same time, he interacts the effects of unemployment benefits with duration of unemployment and finds that the effect is very strong in the first two months, but it declines from the third month of the unemployment spell. Bover *et al.* (1997) find that the effect of receiving unemployment is significant and quite sizeable, but that this effect is reduced over the spell of unemployment. In particular, the largest effect of UI occurs at duration of three months.

This is suggestive of a second important element that may be behind the positive coefficient found in our regression. As the works cited above indicate, the effect of UI decreases over time. This can be seen by simply calculating the correlation between UI and duration of unemployment for different durations (see appendix (4.6.3), first column of table 4.7). Indeed, this correlation is higher at shorter durations. We also calculated this correlation for long durations and found that not only it is not negligible but also it is negative. This may indeed explain our results, especially because the negative correlation of longer duration dominates for the whole sample (first row of table 4.7). Wadsworth (1990) and Schmitt and Wadsworth (1993) exploit the idea that on top of the effect of UI increasing the reservation wage (the *disincentive effect),* there is another effect that goes in the opposite direction. Benefits facilitate search by providing income with which finance job search efforts (the *job offers effect*). These works compare the search behaviour of benefit claimants and non-claimants. It is found that non-claimants search harder during the initial stages of unemployment when benefits may provide a temporary leisure subsidy to benefit claimants. As unemployment duration lenghtens, search activities fall for both groups but benefits recipients are able to maintain a higher level of search effort and

[18]See Atkinson and Micklewright (1991) for a review.

[19]On top of that, as pointed out by Alba (1996c), this dummy variable takes value zero both for people who are not registered in the public employment office and those who are registered but do not receive benefits. The problem of this data is that some unemployed people may have applied for unemployment benefits but do not have an answer at the moment of the interview.

therefore have a relatively higher probability of receiving a job offer. This *job offers effect* seems to be present in our data in a very strong way[20]. A possible reason why the cited works on Spain may differ in the effect of UI is the treatment given to the unemployment duration variable[21].

Finally, there is another effect that may be behind the positive coefficient found in our regression and that may explain differences over time (see appendix (4.6.3)), second and third columns of table 4.7). There was an important reform of the unemployment benefit system in 1992. The motivation for this reform was the increased inflows and outflows from unemployment though temporary contracts which generated an important deficit in the Spanish unemployment benefit system[22]. As mentioned in earlier chapters, the minimum duration of a temporary contract was raised from 6 months to 1 year and consequently increased the minimum job tenure required for eligibility of benefits. At the same time, the level of benefits and duration was also reduced. This implies that the negative effect of UI at shorter durations will be weaker after 1992 because there is a lower proportion of people at short durations (recently unemployed) who receive benefits. Also, this type of reform can clearly generate an *entitlement effect.* Indeed, Alba (1996c) finds that the negative incentive effect of benefits on re-employment probabilities is reduced starting in 1993 and becoming more important from 1994 onwards. Accordingly, we can understand part of the difference in the coefficients of UI for the years 1987-1989 and 1990-1996 (reported in column II in table 4.4).

The other new variable included in this second part of the analysis is a dummy that equals 1 if the reason for separation in the previous job was the end of a temporary contract. As can be seen in table 4.4, the estimated coefficient on this variable is positive and significant. This result is in line with the idea that temporary contracts have isolated some of the unemployed making them more employable while leaving the other unemployed worse than before. We investigate this issue further by estimating separate regressions for those whose previous employment ended because of the exhaustion of a temporary contract and for those whose previous job ended for other reasons

[20] Also, in our sample, the proportion of unemployed receiving UI is very constant across durations.

[21] Alba (1996c) excludes from his sample unemployed people of more than 36 months. Bover *et al.* (1997) treat durations of more than 14 months as censored at 14 months.

[22] See Toharia (1997) for a detailed description of the institutional features of the unemployment benefit system.

than the end of a fixed-term contract.

Figure 4.4 plots the hazard of leaving unemployment of the regressions discussed above and reported in table 4.4. In particular, we plot the hazard function for a reference group again in 1989 and in 1996. The results are very similar to the ones plotted in figure 4.3. In 1989, when there were fewer temporary contracts than in 1996, the probability of leaving unemployment at shorter durations was lower than in 1996. The reverse is true for longer durations. Therefore, this is also suggestive of the fact that the distribution of the duration of unemployment has become more unequal in the 1990's compared to the late 1980's.

The results in the first part of the analysis, with fewer variables but more years, are consistent with the results in the second part of the of the analysis, with more variables but fewer years. Therefore, the results of each part complement each other making our exercise meaningful.

Table 4.4: Maximum likelihood estimates of the probability of leaving unemployment: 1987-1996, 1987-1989 and 1990-1996

	I		II		III	
	1987-1996		1987-1989		1990-1996	
	Coef.	(Std. err.)	Coef.	(Std. err.)	Coef.	(Std. err.)
constant	-1.029	(0.100)	1.633	(0.256)	-1.037	(0.114)
$s/10$	-1.144	(0.127)	-0.514	(0.270)	-1.091	(0.150)
$s^2/100$	0.334	(0.040)	0.147	(0.085)	0.330	(0.047)
age 30-44	-0.256	(0.023)	-0.062	(0.048)	-0.320	(0.027)
age 45-64	-0.576	(0.030)	-0.280	(0.055)	-0.722	(0.037)
head of household	0.210	(0.022)	0.287	(0.044)	0.185	(0.026)
second. or univ. ed.	-0.010	(0.020)	0.090	(0.042)	-0.016	(0.024)
UI	0.228	(0.018)	-0.006	(0.034)	0.337	(0.022)
end TC	0.538	(0.026)	0.331	(0.042)	0.570	(0.033)
year 1988	0.168	(0.042)	0.015	(0.040)		—
year 1989	0.225	(0.042)	-0.061	(0.041)		—
year 1990	0.352	(0.041)		—		—
year 1991	0.497	(0.041)		—	0.119	(0.035)
year 1992	0.418	(0.042)		—	-0.003	(0.037)
year 1993	-0.035	(0.044)		—	-0.432	(0.038)
year 1994	-0.302	(0.048)		—	-0.720	(0.043)
year 1995	-0.205	(0.045)		—	-0.592	(0.040)
year 1996	-0.053	(0.043)		—	-0.421	(0.037)
log unemployment	-0.605	(0.020)	-1.822	(0.080)	-0.485	(0.022)
mean log-likelihood	-1.720		-1.705		-1.721	
No. of cases	51303		12139		39164	

Notes. Reference category: age: 20-29, not head of household, less than secondary or university education, not receiving unemployment benefits, reason unemployed: not end TC in previous job, interviewed in 1987 (regression I and II), or in 1990 (regression III). Standard errors in brackets. Source: EPA.

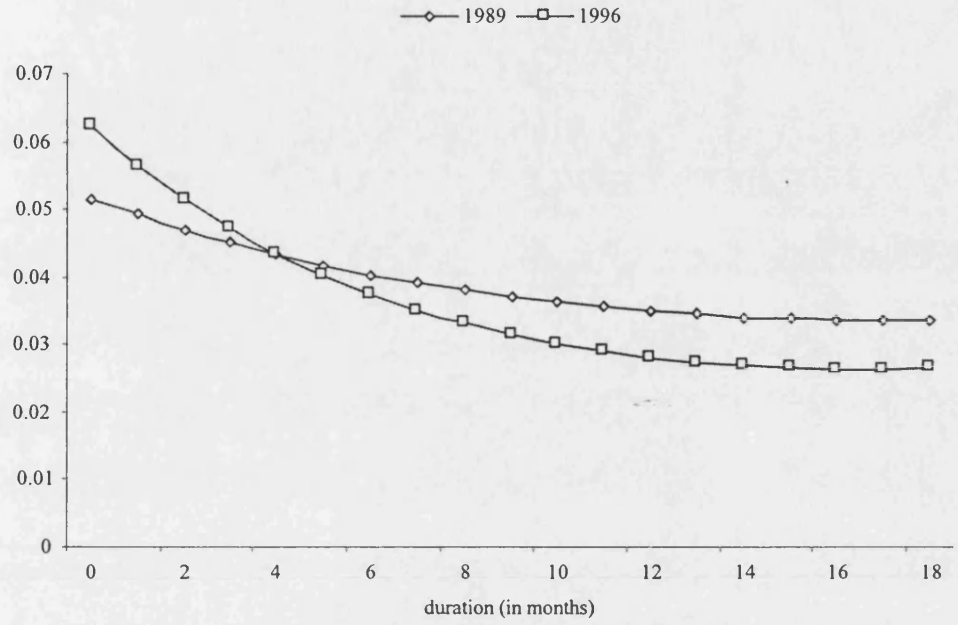

Figure 4.4: Hazard of leaving unemployment for the reference worker in 1989 and 1996. Souce: EPA.

Notes. Reference category according to the regression II (year 1989) and regression III (year 1996) of Table 4.4.

Finally, we estimate the model separately for those unemployed for which the reason of separation in their last job was the end of a TC and for those for which there was another reason (this includes voluntary quits, redundancy, retirement, illness, etc.). Table 4.5 reports the results of such regressions. As can be seen, education is again insignificant for those who ended a temporary contract while, for the first time, it appears clearly sizeable, positive and significant for those who became unemployed for other reasons than the end of a temporary contract. One possible explanation is that since people who became unemployed because of the end of a temporary contract have greater chances of leaving unemployment they are more attached to the labour market and therefore having a secondary education or university degree or not does not substantially affect the probability of finding a job. Instead, people that became unemployed for other reasons are less attached to the labour market and therefore having a secondary education or university degree can improve their chances of becoming employed.

Back to the effects of UI, the coefficient in both cases appears to be positive although very small and not very significant for those who became unemployed for reasons other than ending a temporary contract. In general, people in this last category are less eligible for UI than people that ended a temporary contract (because they quit or because they retire or because there is a conflict in the dismissal and the case is declared in favour of the firm)[23].

Figure 4.5 plots the hazard of leaving unemployment for those who entered unemployment as a result of the end of a temporary contract and for those who lost their job for other reasons. As it was already found in the previous regressions, people that come from a TC have greater chances of leaving unemployment at any duration than the others. Secondly, the hazard for those that became unemployed because of the end of a temporary contract is more flat than for the other groups of individuals. That is, although there is negative duration dependence, it is much smaller than for those individuals that lost their jobs for other reasons. These results are also suggestive of the idea that TC have increased the employment changes for a group of the unemployed which churns from employment to unemployment frequently. The remaining unemployed have lower chances and this chances get worse at longer durations.

[23]of a temporary contracts have UI, while only 24% did if unemployed for other reasons.

Table 4.5: Maximum likelihood estimates of the probability of leaving unemployment: end TC, no end TC

	I end TC		II no end TC	
	Coef.	(Std. err.)	Coef.	(Std. err.)
constant	-0.650	(0.105)	-1.145	(0.262)
$s/10$	-0.844	(0.139)	-2.452	(0.331)
$s^2/100$	0.229	(0.044)	0.768	(0.103)
age 30-44	-0.215	(0.025)	-0.554	(0.068)
age 45-64	-0.397	(0.031)	-1.614	(0.122)
head of household	0.175	(0.024)	0.355	(0.065)
second. or univ. ed.	-0.021	(0.022)	0.105	(0.056)
UI	0.260	(0.019)	-0.061	(0.056)
year 1988	0.092	(0.045)	0.0475	(0.117)
year 1989	0.148	(0.045)	0.637	(0.116)
year 1990	0.270	(0.044)	0.891	(0.116)
year 1991	0.415	(0.044)	0.963	(0.115)
year 1992	0.385	(0.044)	0.596	(0.124)
year 1993	-0.093	(0.046)	0.348	(0.124)
year 1994	-0.335	(0.050)	-0.175	(0.151)
year 1995	-0.193	(0.046)	-0.574	(0.197)
year 1996	-0.036	(0.044)	-0.339	(0.173)
log unemployment	-0.594	(0.021)	-0.339	(0.057)
mean log-likelihood	-1.732		-1.676	
No. of cases	36270		15033	

Notes. Reference category: age: 20-29, not head of household, less than secondary or university education, not receiving unemployment benefits, interviewed in 1987. Standard errors in brackets. Source: EPA.

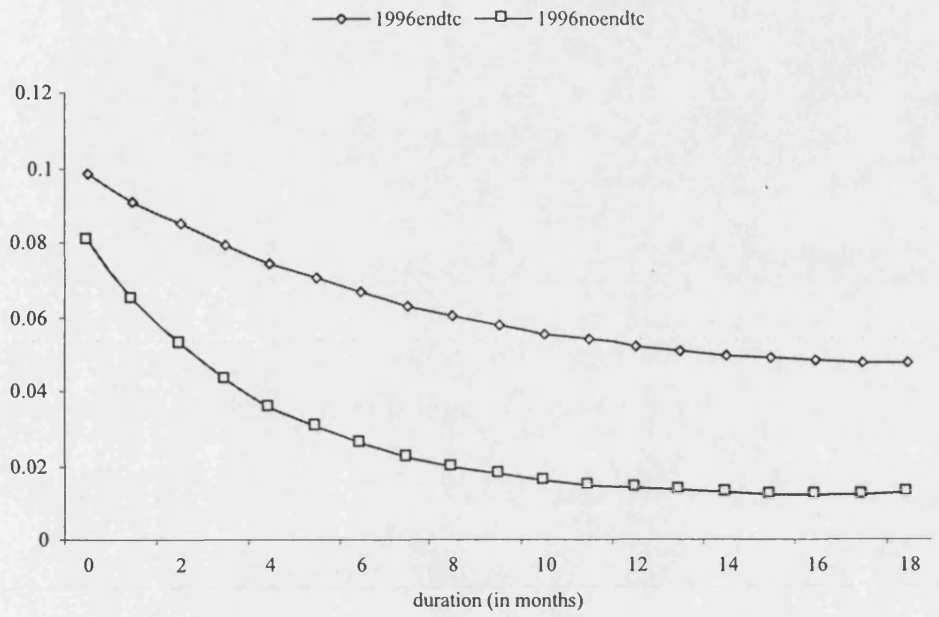

Figure 4.5: Hazard for individuals who became unemployed because end of TC and for other reasons in 1996. Source: EPA.

Notes. Reference category according to the regression I (end TC) and regression II (no end TC) of Table 4.5.

4.5 Conclusion

In this chapter we have analysed the effects of the introduction of fixed-term contracts on the duration distribution of unemployment in Spain with particular emphasis on the changes in duration dependence. The motivation was, on the one hand, to study if this type of policy had an impact through different dimensions of the labour market given the rather unsuccessful effect of this type of policy in reducing unemployment. And, on the other hand, since the introduction of fixed-term contracts has made the labour market *more dynamic*, to study the impact of the increase in inflows and outflows from unemployment to employment as captured in the duration of the unemployed.

The chapter has exploited cross-sectional data available for a very long period of time (from 1980 to 1996) that allows an analysis of the chances of leaving unemployment *before and after* the introduction of fixed-term contracts in Spain. In particular, the idea that the chapter has explored is that, even if the incidence of LTU may be lower due to the increased (average) outflow rate, if the greater chances given by temporary contracts are not equally distributed among all the unemployed workers, then the duration of those who remain stuck in unemployment will be higher and higher. We have found evidence of this idea. The probability of leaving unemployment for a reference category at different duration has changed substantially over time. For very short durations, until six months, the probability has become larger and larger in years where the incidence of temporary contracts in the economy has become more and more important. For longer durations, more than 6 months, the reverse is true. The probability of finding a job has become lower and lower in the years where the presence of temporary contracts in the economy has become more and more important.

We also find that the chances of finding a job at any duration are significantly higher for those unemployed workers who became unemployed due to the end of a temporary contract in the previous job than for those unemployed workers who became unemployed for other reasons. And there is a stronger duration dependence for this latter group. These results are again suggestive that temporary contracts have implied an important increase in the (average) outflow from unemployment but that only some of the unemployed have enjoyed these greater chances at the expense of the others. It seems plausible that these changes are driven by the introduction of fixed-

term contracts since this was the major institutional change in the time period studied.

It is often argued that a high proportion of LTU is a possible cause of high unemployment itself. Although this causality has to be analysed with caution (see Machin and Manning (1998)), in the case of Spain it is possible that the limited success of flexibility measures in reducing unemployment could be linked to the fact that fixed-term contracts have not helped to reduce the duration dependence in unemployment.

4.6 Appendix

4.6.1 The duration of unemployment in the EPA

The way in which the unemployed workers have been asked about their duration in unemployment and the possible answers given by the EPA questionnaires has changed over time. The table below summarises these changes:

Table 4.6: The duration of the unemployment in the EPA

until 1987 (I)	1987 (II) - 1991(I)	from 1992 (I)
How long have you been looking for a job?	*How long have you been looking for a job?*	*Which day did you start looking for a job?*
Less than 1 month *1 to 3 months* *3 to 6 months* *6 months to 1 year* *1 to 2 years* *2 years or more*	If less than 2 years, *number of months* If 2 years or more, *number of years*	*Month* *Year*

In the chapter, the variable duration follows the pattern of column (I) for all the years.

4.6.2 Unemployment inflow and unemployment stock

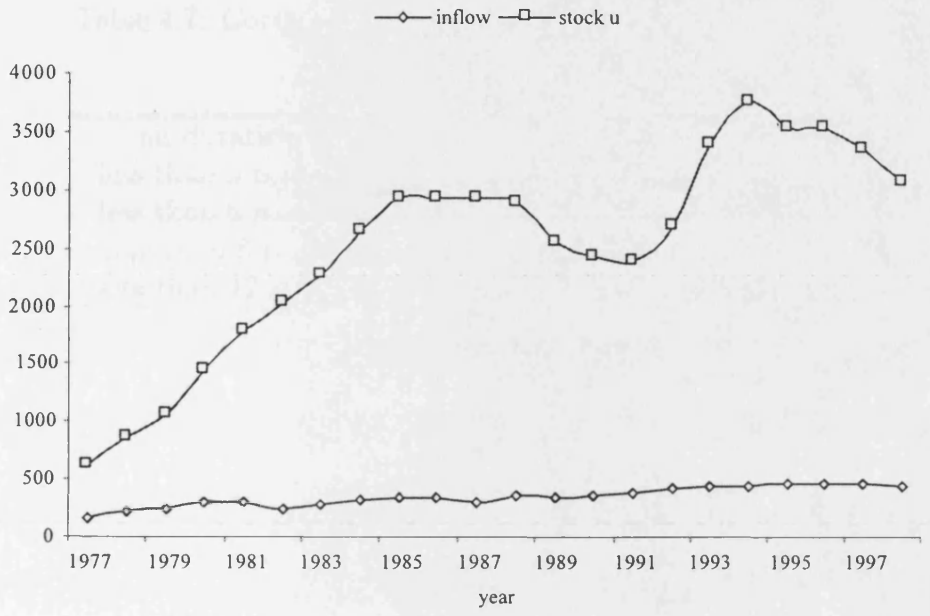

Figure 4.6: Flow into unemployment and stock of unemployment, in thousands. Source: INE, National Institute of Statistics.

Notes. The lowest duration of unemployment data available is 2 months. Both series belong to the second quarters of the relevant year.

4.6.3 Unemployment benefits and duration

Table 4.7: Correlation of UI and duration of unemployment

	1987-1996	1987- 1989	1990-1996
all durations	-0.09	-0.04	-0.11
less than 3 months	0.15	0.14	0.16
less than 6 months	0.07	0.06	0.07
more than 6 months	-0.14	-0.10	-0.16
more than 12 months	-0.16	-0.13	-0.17

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