

Essays on Labour Market Segmentation

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Declaration

I, Priscilla Vieira Fialho, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the work.

Abstract

This dissertation consists of three essays on labour market segmentation between open-ended and temporary employment contracts. Each essay has an empirical nature and exploits either qualitative or quantitative macro and micro data to answer questions related to the extent in which labour markets are segmented and how to address labour market duality in Europe.

The first essay reviews the evolution of Employment Protection Legislation over time, recent labour market reforms that affected labour market segmentation and the different proposals for future reforms in France, Italy, Portugal and Spain. It introduces the reader to the institutional and legal context for the remaining two essays.

The second essay describes several stylised facts about labour market segmentation in the same set of countries. I characterise workers, firms and tasks in atypical employment contracts. I also investigate their average duration, the frequency of transitions from atypical to open-ended contracts and the extent to which firms rotate over workers in atypical employment contracts. Overall, this essay argues that labour market segmentation is not merely a legal artefact, but that there exists a real divide between temporary and permanent workers in dual labour markets.

Finally, the third essay evaluates whether low-skilled workers have benefited from the introduction of fixed-term contracts and analyses the heterogeneous effects of potential labour market reforms aiming at tackling labour market segmentation, such as reducing the red-tape cost of dismissing workers in a permanent contract or taxing fixed-term contracts. One of the main findings is that decreasing the dismissal cost of permanent contracts by 10% would reduce the share of fixed-term contracts in new hires by half a percentage point, if the destruction rate of permanent contracts were to remain unchanged, and that this policy would mostly benefit workers in the upper part of the ability distribution.

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This thesis is dedicated to my father. He always encouraged me during the good and bad years of my postgraduate studies. He always understood and trusted my decisions. He is my best friend, my coach, my role model, my unconditional supporter and a true feminist, who always recommended me to do what I wanted and enjoyed the most in life. I am truly fortunate to be his daughter.

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Chapter 1

Introduction

This dissertation consists of three essays on labour market segmentation between open-ended and temporary employment contracts. Each essay has an empirical nature and exploits either qualitative or quantitative macro and micro data to answer questions related to the extent in which labour markets are segmented and how to address labour market duality in Europe.

In the second chapter, titled *Employment Protection Legislation and labour market dualism: France, Italy, Portugal and Spain, from 1975 to nowadays*, I review the evolution of Employment Protection Legislation (EPL) strictness over time for regular and temporary contracts, and the many reforms that have affected open-ended and atypical employment contracts since the late 1970s in France, Italy, Portugal and Spain. For this purpose, I use the OECD indicators of EPL strictness, the Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database and the EU-LABREF. This historical perspective on EPL attempts to clarify which measures progressively contributed for a segmented labour market. I then briefly review the recent labour market reforms and compare the current legislation affecting both permanent and fixed-term contracts in the four countries considered. At last, I describe the different proposals for future reforms that have been discussed amongst academics and policy makers alike.

I argue that successive measures have contributed for the segmentation of labour markets

in France, Italy, Portugal and Spain until the early 2000s. These measures consisted mostly in the introduction of new atypical forms of employment or the extension of motives to use fixed-term contracts. Such measures were especially directed towards young and inexperienced workers or those further at risk of unemployment, and were unaccompanied by substantial reforms to EPL for permanent contracts. While there were several attempts at reverting the upward trend in temporary employment before the 2008 financial crisis, this was not reflected significantly in the percentage of temporary contracts out of total dependent employment. Since 2008, significant changes were introduced in rules governing permanent contracts in Italy, Portugal and Spain. In Portugal and Spain, severance payments were considerably reduced and dismissal procedures were simplified. Nonetheless, special regimes for temporary and fixed-term contracts were approved to contend the growing youth unemployment rate after the crisis, therefore preserving the dual structure of the labour market. In Italy, major EPL reforms have been implemented since 2014, which should be carefully monitored. The Italian Jobs Act attempts to address one of the major concerns regarding EPL for permanent contracts: the large extent to which judges intervene and the high level of uncertainty associated with labour court processes. The evaluation of such reforms in the near future can be informative for policy makers in all countries.

In the third chapter, titled *Assessing labour market segmentation: evidence from France, Italy, Portugal and Spain* and written jointly with Olivier Charlot, Franck Malherbet, Pedro Martins and Cristina Tealdi, I conduct a number of empirical analyses to shed light on the extent in which labour markets in France, Italy, Portugal and Spain can be considered segmented between two groups of workers: a first group in permanent employment contracts, enjoying a relatively high degree of employment law protection against dismissal, and a second group of workers in non-standard work forms, characterised by much greater flexibility and shorter durations.

In fact, defining a labour market as segmented should not follow only from institutional differences across the different types of employment relationships. Another important aspect

is the mobility or permeability between contract types. In the context of a dual labour market, individuals that find themselves in one contract form tend to remain there for a long time with little scope for movements between contract types. Furthermore, a labour market can be considered segmented if the prevalence of non-standard work forms is much higher amongst particular groups of workers. Finally, on top of differences in terms of workers' pre-determined characteristics, such as age, schooling or previous unemployment spells, there could also exist important differences in terms of characteristics observed after the two types of employment relationships have begun. For instance, individuals that are employed in non-standard work benefiting from lower salaries and fewer training and promotion opportunities than similar colleagues employed under permanent contracts.

Together with my co-authors for this chapter, we find that temporary contracts shorter than a month account for the majority of entries into employment, at least in France and Spain. Moreover, the share of temporary contracts shorter than a month has increased substantially over time in France. Being employed in a temporary contract does not seem to be the result of workers preferences for more flexible jobs. Short-term contracts affect mostly young workers who recently left education, female, foreign born individuals, worker with lower tenure at the job, workers with primary education and workers with low-skilled occupations. It takes about 90 months (almost 8 years) after leaving education for the share of temporary contracts in total employment to reach its average level in the whole population. Transitions rates from fixed-term to permanent contracts with the same employer are relatively low: approximately 5% every quarter in France and 10% in Portugal. Workers employed in a fixed-term contract are more likely to exit towards non-employment than towards a permanent contract at the same firm. In particular, we observe a pick of exits from fixed-term contracts to non-employment around 24 months in both France and Portugal. There is also some evidence suggesting that workers employed in temporary employment contracts do not have to perform complex tasks or learn new things at a fast pace. They receive significantly less training paid by their employer than workers in a permanent contract

and believe that their jobs do not offer good prospects for career advancement. Finally, we also find that firms that do not change their total number of employees over time tend to exhibit a stable share of fixed-term contracts within the firm, suggesting that they rotate different employees over time with fixed-term contracts.

Overall, these findings indicate that labour markets in France, Italy, Portugal and Spain are effectively segmented between temporary and permanent workers, affecting one particular group of vulnerable workers, and with potentially negative consequences for training and productivity. Nevertheless, when controlling for worker and firm characteristics, the wage gap between permanent and fixed-term workers is about 3.5% in France and 1% in Portugal. When taking worker unobserved heterogeneity into account, the gap decreases to 1% in France and becomes statistically insignificant in Portugal. Therefore, the widely acknowledged fixed-term contract earnings penalty could be the result of pre-existing and unobserved worker characteristics. As most evidence described in this chapter is of a non-experimental nature, it is unclear how much of the differences in training and future job prospects, for example, are attributable to contract types and not other differences across the two groups of workers. Consequently, when evaluating the potential effects of employment protection legislation reforms, it seems important to acknowledge that individuals may be ex-ante heterogeneous and sorted across contract types depending on their personal characteristics.

In this context, the fourth chapter, *Who gains from labour market flexibility at the margin?*, has two main objectives. First, it aims at understanding whether low-skilled workers have benefited from the flexibility at the margin permitted by the introduction of fixed-term contracts. Second, it provides insights into the heterogeneous effects of an employment protection legislation reform. In particular, it analyses how workers and firms sort themselves across the different types of contracts, how lowering the dismissal cost of permanent contracts affects that sorting pattern, and which individuals would particularly benefit from such policy.

For that purpose, I develop a partial equilibrium model of the labour market, with fric-

tions, in which two-sided heterogeneous agents optimally decide the employment contract type. Worker and firm can decide to engage into a fixed-term contract - with a lower dismissal cost but lower duration - or a permanent contract - with a higher dismissal cost but higher expected duration. The agents can also decide to convert the fixed-term contract into a permanent contract at its expiry date. Another particularity of the model presented in this chapter is that the decision of whether to invest in job-specific human capital is also modelled. If worker and firm agree to invest in the accumulation of job-specific skills, the match has higher total factor productivity. Such investment has a fixed cost, which is irreversible and non-transferrable to other jobs. The purpose of modelling investment in job-specific skills is to replicate the stylised fact that workers in fixed-term contracts are less likely to receive training sponsored by their employers (Fialho *et al.*, 2017). Ultimately, depending on the share of fixed-term contracts over total employment, this will be reflected in the total output produced. Accommodating the decision of whether to invest in job-specific skills into the model, therefore brings interesting implications for productivity. Finally, wages are determined by sequential auction, as in Cahuc, Postel-Vinay and Robin (2006), which performs remarkably well in replicating the empirical earnings distribution. Adapting the sequential auction wage determination mechanism to a context of multiple employment contracts brings additional advantages. For example, Fialho *et al.* (2017), using administrative data for France and Portugal, report that a significant fraction of movements from fixed-term to permanent contracts are associated with a fall in the hourly wage rate. With wages determined by sequential auction, the model developed in this paper provides a rationale for that empirical finding. In fact, when a worker is converted to a permanent contract, or moves to a new firm from a fixed-term to a permanent contract, the model predicts that the worker suffers a wage cut if the move entitles a higher continuation value, *i.e.* better opportunities for moving along the wage ladder in the future.

Using French matched employer-employee data from 2005 to 2008, the model is estimated using Simulated Method of Moments (SMM). By structurally estimating the parameters of

the model, this paper is amongst the first ones to quantify the red-tape cost of dismissing workers in permanent contracts - the cost associated with administrative procedures, legal expenses, additional financial penalties and the uncertainty about the outcome of a process in the labour court. The model with its parameters set at their point estimates is then used in counterfactual policy analysis.

The main findings are the following. First, in the model presented in this paper, fixed-term contracts appear not to function as stepping-stones. In fact, the estimated contact rate for workers employed in fixed-term contracts is very similar to the estimated contact rate for unemployed workers. Both are significantly lower than the contact rate estimated for workers in permanent contracts. Therefore, it seems that reaching employment through a fixed-term contract does not necessarily open doors to employment at other firms. Nevertheless, this result should be interpreted with caution. In fact, the model abstracts from general human capital accumulation while employed. Second, according to the estimation, the red-tape component of the dismissal cost represents approximately 1% of the match output if the match would last one year. If the match only last a quarter, the red-tape firing cost represents about 4% of the match output. Decreasing this component of the dismissal cost in 10% would reduce the share of fixed-term contracts in new hires by half a percentage point, if the destruction rate of permanent contracts would remain unchanged. In other words, this result is conditional on the lower firing cost not resulting into more frequent dismissals from permanent contracts. The workers that would mostly benefit from the lower red-tape cost of firing are those in the upper part of the ability distribution, namely between the 60th and 80th percentiles. These workers become more likely to be directly hired under a permanent contract, which increases their lifetime utility. Nonetheless, taxing fixed-term contracts seems much more effective in reducing the share of fixed-term contracts in the economy than reducing the red-tape component of the dismissal cost. Finally, much larger gains in total output can be achieved by reducing the cost of training workers on-the-job rather than by reducing the firing cost and the share of fixed-term contracts in new hires.

In fact, the training cost is estimated to represent approximately 6% of the match output if the match lasts one year and 25% of the match output if it only lasts one quarter. Even a small decrease in the training cost would generate a significant increase in total output.

Chapter 2

Employment Protection Legislation and labour market dualism: France, Italy, Portugal and Spain, from 1975 to nowadays

2.1 Introduction

France, Italy, Portugal and Spain are traditionally known for having a very strict legislation protecting employed workers. The strictness of the Employment Protection Legislation (thereafter, EPL) can be reflected in many institutional aspects. First of all, the value of severance payments. But the procedures that must be followed when dismissing a worker, individually or collectively, also constitute a significant cost. Such procedures may include advance notifications, mandatory consultations with workers' unions or workers' representatives, delays before the notice can start, mandatory plans to facilitate the re-integration of the dismissed workers into the labour force, restricted circumstances in which it is possible to lay-off workers, the cost and length of time that a process in the labour court could take, po-

tential penalties if the dismissal is ruled to be unfair (fines or even the obligation to reinstate the worker), interim wages while the labour court process is on-going, amongst other rules. There is some anecdotal evidence suggesting that procedural costs and the uncertainty associated with labour court rulings represent an additional burden from an employers' perspective¹. In fact, in 2001, according to the OECD (2004), 75% of the cases brought to the labour court in France were won by workers and 55% in Italy (where 25.3% of all layoffs were brought to court in France and 1.6% in Italy). This can substantially increase procedural costs, especially taking into account that according to the same source, the average duration of all types of disputes in court was about 1 year in France and 2 years in Italy². In 2015, in France, labour court judges decided favourably for workers in 70% of the cases reviewed. It took, on average, about 16.5 months for a case to be resolved (*Références Statistiques Justice*, 2015). Such strict EPL affecting open-ended or traditional employment relationships contrasts with lax rules governing the use of atypical employment contracts: apprenticeship and training contracts, temporary work agency contracts, fixed-term contracts, etc. Such temporary forms of employment are known for granting lower severance payments to workers, being easier to terminate and rarely leading to a process in labour courts. Consequently, in the countries considered, there are two classes of employment contracts coexisting in the labour market: one employment contract guaranteeing a very high degree of employment protection, and a second class of atypical contracts with a very low degree of protection. The existence of a dual regime in the labour market is generally referred to as labour market dualism or labour market segmentation³.

¹For example, in the Netherlands, an employer could dismiss a worker either by requesting prior permission to the Centre for Work and Income (CWI) or by requesting a Civil Court to dissolve the contract. The difference was that if the Civil Court accepted to dissolve the contract, the worker could not appeal against such decision, but would receive a high severance pay. On the other hand, if the dismissal was authorised by the CWI, the dismissed employee could still take the firm to court for unfair dismissal and demand reinstatement, although no severance pay would be required in such cases. The statistics show that firms opted mostly for dismissal procedures via Civil Court (OECD, 2004).

²No information available for Portugal and Spain.

³The same expression is sometimes used to refer to segmentation between workers in the formal or informal sector, or even to the segmentation between low-skilled workers in low-paying jobs and high-skill workers in highly-paid jobs.

The literature on Employment Protection Legislation and segmented labour market is extensive. There are many studies, for example, trying to understand whether Employment Protection Legislation has a positive impact on workers' welfare and employment rates. Amongst them, one could cite Zylberberg and Cahuc (1999), Bertola (2004), Postel-Vinay and Turon (2014) and Lalé (2016), with mixed results. Another strand of the literature has focused on the consequences of temporary contracts and labour market dualism on job creation, job destruction and unemployment, such as Boeri (1999), Blanchard and Landier (2001), Cahuc and Postel-Vinay (2002) or Kahn (2010). In general, there seems to be a consensus that temporary contracts have increased the turnover rate in the labour market, without necessarily decreasing unemployment, nor increasing workers' welfare. But how did we arrive to the current situation and when did it all started? Which policies contributed for a segmented labour market? Are there similarities across countries? And if there are concerns about the ineffectiveness of temporary contracts to reduce unemployment, or the potential negative impact on workers who are precluded from job security, how did recent reforms addressed the issue in different countries?

In this paper, I review the evolution of EPL strictness over time for regular and temporary contracts, and the many reforms that have affected open-ended and atypical employment contracts since the late 1970s in France, Italy, Portugal and Spain. For this purpose, I use the OECD indicators of EPL strictness, the Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database and the EU-LABREF. This historical perspective on EPL attempts to clarify which measures progressively contributed for a segmented labour market. I then briefly review the recent labour market reforms and compare the current legislation affecting both permanent and fixed-term contracts in the four countries considered. Finally, I describe the different proposals for future reforms that have been discussed amongst academics and policy makers alike. I argue that successive measures have contributed for the segmentation of labour markets in France, Italy, Portugal and Spain, until the early 2000s. These measures consisted mostly in the introduction of new atypical forms of employment or the extension of

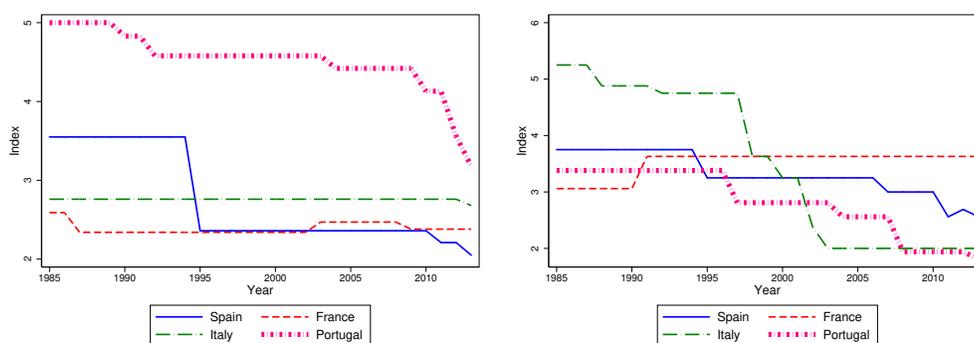
motives to use fixed-term contracts. Such measures were especially directed towards young and inexperienced workers or those further at risk of unemployment, and were unaccompanied by substantial reforms to EPL for permanent contracts. While there were several attempts at reverting the upward trend in temporary employment before the 2008 financial crisis, this was not reflected significantly in the percentage of temporary contracts out of total dependent employment. Since 2008, significant changes were introduced in rules governing permanent contracts in Italy, Portugal and Spain. In Portugal and Spain, severance payments were considerably reduced and dismissal procedures were simplified. Nonetheless, special regimes for temporary and fixed-term contracts were approved to contend the growing youth unemployment rate after the crisis, therefore preserving the dual structure of the labour market. In Italy, major EPL reforms have been implemented since 2014, which should be carefully monitored. The Italian Jobs Act attempts to address one of the major concerns regarding EPL for permanent contracts: the large extent to which judges intervene and the high level of uncertainty associated with labour court processes. The evaluation of such reforms in the near future can be informative for policy makers in all countries.

2.2 Historical perspective of Employment Protection Legislation

For a first overview of EPL in the four countries considered, I use the OECD indicators of Employment Protection Legislation from 1985 to 2013. I use two indicators: (i) an indicator that measures the severance and procedural costs associated to individual dismissals in open-ended contracts, also called regular contracts (serie *epr_v1*); and (ii) an indicator that measures the strictness of regulation on the use of fixed-term contracts and temporary work agency contracts (serie *ept_v1*). The first indicator aggregates information about notification procedures, the delay involved before the notice can start, the length of the notice period at different tenure levels, the amount of severance payments at different tenure levels, the

definition of fair and unfair dismissal, the length of the trial period, the compensation and the possibility of reinstatement following an unfair dismissal. On the other hand, the second indicator summarises information on the number of valid cases to use fixed-term contracts, the maximum number and cumulative duration of successive fixed-term contracts with the same firm, the types of works for which temporary work agency contracts (thereafter, TWA) are legal, the maximum number of renewals and cumulated duration of TWA assignments⁴. Both indicators are plotted in Figure 2.1.

Figure 2.1: Strictness of Employment Protection Legislation Indicators



(a) Individual dismissals in regular contracts (b) Regulations on the use of fixed-term and TWA contracts

Source: OECD - <http://www.oecd.org/els/emp/oecdindicatorsofemploymentprotection.htm>. I used the series *epr_v1* for the strictness of the legislation governing dismissals in permanent contracts and *ept_v1* for the regulation on the use of temporary contracts.

According to the indicators depicted in Figure 2.1 (a), EPL strictness for open-ended contracts has barely changed in France and Italy over the last 25 years up to 2013, whereas it has decreased (i.e. it became easier to dismiss workers individually in permanent contracts) in Portugal and Spain. While the reforms in Spain seem to have mainly taken place around 1995, in Portugal they occurred mostly since the financial crisis of 2008. According to the OECD index and over the period considered, the legislation on the use of fixed-term and TWA contracts has become less restrictive everywhere, except for France. The decrease in restrictions for the use of such atypical contracts was particularly significant in Italy until

⁴See Venn (2009) for further information about the computation of the indexes. Also, since 1998, new items have been considered to construct these indexes, generating new series.

around 2003. In Portugal and Spain, the index kept on decreasing even in the most recent years. Although they summarise most relevant aspects of the EPL in permanent contracts and atypical ones, these indexes may not reflect other facets that are harder to measure quantitatively. For instance, according to Bentolila et al. (2012), it does not take into account the enforcement of rules regarding the use of temporary contracts, therefore ranking Spain with a higher index for atypical contracts than it should.

To obtain a better idea on the pace and extent of the many labour market reforms implemented in France, Italy, Portugal and Spain, affecting both permanent and atypical employment contracts, I complement the information from Figure 2.1 with two additional qualitative sources. First, I use the Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database to obtain an overview of all core labour market reforms implemented from 1975 to 2007. Second, I use the LABour market REForms database (LABREF) managed by the Directorate-General of Employment, Social Affairs and Inclusion (DG EMPL) of the European Commission from 2000 to 2013 to obtain a summary of measures in the more recent years. Table 2.1 summarises the additional information obtained from these sources. The Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database offers a classification of each reform or measure according to different criteria. The first column simply states the total number of reforms and measures taken each period (one reform may implement one or more measures). The second and third columns distinguish between measures that affected atypical and permanent employment contracts. In each case, the sign (positive or negative) indicates whether the measure contributed to increase or decrease labour market flexibility. For example, a measure that facilitates the use of atypical employment contracts (and would therefore decrease the OECD EPL strictness indicator from Figure 2.1 panel (b)) contributes to increase labour market flexibility. It will therefore be attributed a positive sign. Finally, the last column counts the number of measures that were directed at particular segments of the active population only, and hence considered “two-tier”.

Overall, looking at the sign of the measures and if they increased or decreased flexibility,

Table 2.1: Reforms affecting labour market dualism - 1975 to 2013

		# Reforms / # Measures	Affecting atyp.		Affecting perm.		Two-tier measures
			- flexi.	+ flexi.	- flexi.	+ flexi.	
France	1982-1990	8/16	2	3	9	2	8
	1991-2000	2/2	0	0	2	0	0
	2001-2007	8/20	3	9	3	5	12
	2008-2013	4/11	1	1	5	4	0
Italy	1982-1990	3/5	0	2	3	0	4
	1991-2000	6/15	1	9	1	4	10
	2001-2007	3/5	3	2	0	0	5
	2008-2013	10/39	14	15	2	8	12
Portugal	1975-1990	4/6	1	1	1	3	2
	1991-2000	8/11	2	2	3	4	5
	2001-2007	3/5	2	2	0	1	4
	2008-2013	9/16	2	4	1	9	3
Spain	1980-1990	4/7	1	3	0	3	6
	1991-2000	7/14	5	4	0	5	11
	2001-2007	5/11	4	1	3	3	8
	2008-2013	11/29	6	4	2	17	4

Notes from 1975 to 2007: A reform is a collection of policy measures referring to a unique formally approved document. Each reform may therefore contain more or less measures. I only considered reforms affecting EPL and excluded reforms regarding non-employment benefits. I considered measures affecting the use of all atypical contracts (atyp.): apprenticeship, fixed-term contracts, new types of contracts, ATW and training contracts. I also looked at changes in individual procedures, notice periods or severance payments for dismissals in atypical contracts. For the permanent contracts (perm.), I considered measures affecting procedures in collective and individual dismissals, notice periods and severance payments. A positive (negative) sign indicates whether the measure aimed at increasing (decreasing) the labour market flexibility. Two-tier reforms are those directed towards only a fraction of the concerned population (e.g. long-term unemployed among all unemployed, temporary workers among all employed workers, etc.). See Boeri (2011) for further details in the definitions and classifications. Source: Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database - http://www.frdb.org/language/eng/topic/data-sources/doc_pk/9027.

Notes from 2008 to 2013: I used a similar definition for reform and to classify each measure as having a positive or negative impact on labour market flexibility. However, here a measure is considered two-tier if it affects only new entrants or only incumbents. I focused only on the measures concerning Job Protection. Source: EU LABREF - <http://ec.europa.eu/social/main.jsp?catId=1143&intPageId=3193&>.

this database is quite consistent with the above OECD indexes, except for the temporary contracts in France⁵. From Table 2.1, we see that France also experienced an overall increase

⁵The OECD indicator for regular contracts reveals a decrease in strictness of EPL around 1990. Table 2.1, on the other hand, shows that there were many more measures decreasing labour market flexibility.

in flexibility to use atypical employment contracts, from 1982 to 2007. In particular, the reforms in 1983 and 1986 (at the start of the period considered by the OECD EPL indicators, and therefore not reflected) introduced new forms of atypical employment and made fixed-term contracts available for all circumstances. Further reforms liberalising the use of atypical employment contracts occurred in 2004, 2005, and 2006. In fact, France was the country that introduced the highest number of new employment contracts, which consisted mainly of fixed-term contracts targeted at specific segments of the population, such as youth, long-term unemployed, senior workers or individuals with low social and professional integration. Their focus on specific groups or two-tier nature may explain why such reforms are not reflected in a lower indicator in Figure 2.1, panel (b). Notwithstanding, these reforms had a significant impact in increasing dualism, in particular, since they were implemented together with measures decreasing the flexibility of dismissal in permanent contracts, at least up to 2003. Three reforms partially reverted the increased flexibility in atypical employment contracts: in 1990, 2002 and 2005. The first one, which seems to significantly impact the OECD EPL index, re-introduced limits in the circumstances under which fixed-term contracts could be used. The last two, however, affected the cooling off period, severance payments at the expiry of fixed-term contracts, and their maximum duration allowed, in an attempt to prevent the endless succession of fixed-term contracts at the same firm. However, the cooling-off period between successive fixed-term contracts at the same firm is particularly hard to enforce, especially if the same worker can be hired again without restrictions for different positions. Therefore, their impact might have been quite limited and is not reflected in the OECD indicator.

Besides France, it is evident that up to 2008, most reforms undertaken since the introduction of atypical employment contracts, contributed to increase the gap between the

However, most of these measures affected collective dismissals, which are not included in the series plotted in Figure 2.1. The abolishment of the need to obtain an authorisation for individual economic dismissal in 1986 is clearly reflected in the series. Finally, the increases in severance payments in 2001 and 2002 explain the rise in the OECD indicator from Panel (a) in the early 2000s. Measures that increased labour market flexibility during that period in Table 2.1 are again mostly related to collective dismissals.

Employment Protection Legislation governing temporary contracts and permanent contracts. This is particularly the case in Italy and Spain.

In Italy, a wider use of fixed-term contracts and apprenticeships was permitted since 1987. Incentives for the use of atypical employment were introduced in 1997 by reducing the associated social security contributions and pension provisions. On top of this, rules regarding the automatic conversion to permanent at their expiry date were eased, allowing for some time after the deadline. Fixed-term contracts and other forms of temporary employment were also generalised to the public sector in 1998, and to the agriculture and construction sectors in 1999. New atypical contracts emerged again in 2003. Unlike for France, these were not particularly targeted at certain segments of the active population. They consisted in a menu of temporary contract options to cover all sort of situations: discontinuous and intermittent work, shared work, occasional work (known as the on-call employment contracts), freelancer projects, etc. Tealdi (2011) offers a detailed description of the several atypical employment contracts introduced in Italy over this period. Only between 2005 and 2007, given the increasing share of temporary workers in the economy, some incentives were progressively introduced for firms to hire individuals permanently. These consisted mostly of cuts in social security contributions.

In Spain, restrictions for the use of fixed-term contracts, apprenticeship and training contracts were substantially relaxed in the 1984 reform. Similarly, this reform extended their potential duration and removed the limits for successive fixed-term contracts between the same worker and firm. The same year, severance payments in fixed-term contracts were also reduced. This relative freedom in the use of fixed-term contracts persisted until at least 1994, when some types of fixed-term contract were extinguished. But the same year, temporary work agencies were legalised, further incentivising the use of atypical employment contracts. Facing growing concerns about the large amount of atypical contracts in the overall employment level, the tendency was reverted, and limitations to the use of fixed-term and apprenticeship contracts were successively introduced in 1997, 2001 and 2006. These limi-

tations consisted in a lower maximum duration, suppression of certain types of fixed-term contracts, higher minimum wage and further age restrictions in apprenticeship contracts, increasing severance payments in temporary contracts, increasing social security contributions for contracts shorter than 7 days, and finally, re-introducing limits to the successive use of fixed-term contracts between the same worker and the same firm⁶. At the same time, to favour permanent employment, the reasons for a justified economic dismissal were extended to include problems with future financial viability (as opposed to only current problems) in 1995⁷. This significantly reduced the cost of individual dismissals in permanent contracts. Furthermore, new employment contracts were introduced in 1997. Those were new permanent contracts with lower severance payments than the established regular permanent contract. Nevertheless, these new permanent contracts could only be used for a restricted group of individuals: young workers, long-term unemployed, older workers at any unemployment duration, and for the promotion of fixed-term and training contracts within the same firm. These contracts were further expanded to new groups in 2001 and 2006, including a larger age group for youth, any unemployed for more than 6 months, women in jobs with low female representation, any worker older than 45, unemployed women who gave birth in the last 2 years, and to promote workers from all fixed-term contracts signed within a year⁸. Changes to the rules governing interim wages (wages that must be paid to the worker while a labour dispute goes on and before the court's ruling) were introduced in 2002 and 2006. Those changes aimed at offering firms the possibility of paying a higher severance payment upon dismissal rather than interim wages of an uncertain amount in case of a court litiga-

⁶These measures consisted mostly of equalising rights between workers in temporary and permanent contracts. Moreover, some of them could be reverted by collective agreement at the sector level. Consequently, they are not reflected in the OECD index. Furthermore, changes in social security contributions are not accounted for by the OECD since it is not considered EPL policy (but rather taxation policy).

⁷Before 1995, Table 2.1 shows several measures affecting permanent contracts and increasing labour market flexibility, while the OECD index in Figure 2.1 panel (a) remains flat. This is because such measures affected mostly collective dismissals (not included in the series plotted) and probationary periods (not aggregated in the computation of the OECD indexes for not being directly related to dismissal procedures).

⁸Such increases in the flexibility of the labour market are not reflected in the OECD indicator for regular employment contracts as these "new" permanent contracts may not be considered regular open-ended. In fact, they continue to co-exist with the "old" permanent contracts with higher severance payments.

tion (this possibility would be eliminated in 2012). On top of these measures, from 2001 to 2007, successive rebates in social security contributions were offered to employers hiring individuals permanently.

Finally, according to Figure 2.1 panel (a), Portugal had the highest index of EPL strictness regarding permanent contracts in 1985 and remains at the top in 2013 despite successive decreases in the strictness indicator. Fixed-term contracts were introduced in 1976 and their maximum duration extended in 1996 and again in 2003. TWA contracts were particularly encouraged after the 1996 reform and the maximum duration of these assignments was also extended in 2007. Such changes are well reflected in the OECD indicator regarding temporary employment contracts⁹. Overall, Portugal is the country that kept the simplest structure in terms of number of different types of atypical employment relationships. In Portugal, they consist mostly of regular fixed-term contracts and TWA. Apprenticeships can only be held in a limited number of establishments in the context of the National Education System.

Since 2008, more reforms have been undertaken in the four countries considered, that are no longer covered by the Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database. In particular, with the Great Recession and the European sovereign debt crisis, substantial labour market reforms took place in Italy, Portugal and Spain. According to the OECD (2014), Portugal and Spain were amongst the top reformers between 2012 and 2013. Using the information obtained from the LABREF database from 2008 to 2013, I complement Table 2.1 for that period, attributing a sign to each measure¹⁰.

In Portugal, the EPL rules governing dismissals in the public sector were adjusted in 2008 to make them closer to regulations governing the private sector. This consisted in redefining what would be considered a fair dismissal to include a wider number of cases. In 2009, a lot of the procedures for collective and individual dismissals were simplified.

⁹The measures that affected atypical contracts and decreased labour market flexibility in Table 2.1 were quite redundant. They consisted in clarifying the reasons for the use of temporary contracts with facts and preventing the use of temporary workers for hazardous tasks.

¹⁰Note that there is always some degree of subjectivity in assigning each measure a positive or negative sign.

For example, notice periods were shortened, the number of necessary administrative steps was reduced, or procedural errors when dismissing could no longer lead to the workers' reinstatement as long as the cause for dismissal was justified. Under the European Union and International Monetary Fund financial assistance programme from May 2011 to June 2014, further significant EPL reforms were pushed forward. Severance payments in newly hired permanent contracts were first reduced in 2011 from 30 to 20 days per year of service. The previously existing rule of a minimum of 3 months severance payment was abolished and a maximum cap was introduced to 12 months or 20 times the national minimum wage. These changes were extended to all existing permanent contracts in 2012. Finally, a new reduction of severance payments in newly signed employment contracts was approved in 2013. For fixed-term contracts, it consists now of only 18 days per year of service. In permanent contracts, the compensation for dismissal is now of 18 days per year of service for the first 3 years and 12 days per year of service afterwards. However, under the pressure of a higher unemployment rate and in an attempt to prevent further job destruction, special regimes that extended the maximum duration of fixed-term contracts were successively approved.

Spain followed a similar direction with a series of measures easing dismissal rules in permanent contracts, while approving special regimes of temporary employment to contend the growing youth unemployment rate after the crisis. In 2009, some procedures were introduced to facilitate temporary suspensions as alternatives to definitive collective lay-offs. In 2010, the causes for objective justified dismissals (compensated with 20 days of pay per year of service instead of 45 in the case of unfair dismissals) were clarified and broadened. The notification period for justified dismissals was also reduced from 30 to 15 days. The scope for objective collective redundancies was also enlarged while the administrative procedure was streamlined in 2011. 2012 saw a major reform still. To begin with, the conditions for a justified dismissal based on economic reasons, which previously only considered revenues, begin to also admit reductions in the level of sales. Individuals dismissals for absenteeism also became sufficient cause independently of the rate of absenteeism. Workers would no

longer be entitled to interim wages for all the duration of a court process against an unfair dismissal, unless the worker's claim would be recognised and the court reordered his or her reinstatement. Finally, the severance payments for unfair dismissals was reduced from 45 to 33 days of salary per year of service with a maximum of 24 months of compensation (instead of 42 months). Concurrently, there were new social security rebates to promote permanent hires. On what concerns atypical employment contracts, some limitations to the use of fixed-term contracts were introduced in 2010, but temporarily suspended in 2011 in the face of the growth in unemployment. The number of sectors in which temporary agency could operate was increased in 2010 and the age limit for training contracts was increased to 30 in 2012. Lately, in 2013, a new scheme to temporarily employ young workers without work experience was created, even for position of a permanent nature. This measure was meant to hold until the unemployment rate would be above 15%.

The measures introduced in Italy between 2008 and 2013 affected mostly the many forms of atypical employment contracts. At this stage, very little measures reformed the EPL of permanent contracts. In 2008, access to apprenticeships was facilitated by removing the maximum duration of these contracts. Similarly, the possibility of using on-call contracts was reestablished, although it had been eliminated the previous year. The maximum duration of standard fixed-term contracts was also increased. From 2012 onwards, the use of standard fixed-term contracts no longer needed justification when established between a worker and a firm for the first time and if longer than 6 months. It also became possible to use temporary forms of employment without a specific organisation or technical reason for a maximum of one year, even between parties that have had previous employment relationships. The maximum duration allowed for fixed-term contracts in start-ups was increased and the period during which all fixed-term contracts can continue beyond their original deadline without being automatically converted into open-ended was also extended. Nonetheless, in 2010, an indemnity to the worker was introduced in cases where the fixed-term contract is declared null or void and the cooling off period between two successive fixed-term contracts involving

the same worker and firm was increased in 2012. Finally, in 2013, some limitations were introduced to the use of on-call employment contracts, as well as additional social security contributions for workers employed in fixed-term contracts. On the other hand, the only significant change introduced that affected permanent contracts was in 2012. A new and faster judicial procedure was instituted for labour disputes. Alternatively, out-of-court settlement procedures at the local level were strongly encouraged.

In France, since 2008, a new way of terminating open-ended contract was institutionalised by mutual agreement between the worker and the employer¹¹. Whenever both parties agree to terminate the employment relationship, they can sign a convention that sets the terms of the contract rupture, including the indemnity that the worker shall receive from the firm. The advantage from the employer's side is that by accepting the terms of the rupture and signing the convention, the worker abdicates from the right to process the firm in a labour court to claim that the dismissal was unfair. More recently, in 2013, owing to the increasing share of fixed-term contracts with duration inferior to one month, the employer's social security contributions of such short-term contracts were further increased. The fact that fixed-term and permanent contracts are associated to different social security contribution rates will be exploited in the model described in Chapter 4.

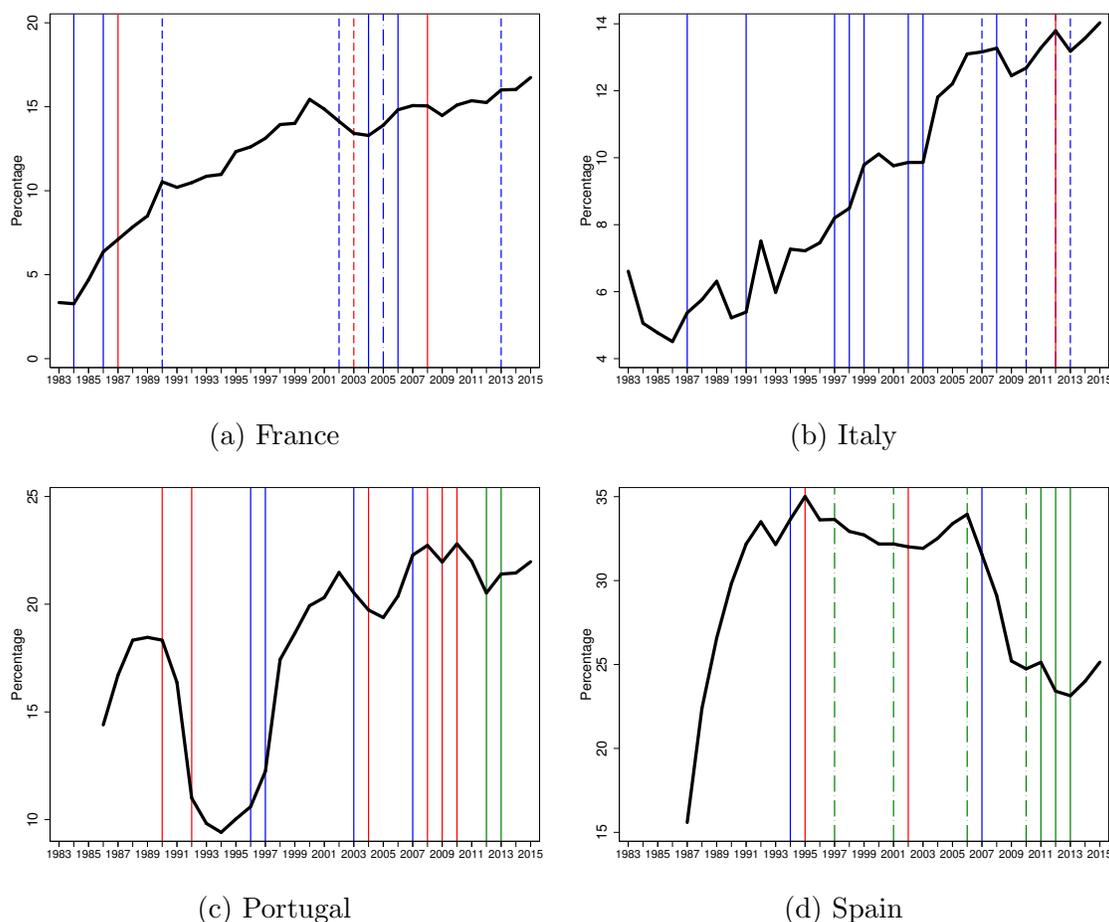
2.3 The share of atypical employment over time

After so many legislation changes, what happened to the share of temporary forms of employment out of dependent employment in each country over time? Figure 2.2 depicts the percentage of temporary employment out of the total stock of employment from 1983 to 2013, along with the major EPL changes that occurred during that period. There are many factors that can influence the share of fixed-term contracts in the economy, such as macroeconomic conditions for example. Nevertheless, it can be interesting to see how changes in

¹¹Known as "*Rupture conventionnelle*": <http://travail-emploi.gouv.fr/droit-du-travail/rupture-de-contrats/article/la-rupture-conventionnelle-du-contrat-de-travail-a-duree-indeterminee>.

the legislation interact with the percentage of temporary employment, without making any claims of causality.

Figure 2.2: Share of temporary employment in the stock of dependent employment



Notes: Each vertical line represents a significant change in EPL. Blue lines correspond to changes in EPL concerning temporary employment. Red lines correspond to changes in EPL concerning permanent employment. Whenever measures concerning both types of contracts were approved, the line is green. Solid lines represent increases in flexibility and dashed lines increases in strictness. Whenever measures with opposite directions were taken, the line is dot-dashed. Source: Fondazione Rodolfo DeBenedetti-IZA Social Reforms Database, LABREF, OECD EPL strictness indicators and OECD Stat.

From the inspection of panels (a) and (b), it is clear that there is an upward trend in the share of temporary workers in the economy for France and Italy. In France, panel (a), it is difficult to see any correlation between EPL changes and the percentage of temporary contracts. The restrictions on the use of fixed-term contracts introduced in 1990 could have had a short-term impact on the percentage of temporary workers. Measures taken in 2002 to decrease the flexibility of the law regarding the use of fixed-term contracts, on the other

hand, coincide with a fall in the percentage of temporary workers. Finally, the introduction of new fixed-term contracts for certain groups of the population in 2004 could have contributed for a new increase in the share of temporary contracts in the economy. In Italy, most EPL changes consisted in further liberalising the use of temporary forms of employment. Hence, these reforms obviously coincided with the observed upward trend in the percentage of temporary workers. The restrictions introduced in 2007 may have slowed down the rising share of temporary workers, but it is not clear enough from a mere visual inspection of Figure 2.2. For Portugal, on the other hand, there seem to be a clearer relationship between EPL reforms and the percentage of temporary workers in the economy. In fact, the fall in strictness of EPL associated to permanent contracts in the early 90s is associated with a significant drop in the percentage of temporary contracts. Similarly, the fall in strictness of EPL over fixed-term contracts in the mid 90s coincides with a sharp rise in the percentage of temporary workers. Finally, reforms to make dismissals in permanent contracts less difficult since 2008 could have contributed to slowdown the percentage of temporary workers in the economy, although it could simply be the result of an increase in job destruction affecting mostly temporary workers following the recession and numerous austerity measures. In Spain, after a huge rise in the share of temporary workers in the economy from 1987 to 1995, the successive measures to relax the EPL over permanent contracts and increase the strictness of regulations over the use of temporary contracts in 1995, 1997, 2001, 2002 and 2006, coincided with a slight decrease in the percentage of temporary workers. After a further decrease in the percentage of temporary contracts between 2007 and 2009, coinciding with the financial crisis and burst in the Spanish real estate market, new measures increasing both the flexibility of temporary and permanent contracts seem to be associated with a new increase in the percentage of temporary workers.

2.4 Reforms in labour market dualism since 2013

Since 2013, Italy has been the major reformer of Employment Protection Legislation out of the the four countries considered, with the approval of the Jobs Act at the end of 2014 and early 2015. This reform specifically had the objective of reducing the level of segmentation between temporary and permanent workers in the Italian labour market. The major change consisted in the introduction of a new employment contract with a level of protection that would progressively increase with job tenure: "*Contratto a tutele crescenti*". In the long term, the idea would be that this new employment contract progressively substitutes both fixed-term and open-ended contracts, known for having very different degrees of EPL and for the sharp discontinuity that exists on the passage from one contract to the other. One major characteristic of this new employment contract is that courts can no longer force employers to reinstate workers who have been dismissed for objective reasons (reinstatement can only occur if it is proved that the layoff has discriminatory grounds or if it is disciplinary and based on facts that did not occur). It also removes the judge's discretion to set the amount of compensation that must be paid if the dismissal is judged unfair: it becomes determined purely based on tenure. The Jobs Act also introduced a new form of out-of-court procedure in which the employer can pay the worker a monetary sum that, if accepted, prevents any future claim or dispute by the worker that the dismissal was unfair ("*conciliazione facoltativa*"). Both parties have a strong incentive to settle disputes through this procedure since the sum paid is exempted from social security contributions. At the present moment, the new contract still co-exists with the previous open-ended contracts and the remaining forms of atypical employment. The new EPL rules only apply to the newly formed employment relationships. In fact, the Job Acts also facilitated the use of temporary employment contracts by eliminating previous restrictions stating that firms were only allowed up to 20% of temporary workers over their total workforce.

Two further reforms were implemented in France. In 2015, the economic plan to boost productivity that would be known as "*loi Macron*" included some measures to cut on the

red-tape cost associated to lay-offs. It aimed at simplifying the judicial procedures to reduce the time taken by the labour court to rule over a contested dismissal. In 2016, a new pack of measures was approved specifically to reform the French labour market. This reform, known as "*loi travail*" and heavily contested by the public and social partners, originally included two measures affecting EPL: (i) the introduction of a cap in the amount of indemnities that the labour court could attribute to workers in case of unfair dismissal; (ii) the inclusion of a precise definition for economic dismissal so as to leave less ambiguity in the law and reduce the uncertainty associated to labour court rulings. Nevertheless, following all the social protests, the first of these two measures was removed from the project finally approved. Instead, judges from the labour court can decide to follow an optional indemnity chart.

Although it is difficult to document the role that worker unions have played in the segmentation between temporary and permanent workers without resorting to newspaper archives, it is widely acknowledged that unions have contributed for the reluctance in increasing flexibility to dismiss workers in open-ended contracts. Bentolila and Dolado (1994) stress the role of unions in defending the "insiders" - workers in open-ended contracts - in Spain. In France, the recent protests against the labour market reforms were always organised and supported by the major worker unions, namely CGT ("*Confédération Générale du Travail*").

In Spain, no major changes were introduced regarding atypical employment contracts and EPL since 2013. Nevertheless, due to the many different types of employment contracts (temporary and permanent), the Spanish Government started to publish synthetic documentation describing all existing contracts, their procedural rules and associated benefits, to facilitate the choice among them. Administrative forms to be filled upon hiring were also simplified and the Government continued to provide fiscal benefits to permanent hirings. Similarly, in Portugal, although there was some debate in 2015 over the implementation of a new dismissal regime by mutual agreement along the lines of what was put into practice in France, such reform was not pushed forward. One of the reasons that may explain the lack of recent reforms is that both countries held legislative elections in 2015. The elections

were inconclusive in Spain and a new vote was organised in 2016. In Portugal, the elected minority government fell after 11 days and a new government was formed shortly after.

2.5 Current legislation and institutional setting

Temporary contracts are often described as being more flexible compared to open-ended contracts, since separation costs are typically lower. However, there are also constraints on the use of temporary contracts and some costs compared to an open-ended contract. In this part of the paper, I focus on the main atypical employment contract in all countries considered: the fixed-term contract. In Table 2.2, I compare the main characteristics of the latest legislation regulating the use of fixed-term contracts, after decades of labour market reforms. Table 2.3 establishes the same comparison for legislation affecting open-ended contracts. There many more aspects of the Employment Protection Legislation over permanent contracts that could be considered. Since it is often argued that fixed-term contracts are preferred by firms facing uncertain and volatile demand, I focused on the strictness of the legislation regarding individual dismissals for economic reasons.

Table 2.2: Current legislation on fixed-term contracts

	France	Italy	Portugal	Spain
Cases where accepted	Replacement of a worker; Temporary increases in workload; Seasonal work; In particular sectors: hotels, restaurants, entertainment, etc; To hire older long-term unemployed.	For any technical, production or organisational reason; First contract does not need justification within 1 year.	Substitution of a worker; Seasonal activity; Exceptional increases in the firms' activity; Occasional task project; New activity within existing firm, new firm or new estab. within small firm; To hire workers looking for their first job or long-term unemployed.	For a specific project, task or service; Replacement of another worker; Due to the accumulation of tasks, increase in the activity or demand.

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Termination before expiry date	Only by mutual agreement, if the worker is considered unapt, for unforeseen events or for disciplinary reasons. Economic or financial difficulties cannot justify.	Under the same conditions than permanent contracts.	Under the same conditions than permanent contracts.	Not possible. Only at the expiry date.
Max. # of renewals and cumulative duration	No minimum. 1 renewal within cumulative duration that depends on motive: between 9 and 24 months. Most common case has maximum duration of 18 months.	No minimum. In general, 1 renewal within cumulative duration of 36 months. No renewal allowed when contract was not justified and maximum 1 year. A delay is allowed after the expiry date before contract is automatically converted to permanent: between 30 and 50 days depending on contract length.	If the term is known and written in contract, cannot be less than 6 months. 3 renewals allowed within cumulative duration that depends on motive: between 18 months and 6 years. Most common case has maximum duration of 3 years.	No minimum. For replacement: no maximum. For a specific task: no limits on renewal as long as within 3 years (4 by collective agreement). For increases in workload: 1 renewal with a maximum duration of 6 months within a year or 12 months within 18 months.
Severance payment	10% of the gross wage bill over the duration of the contract. 6% if worker benefited from particular training.	Same as open-ended contracts. There is an end of contract indemnity: approx. 7.4% of annual gross salary.	18 days of salary per year of service.	12 days of salary per year of service.
Alternatives to fixed-term	TWA and apprenticeship contracts.	TWA, agency contracts, on-call contracts, ancillary work contracts.	TWA, collaborative contracts.	TWA, apprenticeship contracts, internship contracts and many subsidised contracts.

Sources: OECD Employment database - <http://www.oecd.org/els/emp/onlineoecdemploymentdatabase.htm>; International Labour Organization (ILO) Employment Protection Legislation database (EPLex) - <http://www.ilo.org/dyn/epllex/termmain.home>; "Ministère du Travail, de l'Emploi, de la Formation professionnelle et du Dialogue Social" - <http://travail-emploi.gouv.fr/droit-du-travail>; "Código do Trabalho"; "Estatuto de los trabajadores".

The legislation regulating the use of fixed-term contracts in France and Spain looks quite restrictive. In fact, only a few particular cases are admitted by law. The large share of fixed-term contracts in employment may suggest that this legislation is not always strictly enforced. The regulation seems more flexible in Portugal with the admission of fixed-term

contracts in new firms or to launch new activities within an already existing firm. It is even more flexible in Italy, where the first contract between a worker and a firm do not even need to be justified, even if this fixed-term contract cannot last longer than 1 year. Furthermore, one important particularity of fixed-term contracts in France and Spain is that it is very difficult to terminate such contracts before the stipulated expiry date. In fact, in France, terminating a fixed-term contracts for economical reasons before the originally stipulated date, for example, is not possible. In Spain, it is not possible to terminate the contract earlier under any circumstance. This means that if the firm would like to terminate the employment relationship earlier than the expiry date, it should still pay the fixed-term worker's salary until the end. In practice, this makes it too expensive for firms to terminate fixed-term contracts before their expiry date. The model developed in Chapter 4 will use this feature of the French legislation to justify the assumption that fixed-term contracts are only destroyed at their expiration date. Curiously, the duration of fixed-term contracts in France and Spain has been reportedly very short, with many contracts below 1 month. This is described carefully in subsection 3.3.2, in Chapter 3. When focusing on the maximum number of renewals and cumulative duration allowed, Portugal appears to be the country with the most flexible legislation, allowing in certain cases up to 6 years. In all countries, after such limit is reached, if the employment continues it is automatically considered as being open-ended. However, in Italy, a delay is permitted beyond the duration limit before the open-ended EPL applied. This delay can go up to 50 days and the firm is supposed to pay a higher salary during that period. Finally, there seem to be many alternatives to fixed-term contracts in Italy and Spain.

Table 2.3: Current legislation on open-ended contracts

	France	Italy	Portugal	Spain
Types of individual dismissals	For disciplinary reasons, worker's ineptitude or economical reasons	For the worker's non-compliance with contractual obligations or for economic redundancy	For disciplinary reasons, worker's ineptitude or for the extinction of the work position	For disciplinary reasons or objective reasons (worker's ineptitude, worker's inadaptability to new conditions, lack of assiduity, economic reasons)

Definition of economic dismissal	Fall in demand, sales or revenues for 4 consecutive quarters compared to same period the previous year (may be 2 quarters by collective agreement); or fall in profits for 1 semester (may be 1 quarter by collective agreement); or liquidity problems; or technological changes, reorganisation of firm	Reorganisation of the production activity	Reduced economic activity due to falling demand or impossibility to access markets; or unbalanced economic or financial situation; or change of activity, restructuring of organisation or substitution of main products; or changes in the production process, automation of production, transportation, logistic, services, etc.	Changes in the production process, in the methods used, organisation or changes in demand; or when the employer faces current or expected losses; or when the firm faces a persistent reduction in sales for two consecutive quarters compared to same period the previous year
Further restrictions to economic dismissal	Efforts should be made to retrain the worker and reassign within the firm or group	Transfer of the redundant worker to other functions within the firm or group must be attempted	There must be no fixed-term contract at the firm with tasks similar to those of the extincted job and it must be impossible to keep the worker for another position	None
Severance payments	Only if tenure > 1 year. 1/5 th of monthly salary per year of service and an additional 2/15 th after 10 years of tenure.	Before "Contratto a tutele crescenti" : Indemnity for the end of all contracts of approx. 7.4% of annual gross salary. After "Contratto a tutele crescenti" : 2 months salary per year of service with a minimum 4 months and maximum 24 months.	Before 1/11/2012 : 30 days of salary per year of service; Between 1/11/2012 and 1/10/2013 : 20 days of salary per year of service with a maximum of 12 months or 20 times the minimum wage. After the 1/10/2013 : 18 days of salary per year of service for the first 3 years of tenure and 12 additional days of salary per each year of service beyond that, with a maximum of 12 months or 20 times the minimum wage.	20 days of salary per year of service (2/3 of a month's pay) with a maximum of 12 months

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Who gets severance payments?	All but individuals dismissed for disciplinary reasons with a fault considered serious	All dismissed individuals (even if disciplinary)	All but individuals dismissed for disciplinary reasons	All but individuals dismissed for disciplinary reasons
Potential labour court outcomes	Irregular: if there was a fault in the procedure but justified; Unjustified: if no serious or real grounds; Void: in cases of discrimination or harassment	Irregular: if there was a fault in the procedure but justified; Unjustified: if no serious or real grounds; Void: in cases of discrimination or harassment	Irregular: if there was a fault in the procedure but justified; Unjustified: if no serious or real grounds or in cases of discrimination.	Unjustified: includes discrimination, irregularities in the procedure and lack of cause.

<p>What happens if dismissal is considered unfair in court?</p>	<p>Irregular: No reinstatement. Indemnity depends on judge. Generally, it cannot exceed 1 month of salary; Unjustified: Judge may decide for reinstatement if tenure > 2 years and firm has 11+ employees. If worker refuses reinstatement, an indemnity is fixed by the judge. Generally, it must be minimum 6 months of salary; Void: Reinstatement. If worker refuses then the judge can fix an indemnity. Depending on cases, the indemnity may be a minimum of 6 or 12 months of salary. Interim wages are paid when the dismissal is declared void or unjustified.</p>	<p>Before "Contratto a tutele crescenti" - Large firms: Irregular: No reinstatement. Indemnity from 6 to 12 months of salary; Unjustified and Void: Firm can choose between reinstatement or indemnity from 12 to 24 months. If worker refuses the reinstatement choose by the firm, the worker receives an indemnity of 15 months salary. Interim wages should always be paid. Small firms: can choose between re-employment (no interim wages) or an indemnity between 2.5 and 6 months of salary. After "Contratto a tutele crescenti" - Void: Reinstatement. Employer can choose not to do so and pay a 15 months salary indemnity instead; Irregular: No reinstatement. Indemnity is 1 month of salary per year of service with a minimum of 2 months and a maximum of 12. Unjustified: No reinstatement. Indemnity is 2 months of salary per year of service with a minimum of 4 months in total and a maximum of 24.</p>	<p>Unjustified: Employer must reinstate the worker. Worker can refuse and choose an indemnity between 15 and 45 days of salary per year of service depending on the judge, which are paid on top of the regular severance payments. Indemnity must be a minimum of 3 months salary. The firm can only oppose reinstatement if it is a micro-firm or worker had a management position. But then, indemnity must be 30 to 60 days of salary per year of service with a minimum of 6 months; Irregular: No reinstatement. Indemnity is half the value of what it would be if dismissal is ruled unjustified. Interim wages are paid in all cases.</p>	<p>Before 12/02/2012: Firm can choose between reinstatement or 45 days of salary per year of service before the 12/02/2012 and 33 days of salary per year of service that comes after that date. Total cannot be more than 720 days (2 years). This is an alternative severance payment, instead of the regular ones paid for a justified dismissal. After 12/02/2012: Firm can choose between reinstatement or 33 days of salary per year of service with a maximum of 24 months. Interim wages are only paid when the reinstatement takes place. Except if the worker was a union representative: they receive interim wages in any case.</p>
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Labour Organization (ILO) Employment Protection Legislation database (EPLex) - <http://www.ilo.org/dyn/epllex/termmain.home>; "Ministère du Travail, de l'Emploi, de la Formation professionnelle et du Dialogue Social" - <http://travail-emploi.gouv.fr/droit-du-travail>; "Código do Trabalho"; "Estatuto de los trabajadores".

From Table 2.2 and Table 2.3, it is possible to compare the amount of severance payments in fixed-term and open-ended contracts. Severance payments in fixed-term contracts tend to be lower in Italy with the new "*Contratto a tutele crescenti*", in Portugal and also in Spain, especially since severance payment in open-ended contracts are quite high. In France, for low tenure workers, the severance payment in fixed-term contracts (or "precarity prime" as it is actually called) can be much higher than in permanent contracts. This is particularly the case the higher the annual salary in a fixed-term contract and compared to a worker in his first year of permanent contract. In the later case, there is no severance payment at all. For the French case, at least, the major constraint of open-ended contracts will therefore come from other aspects of EPL. For example, the definition of a justified individual dismissal for economic reasons can be quite strict. If an employer wants to dismiss a worker based on a fall in demand, it is required to prove that it experienced a fall in sales or revenues for 4 consecutive quarters, compared to only 2 in Spain. The definition of an acceptable dismissal based on economic motives is much more vague in Italy and Portugal, which may also increase the uncertainty associated to a process in the labour court. Curiously, in Portugal, the legislation gives particular attention to the possibility that firms may substitute permanent workers by fixed-term workers. It therefore restricts firms from dismissing workers under the justification that the job is being extinguished if there is another worker under a fixed-term contract at the firm with similar functions. In case the worker takes the dismissal to court, the regulations in France and Portugal seem to be stricter than in Italy and Spain, to the extent that judges can order the employer to reinstate the worker and the employer cannot refuse. Instead, in Italy and Spain, the employer can alternatively pay a higher indemnity or severance payment. One aspect which is particular to the French legislation is that there is no maximum amount for the indemnity in case of unjustified, irregular or void layoff. The law only specifies a minimum amount in certain cases. This surely adds to the uncertainty of a labour court process, on top of the unknown duration of the process and potential interim wages. On the other extreme, the legislation in Spain specifies a higher, but fixed, amount of severance payment in cases where the dismissal is ruled unjustified. Furthermore, firms no longer have to pay interim wages when they refuse the worker's reinstatement.

2.6 Proposals for future reforms

Many economists have argued that further reforms are needed in order to avoid trapping the same group of workers (young, inexperienced, less educated, females, etc.) into temporary jobs, with recurrent episodes of unemployment, but without depriving firms from the possibility of adjusting their workforce more easily.

Blanchard and Tirole (2003) suggested a joint reform of unemployment benefits and employment protection legislation. They defended that unemployment insurance should be financed by layoff taxes instead of payroll taxes. They argue that payroll taxes, by increasing labour costs, constitute a perverse financial incentive to dismiss workers, while layoff taxes would force firms to internalise the cost of dismissing workers for the overall economy. According to these two authors, less judicial intervention to determine whether a layoff is justified or not would be beneficial to the economy. Firms, once accounting for the social cost of dismissal, are in a better position to assess whether layoffs are economically justified, leading to a better allocation of workers across firms and industries. Judges should only be responsible for verifying if a dismissal was motivated by illegal or discriminatory reasons.

Other economists and legal scholars have advocated a more radical reform of Employment Protection Legislation with the creation of a unified employment contract, sometimes referred to as the single open-ended contract. As described in Lepage-Saucier et al. (2013), there are different ways of evolving from the current dual labour market system to an economy with a single employment contract: (i) removing all forms of temporary employment and keeping the traditional open-ended contract only; (ii) replacing all existing contracts (atypical and permanent) by one single contract that would be somewhere between the traditional permanent contract and the common fixed-term contract; or (iii) replacing the most common forms of temporary employment (mostly, fixed-term contracts) and the traditional permanent contract by a single contract that lies in between in terms of EPL, but leaving Temporary Work Agencies and training contracts available to firms. The idea of a single open-ended contract has received a lot of attention amongst academics, policy makers, social partners and the medias. Some argue that the single open-ended contract could have an extended trial period initially, while others believe it should have lower requirements to dismiss workers than the current typical permanent contract.

In a report to the French Ministry of Labour and Ministry of Economics, Finance and

Industry, Cahuc and Kramarz (2004) recommended the suppression of the fixed-term contract (“*Contrat à durée déterminé*”) and the creation of a single employment contract that would also substitute the current permanent contract (“*Contrat à durée indéterminé*”). The proposed single employment contract would be open-ended, it would be associated with severance payments increasing with tenure and with a layoff tax paid by the firm. The severance payment increasing with tenure would remove the discontinuity in dismissal cost generated by the current system at the 18th month. The authors believe it would stabilise employment and end the excessive turnover at the expiry date of the fixed-term contracts that are generally not converted into permanent. They suggest the severance payment should be proportional to the total remuneration received from the signing date of the contract to the moment of layoff (10% of the total remuneration). In return, firms would be released of any obligation to reinstate the worker. The layoff tax, on the other hand, would align private and social interests, as suggested by Blanchard and Tirole (2003). In this report, Cahuc and Kramarz also suggest that the single open-ended contract could co-exist with Temporary Agency Work. Temporary agencies would hire the individuals they let on missions with the single open-ended contract. Finally, they also defend that the motives for terminating the single open-ended contract should incorporate the possibility that the relationship was of a fixed-term nature. In that sense, the single open-ended contract would assimilate both fixed-term and permanent contracts of the current dual system and still provide enough flexibility for firms to manage their workforce. Cahuc (2012) clarifies that the obstacles to economic dismissals, such as requiring firms to find another position for the worker within the company or group, should be relaxed. According to the author, firms should not be legally responsible for re-employing dismissed workers. Instead, this should be handled by a public employment agency financed by the taxation of dismissals.

A group of 100 economists signed a document suggesting a similar reform to the Spanish labour market shortly after the financial crisis (Abadie et al., 2009). They urged the Government to redesign labour market institutions so as to improve the reallocation of workers from stagnant to growing sectors. They argued that the duality of the Spanish labour market provides an incentive for job creation in low productivity sectors and for firms to face economic downturns with significant labour turnover instead of changing the firm’s organisation or productive process. Instead, they also suggested the implementation of a unique employment contract to replace the currently existing temporary and open-ended contracts.

This unique employment contract would be open-ended and associated with severance payments increasing with tenure. The authors defended this would end with the discontinuity in dismissal costs between fixed-term and permanent contracts.

In Italy, the idea of a single open-ended contract was also widely discussed, in particular with the publication of the book by Boeri and Garibaldi (2008). In 2014, with the approbation of the Jobs Act, a new open-ended contract with severance payments increasing with tenure was finally introduced, although coexisting with the fixed-term contract and other forms of atypical employment initially. In the long term, this new open-ended contract should progressively replace all permanent employment contracts, as well as the temporary forms of employment. With this new contract, judges can no longer order the worker's reinstatement when the dismissal was unjustified and they also no longer set the amount of the indemnity to be paid.

Not everyone agrees with the idea of a single open-ended contract. Lepage-Saucier et al. (2013) argue that the replacement of permanent and temporary contracts by a new single open-ended contract may eliminate some costs of dualism, but not all. For instance, they claim that a single open-ended contract with an extended trial period will not eliminate the current discontinuity between fixed-term and permanent contract, nor the coexistence of workers with high protection and others with low protection. Similarly, while on the trial period, workers will not benefit from further training than workers currently on temporary employment contracts, nor will they more easily gain access to credit and housing as banks and landlords may still discriminate. Even in a single open-ended contract with increasing severance payments and where new legal motives to terminate the contract are considered that would correspond to the current motives to use a fixed-term contract (as suggested by Cahuc and Kramarz, 2004), the authors argue that not much change would be induced compared to the current situation. Employers would have one tool instead of two, but the duality of the labour market would most likely persist. The authors also raise the point that a single open-ended contract coexisting with TWA or training contracts could lead to a surge in the latest forms of temporary employment and a shift from one specific type of dual market to another type of dualism. Overall, they advocate that the existing permanent contracts could be adapted to the logic of increasing severance payments with tenure and that further incentives to hire permanently should be provided. They finally defend the idea that seniority-based rights also contribute to reduce professional mobility and that it might

be preferable to increase severance payments with career seniority rather than tenure within firms.

2.7 Concluding remarks

Fixed-term contracts were liberalised in 1983 in France, 1987 in Italy, 1976 in Portugal and 1984 in Spain. It consisted in the first atypical employment contract, although other alternative forms of temporary employment were introduced since then, namely temporary work agencies. The introduction of new atypical forms of employment and the extension of motives to use fixed-term contracts, together with very strict rules governing dismissals in permanent contracts, led to the current situation of segmented labour markets.

Growing concerns about the rising share of temporary employment meant that some measures were taken between the mid 1990s and 2000s to provide further incentives for permanent hirings. This was particularly evident in Spain. However, the percentage of atypical employment contracts out of the total of dependent employment remained relatively high.

Since 2008, significant changes were introduced in rules governing permanent contracts in Portugal and Spain. Severance payments were considerably reduced and dismissal procedures were simplified. Nonetheless, special regimes for temporary and fixed-term contracts were approved to contend the growing youth unemployment rate after the crisis, therefore preserving the dual structure of the labour market. In Italy, major EPL reforms have been implemented since 2014. The Italian Jobs Act, by introducing a single open-ended contract, attempts to address one of the major concerns regarding EPL for permanent contracts: the large extent to which judges intervene and the high level of uncertainty associated with labour court processes. However, as of now, the fixed-term and other temporary contracts continue to exist and the single open-ended contract only applies to new hires. Less radical measures were also taken in France to limit the ambiguity in the law and judges' discretion in setting compensations. Nonetheless, economic layoffs are very hard to justify and difficult to operate, with the obligation to integrate workers in other positions. This remains one of the main obstacles to permanent hiring. Monitoring and carefully evaluating the recent reforms could be informative for policy makers in all countries about the direction to follow in future labour market reforms.

Chapter 3

Assessing Labour Market

Segmentation: Evidence from France, Italy, Portugal and Spain

3.1 Introduction

Labour market segmentation is a concept typically used when different workers in a labour market face very different economic and legal circumstances. Labour market segmentation has spread in many European countries in the form of what is often referred as dual labour markets (see for example Boeri, 2010). In this respect, a first group of workers will be in permanent employment contracts, enjoying a relatively high degree of employment law protection against dismissal. Several other aspects of the employment relationship may also be relatively favourable in this case. For instance, employment duration for these workers tends to be long, of several years or more. In contrast, a second group of workers will be in non-standard work forms, such as fixed-term contracts, temporary agency work, or service provision contracts. These work relationships are characterised by much greater flexibility, in particular from the employer's perspective. Moreover, non-standard work forms tend to be much shorter in terms of their duration than permanent employment. This prompts many instances of short employment spells, followed by periods of unemployment, followed again by short employment spells and so on. Given that fixed-term contracts are the predominant

form of atypical employment, this paper will focus on them and their contrast with permanent contracts.

The main difference between permanent and fixed-term contracts comes not necessarily only from the differences in terminations costs (as frequently highlighted in the literature), with typically low and predictable costs in the case of fixed-term contracts and high and uncertain costs in the case of permanent contracts. Additional differences result from imperfect enforcement of the legislation that regulates the use of fixed-term contracts (Fialho, 2017). The segmentation perspective follows not only from institutional differences across the different types of employment relationships. Another important aspect is the mobility or permeability (or lack thereof) between contract types. In this context, individuals that find themselves in one contract form tend to remain there for a long time with little scope for movements between contract types, as discussed below. For instance, the prevalence of non-standard work forms is much higher amongst younger workers as well as amongst those who left school earlier and individuals previously unemployed. Moreover, transition rates from non-standard work to permanent contracts tend to be particularly low, especially when looking at high-frequency data (monthly or quarterly). On top of differences in terms of workers' pre-determined characteristics, such as age, schooling or previous unemployment spells, there are also important differences in terms of characteristics observed after the two types of employment relationships have begun. For instance, individuals that are employed in non-standard work are likely to benefit from lower salaries and fewer training and promotion opportunities than similar colleagues employed under permanent contracts.

Historically, these differences have followed policy developments in the 1970s and beyond. After the oil crisis of the early 1970s and the resulting period of stagflation and increasing unemployment, many countries introduced more flexible employment relationships, such as fixed-term contracts. These reforms have been geographically concentrated in countries such as France, Italy, Spain and Portugal, with more stringent employment protection laws for permanent contracts. While promoting more job opportunities to reduce unemployment, these employment reforms at the margin (without addressing the strong employment protection of permanent contracts) may have induced structural changes in the labour markets affected. This transformation created potentially perverse effects in some dimensions and potentially negative effects in overall employment, productivity and wages. Another factor that may explain the rise in segmentation is labour market polarization, which has been

documented in Europe by Goos et al (2009). This leads to an increasing percentage of high skill and low skill jobs, with middle-skill jobs seeing their share fall since the 1990s. This phenomenon would lead to segmentation to the extent that middle-skill jobs are mostly based on permanent contracts while low-skill jobs are mostly based on fixed-term contracts.

Overall, labour market segmentation shares a number of similarities to earlier inside/outside models, in the latter case focused on unionised vs non-unionised workers (a comparison that was already made by Bentolila et al., 2012). While unionisation rates have fallen in most countries over the last decades, there are several other institutional aspects of labour markets that may prevent market clearing, including different forces promoting wage rigidity. These aspects could lead to forms of segmentation whereby high wages for permanent contracts lead to lower wages (and other working conditions - including contract types) for new worker cohorts. The restrictions in market clearing would force the new cohorts to operate in a residual labour market from which they are unable to compete for permanent, high-wage positions. On the other hand, if some workers (insiders) implicitly benefit from dualism, some firms may also benefit from it. For instance, large firms tend to be more productive and can more easily accommodate the constraints imposed by the employment protection legislation regarding permanent contracts. Smaller firms or new entrants may struggle to meet these requirements and be forced to draw more heavily on fixed-term contracts. The latter group of firms may also face greater uncertainty in their industry and therefore wish to rely more heavily on fixed-term contracts. One can also find similarities between labour market and product market segmentation. Under the latter, according to a simple industrial organisation approach, firms may find it profitable to separate their labour (input) markets according to the labour supply elasticities of different workers. If younger or less experienced workers exhibit lower elasticities than older or more experienced individuals, firms may be better off by rewarding each group separately and preventing mobility between labour market types. Of course, this approach assumes a great degree of market power and (implicit) collusion between firms that may not be feasible in local labour markets populated by a very large number of firms, in particular if they employ workers with more general or basic skills.

One important concern that has emerged in the labour market segmentation literature is that, in many instances, firms tend to convert only a small percentage of their non-standard workers into permanent contracts, even if many of those workers exhibit high levels of performance (see for example the work of Güel and Petrongolo, 2007). This may be the case when

firms prefer to dismiss the worker in non-standard contracts and appoint new non-standard workers instead. This wasteful churning is likely to arise if firms are allowed to employ a large number of workers under non-standard work forms and the termination of permanent contracts is too costly. The latter condition will be the case in particular following the possible involvement of employment tribunals by dismissed workers. Such involvement may add considerable uncertainty to the outcome of the dismissal, including a possible reinstatement and payment of foregone earnings during the period of the trial in some cases. Tribunals can create a lot of uncertainty and as a consequence firms may find it difficult to compute ex ante the total firing cost they will incur in case of dismissal. The churning mechanism may also be due to the subsidies associated with fixed-term contracts, including in terms of active labour market policies. In some countries and types of fixed-term contracts, the subsidies are significant and may play a strong role in the decision whether to convert a non-standard employee into permanent or hire a new non-standard worker.

A similar concern is that segmented labour markets may lead to lower levels of productivity, given the over-reliance on non-standard work and the likely effects of that in terms of investment in training and other productivity-enhancing variables (other intangibles, physical capital, recruitment, etc). Indeed, if some workers are not likely to stay in the firm for a reasonably long time, the return of such investments on workers in non-standard contracts would be low, at least from a private perspective [Previous work relating training and labour market segmentation includes Albert et al, 2005, Arulampalam et al., 1998, Arulampalam et al., 2004, and Cabrales et al., 2014. Papers that have acknowledged the potential negative effects on productivity include Hijzen et al., 2017 and Dolado et al., 2013.]. Some papers in the literature have also related dualism with differences in effort, absenteeism and willingness to accept overtime, although this can be hard to measure empirically (Ichino and Riphahn, 2005, and Vallenti et al., 2013). The impact is not clear and seems to depend on the worker's perception about the likelihood of being promoted to permanent at the same firm. Another concern relates to differences in work accidents (Hernanz and Toharia, 2006).

The discussion so far has focused on the views more commonly expressed about segmentation. There are, however, other perspectives, of a less negative - or even positive - nature, in terms of the implications of non-standard work in key variables such as employment, salaries, productivity and welfare. One such view is that firms have different types of labour needs, including many of a non-permanent nature. This will be the case in fixed-term tasks

(short-term replacement of permanent workers, construction projects, temporary extra shifts following new orders or a temporary demand peak, etc), seasonal activities (tourism, farming, some types of manufacturing, retail, etc), new establishments or start-ups of uncertain success and duration, or new firm types or even new industries based on different types of employment relationships (e.g. Uber and other forms of internet-based self-employment under moderate employer relationships). In all the cases above, firms may not find it suitable to employ new workers under permanent contracts. First of all, the jobs at stake are clearly of a not permanent nature. Secondly, the legal cause for the termination of these contracts may be restrictive or subject to significant uncertainties. As mentioned above, one's assessment of the private and social desirability of non-standard contracts cannot be conducted in isolation from the restrictions imposed on permanent jobs.

Another factor that should be taken into account is the scope of a causal interpretation of evidence indicating significant (ex-post) differences between permanent and non-standard contracts. As mentioned above, these differences include aspects such as wages (see Mertens et al., 2007) and training but also health, promotions and job satisfaction. As most of the evidence is of a non-experimental nature, it is unclear how much of these differences between permanent and non-standard work individuals are attributable to contract types and not to other differences across the two groups of workers. An employment law that offers multiple contract types may serve useful purposes in terms of economic efficiency. For instance, different contract types may facilitate the matching between workers and firms by offering different combinations of insurance and other working conditions that may be more suitable than just one contract type, if firms and workers have preferences shaped by multiple dimensions. Indeed, this variety in contract types - especially their duration - can be found in many services. For instance, accommodation can be provided in terms of buying, renting, aparthotels and hotels; cars can be bought, leased or rented. These differences can also be observed across contract types in terms of the resulting costs that firms have to face (many of which mentioned above, such as recruitment, training, and termination, as well as taxes). To the extent that some of these costs are lower under non-standard work, such heterogeneity in contract types may widen the labour market and prompt the creation of jobs that otherwise would not exist, again particularly in cases in which the benchmark contract may be restrictive and costly in itself. Moreover, the matching between the job type and the contract type may be wrongly interpreted in a causal manner. In practice, one may also argue

that the creation of many types of flexible contracts has only increased firms' possibility to avoid the legislation and that employers substitute one type of contract to another to avoid some of the costs involved by (partial) labour market reforms which only produce limited results (essentially substitution effects between contract types) - see Cappellari et al. (2012). In other words, in an already distorted environment as that of many labour market, more contracts may also introduce additional distortions or unexpected effects.

Another aspect, yet overlooked, is that some of the large flows or even churning that affect non-standard work more frequently than permanent employment may be influenced by strong complementarities with labour market institutions. In this dimension the architecture of the unemployment insurance system (UIS) is likely to have a central role. For instance, several studies since the mid-1990s have documented significant spikes in transitions from employment to unemployment (and unemployment benefits) at the exact time of unemployment benefit eligibility (Martins, 2016). These findings suggest that, in many cases, employment spells terminate early because the availability of unemployment benefits creates a more attractive option for some workers than prolonging their spell. Of course, part of such choice may in itself be driven by weak perspectives of long-term appointments in the current (fixed-term or equivalent) jobs. The fact that recruitments on very short-term contracts have risen substantially since the beginning of the 2000s in several European countries (this is particularly relevant in France) may be seen as an illustration of the complex nexus between the UIS and the spread of temporary jobs. Two characteristics of the UIS are, in particular, likely to promote the development of short-term and unstable contracts. First, the existence of partial unemployment schemes which allow combining unemployment benefits with wages for a protracted period of time may encourage workers to cycle between very short employment spell and unemployment repeatedly, potentially with the same employer. Second, this excess of labour turnover turns out to be detrimental to the financial stability of the UIS insofar as firms do not take into account the cost to the UIS of their workforce management policies. Hence, the absence of experience rating fuels the development of two-tier labour markets to the extent that firms offering stable employment provide continuous subsidies to firms misusing and abusing temporary jobs.

This debate on the assessment of the effects of non-standard work has important policy implications. In general, the first, negative perspective may conclude that policy should restrict non-standard work, while also possibly making permanent contracts more flexible.

In the limit, this view would support the creation of a single contract, replacing all existing contract types. This single contract would possibly be introduced gradually (i.e. a third, “single” contract over a transition period of several years or even decades, until “older” permanent contracts are terminated through retirements of their workers) or more quickly (i.e. involving the conversion of existing permanent and non-permanent contracts into the single contract). On the other hand, the second, positive perspective may favour some form of the status quo, while again also possibly making permanent contracts more flexible.

The remaining of this chapter will conduct a number of empirical analyses to shed light on the different perspectives above regarding the adequacy of the segmentation concept and an evaluation of its merits and problems in terms of different labour market outcomes. Whenever data availability permits, it focuses on four countries: France, Italy, Portugal, and Spain¹. The analyses presented in this chapter were jointly conducted by Olivier Charlot, Franck Malherbet, Pedro Martins, Cristina Tealdi, and myself. The empirical regularities described in this chapter will serve to fundament some of the assumptions made when developing the model of Chapter 4.

3.2 Data sources

To characterise the extent in which the four countries considered have a segmented labour market between temporary and permanent contracts, we use different data sources. In this section, we carefully describe each of them.

3.2.1 Aggregate statistics

First of all, some stylised facts are reported using the aggregate statistics made available by OECD.Stat and Eurostat, based on the harmonised Labour Force Surveys (LFS). For the Eurostat data, we have used the aggregate statistics based on the harmonised LFS from 2013. We use these aggregate statistics mostly to obtain an overview of the share of temporary contracts in the overall economy, across different age groups, education groups and industries. To investigate workers’ perception of their future career prospects in different contract types, we use the European Working Conditions Surveys (EWCS) conducted by the

¹At the current moment, some results are only available for France and Portugal, while still in-progress for Italy and Spain.

European Foundation for the Improvement of Living and Working Conditions (Eurofound). In particular, we use the fifth and sixth waves of this survey, conducted in 2010 and 2015.

3.2.2 Labour Force Survey (LFS)

To analyse labor market transitions, in particular, the probability that workers employed in a temporary contract are offered a permanent contract with the same employer, it requires following the same individuals over time. We then resort to longitudinal micro level data sets. We decided to use micro data from the Labour Force Surveys² for several reasons. First, because the LFS are to some extent homogenised and make comparisons across countries possible. Second, because the LFS are collected on a quarterly frequency, which permits us to capture short-term transitions that would be missed with micro data sets of a higher frequency. That is, we can observe transitions at a high level of detail. The LFS for each country include general information about individuals, information about their employment status, characteristics of their job at the time of the interview, namely the contract type, hours worked and earnings. It also contains some information about the training that the workers received and that was paid by the employer. The drawback of the micro LFS is the very fast sample rotation which causes significant changes in sample size and composition from one year to the other. In fact, in the micro LFS, individuals are only followed at most for six consecutive quarters, which is equivalent to one year and a half.

Even the LFS at quarterly frequency will lose some information regarding entry flows into fixed-term employment. As a result, whenever interested in the exact flows into employment and when possible, we turn to administrative records made available publicly. We use the data published by the ACOSS for France and the Ministry of Labor for Spain. For Portugal, data on entry flows could be obtained using the Social Security Records³, but the employment contract type is not recorded. Therefore, it will not be included for this analysis.

We used the Labour Force Surveys specific to each country as they tend to have more variables than the harmonised European LFS panel. The Spanish EPA and Portuguese IE have a very similar structure and questionnaire. Consequently, the variables are almost the same in both data sets. Nonetheless, the EPA has no information on earnings at all. The IE,

²France: *Enquête Emploi* (EE); Italy: *Rilevazione sulle forze di lavoro*; Portugal: *Inquérito ao Emprego* (IE); Spain: *Encuesta de Población Activa* (EPA).

³*Base de dados do Instituto de Informática da Segurança Social* (IISS). The access to this data set is quite restricted, even for research purposes.

on the other hand, does have information about the monthly net earnings at the main job. This information is available for workers in dependent employment and without limitations (i.e. not in brackets, but as a continuous variable). Both data sets have information about the number of hours worked in the reference week and hours spent in non-paid formation. The IE is available in different series from 1974 to 1982, from 1983 to 1991, from 1992 to 1997, from 1998 to 2010, and the most recent one from 2011 to 2013. In between each of these series, there were breaks with no data collection and the questionnaires changed substantially from one version to the other. We will therefore use the most recent series from 2011 to 2013 for Portugal, and restrict the Spanish EPA sample to the same period. The EE for France has much more information than the IE or the EPA. It has information on earnings (also in a continuous variable), hours worked, and even information about training provided specifically by the employer. The latest year available is 2012. We will therefore restrict the EE analysis to the period 2010 to 2012, to make it as close as possible to the time period analysed in Portugal and Spain, but keeping the same number of quarters observed.

3.2.3 Administrative data sets

Earnings information in the LFS, apart from not being available for all countries under study, is self-reported and subject to significant measurement and reporting error. Hence, to study wages across different contract types, we exploit other administrative sources, such as matched employer-employee data sets or social security records. Administrative records have several advantages: information on earnings tend to be more accurate than in survey data, very large data sets with millions of observations, compulsory completion and no issues with low response rates or sample selection bias. In some cases, such administrative data sets also allow us to follow firms over time, which we will exploit to shed some light on firms workforce management policies regarding different employment contracts. To be precise, we use the *Déclaration Annuelle de Données Sociales* (DADS) for France, the *LoSai* for Italy, the *Quadros de Pessoal* (QdP) for Portugal, and the *Muestra Continua de Vidas Laborales* (MCVL) for Spain. The structure, sample selection and data collection methods for these additional sources differ slightly from one country to the other. But all these are longitudinal data sets that permit the reconstruction of individuals' career paths and identification of their successive employers, with precise and very accurate earnings information. Yet, the information regarding the characteristics of jobs in these administrative panels is aggregated

annually (DADS, LoSai and QdP) or not always updated over time (MCVL), meaning that employment spells starting on fixed-term contracts and later converted to permanent may not always be identified. This is the reason why we do not use these sources to analyse labour market transitions and the duration of employment spells.

3.2.3.1 *Déclaration Annuelle de Données Sociales (DADS)*

The French DADS panel data set, collected by the French national statistics institute (INSEE), spans the period between 1976 to 2010, with interruptions in 1981, 1983 and 1990, due to the national demographic census that occurred in 1982 and 1990. Nevertheless, information about the employment contract type is only available from 2005 onwards. The completion of the DADS is mandatory each year and the dataset made available for research purposes was formed, from 1976 to 2001, by selecting from the exhaustive administrative records all the individuals who were born in October of each even calendar year. This constituted approximately 4% (1/25) of the population covered in the exhaustive records. From 2002 onward, the panel started to include all the individuals born in October every year. That is, both even and odd years. This means that the DADS became an approximately 8% (1/12) sample of the exhaustive record. Some changes occurred over time regarding the scope of the DADS. Originally, the DADS included all private firms operating in the French territory, except for firms related to agriculture exploitation. During the 1980s and early 1990s, the DADS started to also include industrial and commercial firms related to the State operation. For e.g. large State participated firms and public hospitals. Among these State participated or owned firms were *La Poste*, *France Telecom*, BNP or *Credit Lyonnais*, who were later privatised. Employees in the agriculture sector were later included in 2003. Finally, in 2009, the DADS started to also include public servants and employees of domestic services (those whose employer is a single individual without corporate status). The dataset is designed such as to aggregate in each observation a worker, with a given firm identifier, in a given calendar year. There is a worker identifier and workers can be followed over time. If a worker changes from one establishment to the other, within the same firm, during the calendar year, this information will not be reflected in the DADS. The dataset will provide the establishment ID corresponding to the establishment where the worker was employed for longer during the year. If there is a tie, then the establishment associated with the highest pay is selected. The characteristics of the establishment, such as the location, will correspond

to this selected premises. Annual earnings (gross and net), annual hours worked and number of days paid will be added up at the firm level. The start and end dates of the spell are picked as the smallest and the largest dates of each episode with a different establishment. Some characteristics of the job, such as the profession or the contract type, may change during the calendar year. The information that is displayed in the DADS will correspond to the characteristics of the job by the time the information was reported by the firm. The administrative form for a given year t must be submitted before the end of January of the year $t + 1$. Therefore, the information about the job will correspond to the job as it was at the end of each calendar year, or when the employment spell ended. Since the information about the contract type only started to be requested from 2005 onwards, INSEE must have received a larger number of different episodes to aggregate with the same firm, depending on the contract type. According to the INSEE reports, in 2004, 0.2% of all spells were the result of the aggregation of more than one episode. In 2005, that number increased to 4.2%. If the worker experiences a wage increase during the year, this information will be absorbed in the annual earnings and result in a higher daily or hourly wage that year. However, that average will not correspond to the original wage or the new wage. Therefore, wage increases can only be detected if the worker remains at the same firm for more than one calendar year, by comparing the daily/hourly wage across two consecutive years. Finally, if a worker is hired by the same firm on short-term contracts, with interruptions, this will appear in the DADS as a single uninterrupted employment spell. The start and end date will correspond to the first and last episode, respectively. Additional information available includes: firm's industry, worker's occupation, firm's number of workers and number of establishments, location of the firm, amongst other things. One major drawback is that the DADS has no information on the highest educational level attained, unless merged with another administrative record, the *Échantillon Démographique Permanent* (EDP).

3.2.3.2 LoSai

The LoSai data set is collected by the Italian social security administration⁴. It records the complete earnings and contribution histories of private sector employees, as well as unemployment episodes and sickness leaves. The sample available for research purposes is formed by all individuals born on the 1st and 9th of each calendar month every year. In total,

⁴"Istituto Nazionale di Previdenza Sociale" - INPS.

this represents approximately 6.6% of the population. The data set spans the period between 1975 and 2012. Similarly to DADS, each observation represents a worker-firm relationship in a given calendar year. Some transitions and conversions of fixed-term to permanent contracts will therefore be inevitably lost. Each individual and firm have a unique identifier and can be followed over time. The data set provides information about the annual earnings (which are top coded) with each particular firm and the total number of weeks the earnings refer to. However, there is no information on the number of days worked, the annual hours worked, nor the exact start and end date of the employment relationship during the year. There is information about the characteristics of each worker, such as the age, gender, nationality, tenure or experience, as well as characteristics of the job, namely the sector of activity.

3.2.3.3 *Quadros de Pessoal (QdP)*

The *Quadros de Pessoal* are collected every year by the Portuguese Ministry of labour, solidarity and social security⁵. The completion of the form is mandatory for all private firms, regardless of the number of workers employed. The dataset made available for research purposes is not a sample of the collected data, but the whole universe covered, making it an exceptional large data set. It spans the time period between 1986 and 2009, with exceptional interruptions in 1990 and 2001. From 1986 to 1993, the information collected referred to March each year. From 1994 onwards, the information referred to the month of October. Information about the contract type is available starting in 2000. Workers are assigned a unique identifier and can be followed over time across different firms. However, given that the data refers to one particular month, we can only see whether individuals were employed in March/October each year and at which firm. If a worker is observed at two different firms from one calendar year to the other, we cannot know exactly when the transition took place, neither if it was a direct job-to-job transition or if it was interrupted by a period of non-employment. In a few cases, this information can be partially inferred from the tenure variable. The same will apply to the information on the employment contract, which is available from 2000 onwards. We will only observe the contract the worker had in the reference month. It is possible that a worker is initially hired on a fixed-term contract but that we observe a permanent contract in October because the contract was converted in

⁵"Gabinete de Estratégia e Planeamento" (GAP), "Ministério do Trabalho, da Solidariedade e Segurança Social" (MTSSS).

the meantime. This data set is therefore not appropriate to get a sense of the share of fixed-term contracts in newly hired workers, nor the share that eventually ends up being converted to permanent. Nevertheless, the data is very rich in information. It provides separate variables about the monthly baseline wage, earnings from overtime, earnings from regular subsidies and from exceptional payments (bonuses, commissions, etc.). There is also information about the regular contractual hours, the hours effectively worked and the total of overtime during the reference month. Additionally, there is plenty of information about the worker, the employer and the job. For instance, we are able to know the gender, the age, the nationality, birth locality, as well as education for all individuals. We also have detailed information about the firm's location, age, industry, number of workers, number of establishments and volume of sales. Job characteristics include the contract type, the exact occupation and skill level required, or the wage bargaining mechanism that applies.

3.2.3.4 *Muestra Continua de Vidas Laborales (MCVL)*

The MCVL is the result of several administrative forms that are collected every year by the Spanish administration for the computation of taxes and social security contributions. The Ministry of Social Security has made available a sample of these records since 2004 for research purposes. They randomly selected 4% of all individuals with a social security identification number. Every year, if these individuals have any contributive relationship with the social security, they will appear in the data file that is made available. For this purpose, it is enough that the social security records at least one day of contributive relationship, that is, an employment record from which the individual paid social security contributions, an unemployment subsidy or pension from which social contributions are discounted, etc. The data files will therefore include workers, but also pensioners or unemployed individuals. The same individuals are followed over time, with a unique identifier, but they may disappear from the data files in a given year if they did not experience any relationship with the social security. For example, after a long period of unemployment, when the worker stops receiving contributive unemployment benefits. If any contributive relationship is established again, the individuals will reappear in the data files of subsequent years. Nevertheless, the data files include one module where the entire contributive history of workers is available. One can therefore reconstruct the entire working history of the selected individuals from the data file of a single year. There are two versions of the MCVL database: one without fiscal data

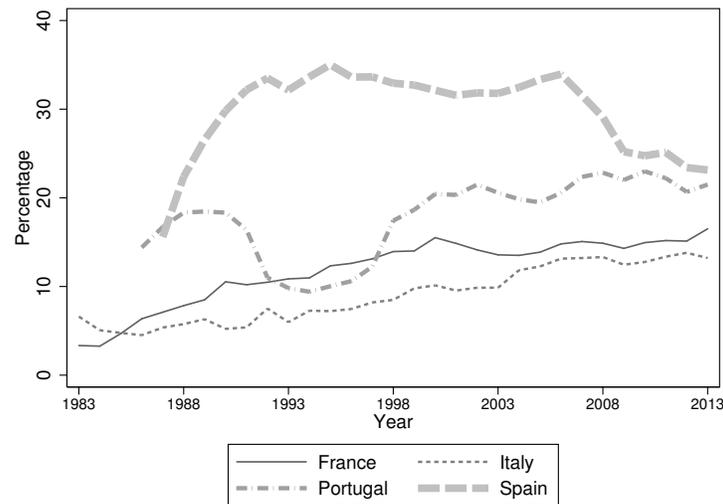
and one with fiscal data. We use the data set with fiscal data as it includes more precise earnings information and an employer identifier which the version without fiscal data does not have. Each observation in the historical record corresponds to one contributive relationship in a given calendar year. Workers who have more than one employer or who switch employers during the year will have more than one observation per year. There is several information about the worker characteristics, such as gender, nationality, birth place, age, residence or education. However, the education variable may not be updated or even available for all observations. It comes from municipality records that individuals fill voluntarily when registering. Regarding the job and the employer, the variables available include: the exact start and end date of the relationship, the current contract type, the initial contract type, the second contract type, the date at which the initial contract type was changed, the date at which the second contract type was changed, earnings over which contributions are computed, the firm industry, location, age and number of workers. Therefore, the MCVL offers a very complete record of employment contract types and allow us to track exactly in which contract every individual was hired and fixed-term contracts that have been converted into permanent. Note though that the current employment contract variable is only available in the historical records from 1991 onwards, and the information regarding initial and second contract only since 2005 (whenever a change did occur and missing otherwise). The fiscal module adds more information about earnings each year, namely gross earnings, net earnings and social contributions paid. The MCVL has no information about hours worked.

3.3 Stylised facts

3.3.1 Trends in temporary employment

The share of temporary contracts in aggregate employment has risen in the four countries from the 1980s to the middle of the years 2000s, as can be seen in Figure 3.1. Since then, it remained broadly constant or slightly uprising in France, Italy and Portugal at around 15%, 13% and 25%, respectively. In contrast, the share of atypical employment contracts has dramatically fallen in Spain, from above 30% until 2006 to slightly above 20% in 2013. Since these numbers result from the annual Labor Force Surveys, it consists of the share of temporary contracts in the stock of dependent employment each year. However, many

Figure 3.1: Temporary employees as a percentage of the total number of employed workers



Notes: Stock data. All atypical employment contracts are considered within the temporary jobs (Temporary work agencies, Apprenticeships, Collaborative contracts, Fixed-term contracts, etc.). All individuals older than 15 included. **Source:** OECD, based on annual Labor Force Surveys.

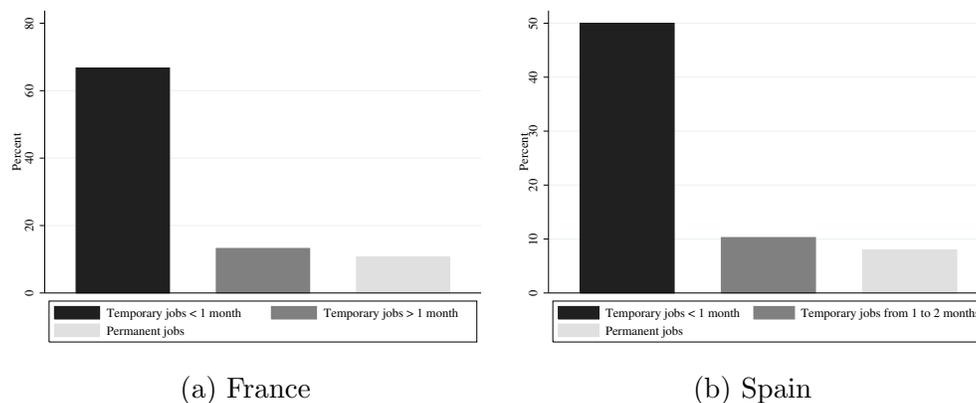
temporary contracts of a very short duration are not accounted for in these percentages. In fact, during the year, there could be a large number of temporary jobs being created and destroyed that are not captured in these statistics. In that sense, a more accurate measure of the extent in which temporary contracts are relevant for the labour market would be the share of temporary contracts in newly hired workers.

3.3.2 Entries into temporary and permanent employment

Although the stock of temporary employment contracts out of the total number of employed workers is quite significant, the numbers are even more striking if one looks at flow entries into employment, as in Figure 3.2. Entries into temporary jobs account for 80% to 90% of entries into employment in France and Spain. Furthermore, for the two countries, most entries into temporary employment are in contracts of a very short duration, such as less than one month. Temporary contracts shorter than a month account for about 65% of entries in France. In Spain, short-term contracts of less than 1 month account for 50% of all entries and temporary contracts lasting between 1 month and 2 months constitute about 10% of entries. The same figure could not be obtained for Italy and Portugal, for lack of detailed

data on the flows into each type of contract⁶. Figure 3.2. also highlights the fact that there is a distribution of different durations for temporary employment contract. Not all temporary contracts seem to have the same pre-determined duration. In Chapter 4, when deciding how to model the duration of fixed-term contracts, this fact will be used to justify a stochastic destruction rate, instead of a fixed duration of one time period.

Figure 3.2: Percentage of each contract type in the flow entries into employment



Notes: **Panel (a)** - Over the period 2000-2010. Only fixed-term contracts are considered in the temporary jobs. **Source:** ACOSS, *Déclaration Préalable à l'embauche* (DPAE). This is an exhaustive administrative record of all newly formed employment contracts, coming from unemployment, inactivity or employment at another firm, every quarter. The duration of the contract refers to the declared duration in the written contract, if known and specified. Does not include renewals of fixed-term contracts. **Panel (b)** - Over the period 2000-2010. All forms of temporary jobs are included. The duration of the contract refers to the observed duration of the employment spell, which may include renewals. **Source:** MCVL.

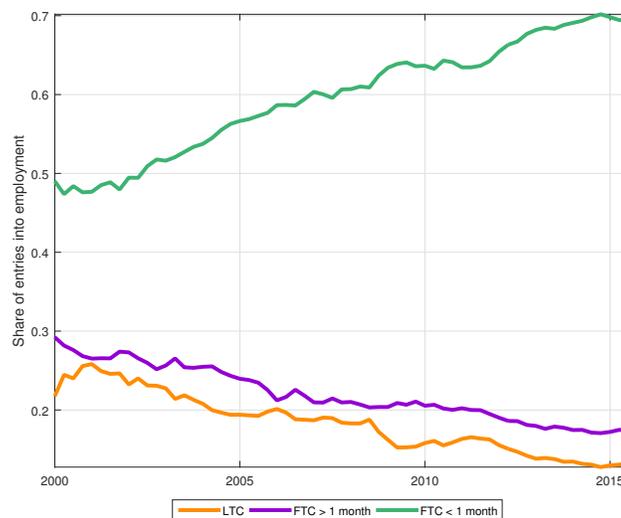
The nature of the data used for each country is quite different. For France, these are the exhaustive inflows into new employment and the duration specified in the first employment contract. It may not represent the entire duration of the spell since these temporary contracts could have been renewed afterwards. For Spain, inflows are obtained from social security records and the duration consists in the observed spell duration. Nevertheless, it is quite curious that employers opt for such short-term contracts, at least in an initial stage, given that probationary periods in permanent contracts exceed this amount of time. One could think that this is evidence against the idea that temporary contracts are merely used as

⁶As explained in section 4.3.3, the Portuguese Social Security database (IISS) records all flows into employment at a monthly frequency, but it does not keep track of the contract type for every entry. In Italy, the yearly aggregation of LoSai makes it inappropriate to look at the share of temporary contracts in newly formed jobs. The flows into each contract type could be approximated with the micro data LFS. We performed such approximation for the French LFS, the Italian LFS and the Portuguese LFS. However, for France, the results were significantly different than those obtained with the exact record of entry flows. This suggests a poor approximation to short-term entry flows with the LFS, due to the quarterly frequency. Therefore, we decided not to include such approximated results for Italy and Portugal.

screening devices by employers, to learn about individuals' abilities. In this context, the model developed later in Chapter 4 will not exploit the possibility that firms learn about the individuals' abilities using fixed-term contracts. We return to the duration of temporary employment spells in subsection 3.3.9, using similar data for all countries.

Using the DPAE data for France, we are able to analyse how the duration of the first fixed-term contract (without taking renewals into account) has evolved over time. Figure 3.3 depicts the share of fixed-term contracts of less than one month, more than one month and permanent contracts in the entries into employment.

Figure 3.3: Trend in the duration of fixed-term contracts - France



Notes: Over the period 2000-2010. Only fixed-term contracts are considered in the temporary jobs. **Source:** ACROSS, *Déclaration Préable à l'embauche* (DPAE). This is an exhaustive administrative record of all newly formed employment contracts, coming from unemployment, inactivity or employment at another firm, every quarter. The duration of the contract refers to the declared duration in the written contract, if known and specified. Does not include renewals of fixed-term contracts.

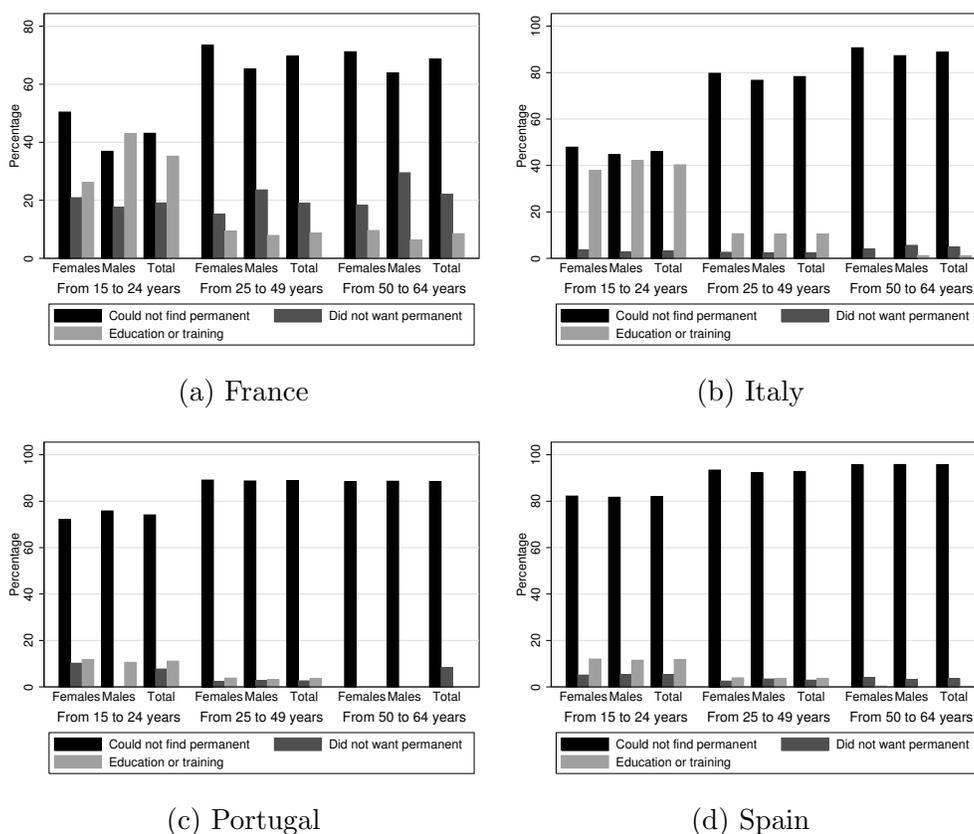
It is quite clear that fixed-term contracts have become increasingly shorter. We observe a significant rise in fixed-term contracts shorter than one month, while the share of fixed-term contracts longer than one month decreased together with the share of open-ended contracts. This trend towards fixed-term contracts of an extremely short duration can be observed since the year 2000 and has persisted until 2015.

3.3.3 Reasons for being on a temporary contract

Why do we observe so many temporary contracts? The use of temporary contracts could reflect the workers' preferences towards more flexible employment arrangements. This could

be particularly relevant for female workers. It could also be the case that young individuals are enrolled in education until longer and searching for short-term job opportunities to pay for their additional education expenses. Figure 3.4 depicts the main reason for being employed on a temporary contract by gender and age category. In most cases, being employed on a temporary contract does not seem to be the result of workers preferences for more flexible and short-term jobs. In fact, 60% to 80% of the workers aged 25 to 64, employed in a temporary contract, could not find a permanent contract. For the youngest workers in France and Italy (aged between 15 and 24), however, the main reason for being on a temporary contract is not as clear. Many young workers are on a temporary contract as part of their education or training. This can be explained by the wider spread of vocational training in France and Italy, compared to Spain and Portugal.

Figure 3.4: Reasons for being on a temporary contract in 2013



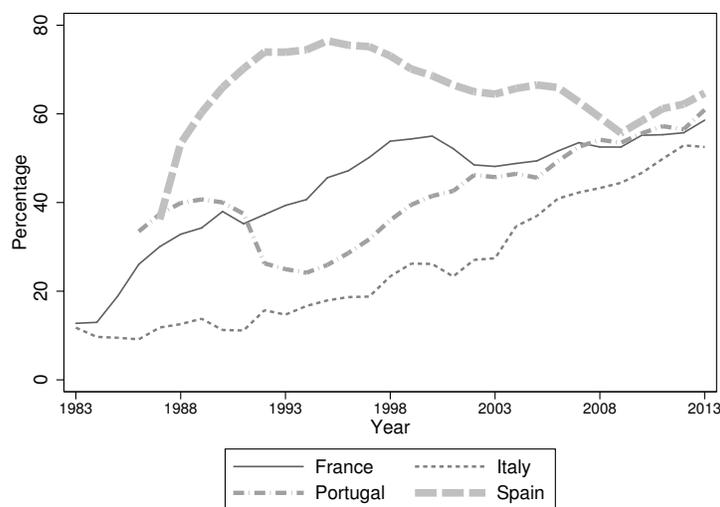
Notes: Survey answers to the question “Why are you employed with a temporary contract?”. Percentages out of the total number of workers within each gender and age category. All atypical employment contracts are considered within the temporary jobs (Temporary work agencies, Apprenticeships, Collaborative contracts, Fixed-term contracts, etc.). **Source:** Eurostat (*lfsa etgar*) based on annual Labor Force Survey.

For females below 25 years old, when women are more likely to detach from the labour market as a result of fertility, the fraction of temporary workers that did not want a permanent contract is not particularly relevant. It also does not seem significantly larger than for males, except for Portugal. Overall, France is the country where the fraction of workers who preferred a temporary contract over a permanent contract is the largest. This seems to be particularly the case for males aged 50 to 64 years old.

3.3.4 Youth in temporary employment

The share of temporary employment contracts is particularly significant for workers at a younger age who recently entered the labour market. This reinforces the idea of a segmented labour market, mainly between the youth and experienced workers. Figure 3.5 replicates Figure 3.1 for workers between 15 and 24 years old. The share of temporary employment contracts out of dependent employment is remarkable, growing to over 50% in all countries until recently.

Figure 3.5: Temporary employees as a percentage of the total number of young workers



Notes: Stock data. All atypical employment contracts are considered within the temporary jobs (Temporary work agencies, Apprenticeships, Collaborative contracts, Fixed-term contracts, etc.). All individuals aged between 15 and 24 years old. **Source:** OECD, based on annual Labor Force Surveys.

To understand whether temporary contracts are used as a port-of-entry to the labour market and more stable forms of employment or if young workers can remain trapped in temporary employment for a long period, Figure 3.6 shows the share of temporary employment by

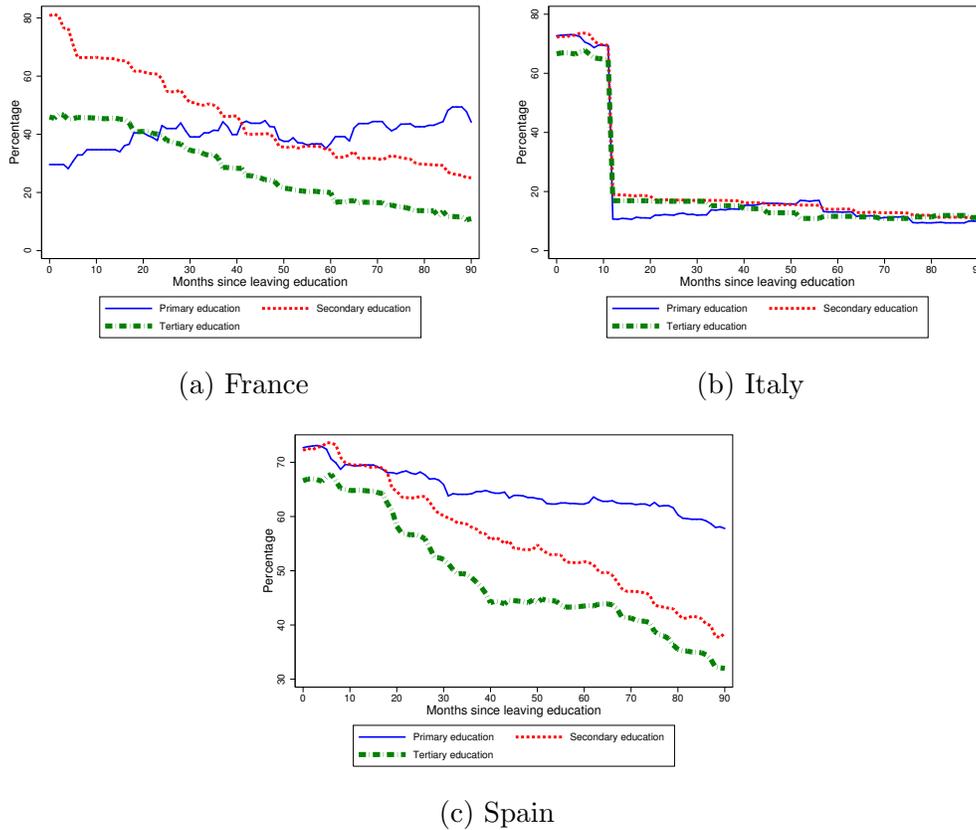
years since leaving education⁷. For all countries considered, the percentage of young workers employed in temporary contracts decreases over time, when the highest educational level attained is Secondary and Tertiary. The same applies for workers with solely Primary education in Italy and Spain. Nevertheless, in France, workers with Primary education are less likely to be employed on a temporary contract when they first enter the labor market, but the share of temporary workers increases with accumulated years of activity in the labour market. Overall, temporary employment seems quite persistent in France and Spain. It takes about 90 months (almost 8 years) after leaving education for the share of temporary contracts amongst young workers to reach the overall levels observed in Figure 3.1. The absorption of young workers into stable forms of employment is therefore quite slow. Again, this could also be used as piece of evidence that firms are not solely using temporary contracts to learn about workers' unobserved ability. Therefore, and as previously mentioned, learning about workers' types will not be included in the model developed in Chapter 4. In Italy, however, there is a clear discontinuity one year after leaving education. Young workers do not seem to get trapped into temporary forms of employment for long. This could be explained by legislation at the time, limiting the duration of fixed-term contracts for youth to one year maximum, as explained in Chapter 2.

3.3.5 Temporary contracts by level of educational attainment

Figure 3.6 revealed that young workers with primary education are more likely to be employed temporarily than workers with secondary and tertiary education in France, Italy and Spain. Figure 3.7 compares the education level of workers in different contract types for all four countries. Looking at the distribution of education within each contract type, workers with primary education are more significantly represented on temporary than permanent contracts in France, Italy and Spain. To the extent that educational is a proxy for workers' ability, this empirical finding suggests that workers are sorted across contract types based on their productivity. This will be exploited in the model developed in Chapter 4. For Portugal, on the other hand, workers with primary education are more greatly represented in permanent contracts, when compared with temporary contracts. For Portugal, the share of workers with tertiary education is higher in the total of temporary contracts than in the total of permanent contracts. Workers with secondary education seem to be equally represented

⁷The data is not available for Portugal.

Figure 3.6: Young workers in temporary employment by time since left education

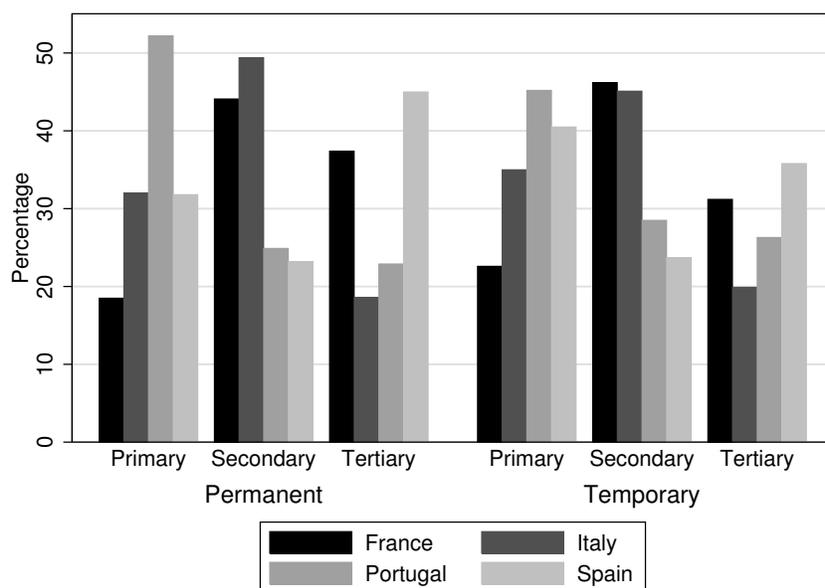


Notes: Panels (a), (b) and (c) - Percentage of young workers (aged 18 to 34) employed in a temporary contract, by months since left education, in 2000. All atypical employment contracts are considered within the temporary jobs (Temporary work agencies, Apprenticeships, Collaborative contracts, Fixed-term contracts, etc.). Highest educational degree obtained considered for education. Primary corresponds to ISCED 1-2, Secondary to ISCED 3-4 and Tertiary to ISCED 5-6. **Source:** Eurostat (*edat lfso 00t1*), based on Labor Force Surveys.

across each contract type.

From Figure 3.7, we conclude that it is not always the case the least educated workers are more likely to be hired on a temporary contract. The high share of workers with tertiary education in temporary employment observed in Portugal could be explained by the fact that younger workers are simultaneously more likely to hold a tertiary education degree and to be hired with a temporary employment contract. Otherwise, it could also be explained by a high mismatch of skills with job requirements.

Figure 3.7: Distribution of education in each contract type in 2013



Notes: Included all workers aged between 15 to 74. All atypical employment contracts are considered within the temporary jobs (Temporary work agencies, Apprenticeships, Collaborative contracts, Fixed-term contracts, etc.). Highest educational degree obtained considered for education. Primary corresponds to ISCED 0-2, Secondary to ISCED 3-4 and Tertiary to ISCED 5-6. **Source:** Eurostat (*edat lfs 9906*), based on Labor Force Surveys.

3.3.6 Workers in a fixed-term contract

Exploiting the administrative data sources, we now focus on the characteristics of workers who are employed in a fixed-term contract, the most common atypical form of employment. For each country separately, we estimate a Probit regression model for each country separately.

For France, the dependent variable is a dummy variable taking the value one if the worker is employed in a fixed-term contracts in the last quarter of 2005 - the first year for which the contract type is available in DADS. For that purpose, the spell data set is restructured as a quarterly panel data set. The sample only considers full-time employment and workers aged between 25 and 50 years old. We have excluded apprenticeships and internships, as well as employment spells with an hourly wage below twice the value of the hourly minimum wage. Further details about data cleaning and sample selection with each administrative source are available in Appendix A.1. We controlled for several individual characteristics as well as characteristics of the job and firm. The results are summarised in Table 3.1. Gender, nationality, age, tenure at the job, the firm size (measured by the number of employees) and

an indicator variable taking value one if the worker was already employed with a fixed-term contract at the beginning of the year, are all statistically significant at the 1% level.

Table 3.1: Probit regression - France - 4th quarter of 2005

VARIABLES	(1) Probit
Male	-0.0547*** (0.00685)
Foreign	0.0828*** (0.00888)
Age	-0.00648*** (0.000404)
Tenure (in quarters)	-0.124*** (0.000991)
Nr. establishments	-0.00381 (0.0154)
Nr. employees (in tens)	-3.38e-05*** (2.69e-06)
1 st quarter fixed-term	1.808*** (0.00630)
Constant	-4.827 (194.9)
Occupation	YES
Industry	YES
Region	YES
Firm status	YES
Observations	894,224
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Notes: The dependent variable is a dummy = 1 if the individual is employed in a fixed-term contract during the 4th quarter of 2005. The explanatory variable '1st quarter fixed-term' is a dummy = 1 if the same worker was already employed in a fixed-term contract in the 1st quarter of 2005. Sample restricted to individuals working full-time and aged between 25 and 50 years old. **Source:** DADS 2005-2010, restructured as a quarterly panel.

Female workers are more likely to be employed in a fixed-term contract than males. Workers with a foreign nationality are also more likely to be on a fixed-term contract. Both age and tenure are associated with a lower probability of being employed in a fixed-term contract.

The firm size, as measured by the number of employees, seems to indicate that larger firms are less likely to employ individuals with fixed-term contracts. Firm size, measured by the number of establishments, is not statistically significant when controlling for the firm's number of workers.

None of the dummy variables for occupations were statistically significant. The economic activity of the firm, on the other hand, is an important explanatory factor for the probability of being employed in a fixed-term contract. The baseline category was a job in the agriculture, forestry and fishing industry and all dummy variables had a positive sign except for one: administrative and support service activities. Therefore, almost all economic activities are more likely to lead to a fixed-term contract than a job in agriculture, forestry or fishing industry. Administrative jobs, on the other hand, are less likely to be held in a fixed-term contract. The location of the firm at the regional level is also a statistically significant explanatory variable. The reference group was the region of Guadeloupe. Jobs held in other overseas regions (Martinique, Guyane and Reunion) are more likely to be in a fixed-term contract, while jobs held in metropolitan France are less likely to be fixed-term. We also control for the firm status, that is, whether it is a public firm owned by the state, a public firm owned by local authorities, a public hospital, a public administration job, a commercial firm with public ownership or participation, a firm owned by a single individual or a private firm. The baseline category is a job in a public firm owned by the state. We find that other jobs associated to the public sector are more likely to be held in a fixed-term contract, except for jobs in a commercial firm with public ownership or participation. The coefficient for jobs in public hospitals is not statistically significant. Any job in a private firm (small or large firms) is less likely to be held in a fixed-term contract.

Even controlling for worker, job and firm characteristics, the fact that the worker was previously employed in a fixed-term contract at the beginning of the year seem to be an important determinant of whether the individual is still employed in the same contract type at the end of the same year. This could indicate that once employed in a fixed-term contract, workers are more likely to receive other offers of short-term jobs. There could be unobserved characteristics of the worker that make the individual more likely to be employed in a fixed-term contract or firms look at the previous employment contract types as a signal of the worker's productivity. The possibility that workers sort into temporary and permanent contracts based on unobservable characteristics will be further exploited in Chapter 4.

For Portugal, the dependent variable is a dummy variable taking the value one if the individual is employed in a fixed-term contract in October 2006, exploiting the annual panel structure of the dataset. The results are summarised in Table 3.2. The Portuguese data also provides information about the education and skill level of workers. We are therefore able to control for these additional characteristics. We also control for the firm's volume of sales and the percentage of capital that is public and foreign. The results for gender, nationality, tenure and firm size - measured by the number of employees - are qualitatively similar between France and Portugal. The exact value of the coefficients is not directly comparable since the two data sets have different structures. Being employed in a fixed-term contract in the previous year also contributes positively to the likelihood of being employed in a fixed-term contract currently. The coefficient is significant at the 1% level, positive and large.

Table 3.2: Probit regression - Portugal - 2006

VARIABLES	(1) Probit
Male	-0.0141** (0.00579)
Foreign	0.0671*** (0.0104)
Age	0.000554 (0.000356)
Tenure (in years)	-0.00865*** (5.44e-05)
Nr. employees (in tens)	-0.000881*** (2.75e-05)
Primary education	0.218*** (0.0110)
Secondary education	0.137*** (0.00928)
Firm's sales volume (in thousands)	8.25e-11*** (0)
Public capital	-0.000582*** (0.000182)
Foreign capital	-0.000204** (8.57e-05)
Fixed-term previous year	2.336*** (0.00447)
Constant	-1.516*** (0.103)
Occupation	YES
Industry	YES
Region	YES
Skill level	YES
Observations	1,087,980

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The dependent variable is a dummy = 1 if the individual is employed in a fixed-term contract in October 2006. The explanatory variable 'Lag fixed-term' is a dummy = 1 if the same worker was already employed in a fixed-term contract in October 2005. Sample restricted to individuals working full-time and aged between 25 and 50 years old. **Source:** QdP 2005-2009, structured as a yearly panel.

In terms of educational level, the baseline group was individuals with a tertiary education degree. Both coefficients associated to primary and secondary education are highly statistically

significant and positive. Individuals with secondary education, and in particular, those with primary education, are therefore more likely to be hired with a fixed-term contract than those with tertiary education, holding everything else constant. We can compare this result with the findings from section 3.3.5 for Portugal, where workers with tertiary education were more represented in fixed-term contracts than permanent contracts. In section 3.3.5, the worker and firm characteristics were not controlled for. Therefore, this could imply that workers with tertiary education tend to work in occupations which are more likely to be temporary, or for firms in sectors that are more likely to employ fixed-term contracts. Nevertheless, if the occupation, sector of activity and firm characteristics are identical, individuals with tertiary education are less likely to be hired with a fixed-term contract.

The baseline category for the skill dummies was that of workers employed as managers. The coefficients associated with other categories, such as technicians, line supervisors or high-skill workers, were not statistically significant. Coefficients associated with categories like semi-skilled workers, unskilled workers and workers in training, on the other hand, were highly statistically significant and positive. Workers at these skill levels are therefore more likely to be employed in a fixed-term contract than workers employed as managers.

Focusing on the firm's characteristics, we find that the greater the volume of sales of the employing firm, the higher the probability that the worker is hired with a fixed-term contract. On the other hand, the higher the share of public capital, and also, foreign capital, the lower the likelihood that the worker is in a fixed-term contract.

3.3.7 Earnings in different contract types

Looking at the average wages in each contract type, without controlling for any characteristics, we find that workers on fixed-term contracts earn less than workers on permanent contracts. This wage gap, widely reported in the empirical literature⁸, can be the result of selection of workers and firms into each contract type. For example, as previously discussed, temporary employment contracts are widely used amongst younger inexperienced workers, eventually with lower educational levels. But workers could also be sorted across contract types based on their unobserved characteristics. To investigate further if this wage gap persists for any age category, experience level or when controlling for worker fixed effects, we

⁸See, for instance, De la Rica (2000) for the Spanish case, Blanchard and Landier (2001) for France, Tealdi (2011) for Italy.

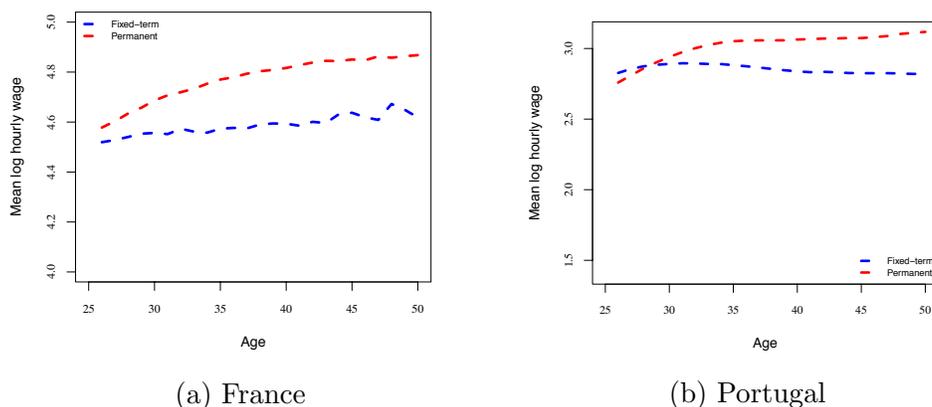
now analyse wages in different contract types using the administrative data sources.

To begin with, we characterise the level of inequality in earnings over the life-cycle in fixed-term and permanent contracts separately. Figure 3.8 represents the average log hourly wage for different age groups in the two types of contract and Figure 3.9 plots the variance of the log hourly wage. These figures are obtained by estimating the following regression with longitudinal administrative data, separately for workers employed in fixed-term or permanent contract:

$$\log w_{it} = \sum_a \beta^a d_{it}^a + \sum_c \beta^c d_{it}^c + \epsilon_{it} \quad (3.1)$$

where w_{it} is the hourly wage of individual i in year t , d_{it}^a are a full set of age dummies, and d_{it}^c a full set of cohort dummies. The parameters β^a and β^c are estimated by Ordinary Least Squares (OLS) and each β^a is interpreted as the average log hourly wage for individuals aged a , net of cohort effects. These wage profiles are common in the earnings dynamics literature. The novelty here, is that we explore potential differences in the life-cycle profile across employment contracts.

Figure 3.8: Mean wage profile for males on different employment contracts

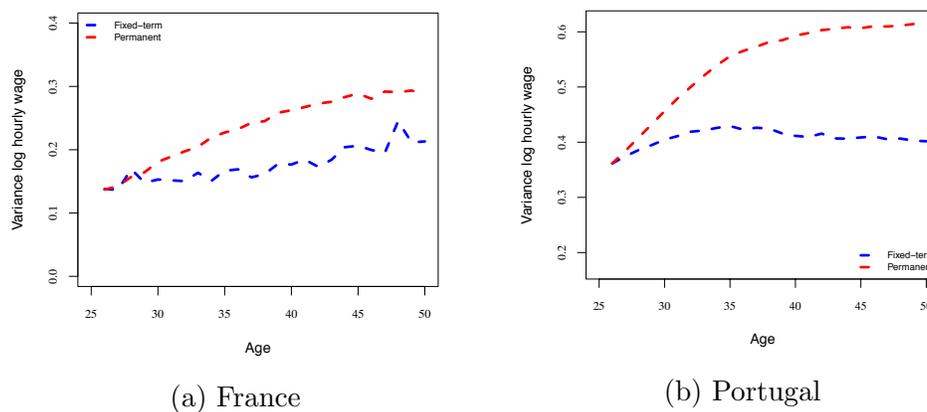


Notes: Only fixed-term contracts are considered. Sample selection: only firms in the private sector and full-time jobs are considered. We also excluded some sectors, such as: domestic work, religious, agriculture, hunting, fishing, extracting industries, construction, tourism, public sector and extra-territorial activities. We considered nominal log hourly wages before taxes. To compute the hourly wage, all earnings were taken into account (including regular or irregular subsidies, premiums, payment of extra hours, etc.) and all the paid hours (including extra hours). Only the main job is considered for workers with multiple jobs. Finally, we only looked at males aged between 25 and 50 years old. **Panel (a)** - Source: DADS, 2005-2010. **Panel (b)** - Source: QdP, 2000-2009.

We find that workers on fixed-term contracts earn higher wages at the early stage of their career, when the selection across contracts based on workers (unobserved) ability or pro-

ductivity is less likely to be present. This could reflect a compensating differential for the higher precariousness implied in fixed-term contracts. With ageing and the accumulation of experience in the labour market, workers on a permanent contract eventually surpass those still on a fixed-term contract, resulting in growing inequality across their wages. In France, for example, if some individuals were to remain trapped in fixed-term contracts until the age of 35, the wage of their permanent counterpart would be higher in roughly 22%. Different factors could be at force. First, sorting of more productive workers into permanent contracts, resulting in higher wages overall. Second, workers in permanent contracts are likely to have more seniority than workers in fixed-term contracts, which is known to bring positive returns. On the other hand, even if the productivity and seniority of workers in permanent and fixed-term contracts would be identical, workers on fixed-term contracts may carry a more unstable labor market history, with frequent episodes of unemployment between temporary contracts, which *per se* would result in lower negotiated wages. This could be particularly relevant when compared with individuals in permanent contracts who change employers over time and negotiate wages with a better outside option.

Figure 3.9: Variance wage profile for males on different employment contracts



Notes: Only fixed-term contracts are considered. Sample selection: only firms in the private sector and full-time jobs are considered. We also excluded some sectors, such as: domestic work, religious, agriculture, hunting, fishing, extracting industries, construction, tourism, public sector and extra-territorial activities. We considered nominal log hourly wages before taxes. To compute the hourly wage, all earnings were taken into account (including regular or irregular subsidies, premiums, payment of extra hours, etc.) and all the paid hours (including extra hours). Only the main job is considered for workers with multiple jobs. Finally, we only looked at males aged between 25 and 50 years old. **Panel (a)** - Source: DADS, 2005-2010. **Panel (b)** - Source: QdP, 2005-2009.

A similar life-cycle pattern is observed regarding the variance of wages in fixed-term and permanent contract. The cross-sectional variance of wages in fixed-term and permanent

contracts is very similar in early stages of the life-cycle. Nevertheless, with age, the variance of wages in permanent contracts increases and becomes much larger than that of fixed-term contracts. This is particularly the case in Portugal where the cross-sectional variance of wages in fixed-term contracts does not change significantly across age groups. Using the same data set and sample selection criteria, we estimated three different regressions, with the individual log hourly wage as a dependent variable. The first is a simple OLS regression controlling for worker and firm characteristics. The second adds information about the past contract type to the former regression. And finally, the last regression uses a fixed-effect estimator, also known as the within estimator, to control for individual unobserved characteristics. Table 3.3 summarises the results for France, with the data set structured as a quarterly panel. In the three specifications, we find that workers in a fixed-term contract earn on average less than workers in a permanent contract, holding personal and firm characteristics constant. Controlling for the previous contract type - whether it was a fixed-term contract too - reduces the magnitude of the coefficient associated with the current fixed-term contract dummy, which remains statistically significant at the 1% level nevertheless. Curiously, workers who are employed with temporary work agencies actually earn a higher hourly wage on average, than workers in a permanent contract. Workers in apprenticeship contracts, on the other hand, earn on average less.

Table 3.3: Wage regressions - France

VARIABLES	(1) OLS	(2) OLS Dynamic	(3) Fixed Effects
Fixed-term	-0.035*** (0.00033)	-0.01112*** (0.0004397)	-0.00944*** (0.00057)
Fixed-term last quarter		-0.02446*** (0.00041)	-0.00205 (0.00039)
Temporary	0.1052*** (0.00053)	0.11717*** (0.00061)	0.0804*** (0.0011)
Apprenticeship	-0.3209*** (0.00659)	-0.30237*** (0.009277)	-0.28348*** (0.01168)
Male	0.0893*** (0.00023)	0.0913*** (0.00026)	
Foreign	-0.0131*** (0.000298)	-0.0121* (0.00034)	
Tenure (year)	0.0281*** (0.0000741)	0.02697*** (0.00008)	0.00918*** (0.00011)
Firm nr. employees	2.68e-06*** (5.26e-08)	2.30e-06*** (5.92e-08)	1.96e-06*** (1.61e-07)
Firm nr. estab	-0.0151*** (0.000496)	-0.0157*** (0.00054)	-0.00123*** (0.00053)
Constant	2.6553*** (0.03232)	2.589*** (0.0522)	2.628*** (0.0763)
Observations	8,908,615	6,927,689	6,927,706
R-squared	0.125	0.202	0.004
Year FE	YES	YES	YES
Occupation FE	YES	YES	YES
Region FE	YES	YES	YES
Industry FE	YES	YES	YES
Skill FE	YES	YES	YES
Firm status FE	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the log hourly wage. Sample restricted to individuals working full-time and aged between 25 and 50 years old. **Source:** DADS 2005-2010, restructured as a quarterly panel.

Table 3.4 summarises the results for Portugal, where the specification affects the results significantly. In fact, controlling for the contract type in the previous year changes the sign of the coefficient associated to the current fixed-term contract dummy. This suggests that

workers in fixed-term contracts do not systematically earn less than workers in permanent contracts. The lower wage, on average, observed for fixed-term workers can be explained by their personal characteristics, the characteristics of their employer and their recent labour market history. The model developed in Chapter 4 will be able to reproduce lower average wages in fixed-term contracts, compared to permanent contracts, explained by the selection of workers with lower productivity in contracts of shorter durations.

Table 3.4: Wage regressions - Portugal

VARIABLES	(1) OLS	(2) OLS Dynamic	(3) Fixed Effects
Fixed-term	-0.00976*** (0.000332)	0.00887*** (0.000679)	-0.000313 (0.000688)
Fixed-term last year		-0.0190*** (0.000651)	-0.00105** (0.000532)
Temporary	-0.0199*** (0.00146)	-0.00575** (0.00261)	0.0136*** (0.00424)
Male	0.157*** (0.000329)	0.164*** (0.000421)	
Foreign	-0.00616*** (0.000757)	0.00808*** (0.00110)	
Tenure (years)	0.000872*** (1.58e-06)	0.000798*** (1.96e-06)	1.06e-06 (7.53e-06)
Firm sales (1000s)	5.96e-09*** (1.79e-10)	6.63e-09*** (2.04e-10)	-1.79e-09*** (2.26e-10)
Firm nr. workers (10s)	6.57e-05*** (6.20e-07)	4.69e-05*** (7.29e-07)	4.35e-06*** (1.41e-06)
Firm % public capital	0.00146*** (7.89e-06)	0.00141*** (9.71e-06)	0.000249*** (2.18e-05)
Firm % foreign capital	0.00198*** (5.17e-06)	0.00199*** (6.46e-06)	0.000608*** (1.59e-05)
Constant	1.395*** (0.00678)	1.428*** (0.00837)	1.742*** (0.0125)
Observations	8,832,571	5,444,463	5,912,889
R-squared	0.632	0.643	0.092
Year FE	YES	YES	YES
Occupation FE	YES	YES	YES
Region FE	YES	YES	YES
Industry FE	YES	YES	YES
Skill FE	YES	YES	YES
Education	YES	YES	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

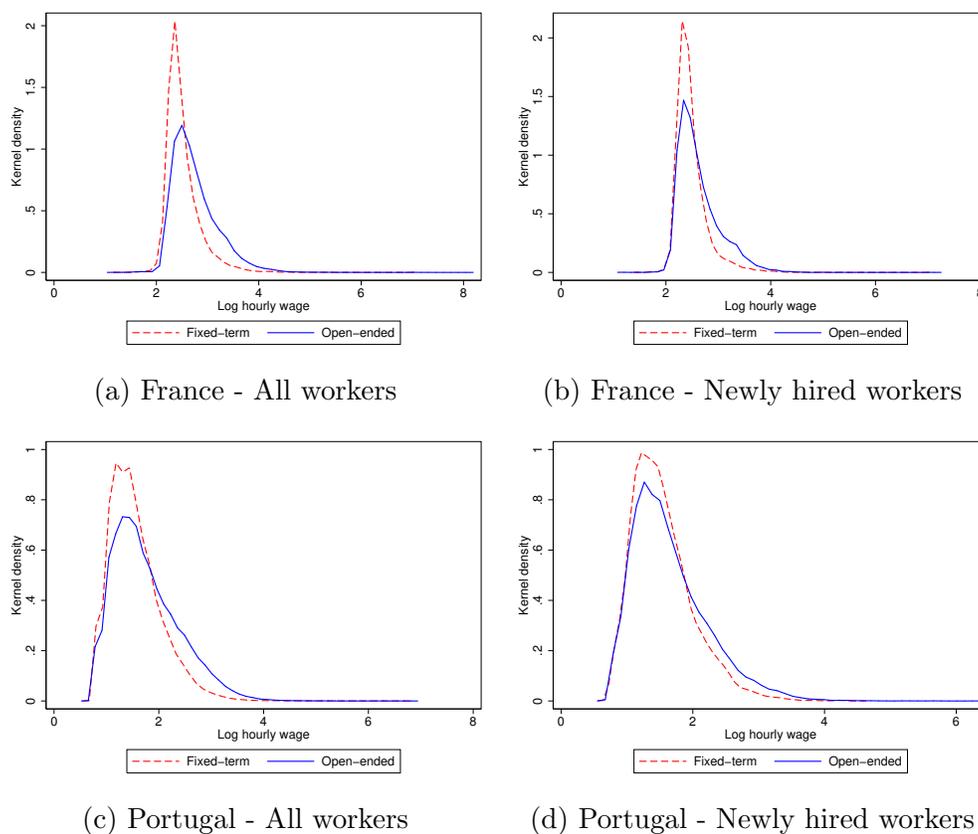
Notes: The dependent variable is the log hourly wage. Sample restricted to individuals working full-time and aged between 25 and 50 years old. **Source:** QdP 2005-2009, structured as a yearly panel.

From the third and last column in Table 3.4, it can also be seen that the dummy variable

indicating whether the individual is in a fixed-term contract or not loses statistical significance when we account for worker unobserved heterogeneity using the within estimator. The remaining coefficients, except for the one associated with being a foreign worker, are consistent across specification.

While wage regressions are extremely informative regarding average wage gaps between fixed-term and permanent workers, one may also be interested in other moments of the wage distribution apart from the mean. Figure 3.10 depicts the kernel density distribution of the log hourly wage in France (panel (a) and (b)) and Portugal (panel (c) and (d)) for fixed-term workers and permanent workers separately. Observing the shape of the distributions conveys some information regarding wage dispersion (the variance of wages overall) and the probability that individuals receive potentially extreme wage rates (the mass of individuals in that situation - kurtosis - and the probability of extreme values - skewness).

Figure 3.10: Kernel density of the log hourly wage for all and newly hired male workers

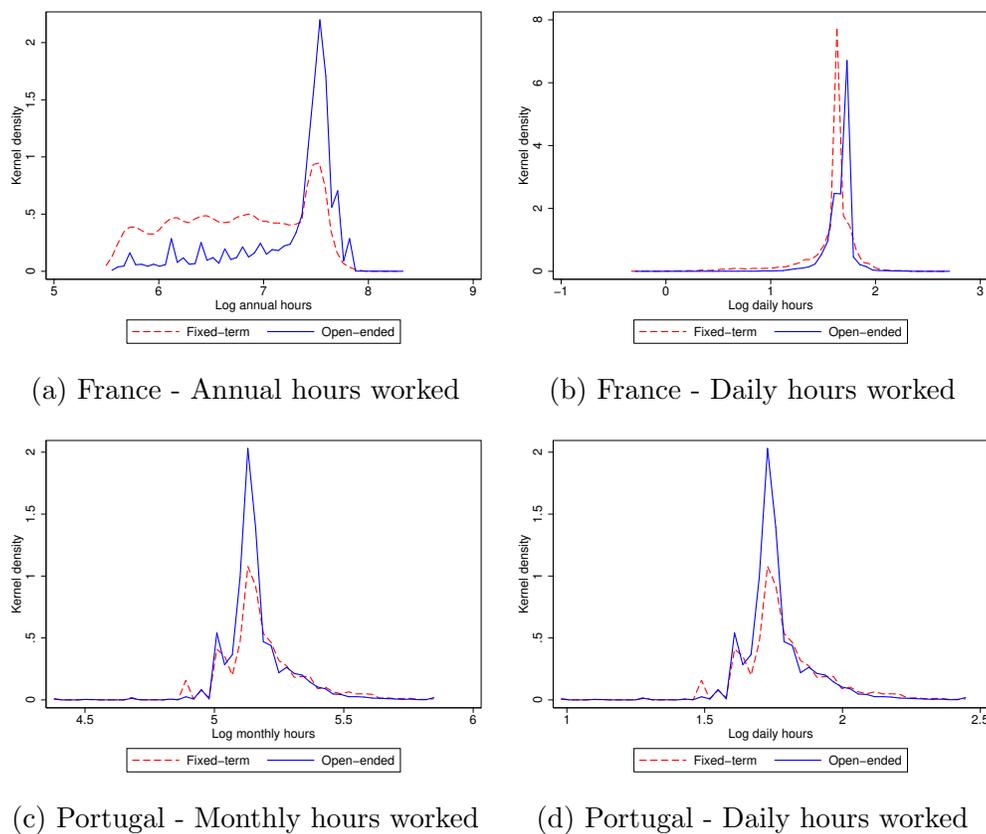


Notes: Panel (a) - Source: DADS, 2006. Panel (b) - Source: QdP, 2006.

Overall, hourly wages are more dispersed in permanent contracts than fixed-term contracts.

This is true in France and Portugal, for all male workers together and for only newly hired male workers, i.e. male workers with less than one year of tenure at the job. The kurtosis for wages in fixed-term contracts is higher in both countries, meaning that there is a larger mass of workers earning an hourly wage that is close to the mode of the distribution than for permanent contracts. The distribution for both fixed-term and permanent wages are right-skewed. However, the skewness is much higher for permanent wages than for wages in fixed-term contracts. Therefore, one is much more likely to encounter extreme positive hourly wage rates in permanent contracts than fixed-term contracts.

Figure 3.11: Kernel density of annual and daily hours worked for male workers



Notes: Panel (a) - Source: DADS, 2006. Panel (b) - Source: QdP, 2006.

Figure 3.11 replicates Figure 3.10 for the number of hours worked. Panels (a) and (b) refer to France, while panels (c) and (d) refer to Portugal. For France, we depict the distribution of annual hours worked and daily hours worked. For Portugal, we depict the distribution of monthly hours worked (with October being the reference month as previously explained) and daily hours worked. The analysis in this section so far has used the hourly wage rate.

Nevertheless, the number of hours worked is also relevant when comparing earnings between fixed-term and permanent contracts. Even if the hourly wage rate is close between the two contracts in some cases, earnings may differ significantly if individuals in fixed-term contracts work less hours than those in permanent contracts. Annual and monthly hours worked will be affected by the number of days that individuals are employed. If fixed-term workers experience several spells of unemployment between two short-term contracts, they will work significantly less hours than permanent workers who have always been employed during the year or month. From the left-hand side panels, we can see that fixed-term workers are likely to work less hours than permanent workers over the entire year. This is striking from panel (a) which refers to France. The difference is not as marked during a single month, as of panel (c), which refers to Portugal. This will of course affect fixed-term workers annual earnings. The distributions for daily hours worked, on the right-hand side, are not too different between the two contract types. The mode daily hours worked for fixed-term workers is slightly lower in France than for permanent workers, suggesting slightly shorter journeys.

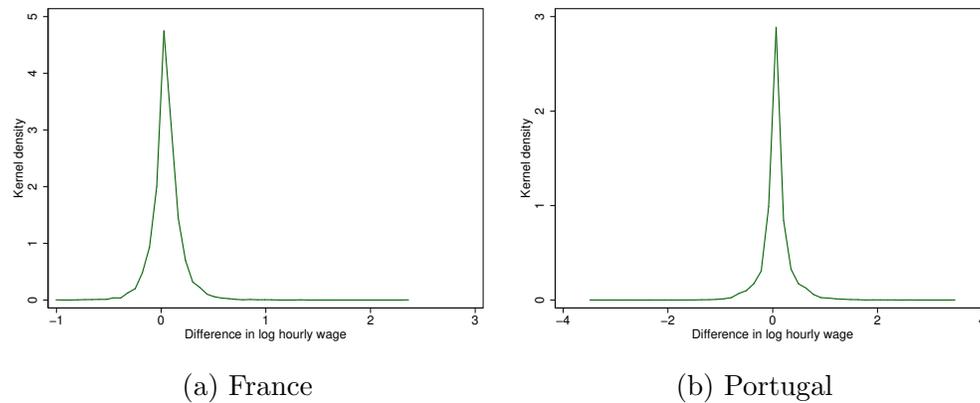
Finally, Figure 3.12 depicts the distribution of the wage change when the same worker is converted from a fixed-term to a permanent contract at the same firm, and Figure 3.13 represents the distribution of the wage change when a worker switches employer and potentially contract type. What is striking from Figure 3.12 is that although centered around zero in both countries, there are still some really extreme negative changes and a large mass of slightly negative values. This means that in many cases, workers are willing to accept a wage cut in exchange for a permanent contract, which offers further stability and career prospects.

The idea that workers are willing to take a wage cut for a more stable contract or a contract offering better career prospects is confirmed by Figure 3.13, especially panel (a) which refers to France. In fact, the distribution for wage changes after a move from a fixed-term to a permanent contract has a particularly long left tail, implying that there are some extreme wage cuts in this case that are not observed when a worker moves to another fixed-term contract⁹.

The model described in Chapter 4, estimated using the French administrative matched employer-employee data used to analyse the wage distributions in each contract type, will be able to replicate this empirical regularity.

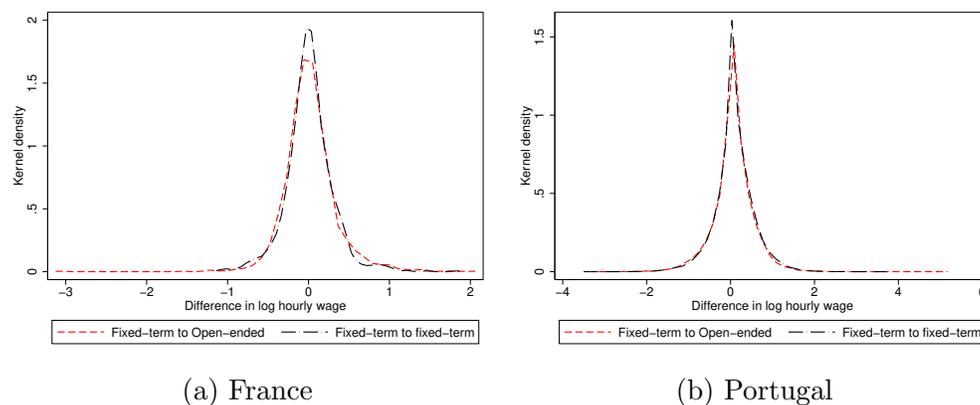
⁹The fact that individuals are willing to accept a wage cut upon moving jobs was already reported by Jolivet et al. (2006).

Figure 3.12: Kernel density of log hourly wage change after conversion from fixed-term to permanent for male workers



Notes: Panel (a) - Source: DADS, 2006. Panel (b) - Source: QdP, 2006.

Figure 3.13: Kernel density of log hourly wage change after changing employer for male workers



Notes: Panel (a) - Source: DADS, 2006. Panel (b) - Source: QdP, 2006.

3.3.8 Turnover in a segmented labor market

Tables 3.5 to 3.6 show the quarterly transition probabilities from one state to the other in the labour market, for each country. We differentiate transitions from one contract type to the other, depending on if it is with the same employer or a new one.

In France, about 5% of the workers hired on a fixed-term contract are promoted to a permanent contract the following quarter, within the same firm. Instead, approximately 2% find a permanent contract at another firm. Nevertheless, the likelihood of returning to unemployment is much higher. Every quarter, about 11% return to the job search process and

Table 3.5: Quarterly transition probabilities across employment states, France, 2011-2012

	OLF (t)	U (t)	FT (t)		P (t)	
			Same firm	New firm	Same firm	New firm
OLF ($t-1$)	96.56%	1.93%		0.76%		0.76%
U ($t-1$)	15.71%	67.45%		11.64%		5.20%
FT ($t-1$)	7.34%	10.77%	70.36%	4.82%	4.93%	1.78%
P ($t-1$)	1.39%	0.67%	0.12%	0.21%	96.50%	1.11%

Columns - status in quarter t . Rows - status in quarter $t - 1$. States considered in respective order: Out of the Labor Force (OLF), Unemployment (U), Employed in fixed-term contract (FT) and Employed in permanent contract (P). Transitions to different employer identified based on the date of admission at the current job. Only fixed-term contracts are considered. Temporary agencies and apprenticeship contracts are ignored. Only dependent employment is considered. Source: Calculations made by author based on micro data LFS (EE). Sample selection excluded jobs held outside France and in the military. Sample size: 816 657 individuals-quarter.

7% exit the labor force. This contrasts with only 0.7% and 1.4%, respectively, in permanent contracts. Hence, as expected, worker with a permanent contract have a more stable position than those on a fixed-term contract. The estimated transition rates suggest that temporary contracts do not fully fulfil the role of stepping-stones to more stable employment contracts. If firms merely use fixed-term contracts to learn about workers' unobserved ability, one would expect higher transition rates from fixed-term to permanent contract with the same employer. As previously mentioned, this empirical finding is used to justify the fact that the model in Chapter 4 ignores learning about workers' types while employed in fixed-term contracts. Note, as well, that there is very little downgrading for the workers with a permanent contract toward a fixed-term contract. The most common destination for the workers previously employed on a permanent contract, when not remaining at their current job, is inactivity or a permanent contract at a new employer. Regarding transitions to other employers, we observe many more job-to-job transitions for workers employed in fixed-term contracts than for workers employed permanently. Workers on fixed-term contracts will be employed at another firm the following quarter in about 6.6% of the cases. Workers on a permanent contract, on the other hand, will switch employer in 1.3% of the cases. This may suggest that workers in different contract types contact potential employers at different frequencies. Accordingly, the model in Chapter 4 will consider different contact rates for workers in fixed-term and permanent contracts,

Conclusions regarding the greater stability in permanent contracts, when compared to fixed-

Table 3.6: Quarterly transition probabilities across employment states, Portugal, 2011-2012

	OLF (t)	U (t)	FT (t)		P (t)	
			Same firm	New firm	Same firm	New firm
OLF ($t-1$)	96.09%	1.11%		1.96%		0.84%
U ($t-1$)	37.85%	50.46%		9.34%		2.35%
FT ($t-1$)	22.97%	0.31%	48.38%	15.51%	10.28%	2.54%
P ($t-1$)	5.5%	0.03%	1.79%	1.22%	90.27%	1.19%

Columns - status in quarter t . Rows - status in quarter $t - 1$. States considered in respective order: Out of the Labor Force (OLF), Unemployment (U), Employed in fixed-term contract (FT) and Employed in permanent contract (P). Transitions to different employer identified based on the date of admission at the current job. Only fixed-term contracts are considered. Temporary agencies and collaborative contracts are ignored. Only dependent employment is considered. Source: Calculations made by author based on micro data LFS (IE). Sample selection excluded jobs held outside Portugal and in the military. Sample size: 318 290 individuals-quarter.

term contracts, are similar for Portugal. Note that there are many more transitions from fixed-term contracts to inactivity, instead of unemployment¹⁰. For Portugal, the quarterly transition probability from a fixed-term contract to a permanent contract is higher. About 10% of the workers hired on a fixed-term contract will be promoted to permanent every quarter, with the same employer. This suggests that fixed-term contracts work more as a stepping stone in Portugal than in France. The job-to-job transition probability of workers in a fixed-term contract is also much higher in Portugal, suggesting a higher rotation between firms for these workers, or that fixed-term employment spells (eventually over successive renewals) are shorter. We investigate the duration of temporary employment spells in section 3.3.9.

Regarding the entry flows into employment, coming from unemployment, inactivity and employment at other firms, we found in section 3.3.2 that in France, out of 100 entries into new employment every quarter, there are about 10 entries directly into a permanent contract and 90 entries into temporary jobs of different durations. From those 90 entries into temporary employment, about 5% will be promoted to permanent every quarter. Therefore, there are 15 entries into a permanent contract every quarter, for each 100 entries into employment from inactivity, unemployment and employment at another firm. This implies that $1/3^{rd}$ of entries into permanent contracts come from the conversion of temporary employment

¹⁰This could be explained by different statistical criteria when classifying workers who are considered unemployed or out of the labor force.

contracts.

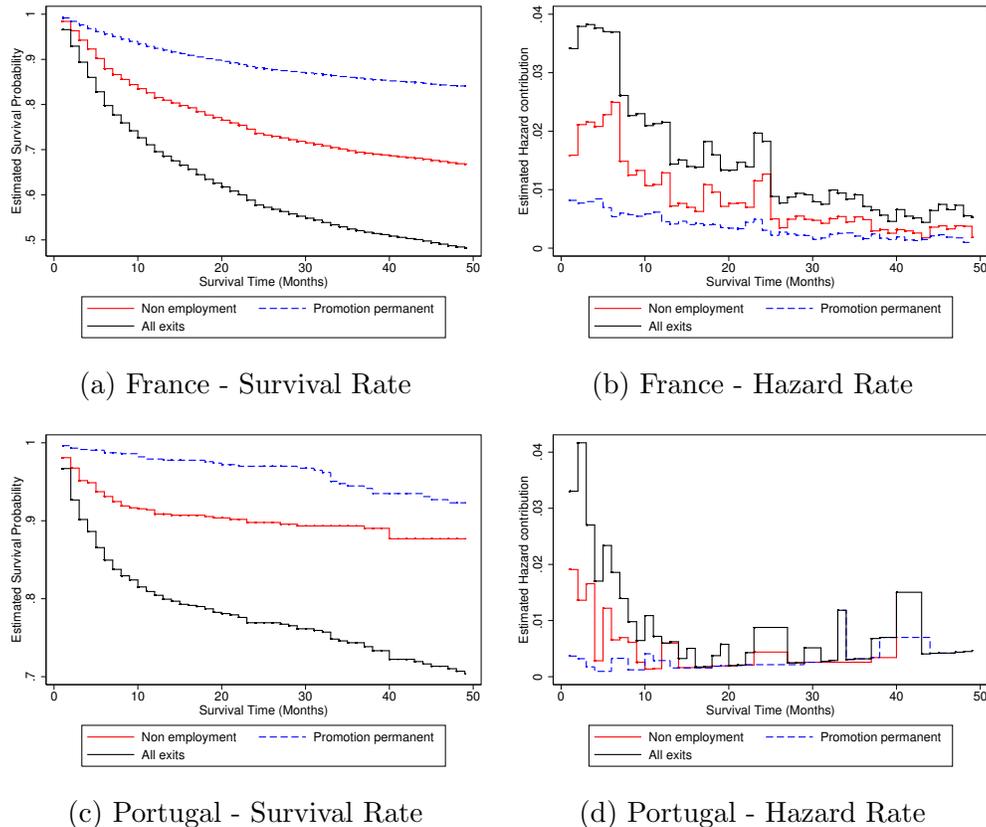
3.3.9 Duration of temporary employment spells

How short are the employment spells in temporary contracts? That is, how long do workers on temporary contracts remain employed until they return to unemployment or move to another state? The transition probabilities computed earlier tell us the probability of each scenario, every quarter. But by following individuals over time, we obtain a clearer picture about which event is likely to occur first. Consider that when a worker is employed in a fixed-term contract, there are four possible events, for every observed period of time: (i) the worker is promoted to a permanent contract with the same firm; (ii) the contract expires, is not renewed, and the worker leaves to non-employment; (iii) the worker exits the fixed-term contract for all other reasons (retirement, voluntary quit, job to job movement, etc.); (iv) the path is censored and we do not observe what happens to the worker. The left column of Figure 3.14 depicts the non-parametric survival function in fixed-term contracts, for all exits, exits to non-employment and exits for a permanent contract with the same employer, accounting for right-censoring. The right column, on the other hand, represents the (non-parametrically estimated) hazard contribution for each of these events to occur at any point in time.

The duration of fixed-term employment spells implied by Figure 3.14 takes into account all subsequent fixed-term contracts with the same employer, therefore adding up with each renewal. Eventually, if the same firm offers fixed-term contracts to the same worker, but for different positions, these will also be included in the same fixed-term employment spell. Employer changes are identified based on the self-reported date of admission at the current job by every worker in the micro data LFS. It is likely that workers who experienced several fixed-term contracts with the same firm, but separated by periods of unemployment or other short jobs, will report the initial date of the first contract as the date of admission. Consequently, the computed durations are very large. Raw durations (ignoring right censoring) of fixed-term employment spells above the 95th percentile may even span decades. In France, the raw median duration is 17 months (1 year and a half) and the 90th percentile is 93 months (almost 8 years). In Portugal, the raw median duration is 16 months and the 90th percentile is 81 months (almost 7 years).

This explains why after 50 months, the estimated survival probability (to exit for any rea-

Figure 3.14: Survival and Hazard functions



Notes: Only fixed-term contracts are considered. For every individual in a fixed-term contract at some interview date, we take the date of admission into the job (month and year) to be the starting point of the spell. In the following interviews, if the individual is observed and non-employed, we check the date in which the individual reports having left his previous job (month and year) and set it as end date of the fixed-term spell. If the worker is employed in a permanent contract and the admission date has not changed, we take that interview date (month and year) to be the end date of the fixed-term spell, for a promotion to permanent with the same employer. If the worker is still employed, but the admission date has changed (suggesting a job-to-job movement), we take the new admission date to be the end date of the previous fixed-term spell. Finally, if the worker is no longer observed, we flag the last interview date as censoring moment. Source: Micro data of the LFS (IE and EE). No sample selection.

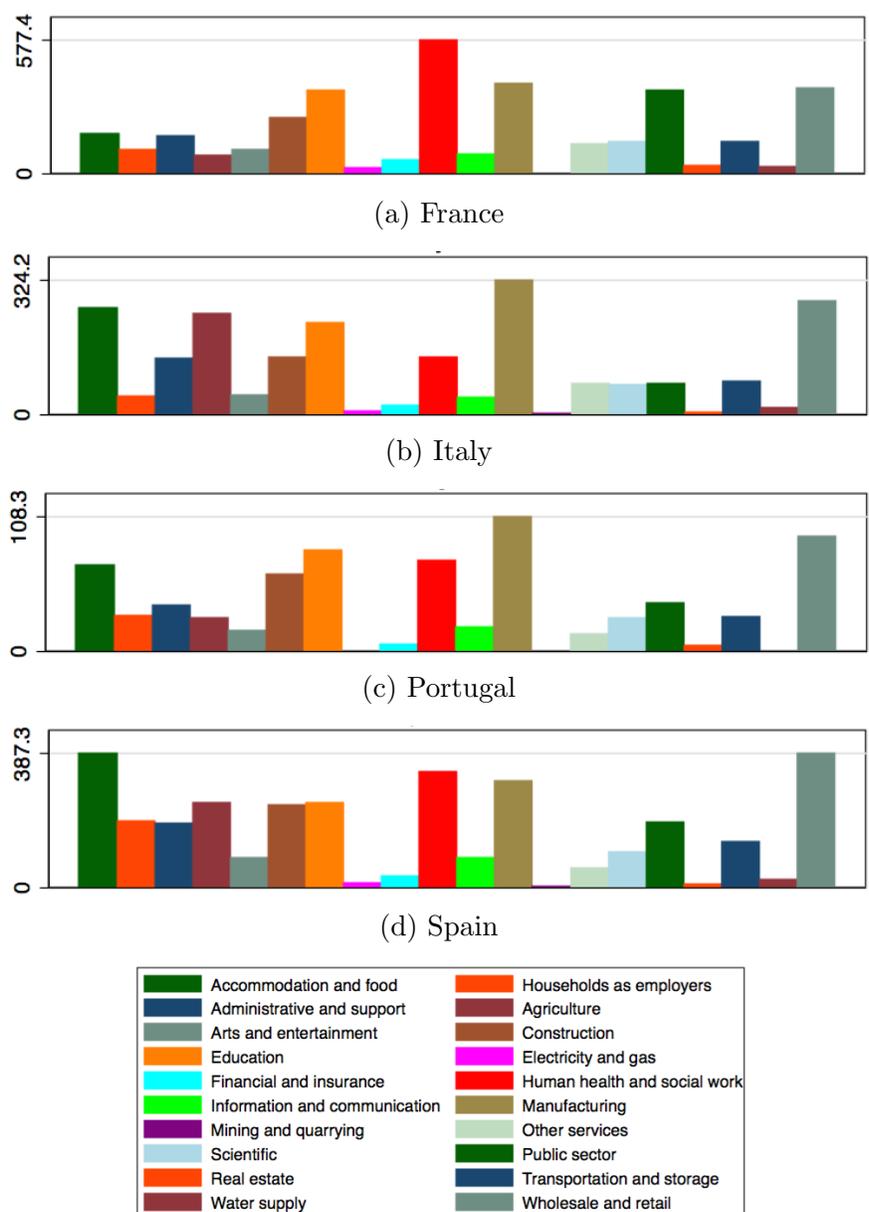
son), which accounts for censored spells, is above or equal to 50%. While the presence of measurement error in the admission date can explain part of this result, it may also suggest that firms recur repeatedly to the same workers to occupy jobs in fixed-term contracts, without necessarily ever offering them a permanent contract. Considering the different motives to exit a fixed-term employment spell, as expected, workers are much more likely to exit to non-employment. For all countries, until up to 30 months, the probability to exit the fixed-term employment spell (for whatever reason) decreases with duration, meaning that workers who are successively employed in fixed-term contracts with the same firm become less and less likely to change status (negative duration dependence). After 30 months, the

negative duration dependence pattern vanishes.

3.3.10 Characteristics of jobs held in temporary contracts

Which are the jobs that are filled with temporary employment contracts? Figure 3.15 looks at the number of fixed-term contracts in employment across different sectors of activity.

Figure 3.15: Number of fixed-term contracts by sector of activity in 2013



Notes: Numbers in thousands. All forms of temporary employment contracts are considered and all workers aged 15 and above. Classification of sectors of activity according to NACE Rev. 2 (2008). Source: Eurostat (Ifsa etgan2), based on Labor Force Surveys.

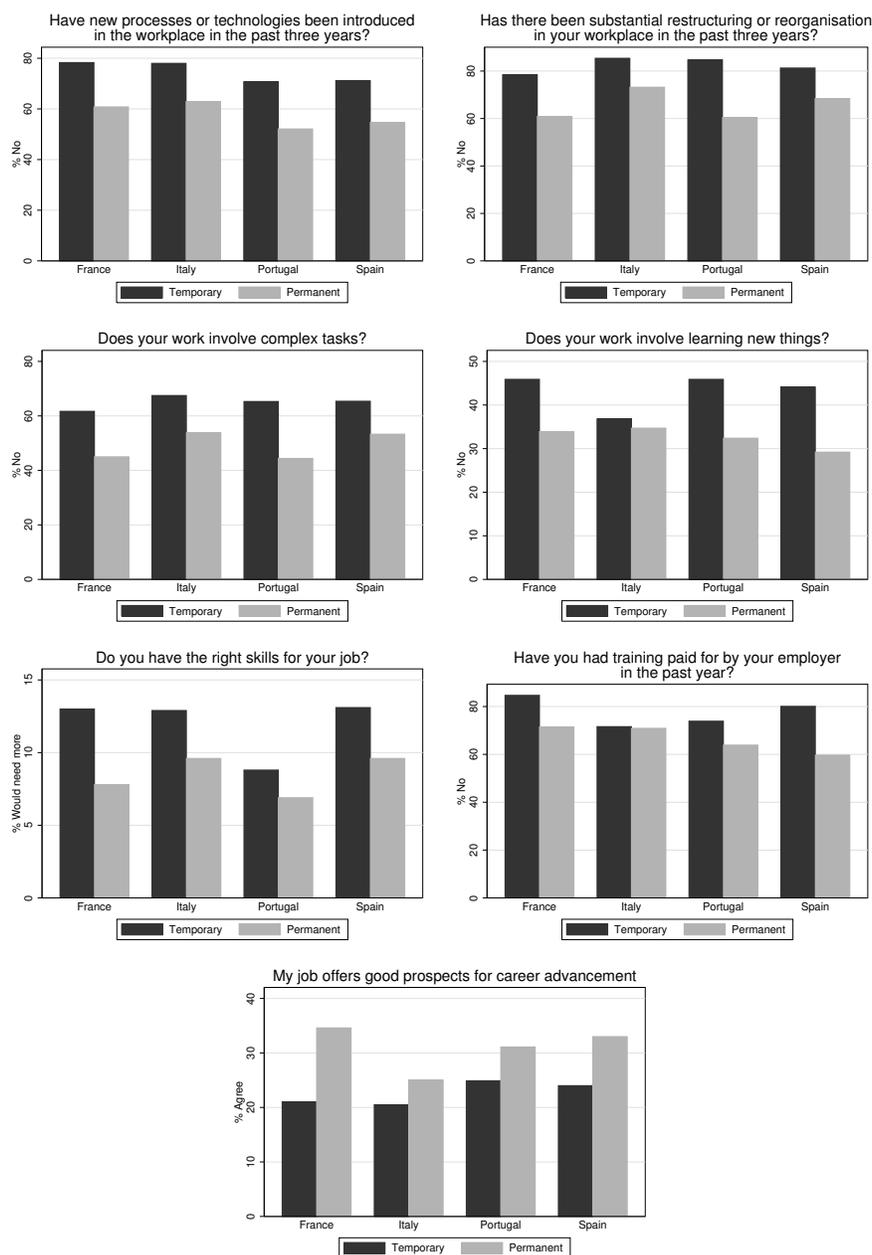
Temporary employment contracts are mostly used in sectors known for their extreme volatility in demand. For example, in countries like Italy, Portugal and Spain, where the tourism industry is economically significant, the accommodation and food sector is one of the activities where temporary contracts are used in significant proportions. The agriculture sector, another sector characterised by intense seasonal fluctuations, is also an heavy user of temporary contracts in Italy and Spain. Finally, the construction sector, which fluctuates importantly over the business cycle, also accounts for many temporary jobs. However, we also find a very large number of temporary contracts in sectors not particularly associated with large fluctuations in demand. For instance: human health and social work, manufacturing, wholesale and retail, education or the public sector. It is hard to justify that the high share of fixed-term contracts, in these sectors of activity, can be entirely justified by temporary needs and changes in demand.

Using aggregate results from the fifth wave of the EWCS, collected in 2010, we investigate further the characteristics of jobs that fixed-term workers hold. Figure 3.16 depicts the frequency of each answer to some of the survey's questions, separately for workers in temporary and permanent contracts.

Overall, it seems that workers employed in temporary jobs tend to work for firms where new processes or new technologies are not frequently introduced. They also seem to be mostly employed in firms that did not suffer substantial restructuring or reorganisation during the financial crisis (2007-2010). Their jobs, in the majority of cases, do not involve complex tasks or learning new things. In France, Portugal and Spain, there is a significant difference in the fraction of temporary workers that received training paid by their employer, compared to permanent workers¹¹. Although this is not the case in Italy. Finally, temporary workers are more likely to believe that they would need more skills for their current job and less likely to agree that their jobs offer good prospects for career advancement. Two conclusions emerge from this analysis. First, that there could be a selection of less productive firms using temporary contracts. Second, that workers employed in fixed-term contract benefit from less investment in job-specific training, the type of training that is usually financed by the employer. These two considerations will be exploited in the model developed in Chapter 4. The model will be able to replicate the fact that low productive firms use fixed-term

¹¹Differences in on-the-job training between workers in temporary and permanent contracts had already been highlighted by Albert, García-Serrano and Hernanz (2005) or Cabrales, Dolado and Mora (2014) in Spain, and Arulampalam, Booth and Bryan (2004) for several European countries.

Figure 3.16: Working conditions for temporary and permanent workers



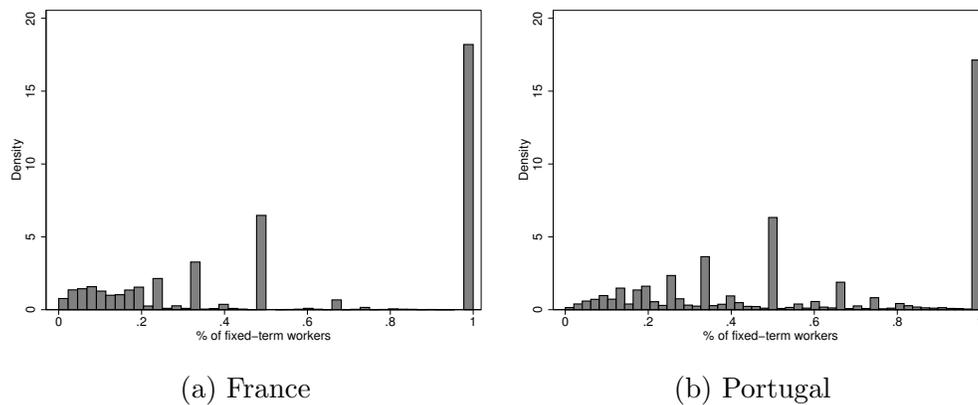
Notes: Source: 5th wave of the European Working Conditions Survey, 2010.

contracts more often than high productive firms, and the fact that workers in fixed-term contract receive less training on-the-job.

3.3.11 Use of fixed-term contracts at the firm level

How intensely do firms use fixed-term contracts in particular? At any point in time, what is the workforce composition at the firm level, in terms of contract type? Are there firms that use only one type of contract or do they use different contract types simultaneously? Figure 3.18 provides an answer to these questions.

Figure 3.17: Percentage of fixed-term contracts at the firm level



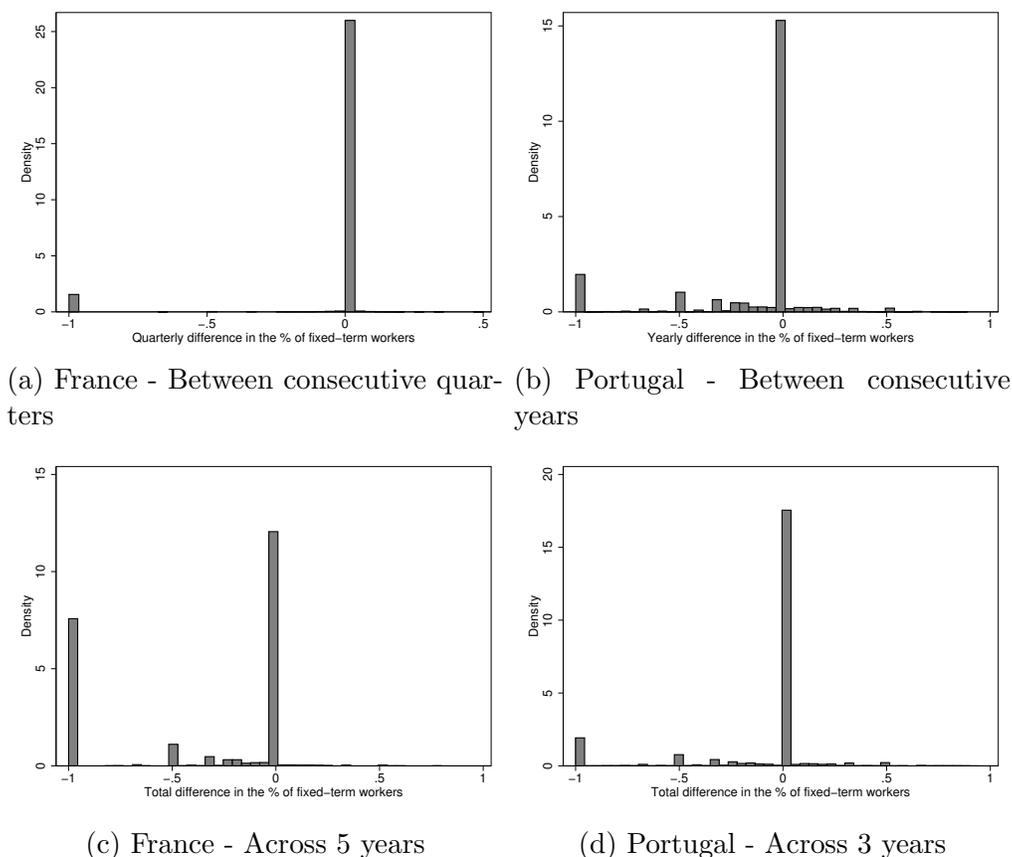
Notes: Percentage of fixed-term contracts out of total employment at the firm level. Vertical axis provides the density of firms for each percentage. Only fixed-term contracts are considered. **Panel(a)** - DADS, 2010. All firms, all size, all sectors of activity. Total number of firms in the sample: 1 568 679. **Panel (b)** - QdP, 2009. All firms, all size, all sectors of activity. Total number of firms in the sample: 512 355.

Curiously, we find that the percentage of fixed-term workers in the stock of employment, using the administrative data sources that contain firm identifiers, peaks at 0% and 100% for all countries. This means that there is a large number of firms that use permanent contracts exclusively, and others that only use fixed-term contracts. In between these extreme values, the composition of fixed-term and permanent workers at the firm level varies substantially. This variation suggests that it is not exclusively the characteristics of the firm that matter in the contract choice. In fact, the same firm can hire a mix of workers in fixed-term and permanent contracts. In this context, the model explained in Chapter 4 will exploit heterogeneity from both the worker and the firm side.

To further understand whether firms use temporary employment contracts successively, as part of their staffing policy, we use these administrative data sets (and the employers identifiers) to follow the same firms over time. In particular, we look at changes in the composition of the workforce, by employment contract type. One would expect that if firms do not use fixed-term contracts for churning, the trend in the share of temporary employment contracts

among the firm's workforce would decrease. That is, as firms learn about the quality of their workers, they would eventually promote temporary contracts into permanent. Eventually, the amount of permanent workers overall would increase. On the contrary, a relatively stable share of temporary workers could indicate the successive use and destruction of atypical employment contracts (although not necessarily with the same workers).

Figure 3.18: Changes in the percentage of fixed-term contracts for firms with equal size



Notes: We select only firms with more than 5 workers and that are continually observed in the panel, with no interruptions. We removed firms operating in volatile sectors of activity, such as: agriculture, hunting, fishing, extracting industry, construction, tourism, public sector and extra-territorial activities. We look at the change in the percentage of fixed-term workers at the firm level, for firms that kept their workforce constant over time, and that had a positive number of fixed-term workers at the initial and final period. **France** - DADS, 2005-2010. **Portugal** - QdP, 2005-2007.

We find that for firms that do not change their workforce size over one year, and that do employ fixed-term workers, the percentage of fixed-term contracts at the firm level remains remarkably stable: most firms exhibit a zero percentage change in the share of fixed-term workers from one year to the other. The same comparisons in a 6 or 8 years horizon still reveals a significant number of firms that did not change the overall share of fixed-term

workers in their workforce. This stability in the share of fixed-term workers at the firm level suggests the recurrent use of these atypical employment contracts as part of the firm's staffing policy. It may also suggest, as previously explained, that these firms are not progressively promoting their workers into permanent contracts.

3.4 Conclusion

In this chapter, we conduct a number of empirical analyses to shed light on the extent in which labour markets in France, Italy, Portugal and Spain can be considered segmented between two groups of workers: a first group in permanent employment contracts, enjoying a relatively high degree of employment law protection against dismissal, and a second group of workers in non-standard work forms, characterised by much greater flexibility and shorter durations.

We find that temporary contracts shorter than a month account for the majority of entries into employment, at least in France and Spain. Moreover, the share of temporary contracts shorter than a month has increased substantially over time in France. Being employed in a temporary contract does not seem to be the result of workers preferences for more flexible jobs. Short-term contracts affect mostly young workers who recently left education, female, foreign born individuals, worker with lower tenure at the job, workers with primary education and workers with low-skilled occupations. It takes about 90 months (almost 8 years) after leaving education for the share of temporary contracts in total employment to reach its average level in the whole population. Transitions rates from fixed-term to permanent contracts with the same employer are relatively low: approximately 5% every quarter in France and 10% in Portugal. Workers employed in a fixed-term contract are more likely to exit towards non-employment than towards a permanent contract at the same firm. In particular, we observe a pick of exits from fixed-term contracts to non-employment around 24 months in both France and Portugal. There is also some evidence suggesting that workers employed in temporary employment contracts do not have to perform complex tasks or learn new things at a fast pace. They receive significantly less training paid by their employer than workers in a permanent contract and believe that their jobs do not offer good prospects for career advancement. Finally, we also find that firms that do not change their total number of employees over time tend to exhibit a stable share of fixed-term contracts within the firm,

suggesting that they rotate different employees over time with fixed-term contracts. Overall, these findings indicate that labour markets in France, Italy, Portugal and Spain are effectively segmented between temporary and permanent workers, affecting one particular group of vulnerable workers, and with potentially negative consequences for training and productivity. Nevertheless, when controlling for worker and firm characteristics, the wage gap between permanent and fixed-term workers is about 3.5% in France and 1% in Portugal. When taking worker unobserved heterogeneity into account, the gap decreases to 1% in France and becomes statistically insignificant in Portugal. Therefore, the widely acknowledged fixed-term contract earnings penalty could be the result of pre-existing and unobserved worker characteristics. As most evidence described in this paper is of a non-experimental nature, it is unclear how much of the differences in training and future job prospects, for example, are attributable to contract types and not other differences across the two groups of workers. Consequently, when evaluating the potential effects of employment protection legislation reforms, it seems important to acknowledge that individuals may be ex-ante heterogeneous and sorted across contract types depending on their personal characteristics.

Appendix to chapter 3

A1. Sample selection with DADS

Overall, there are 48 142 830 observations, corresponding to one worker at one firm in a given year. This corresponds to 7 266 269 individuals, of which 4 018 562 are males and 3 239 771 are females. In total, there are also 2 890 199 different firms. On average, each worker has approximately 20 employment spells over the whole period and 1.8 per year. Workers are followed, on average, for 13.8 years. There are 385 752 individuals followed for 20 years or more, 201 452 workers followed for 25 years or more, and 63 326 followed for 30 years or more.

For the analysis in this paper we exclude all observations with missing information regarding gross earnings, net earnings, hours worked, spell start or end date, as well as all spells associated with domestic employment or shorter than 15 days¹². We also exclude all spells associated with an individual who in a given calendar year appears to have more than 8 different employers as those can be considered marginal jobs¹³. Finally, we restricted the analysis to the period 2005 to 2010, as contract type is only reported from 2005 onwards.

We select all individuals between the ages of 25 and 50 to focus on working-age population. We also excluded apprenticeships, internships and workers whose status (full-time or part-time) was missing. We dropped employment spells in the extra-territorial and domestic sectors. Finally, we focus all the analysis on full-time employees only.

To avoid problems with outliers, we exclude from the sample individuals whose annual earnings are below half the minimum wage legally in force each calendar year, annual hours worked exceed 4160 or average daily hours worked exceed 16. We also dropped observations for whom the total number of hours worked was inferior to 260 in a year.

A2. Sample selection with QdP

For the analysis in this paper we exclude all observations with missing information regarding earnings and hours worked. Similarly to the analysis with the French DADS, we select all

¹²We excluded spells shorter than 15 days following Ceci-Renaud, Charnoz and Gaini (2014) who raised the point that those were not consistently reported by employers over the whole period between 1976 and 2010.

¹³A similar criteria is applied in Abowd, Kramarz and Margolis (1999) and Kramarz and Perez-Duarte (2009)

individuals between the ages of 25 and 50 to focus on working-age population. We also excluded apprenticeships, internships and workers whose status (full-time or part-time) was missing. We dropped employment spells in the extra-territorial and domestic sectors. Finally, we focus all the analysis on full-time employees only.

Finally, we restricted the analysis to the period 2005 to 2009. While the contract type is available since 2000, we start the analysis in 2005 to make it comparable to France. The analysis ends in 2009 which is the last year available before changes were introduced to the *Quadros de Pessoal* affecting significantly its structure.

The resulting sample has 11 040 741 observations, corresponding to one worker at one firm in a given year. This corresponds to 3 549 967 individuals, of which 1 991 166 are males and 1 558 801 are females. In total, there are also 423 053 different firms.

Chapter 4

Who gains from labour market flexibility at the margin?

4.1 Introduction

Following the high and persistent levels of unemployment experienced during the 1980s, restrictions on the use of fixed-term contracts were relaxed in some European countries, while strict employment protection legislation governing permanent contracts was left practically untouched. The second chapter of this thesis describes the cases of France, Italy, Portugal and Spain, where such dual reforms were particularly striking. The general belief was that a too stringent employment protection legislation discouraged the creation of new jobs or firms from expanding during good economic times. However, as a result of the strong social opposition to lower levels of job protection, policy makers opted for liberalising the use of fixed-term contracts for positions that were not necessarily of a temporary duration by nature¹. These alternative employment contracts introduced additional flexibility, without affecting the *status quo* of the workers already employed in permanent contracts. Since then, the share of these atypical contracts has raised substantially. Fixed-term contracts represent nowadays from 15% to 30% of total dependent employment in continental European countries. The share of fixed-term contracts in the flows towards employment is even more remarkable, reaching up to 90% in some countries, such as France and Spain. The growth

¹Chapter 2 discusses the role that Unions may have played to that effect.

and importance of fixed-term contracts is carefully described in Chapter 3. The growth of these atypical employment contracts led to what is often referred to as segmented labour markets. In fact, these reforms at the margin affected mostly labour market entrants or workers searching for a job, while leaving existing employment contracts or the “insiders”² practically unaffected.

The consequences of this segmentation are still to be fully understood. Empirical evidence suggests that workers employed in fixed-term contracts earn less (Bentolila and Dolado, 1994; Bentolila *et al.*, 2012; Blanchard and Landier, 2002), receive less training on-the-job (Arulampalan *et al.*, 2004; Cabrales *et al.*, 2014) and enjoy worse career prospects (Garcia-Perez *et al.*, 2013). Similar empirical regularities are described for France, Italy, Portugal and Spain, in Chapter 3. The impact of this marginal flexibility on unemployment is also unclear. Some findings suggest that it boosted the job creation rate but also the job destruction rate, leading simply to higher turnover and no clear impact on unemployment (Garcia-Serrano, 1998) or even higher unemployment (Cahuc and Postel-Vinay, 2002). Nevertheless, fixed-term contracts could still function as a stepping stone for low-skilled workers. On one hand, low-skilled workers may find employment more easily than if only highly protected permanent contracts are available. On the other hand, while employed, even if precariously, those workers remain active, accumulate experience and could increase their chances of contacting other employers for potentially more stable jobs, although this does not seem to happen so frequently in the countries analysed in Chapter 3. In the current global context of growing wage inequality (ILO *Global Wage Report 2016/2017*), it becomes increasingly important to understand whether fixed-term contracts have benefited low-skilled individuals. It is also fundamental to evaluate how reforming employment protection legislation would affect different individuals in the labour market.

The objective of this chapter is twofold. First, it aims at understanding whether low-skilled workers have benefited from the flexibility at the margin permitted by the introduction of fixed-term contracts. Second, it provides insights into the heterogeneous effects of an employment protection legislation reform. In particular, it analyses how workers and firms sort themselves across the different types of contracts, how lowering the dismissal cost of permanent contracts affects that sorting pattern, and which individuals would particularly benefit from such policy.

²Term originally used by Bentolila *et al.* (2012)

For that purpose, I develop an equilibrium model of the labour market, with frictions, in which two-sided heterogeneous agents optimally decide the employment contract type. Worker and firm can decide to engage into a fixed-term contract - with a lower dismissal cost but lower duration - or a permanent contract - with a higher dismissal cost but higher expected duration. Following the legal environment discussed in Chapter 2, the agents can also decide to convert the fixed-term contract into a permanent contract at its expiry date. Another particularity of the model presented in this paper is that the decision of whether to invest in job-specific human capital is also modelled. If worker and firm agree to invest in the accumulation of job-specific skills, the match has higher total factor productivity. Such investment has a fixed cost, which is irreversible and non-transferrable to other jobs. The purpose of modelling investment in job-specific skills is to replicate the stylised fact that workers in fixed-term contracts are less likely to receive training sponsored by their employers as discussed in Chapter 3. Ultimately, depending on the share of fixed-term contracts over total employment, this will be reflected in the total output produced. Accommodating the decision of whether to invest in job-specific skills into the model, therefore brings interesting implications for productivity. Finally, wages are determined by sequential auction, as in Cahuc, Postel-Vinay and Robin (2006), which performs remarkably well in replicating the empirical earnings distribution. Adapting the sequential auction wage determination mechanism to a context of multiple employment contracts brings additional advantages. For example, Chapter 3, using administrative data for France and Portugal, reports that a significant fraction of movements from fixed-term to permanent contracts are associated with a fall in the hourly wage rate. With wages determined by sequential auction, the model developed in this paper provides a rationale for that empirical finding. In fact, when a worker is converted to a permanent contract, or moves to a new firm from a fixed-term to a permanent contract, the model predicts that the worker suffers a wage cut if the move entitles a higher continuation value, *i.e.* better opportunities for moving along the wage ladder in the future.

Using French matched employer-employee data from 2005 to 2008, the model is estimated using Simulated Method of Moments (SMM). By structurally estimating the parameters of the model, this paper is the first one to quantify the red-tape cost of dismissing workers in permanent contracts - the cost associated with administrative procedures, legal expenses, additional financial penalties and the uncertainty about the outcome of a process in the labour court. The model with its parameters set at their point estimates is then used in

counterfactual policy analysis.

There are only a few studies that focus on analysing how the duality in the labour market emerges and allow for the choice between fixed-term and open-ended contracts to be endogenously determined. Most studies regarding labour market segmentation impose an exogenous share of fixed-term contracts in the economy. To the extent of my knowledge, the studies that model the employment contract choice are Kettemann, Kramarz and Zweimüller (2017), Guglielminotti and Nur (2016), Cahuc, Charlot and Malherbert (2016), Bertron and Garibaldi (2012), Tealdi (2012) and Caggese and Cuñat (2008). However, none of these papers takes simultaneously into account that both workers and firms are heterogeneous and that workers search on-the-job. With *ex-ante* heterogeneous workers, one can draw different conclusions about the effects of facilitating the use of fixed-term contracts depending on the workers' characteristics, which is the main objective in this paper. On the other hand, including on-the-job search in the model internalises the impact that voluntary quits can have on the sorting of workers between fixed-term and permanent contracts. As argued by Postel-Vinay and Turon (2013), on-the-job search provides a mean for employers to avoid firing costs, as workers may leave voluntarily upon receiving an outside offer. By ignoring it, one may overestimate the impact of firing costs on the segmentation in the labour market.

Kettemann, Kramarz and Zweimüller (2017) set up a model of directed search with two types of vacancies: temporary and permanent. The trade-off between the two vacancies emerges because temporary vacancies have a higher filling rate, but they yield lower value, as they are inherently less stable. Temporary contracts are exogenously destroyed, while separations in permanent contracts are endogenous. They use a calibrated version of their model to analyse the impact on unemployment of introducing mandatory occupational pensions and abolishing employer-provided severance pay. The main difference between the two systems is that in the later case, workers who quit to another job voluntarily are penalised with loss of severance payment, while in the first case, this would not occur. They find that switching to a mandatory occupational pension system would reduce unemployment and increase the share of permanent jobs. However, in their model, workers are homogeneous and there is no sorting between temporary or permanent contracts as a function of workers characteristics. The model developed in this chapter allows workers and firms to differ in their ability and productivity, therefore exploiting heterogeneous effects of employment protection legislation reforms.

Guglielminotti and Nur (2016) build a random search model with heterogeneous match quality and two types of contracts: open-ended and temporary. They show that when there is super-modularity in the production function, matches of higher quality are sorted into open-ended contracts, while matches with lower quality are sorted into fixed-term contracts. Through simulations, they show that the introduction of temporary contracts in a one-tier labour market, together with lower firing costs, would decrease unemployment. Nevertheless, in their model, worker and firms are homogeneous and there are no differences based on workers' and firms' characteristics. Furthermore, the authors do not attempt to estimate the structural parameters of the model, neither exploit differences in human capital investment across the two types of contracts. By structurally estimating the model developed in this chapter, it becomes possible to quantify the red-tape cost of firing and the cost of job-specific human capital investment.

Cahuc, Charlot and Malherbert (2016) develop a search model of the labour market where they account for the fact that it is costly to dismiss temporary workers before the date of termination of the contract, as stipulated when the job started. This feature of the legislation in France is also present in Italy, Portugal and Spain, as described in Chapter 2. In practice, this amounts to temporary contracts not terminating before their expiration date. In this context, when firms hire workers for production opportunities with different expected durations, and in equilibrium, permanent jobs are chosen to exploit production opportunities expected to endure for a long time, while temporary jobs are used for production opportunities with short expected duration. Through simulations, they show that when firing costs in permanent contracts increase, total employment barely changes, but there is a large substitution of temporary jobs for permanent jobs, which significantly reduces aggregate production. Their finding is consistent with the results from the counterfactual analysis in this chapter: a large fraction of fixed-term contract can reduce aggregate output. In this chapter, one potential channel to explain this result is fully exploited: firms invest less in job-specific training for workers in fixed-term contracts, therefore reducing the match productivity. Cahuc, Charlot and Malherbert remain agnostic about the potential mechanisms.

Bertron and Garibaldi (2012) also propose a matching model with direct search in which temporary and permanent jobs coexist in equilibrium. Their model has directed search and the trade-off between the two contracts emerges between an ex-ante job filling rate,

which is higher for permanent jobs, and an ex-post flexible dismissal rate in temporary jobs. The purpose of their model is to rationalise theoretically the co-existence of the two contract types. However, the model is not exploited for counterfactual policy analysis. In this chapter, the main goal is to estimate the structural parameters of the model using micro-data so as to analyse different policy scenarios.

Tealdi (2012) develops a random search and matching model where there are different groups of workers: young and older. When workers are young, their productivity level is unknown. When workers are older, they can either be of high or low productivity. In equilibrium, young workers are all in temporary contracts. Once the types are observed, the highly productive workers are converted to permanent and the others are not. Through simulations, the author finds that low productivity workers are worse off when temporary contracts are introduced, while high productivity workers are better off. In contrast with the current paper, Tealdi (2012) does not exploit firm heterogeneity or the fact that there is on-the-job search. Complementarity with firm characteristics may partly explain why some firms are willing to offer a permanent contract even if the worker is low skilled. On the other hand, on-the-job search may increase the lifetime value of low-skilled workers when the possibility of being employed temporarily is introduced. The model developed in this chapter is therefore more complete to the extent that it considers the above channels. Furthermore, similarly to Guglielminotti and Nur, Tealdi does not structurally estimate the model, neither exploits heterogeneous effects of employment protection legislation based on individual productivities. Finally, Caggese and Cuñat (2008) offer an alternative explanation for the trade-off between temporary and permanent contracts. They construct a dynamics model with heterogeneous firms in terms of financial constraints. They show that in equilibrium, financially constrained firms tend to use more intensely fixed-term workers, and to make them absorb a larger fraction of the total employment volatility than financially unconstrained firms do. While this is a pertinent channel that is not exploited in this thesis, it ignores the fact that firms tend to use a mix of fixed-term and permanent contracts amongst their workforce, as described in the last subsection of Chapter 3. In fact, there seems to be a selection of workers into fixed-term and permanent contracts, based on their personal characteristics and independent from the firm. In model developed here, the segmentation between fixed-term and permanent contracts can occur across workers with the same employer.

In this chapter, the main findings are the following. First, in the model presented thereafter,

fixed-term contracts appear not to function as stepping-stones. In fact, the estimated contact rate for workers employed in fixed-term contracts is very similar to the estimated contact rate for unemployed workers. Both are significantly lower than the contact rate estimated for workers in permanent contracts. Therefore, it seems that reaching employment through a fixed-term contract does not necessarily open doors to employment at other firms. Nevertheless, this result should be interpreted with caution. In fact, the model abstracts from general human capital accumulation while employed. Second, according to the estimation, the red-tape component of the dismissal cost represents approximately 1% of the match output if the match would last one year. If the match only last a quarter, the red-tape firing cost represents about 4% of the match output. Decreasing this component of the dismissal cost in 10% would reduce the share of fixed-term contracts in new hires by half a percentage point, if the destruction rate of permanent contracts would remain unchanged. In other words, this result is conditional on the lower firing cost not resulting into more frequent dismissals from permanent contracts. The workers that mostly benefit from the decrease in this firing cost are those in the upper part of the ability distribution, namely between the 60th and 80th percentiles. These workers become more likely to be directly hired under a permanent contract, which increases their lifetime utility. Nonetheless, taxing fixed-term contracts seems much more effective in reducing the share of fixed-term contracts in the economy than reducing the red-tape component of the dismissal cost. Finally, much larger gains in total output can be achieved by reducing the cost of training workers on-the-job rather than by reducing the firing cost and the share of fixed-term contracts in new hires. In fact, the training cost is estimated to represent approximately 6% of the match output if the match lasts one year and 25% of the match output if it only lasts one quarter. Even a small decrease in the training cost would generate a significant increase in total output.

The rest of the chapter is structured as follows. The model is presented in section 2. Section 3 discusses the identification strategy, the estimation protocol and describes the different data sources used for the estimation. The results are exposed and interpreted in section 4. Finally, the counterfactual policy analysis is performed in section 5 and section 6 concludes.

4.2 Model

The model presented in this section departs from Lise, Meghir and Robin (2016). The framework developed by these authors is simplified with exogenous separations and vacancy creation. Alternatively, it is extended in two directions. First, by allowing for workers and firms to choose between two possible employment contracts: a fixed-term contract, with limited duration and no firing tax, and a permanent contract, which can last longer but is costly to destroy. Second, in the present model, worker and firm can also decide whether they want to invest in job-specific human capital. Investment in job-specific human capital is modelled as a discrete choice: there is either no investment or positive investment. Finally, the process of on-the-job search draws from Cahuc, Postel-Vinay and Robin (2006), with the necessary adaptations as subsequently explained.

4.2.1 Environment

4.2.1.1 Workers and firms

The economy is populated by a continuous mass of infinitely lived and risk-neutral workers, normalised to 1. Workers differ in their personal ability x , which is not observed by the econometrician. The ability x is independent and identically distributed across workers and can be interpreted as the worker's rank. I assume that the types are fully observable to all agents in the economy and constant over time. This means that there is no learning about the worker's ability, neither general human capital accumulation or depreciation. Fixed-term contracts can also be used as a screening device, to learn about the worker's ability before engaging in a binding permanent contract. See, for instance, Tealdi (2012) and Nagypál (2002, 2007). Nevertheless, the existence of long probationary periods as detailed in Chapter 2, and the high destruction rate of fixed-term contracts reported in Chapter 3, suggest that a large fraction of fixed-term contracts are used to avoid firing costs rather than learning about the worker's ability. The model developed in this chapter therefore abstracts from learning about the individual's ability. Individuals can be either unemployed and actively searching for a job, or employed and searching on-the-job. Workers discount future flows at the exogenous rate $r > 0$ and they aim at maximising their expected discounted life-time utility.

On the demand side of the labour market, there is a continuous mass of firms that also live

infinitely. Every firm differ in a productivity parameter $y \in [0, 1]$ which is independently drawn across firms. The firm characteristic y can be interpreted as the firm's productivity rank. I assume that the firm productivity is constant over time. The firm's type is also fully observable and all agents agree on the ranking of the firms: the higher y , the more productive is the firm. Each firm represents only one potential job. Firms' objective is to maximise lifetime expected discounted profits and firms are also risk-neutral.

4.2.1.2 Labour market institutions

The features of the model that are described in this section draw intensely on the legislation environment described in Chapter 2. When unemployed, workers receive the unemployment benefit b . The law governing employment relationships considers that two types of employment contracts can be used: fixed-term contracts and permanent contracts. Both contracts are destroyed exogenously³. Fixed-term contracts are destroyed at rate δ^F and permanent contracts at rate δ^P . The arrival rate δ^F reflects the impossibility to remain on a fixed-term contract indefinitely: these contracts must stipulate an expiry date. Alternatively, one could make fixed-term contracts last only one period, like in Cahuc and Postel-Vinay (2002). However, since different durations for fixed-term contracts are observed in the data, as seen in the subsection 3.3.2. of Chapter 3, assuming a stochastic destruction rate provides a better empirical fit. This was previously done in Wasmer (1999). When the fixed-term contract reaches its expiry date, there are two possible scenarios. With probability $1 - \mu$, worker and firm are given the option to continue the employment relationship with a permanent contract. In this case, the conversion decision is jointly taken by the worker and the firm so as to maximise their value functions. If one of the parties does not find it optimal to convert the fixed-term contract to permanent, the match is destroyed: the worker returns to

³Endogenous separations, in the presence of firing costs and on-the-job search, would lead to the existence of matches in equilibrium that generate negative surplus. Furthermore, it would also imply that workers do not move to outside firms, even if the new surplus is higher. These situations are unlikely to persist in practice and would require additional elements to be added to the model, such as the negotiation of severance packages. Additionally, with endogenous separation in this model, wages - instead of the match surplus - would become the main determinant of job-to-job movements, making the model more difficult to solve numerically. In fact, the current wage would become another state variable in the optimisation problem. Postel-Vinay and Turon (2013) tackle this problem by introducing severance packages and the existence of a minimum wage. Since their purpose is to show that ignoring on-the-job search will overstate the negative impact of firing costs on employment, endogenous separations are crucial feature of their model. Nonetheless, in their model, agents are homogeneous, there are no fixed-term contracts, nor choice of contract type. Furthermore, they do not solve for wages in equilibrium. In this paper, since the focus is on the sorting pattern across different employment contract types, the setting is simplified with exogenous separations.

unemployment and the job disappears. With probability μ , the fixed-term contract cannot be converted to permanent. The probability μ represents the risk that the position is no longer justified at the end of the fixed-term contract or that the firm is unable to convert the contract into permanent for exogenous reasons. Consequently, there is no guarantee that a fixed-term contract can be converted into permanent, even for highly productive matches.

Costs associated to the destruction of fixed-term or permanent contracts are different. The cost of dismissing a worker on a permanent contract has two components: a transfer from the firm to the worker (t^P) and a red-tape cost (τ). The transfer component includes severance payments, other monetary compensations and also, requirements of advance notification, for example. On the other hand, the red-tape component includes costs associated with administrative procedures, legal expenses, additional financial penalties and the uncertainty over the outcome of a process in the labour court. Such red-tape costs are extensively discussed in Chapter 2. In this model, with linear utility, perfect transferability of utility between worker and firm and a flexible wage setting, the transfer component will have no impact on the agents' decision to match and on the contract choice. This is usually referred to as the “Bonding Critique”, following Lazear (1990). Nevertheless, the severance payment to the worker will have an impact on equilibrium wages. The cost of dismissing a worker on a fixed-term contract consists only of a transfer from the firm to the worker (t^F). Finally, firms must pay contributions to the social security, for every period that they employed someone to produce the final good. Social security contributions differ by type of contract: it is ν^F on a fixed-term contract and ν^P on a permanent contract. Differences in social security contributions by contract type are in place in France, as discussed in the last paragraph of section 2.2, Chapter 2.

4.2.2 Meetings, matching, and contract choice

Search is random, sequential and time consuming. Every period, an unemployed worker contacts a vacant firm at rate λ^U . Employed workers are searching on-the-job. The contact rate for employed workers depends on their contract type. A worker employed in a fixed-term contract contacts a vacant firm at rate λ^F and a worker employed in a permanent contract at rate λ^P . In fact, the different estimated transition rates from one job to the other for workers in temporary and permanent contracts described in Chapter 3, suggest that workers in fixed-term and permanent contract may contact potential employers at different frequen-

cies. The contact rates are taken as exogenous and structurally estimated.

If after meeting, worker and firm decide to form a match, the output of the match is given by $f(x, y)$, multiplied by a total factor productivity parameter. The function f is increasing in both arguments. The total factor productivity will depend on if worker and firm agree to invest in job-specific human capital. If they agree to invest in on-the-job training, the match becomes highly productive and the total factor productivity (or match-specific productivity) is given by θ^H . If they do not invest in on-the-job training, the match is less productive and the total factor productivity is given by θ^L . However, on-the-job training is costly. If they agree to invest in job-specific human capital, there is an initial cost of ξ upon forming the match. The training cost is a sunk cost and I assume it is instantaneously paid at the start of the match. Finally, I assume that investment in job-specific human capital is irreversible. Such investment is lost whenever the worker leaves to another firm or returns to unemployment. Therefore, an employment contract must stipulate a duration: fixed-term (F) or permanent (P), and a match-specific productivity level: high (H) or low (L). The state space for the employment contract is given by $C \in \{F, P\} \times \{H, L\}$.

The contact rate, is given by:

$$\lambda^c = \begin{cases} \lambda^F & \text{if } c \in F \times \{H, L\} \\ \lambda^P & \text{if } c \in P \times \{H, L\}. \end{cases} \quad (4.1)$$

The decision of whether to form a match will depend on the value of the surplus that the worker and the firm can generate. What the worker and the firm can jointly produce is a function of their types, of the match-specific productivity and of the expected continuation value after different scenarios. That is, it will also be a function of how long they expect the match to last and what would be the flow of utility or profit after each potential event. For example, after the worker receives another offer, after the worker leaves for another firm, or after the contract is destroyed for exogenous reasons. Therefore, the exact surplus that a specific match can generate also depends on if it is fixed-term or permanent. Worker and firm optimally decide which contract to form by maximising the surplus of the match, given their types. Consider the surplus of a match between worker x and firm y with employment contract c :

$$S(x, y, c) = \left(W^1(w, x, y, c) + \Pi^1(w, x, y, c) - \xi(c) \right) - W^0(x) \quad (4.2)$$

All value functions W refer to the worker. Value functions Π refer to the firm. $W^0(x)$ represents the value for a worker type x from being unemployed. $W^1(w, x, y, c)$ stands for the value for a worker type x of being employed at wage w and contract type c with firm type y . $\Pi^1(w, x, y, c)$ is the value for a firm type y of having a job filled with worker type x paid at wage w in contract type c . When a job is destroyed, the position disappears. Therefore, the outside option for the firm has no value. The outside option for the worker is always the same, regardless of the contract type. What changes is what is jointly produced when a worker type x and a firm type y are together under different arrangements. Equation (4.2) will be carefully defined in section 4.2.4, as well as the respective value functions for the worker. The function $\xi(c)$, which represents the training cost, is given by:

$$\xi(c) = \begin{cases} \xi & \text{if } c \in \{F, P\} \times H \\ 0 & \text{if } c \in \{F, P\} \times L. \end{cases} \quad (4.3)$$

It will be null when there is no investment in on-the-job training and positive otherwise. The match formation decision can be summarised as follows. A match between an unemployed worker x and a firm y will be formed whenever:

$$\max_c S(x, y, C) \geq 0 \quad (4.4)$$

The contract will be fixed-term if the argument that maximises equation (4.4) is $c \in F \times \{H, L\}$ and permanent if the argument is instead $c \in P \times \{H, L\}$. For each contract type, the worker will receive on-the-job training if the argument that solves equation (4.4) is $c \in \{F, P\} \times H$. At the expiry of a fixed-term contract, provided that the match is not exogenously destroyed with probability μ , worker and firm can still agree on converting the contract to permanent instead of separating. An existing fixed-term contract between worker type x and firm type y , where the worker already received on-the-job training, will be upgraded to permanent whenever:

$$S(x, y, PH) + \xi \geq 0 \tag{4.5}$$

Since the training cost had already been paid and it is a sunk cost, it is not taken into account for the conversion decision. It must therefore be added back to equation (4.2). On the other hand, if the worker had not received on-the-job training yet, the contract is upgraded to permanent if:

$$\max_{C \in P \times \{H, L\}} S(x, y, C) \geq 0 \tag{4.6}$$

where the set over which the surplus is maximised only includes permanent contracts. The worker will receive job-specific training together with the conversion if $S(x, y, PH) \geq S(x, y, PL)$.

4.2.3 Wage determination, on-the-job search and wage renegotiation

Wages are determined by sequential auction, adapted from Cahuc, Postel-Vinay and Robin (2006). The agreed wage determines how the surplus of the match is split between the worker and the firm, but the surplus is not a function of the wage⁴. This is a common feature amongst models of on-the-job search where wages are determined by sequential auction, following the work of Postel-Vinay and Robin (2002). It provides computational advantages since wages do not need to be computed to characterise the equilibrium of the model.

In this paper, there is one additional computational advantage. Since investment in job-specific human capital is incorporated into the model, the surplus to be considered when negotiating the wage at the match formation stage is $S(x, y, c)$ as defined in equation (4.2), while it becomes $S(x, y, c) + \xi(c)$ immediately after the start of the match, since the investment in job-specific skills has already been paid for and is irreversible. If wages would be determined by Nash bargaining and renegotiated every period, they would be renegotiated immediately after the start of the match and increase. Instead, when wages are determined

⁴Lise, Meghir and Robin (2016) provide a mathematical proof that the surplus is independent of the wage.

by sequential auction and are only renegotiated by mutual consent, one of the parties must have a credible threat to trigger the renegotiation process. It turns out that, even if the training cost is a sunk cost and the investment is irreversible, the worker would not have a credible threat to force the firm to renegotiate a higher wage once the training has been provided, as long as the initial wage was set such that he is still better off than if unemployed.

There are also benefits from determining wages by sequential auction in terms of empirical fit. Search models of the labour market, where wages are determined by sequential auction, have been shown to provide a better fit to the data than models where wages are determined by Nash bargaining (Cahuc, Postel-Vinay and Robin, 2006). Adapting the sequential auction wage determination mechanism to a context of multiple employment contracts brings additional desirable features. For example, in Chapter 3, using administrative data for France and Portugal, I find that a significant fraction of movements from fixed-term to permanent contracts are associated with a fall in the hourly wage rate. With wages determined by sequential auction, the model developed in this paper provides a rational for that empirical finding. In fact, when a worker is converted to a permanent contract, or moves to a new firm from a fixed-term to a permanent contract, the model predicts that the worker suffers a wage cut if the move entitles a higher continuation value, *i.e.* better opportunities for moving along the wage ladder in the future.

4.2.3.1 Wages coming from unemployment

When a worker type x comes from unemployment, the wage is negotiated such that the worker receives the value of being unemployed and a fraction β of the surplus generated. The parameter β consists in the workers' bargaining power. The implied wages ϕ_0^c for $c \in \{F, P\} \times \{H, L\}$, solve:

$$W^1(\phi_0^c(x, y), x, y, c) = W^0(x) + \beta S(x, y, c) \quad (4.7)$$

where $S(x, y, \cdot)$ is defined in equation (4.2).

4.2.3.2 Wages after receiving an offer from another firm

Workers keep on searching for better opportunities while on-the-job. Consider a worker type x employed at a firm type y and in contract type i , where $i \in \{F, P\} \times \{H, L\}$ has already been determined. Suppose that this worker contacts an outside firm y' . The contact will result in an outside offer if equation (4.4) is satisfied for x and y' . The worker will move to (or stay with) the firm with whom the surplus generated is higher and keep the other firm, with whom the surplus is lower, as outside option to potentially negotiate a higher wage (or renegotiate the current wage). The worker will move to firm y' if and only if:

$$\max_{C'} S(x, y', C') > S(x, y, i) + \xi(i) \quad (4.8)$$

The surplus considered at the incumbent firm is not discounted with eventual training costs since these have already been paid and are irreversible. The training cost is therefore added back to the current surplus. For the poaching firm, however, the training cost would still have to be paid. The wage at the new firm is determined by:

$$W^1(\phi_i^{C'}(x, y', y), x, y', C') = W^0(x) + S(x, y, i) + \xi(i) + \beta \left(\max_{C'} S(x, y', C') - \left(S(x, y, i) + \xi(i) \right) \right) \quad (4.9)$$

It will be such that the worker receives the entire surplus at his previous firm and a fraction β of the additional surplus generated with the new employer. If the worker stays at the incumbent firm instead, the wage might be renegotiated. This will be the case whenever: $W^1(w, x, y, i) - W^0(x) < \max_{C'} S(x, y, C')$. In words, whenever the value the worker receives currently falls short of the minimum he could receive with the outside firm. In this case the renegotiated wage will solve:

$$W^1(\varphi_{C'}^i(x, y, y'), x, y, i) = W^0(x) + \max_{C'} S(x, y', C') + \beta \left(S(x, y, i) + \xi(i) - \max_{C'} S(x, y', C') \right) \quad (4.10)$$

In some cases, renegotiated wages for “stayers” are different than the negotiated wages for “movers”. Therefore, I use the notation ϕ for wages after a job-to-job movement (for

“movers”) and φ for renegotiated wages within the same firm and keeping the same contract type (for “stayers”). This is a necessary adaptation to Cahuc, Postel-Vinay and Robin (2006) given the introduction of on-the-job training.

One final note is worth mentioning. When the worker with a fixed-term contract receives an outside offer, the best thing that the current firm can do to retain the worker is to offer the entire surplus of the fixed-term match. The firm would never offer a permanent contract in that case. In fact, if worker and firm choose to be on a contract i , it must have been the case that $i = \arg \max_C S(x, y, C)$. Therefore, offering the entire current surplus $S(x, y, i)$ is the incumbent firm’s best counter-offer.

4.2.3.3 Wages after being converted to permanent within the same firm

If the contract is converted to permanent, the new wage is determined as if the worker would come from unemployment. In fact, if the conversion doesn’t happen, the worker must return to unemployment, which therefore represents his outside option. The negotiated wage will depend on whether the worker already received training or not. If investment in on-the-job training already took place, the wage after conversion will solve:

$$W^1(\psi_H^{PH}(x, y), x, y) = W^0(x) + \beta \left(S(x, y, PH) + \xi \right) \quad (4.11)$$

and the worker is upgraded to a permanent contract with high match-specific productivity. If, on the other hand, no investment in on-the-job training has been made yet, the wage after conversion will solve:

$$W^1(\psi_L^C(x, y), x, y) = W^0(x) + \beta \max_{C \in P \times \{H, L\}} S(x, y, C) \quad (4.12)$$

where the worker is upgraded to a permanent contract with high or low match-specific productivity, depending on the argument that maximises the surplus.

4.2.4 Value functions

In this section, I define every value function for the worker and for the match surplus. The value functions reflect the model environment described in the previous subsections. The value functions for the firm are implicitly defined by subtracting the value functions for the worker to the value functions for the match surplus. The model is defined in continuous time.

4.2.4.1 Value for an unemployed worker

The present value for an unemployed worker with ability x is given by:

$$rW^0(x) = b + \lambda^U \beta \int \max \{ \max_C S(x, y, C), 0 \} v(y) dy \quad (4.13)$$

where λ^U is the rate at which a worker contacts a firm and $v(y)$ is the probability density of drawing an offer from a firm type y . The match is only formed if one of the potential surpluses is positive. Otherwise, the worker continues to receive the unemployment benefit b . The continuation value is the average of all potential surpluses, depending on which firm type the worker will meet.

4.2.4.2 Value for an employed worker

The value for a worker type x of being employed with firm y in an employment contract c , which can be any of the state space $\{F, P\} \times \{H, L\}$, solves:

$$\begin{aligned}
 & \left(r + \delta^c + \lambda^c \int_{\Omega(\omega, x, y, c)} v(y') dy' \right) \left(W^1(w, x, y, c) - W^0(x) \right) = w - rW^0(x) + \delta^c \mu^c t^c \\
 & \quad + \lambda^c \int_{\Omega(\omega, x, y, c)} \left(\beta \max \left\{ S(x, y, c) + \xi(c), \max_{C'} S(x, y', C') \right\} \right. \\
 & \quad \left. + (1 - \beta) \min \left\{ S(x, y, c) + \xi(c), \max_{C'} S(x, y', C') \right\} \right) v(y') dy' \\
 & \quad + 1\{c \in FL\} \left(\delta^F (1 - \mu) \left[1 \left\{ \max_{C \in P \times \{H, L\}} S(x, y, C) \geq 0 \right\} \beta \max_{C \in P \times \{H, L\}} S(x, y, C) \right. \right. \\
 & \quad \left. \left. + 1 \left\{ \max_{C \in P \times \{H, L\}} S(x, y, C) < 0 \right\} t^F \right] \right) \\
 & \quad + 1\{c \in FH\} \left(\delta^F (1 - \mu) \left[1 \left\{ S(x, y, PH) + \xi \geq 0 \right\} \beta (S(x, y, PH) + \xi) \right. \right. \\
 & \quad \left. \left. + 1 \left\{ S(x, y, PH) + \xi < 0 \right\} t^F \right] \right) \quad (4.14)
 \end{aligned}$$

where some parameters depend on the contract type c :

$$\delta^c = \begin{cases} \delta^F & \text{if } c \in F \times \{H, L\} \\ \delta^P & \text{if } c \in P \times \{H, L\} \end{cases} \quad \mu^c = \begin{cases} \mu & \text{if } c \in F \times \{H, L\} \\ 1 & \text{if } c \in P \times \{H, L\} \end{cases} \quad t^c = \begin{cases} t^F & \text{if } c \in F \times \{H, L\} \\ t^P & \text{if } c \in P \times \{H, L\} \end{cases}$$

The wage w represents the current flow the worker receives each period, as long as the match continues. With probability δ^c that the match is destroyed. In this case, the worker may receive the severance payment t^c . The worker will receive the severance payment if he is in a permanent contract or if he is in fixed-term contract that cannot be converted to permanent (with probability μ). However, if the match is on a fixed-term contract, with probability $1 - \mu$ the contract can still be converted into permanent. This is expressed in the last two elements of equation (4.14). The continuation value in such case will depend upon if the worker already received training on-the-job or not. In the first case, the decision of whether to convert the contract to permanent is not affected by the training cost which is added

back to the surplus $S(x, y, PH)$. In the later case, the worker can still receive on-the-job training when converted to permanent, hence the maximisation over $C \in P \times \{H, L\}$ which represents the optimal permanent contract, after conversion, with the current firm y (the incumbent firm).

With probability λ^c the worker contacts another firm type y' . The second line of equation (4.14) defines the continuation value in this case. The continuation value will, of course, depend on the firm type that the worker meets. It must therefore be averaged, taking into account the probability that the worker meet each firm type $v(y')$. The integration set is a function of the current wage, the worker type, the current firm type and the current contract type:

$$\Omega(\omega, x, y, c) = \left\{ y' : W^1(w, x, y, c) - W^0(x) < \max_{C'} S(x, y', C') \right\} \quad (4.15)$$

To be precise, the average is taken over all firms with productivity y' such that the current wage is at least worth being renegotiated, even if the worker stays at the incumbent firm. Otherwise, the worker continues to receive the wage w and nothing changes. C' represents the optimal employment contract with a potentially new firm y' (the poaching firm).

The value for the employed worker is just a fraction of the surplus. The equilibrium wage w is implicitly defined by equation (4.14). Nevertheless, the equilibrium wage does not influence the decision about which contract type to choose.

4.2.4.3 Surplus of a match

The surplus of a match between worker x and firm y , who choose the employment contract c , solves:

$$\begin{aligned} (r + \delta^c)S(x, y, c) &= \theta^c f(x, y) - \nu^c - rW^0(x) - (r + \delta^c)\xi(c) \\ &+ \lambda^c \beta \int \max \left\{ \max_{C'} S(x, y', C') - (S(x, y, c) + \xi(c)), 0 \right\} v(y') dy' - 1\{c \in P \times \{H, L\}\} \delta^P \tau \\ &+ 1\{c \in FL\} \delta^F (1-\mu) \max \left\{ \max_{C \in P \times \{H, L\}} S(x, y, C), 0 \right\} + 1\{c \in FH\} \delta^F (1-\mu) \max \left\{ S(x, y, PH) + \xi, 0 \right\} \end{aligned} \quad (4.16)$$

where:

$$\theta^c = \begin{cases} \theta^H & \text{if } c \in \{F, P\} \times H \\ \theta^L & \text{if } c \in \{F, P\} \times L \end{cases} \quad \nu^c = \begin{cases} \nu^F & \text{if } c \in F \times \{H, L\} \\ \nu^P & \text{if } c \in P \times \{H, L\} \end{cases}$$

Equation (4.16) is key to understand the trade-off between fixed-term and permanent contracts, as well as the decision of whether to invest in on-the-job training.

Let's start by considering the model without on-the-job search, i.e. setting $\lambda^c = 0$. If one sets $\tau = 0$, $\mu = 0$ and $\delta^P = \delta^F$, worker and firm will be indifferent between the two contracts which are virtually equivalent. In this case, all matches will start immediately on a permanent contract if worth forming, and the only decision left to be taken concerns investment in on-the-job training. However, as soon as the destruction rates δ^F and δ^P differ (still with $\tau = 0$ and $\mu = 0$), not all matches will start as a permanent contract anymore. In fact, the better the match compared to the alternatives, the longer worker and firm will want to stay together and avoid exogenous destruction. In this case, for $\mu = 0$, meaning that fixed-term contracts can always be converted to permanent, the matches with highest quality will prefer to start with a fixed-term contract and convert it to permanent when the fixed-term contract is exogenously destroyed. Indeed, starting with a fixed-term contract that can always be converted later on to permanent, allows for the match to have a longer expected duration. As μ becomes positive and increases, the risk of not being able to convert the fixed-term contract into permanent at its expiry date becomes too high and more matches are directly formed as permanent contracts. At the other extreme, when $\mu = 1$ and fixed-term contract can never be converted into permanent, keeping $\tau = 0$, all matches will start directly as a permanent contract. Introducing a positive value for τ in such a context will generate that the matches with lowest quality will be formed as a fixed-term contract instead, despite the inability to convert it into permanent at the expiry date.

From the above discussion, it becomes clear that the fraction of fixed-term contract in new hires will crucially depend on the estimated value for the destruction rates, the firing tax and the probability of being able to convert fixed-term contracts into permanent at their expiry date. Introducing on-the-job search, i.e. setting $\lambda^c \neq 0$ for all contract types, for given values of τ , μ and δ^c , will increase the fraction of matches that start directly with a permanent

contract if $\lambda^P > \lambda^F$ or increase the fraction of fixed-term contracts in new hires if $\lambda^P < \lambda^F$. For example, if $\lambda^P > \lambda^F$, permanent contracts become comparatively more attractive as their continuation value increase relatively more than fixed-term contracts. In fact, contact with further firms allow workers to move to better matches faster and to renegotiate higher wage rates.

The decision of investing in on-the-job training, on the other hand, will depend mostly on the estimated value for the training cost ξ . Nonetheless, the destruction rates δ^F and δ^P , as well as the probability of being able to convert a fixed-term contract into permanent μ , will also impact the optimal investment in training. This is the result of such parameters influencing the expected duration of a match. Since the training cost is a lump-sum payment made at the beginning of the match, the longer the expected duration of the match, the larger the incentives to invest in on-the-job training. Changes in the firing tax τ will have no effect on the share of matches that decide to invest in on-the-job training since jobs are exogenously destroyed in this model. In a model with endogenous separations, an increase in τ would probably increase the expected duration of permanent contracts and, therefore, increase the share of workers who receive training.

4.3 Estimation

Identification of the worker type x and the firm type y can be very difficult in the presence of assortative matching, even with the availability of matched employer-employee data. In fact, within a given employer, it will not necessarily be the most able worker who receives the highest wage. If there is a high degree of complementarity between the worker and the firm type in production and the worker is mismatched, his wage might be lower than that of lower-skilled individuals. Non-parametric estimation procedures for this type of models have been recently proposed. The most prominent contributions are those of Hagedorn, Law and Manovskii (2017), Bagger and Lentz (2015), and Lamadon, Lise, Meghir and Robin (2016). In this paper, non-parametric identification is further complicated by the presence of on-the-job training, which leads to some matches having higher total factor productivity than others, within the same firm. Consequently, the relationship between wages, worker ability and firm productivity is not monotonic. As a result, I will impose parametric assumptions regarding the distributions of the types in the economy, and structurally estimate aggregate parameters

that do not depend on the worker type x and the firm type y . The parametric assumptions, the estimation method, the data sources and the identification, are now explained in detail.

4.3.1 Parametric assumptions

I assume that both the worker type (x) and the vacancy type (y) are drawn from a beta distribution, respectively $I_x(\alpha_0^x, \alpha_1^x)$ and $I_y(\alpha_0^y, \alpha_1^y)$, in the interval $[0, 1]$. The beta distribution is parametrised by two positive parameters, that control its shape. These parameters are estimated. I also assume a Constant Elasticity of Substitution (CES) production function, such that:

$$f(x, y) = \theta \left(0.5x^\rho + 0.5y^\rho \right)^{1/\rho} \quad (4.17)$$

The total factor productivity θ depends on whether the worker and the firm decided to invest in match-specific human capital. It can be either θ^H or θ_L . ρ is the parameter that depends on the elasticity of substitution between x and y . ρ determines if the production function is super modular ($\rho > 1$), sub modular ($\rho < 1$) or modular ($\rho = 1$). In other words, the parameter ρ determines how much complementarity there is between the worker and the firm in the production process. These parameters are all estimated.

The model is estimated imposing that $\nu^F = 0$ and $\nu^P = 0$ since these are policy parameters that can be calibrated. Positive values for social security contributions in both types of contracts will be introduced as a counterfactual analysis exercise. The value of the severance payments in fixed-term and permanent contracts, t^F and t^P , is arbitrarily set to 0.01 since there is no institutional difference in severance payments across contract type in France. Again, these parameters can be changed in the counterfactual analysis.

4.3.2 Estimation method and protocol

The vector of parameters to be estimated is given by:

$$\Theta = \{\alpha_0^x, \alpha_1^x, \alpha_0^y, \alpha_1^y, \delta^F, \delta^P, \mu, b, t^F, t^P, \tau, \theta^H, \theta^L, \rho, \xi, \beta, \lambda^U, \lambda^F, \lambda^P\} \quad (4.18)$$

There are 19 parameters to estimate. The parameters are estimated by Simulated Method of Moments (SMM). For an initial set of parameters Θ , the fixed-point of the surplus (4.2)

is computed by value function iteration for every possible contract $c \in \{F, P\} \times \{H, L\}$ and a discretised grid of worker and firm productivities⁵. The equilibrium values of all surpluses, for every potential worker and firm, are then used to simulate a representative sample of workers' histories. From the simulated data, I compute a set of moments m_n and the distance between the simulated moments and the data moments $m(\Theta)$. Some moments are based on individual data and some are based on aggregation at the firm level. However, the simulated moments are not a smooth function of the parameters. Therefore, it is not appropriate to use a derivative based method to find the minimum of the objective function, which consists in a metric of distance between the vector of simulated moments and simulated data. Following Lise, Meghir and Robin (2016), Lamadon (2016) and Oswald (2017), I use the method developed by Chernozhukov and Hong (2003) and extended by Baragatti, Grimaud and Pommeret (2013). This method consists in constructing several Markov chains in parallel that converge to a stationary process of which the ergodic distribution has a mode that is asymptotically equivalent to the Simulated Method of Moment estimator. Each chain has a different order. Chains of higher order (with high tolerance level) move over the entire parameter space, while chains of lower order (with low tolerance level) focus on giving a precise estimate of the target distribution. Because the chains of lower order can end up trapped in a local mode, the algorithm allows for chains to swap. This method insures that the solution found is a global minimum.

The estimation is performed over a number of steps⁶. In the first stage, all the transition parameters are estimated for *ex-ante* fixed values of the remaining parameters. This includes the contact rates λ^U , λ^F and λ^P , the destruction rates δ^F and δ^P , as well as the probability that fixed-term contracts cannot be converted into permanent μ . In a second stage, fixing the transition rates at their point estimates from the first stage, the parameters from the production function ρ , θ^L and θ^H , and the policy parameters τ , b and ξ are estimated. Finally, the parameters from the distribution of workers and firms' type, as well as the workers' bargaining power, are estimated. For this final step, the remaining parameters are all fixed at their point estimates from the first and second stage. These three steps are continuously iterated on until all parameter estimates appear stable.

⁵The grid is discretised with 100×100 points.

⁶The reason a multi-stepped estimation is implemented is because it performed better when testing the estimation routine than if estimating all parameters in a single stage. Using simulated data moments for which the exact set of parameters was known, the multi-stepped estimation protocol always produced more precise estimates.

4.3.3 Data sources and sample selection

The structural parameters of the model are estimated using data from different sources. The main data source is the DADS (*Déclarations Annuelles des Données Sociales*). This data set is a large matched employer-employee panel, collected by the French Statistical Institute INSEE (*Institut National de la Statistique et des Études Économiques*). It is an administrative data set with compulsory completion by all private firms and establishments of all sizes. It contains information about the worker characteristics, such as age, gender, tenure at the current job, where the worker is natural from or the worker's residence. It also contains information that is specific to the job. For instance, one knows exactly the occupation, the hourly wage, the number of hours worked, the exact number of days for each employment spell, the tenure, if the position is part-time or full-time, and also the contract type. Finally, the data set also covers the firm's characteristics: how many employees and establishments the firm has, between which deciles of the distribution the firm is ranked in terms of volume of sales, the total wage bill per calendar year, the sector of activity, the exact location and the creation date, among other things. The DADS panel is available between the years 1976-2010. For confidentiality purposes, INSEE extracts a 1/25th sub-sample of the whole universe covered. This sub-sample is selected based on the individual's birth dates: it consists of individuals born in October of each even numbered year. Those individuals are followed over time, across different jobs and different firms. Nevertheless, the information on the type of contract for each employment spell is only available since 2005. I therefore use the years from 2005 to 2008, to avoid the financial crisis period and the subsequent sovereign debt crisis in Europe.

One advantage of this data set is the low measurement error on wages and the low attrition given mandatory completion. The absence of declared earnings can be interpreted as zero earnings in the private sector. However, there is one drawback associated with the DADS. The DADS panel aggregates the individual's experiences at the calendar year level. This means that if the worker experienced a wage renegotiation within the year or a change of contract, the DADS panel will only record the characteristics of the job as it was held for longer during the year. The consequence is that many fixed-term contracts, later converted in permanent, will appear as permanent for the entire duration of the employment spell. This means that the share of fixed-term contracts in new hires, in overall employment and the conversion rate of fixed-term contracts into permanent will be underestimated. There-

fore, I complement the information provided by the DADS with additional data sources. ACOSS publishes the total number of entries into employment in France, every quarter, by contract type and duration, from 2000 to 2014. This information, publicly available on the internet, is based on mandatory registries to all firms⁷. This registry only concerns first hirings with the firm. When a contract is renewed or upgraded, there is no additional record. With this additional information, I can compute the exact share of fixed-term contracts in new hires. The share of fixed-term contract in the stock of employment, on the other hand, is taken from *OECDStat*. In both cases, I average the share of fixed-term contracts over time between 2005 and 2008.

Finally, full identification of the model's parameters also requires some information regarding on-the-job training. This information is not available at the micro level in the DADS Panel. Therefore, the overall amount of training provided by firms in fixed-term and permanent contracts is obtained from the European Survey of Working Conditions (ESWC) from 2010. I use the fifth wave of that survey instead of using the data from the fourth wave in 2005, because this is the only wave for which detailed data has been published online for each country and contract type separately.

The sample used to compute the data moments with the DADS comprises prime age workers between 25 and 50 years old for whom information on the spell start and end date, earnings, contract type and employment status are known. The sample is further restricted so that employment spells correspond only to full-time jobs as employees, excluding: apprenticeships, internships, jobs in the extra-territorial and domestic sectors, jobs where the number of hours worked per day is superior to 16 on average, jobs where the number of hours worked per year is lower than 260 or higher than 4160, and jobs where the log hourly wage is lower than half the log of the institutional minimum hourly wage.

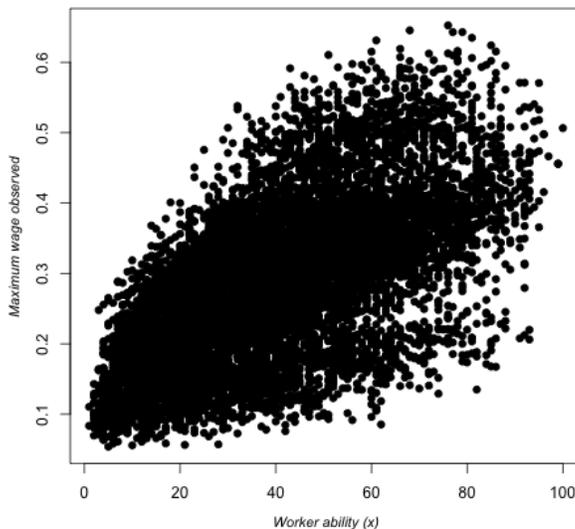
4.3.4 Identification and choice of moments

The moments m_n and $m(\Theta)$ must be sensitive to the model's parameters. To identify the parameters associated to the distribution of worker types α_0^x and α_1^x , I choose moments from the distribution of the maximum wage observed over time for each worker in the data, following the work of Hagedorn, Law and Manovskii (2017). Figure 4.1 shows the relationship

⁷Data can be found and downloaded at <http://www.acoss.fr/home/observatoire-economique/publications/acoss-stat/acoss-stat-n207.html>. It is based on the *Déclaration préalable à l'embauche (DPAE)*.

between the worker ability x and the maximum wage observed over time in a simulated data set from the model. There is a clear positive relationship between the two, although it would not be possible to rank the workers based on the maximum wage observed and obtain the correct rank.

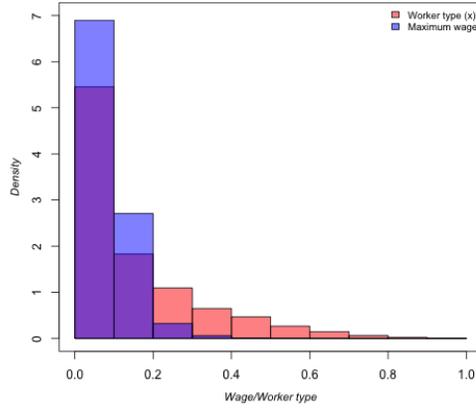
Figure 4.1: Correlation between worker ability and maximum wage received in simulated data



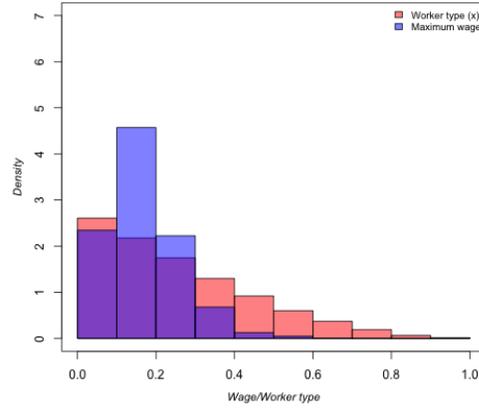
Figures 4.2 and 4.3 show how the histograms of the worker ability and the maximum wage observed evolve for different parameters α_0^x and α_1^x . The two distributions move along in the same direction for every combination of α_0^x and α_1^x . Based on that observation, and since the beta distribution is fully characterised by its mean and variance, I use the mean and variance of the distribution of the maximum wage observed.

For the distribution of the vacant jobs' productivity α_0^y and α_1^y , I look at characteristics associated to the existing jobs: the jobs that were vacant and successfully filled. In particular, I look at the maximum wage paid by a firm each year and take the average of that statistic over time, for as long as that firm is observed in the data. I then take the cross-sectional average and variance of that distribution across all firms. I repeat the same procedure for the average wage paid within each firm. Figure 4.4 shows the correlation between the job productivity and wages at the firm level (the average wage and the maximum wage paid within each firm) for simulated data. There is a clear positive association between the two. As in Bagger and Lentz (2015), I also use compute the percentage of workers who are poached from other firms out of the inflow of workers to each firm every period. I average

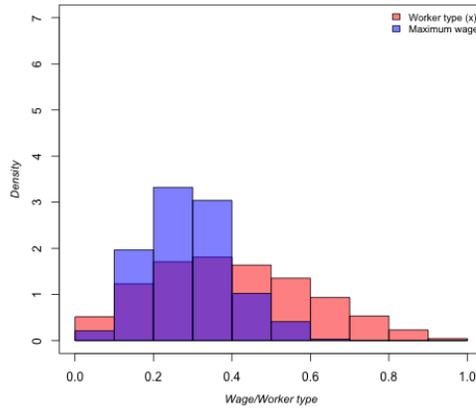
Figure 4.2: Histogram of the worker ability and maximum wage observed - Different α_0^x



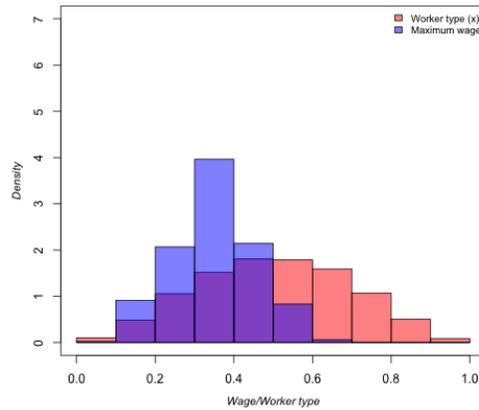
(a) $\alpha_0^x = 0.5$ and $\alpha_1^x = 3$



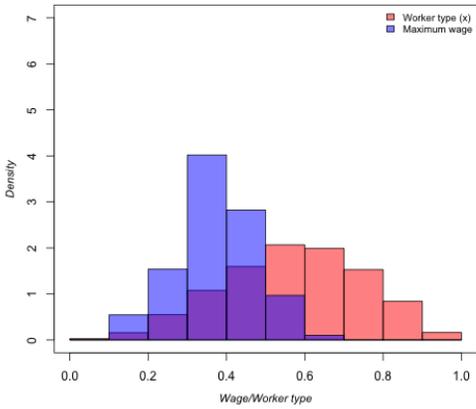
(b) $\alpha_0^x = 1$ and $\alpha_1^x = 3$



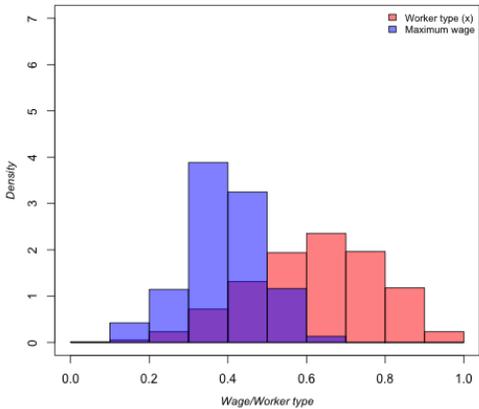
(c) $\alpha_0^x = 2$ and $\alpha_1^x = 3$



(d) $\alpha_0^x = 3$ and $\alpha_1^x = 3$



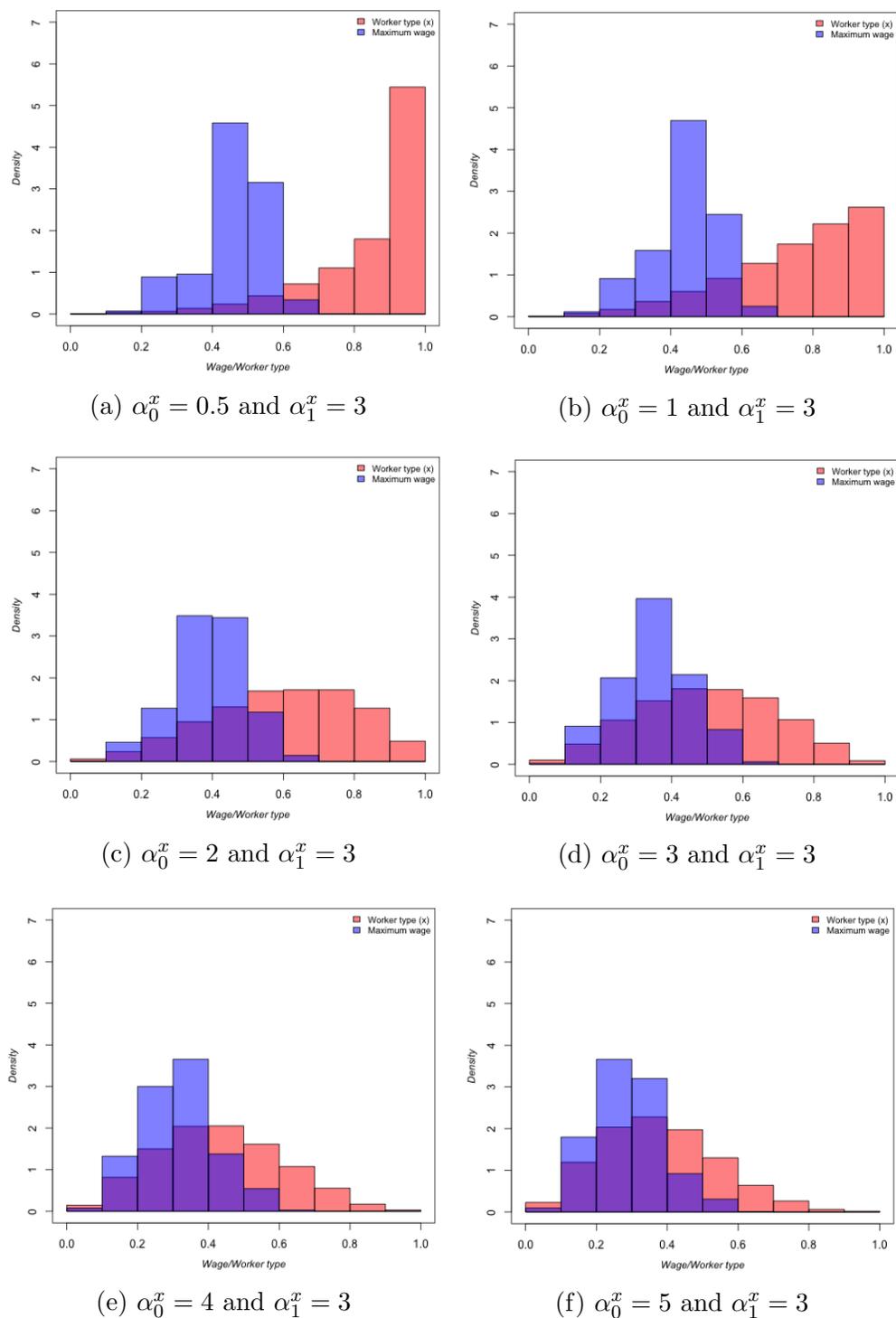
(e) $\alpha_0^x = 4$ and $\alpha_1^x = 3$



(f) $\alpha_0^x = 5$ and $\alpha_1^x = 3$

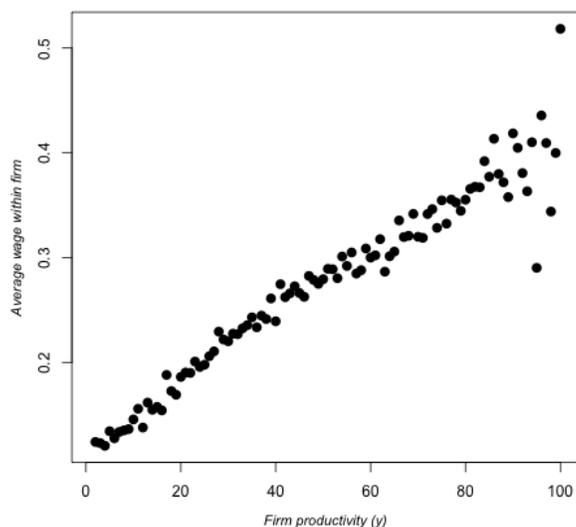
that percentage for each firm over time. I then take the cross-sectional average and variance of the distribution of this percentage across all firms.

Figure 4.3: Histogram of the worker ability and maximum wage observed - Different α_1^x

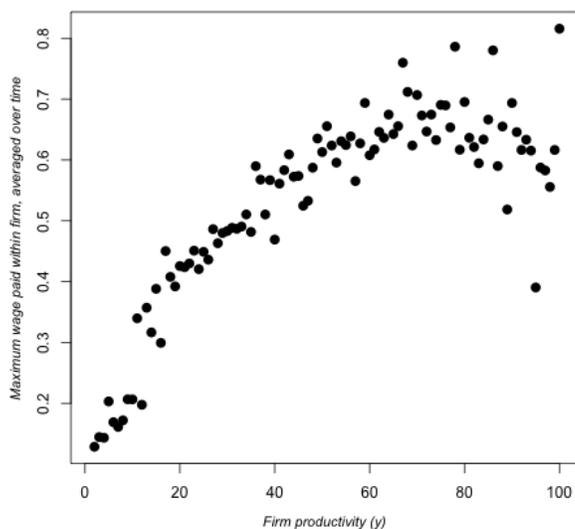


The cross-sectional mean and variance of the wage growth distribution after a renegotiation with the same employer are also very sensitive to the parameters that shape the distribution

Figure 4.4: Correlation between firm productivity and wages paid at the firm level



(a) Average wages within each firm



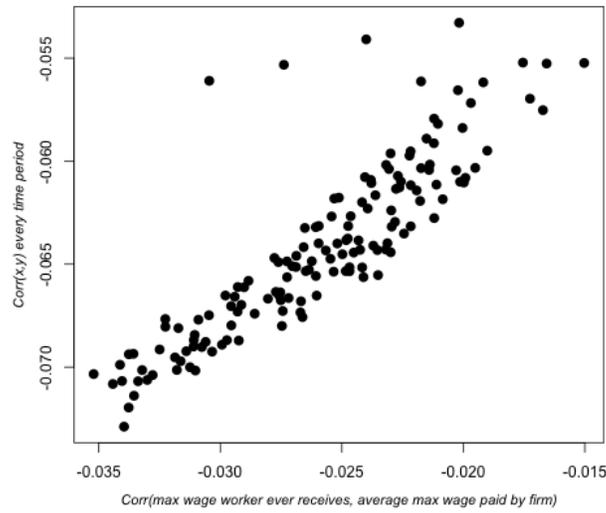
(b) Maximum wage paid within each firm

of the worker's ability. I also use the cross-sectional mean and variance of the wage growth distribution after conversion from fixed-term to permanent and after a job-to-job movement. The later is particularly sensitive to values of the bargaining power β . The red-tape cost component of the dismissal cost τ , on the other hand, directly influences the average percentage of fixed-term contracts out of all employees at the firm level. The higher is τ , the higher the share of fixed-term contracts at every firm. Therefore, I also use the cross-sectional mean

and variance of the percentage of fixed-term contracts at the firm level. There are two other moments that help to pin down the value of τ : the percentage of fixed-term contracts in the flows from unemployment to employment and the percentage of fixed-term contracts in the stock of employment overall. The parameters associated to the decision of whether to invest in job-specific human capital or not (that is θ^H , θ^L and ξ) are identified as follows. The two productivity parameters help determine the percentage of workers that will receive training in a fixed-term contract and a permanent contract. The cost of training also influences these percentages. But, on top of that, it also plays a role in the average and variance of wages in permanent contracts and the wage growth after conversion from fixed-term to permanent. The unemployment benefit parameter b influences the average and variance of wages when coming from unemployment. The transition rates λ^U , λ^F and λ^P are identified by their empirical counterfactual. That is, the transition rate from unemployment to employment (at any contract type), the job-to-job transition rate when departing from a fixed-term contracts and the job-to-job transition rate when departing from a permanent contract. The overall unemployment rate is also extremely sensitive to the parameter λ^U which determines the rate at which unemployed workers are contacted by firms. The destruction rates δ^F and δ^P are respectively identified with the transition rate from a fixed-term contract to either unemployment or conversion to a permanent contract, and the transition rate from a permanent contract to unemployment. Finally, the probability that a fixed-term contract cannot be converted into permanent at its expiry date μ is identified with the conversion rate of fixed-term contracts into permanent at the same employer. The relationship between that particular parameter and moment is clearly monotonic, linear and decreasing. The last parameter that remains to identify is ρ which determines the degree of substitutability between worker ability and firm productivity in the production process. To identify this parameter, I use the covariance between the maximum wage ever received by a worker and the average wage paid within each firm, for all the observed matches. Figure 4.5 shows the correlation between this covariance and the covariance between the actual worker ability and firm productivity in simulated data. There is a clear positive association between the two.

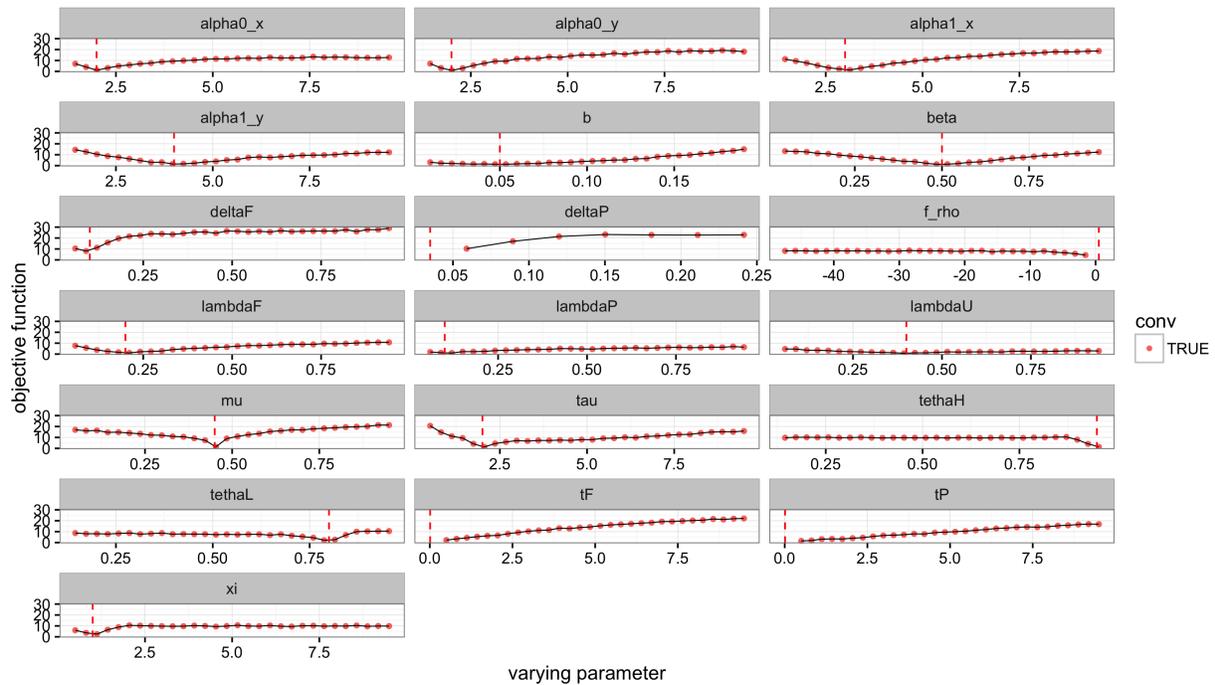
To conclude on the discussion of the identification strategy, Figure 4.6 shows the evolution of the objective function that computes the distance between data and simulated moments for varying parameters. In each sub-panel, only one parameter is changing while the remaining parameters are fixed. A vertical, red and dashed line in each sub-panel represents the exact

Figure 4.5: Correlation between the true covariance of worker and firm types and the covariance of maximum wage received with average wage paid



value used to fake the data moments. The model's parameters are identified if the objective function is minimised at that value for each of the parameters.

Figure 4.6: Value of the objective function for different parameter values



The following section presents the parameter estimates and discusses the results.

Table 4.1: Parameter Estimates

λ^U	λ^F	λ^P	δ^F	δ^P	μ
0.2426 (0.1896)	0.2240 (0.0894)	0.5408 (0.1634)	0.2363 (0.0611)	0.0414 (0.0042)	0.1142 (0.0478)
ρ	θ^L	θ^H	τ	b	ξ
0.3102 (0.4963)	5.6573 (0.4366)	6.0363 (0.4038)	0.6650 (1.9568)	1.9804 (0.2564)	4.0474 (1.6294)
α_0^x	α_1^x	α_0^y	α_1^y	β	
4.0604 (0.7112)	4.8048 (0.9439)	3.0800 (0.7954)	4.4080 (0.9577)	0.9723 (0.0305)	

Note: Standard errors correspond to the standard deviation of the parameters in the last 500 iterations of the Markov Chain.

4.4 Results

4.4.1 Parameter estimates

Table 4.1 presents the point estimates of the parameters in the model. The values in the parentheses underneath each point estimate correspond to the standard deviations of the Markov chain.

The transitional parameters given in the first row of Table 4.1 are all quarterly Poisson rates. The contact rates λ^U and λ^F are in line with quarterly job finding rates estimated in the previous literature, although λ^P appears to be higher. In Petrongolo and Pissarides (2008), they find a job finding rate in the United States that is close to the point estimate for λ^P and a job finding rate in the United Kingdom that lies between the estimates for λ^U and λ^P . For Spain, which also has a labour market strongly segmented between fixed-term and permanent contracts, Petrongolo and Pissarides (2008) estimate two job finding rates separately for the periods 1990-1994 and 1994-2006. After 1994, when fixed-term contracts became more common in the Spanish labour market, they found a quarterly job finding rate of 0.337. The average of the point estimates for λ^U , λ^F and λ^P is exactly 0.3358. For the job destruction rates, Petrongolo and Pissarides (2008) find a slightly lower rate than the estimated δ^F for the United States and the United Kingdom. For Spain, nonetheless, they find an overall quarterly job destruction rate of 0.23 between 1994 and 2006, which is very close to the point estimate for δ^F .

In terms of economic interpretation, the estimate for λ^U implies that unemployed workers,

on average, contact a potential employer every year⁸. Workers in a fixed-term contract also contact a potential employer every year, and workers in a permanent contract approximately every six months. Since the estimated contact rates for unemployed workers and workers employed in fixed-term contracts are similar, and significantly lower than for workers in permanent contracts, this suggests that fixed-term contracts are not functioning as a stepping stone to other jobs. With the estimated destruction rate δ^F , fixed-term contracts are destroyed every year, on average, while permanent contracts are only destroyed approximately every six years. According to the point estimate for μ , 11.42% of the fixed-term contracts that expire every year cannot be converted to permanent.

The point estimate for ρ from the production function implies an elasticity of substitution between the worker's ability and firm's productivity of 1.45⁹. Since this is higher than unity, it would imply that worker and firm characteristics are substitute in the production process rather than complements. Lise, Meghir and Robin (2016) obtain a similar result for a sample of low-skilled workers in the United States. However, for college graduates, they find an elasticity of substitution of 0.53, implying a high degree of complementarity. The estimated parameters for the total factor productivity when workers receive on-the-job training (θ^H) or not (θ^L), imply that non-trained workers attain approximately 93.7% of the productivity associated with trained workers.

The estimated red-tape cost of dismissing workers in a permanent contract (τ), compared with the average match product in a simulated economy at the estimated parameters, represents approximately 4% of the match output in a quarter or 1% of what the match output would be in a year¹⁰. Similarly, the estimated pecuniary benefit of unemployment, b , represents 75% of an average salary in a fixed-term contract and 68.6% of an average salary in a permanent contract for a quarter. The training cost, finally, amounts to approximately 25.2% of the average match output in a quarter or 6.3% of what would be the average match output in a year.

To conclude with the discussion of the point estimates, the estimated worker bargaining power β , is extremely high compared to similar estimates in the literature. It would imply that workers obtain 97.23% of the match surplus. Lise, Meghir and Robin (2016), for example, estimated a bargaining power of 0.188 for low skilled individuals and 0.272 for college

⁸ $\frac{1}{4 \times \lambda^U} = 1.03$

⁹ $\frac{1}{1-\rho} = 1.45$

¹⁰ $\frac{0.665}{16.0522} = 0.04$ and $\frac{0.665}{4 \times \text{Average match Product}} = 0.0104$

graduates.

4.4.2 The fit

Table 4.2 compares the targeted moments as computed in the data and resulting from the model at the estimated parameters.

Some moments fit extremely well. It is the case for the rate at which fixed-term and permanent jobs are destroyed, the transition rate from unemployment to employment, as well as the percentage of workers who receive training by their employer in both types of contracts. The mean and variance of the maximum wage that workers received over time and the average of the annual wage growth within the same job also fit quite well. Overall, there is also a fairly good fit for the percentile of wages, as well as the mean and variance of wages in both types of contracts. Finally, there is not much variation in the percentage of fixed-term contracts within each firm in the data, and this is well reflected in the model.

Other moments, however, appear to be poorly fitted. For instance, the model predicts a higher conversion rate of fixed-term contracts into permanent contracts than measured in the data. Nonetheless, the conversion rate computed using the DADS is imprecisely measured and most likely underestimated due to the annual aggregation of employment spells. The model also predicts more job-to-job movements than in the data. In particular, while in the data workers in a fixed-term contract are more likely to experience a job-to-job transition than permanent workers, the model predicts the opposite. It is possible that the job-to-job transition rate computed in the data is overestimated. If some workers who lose their job regain employment very quickly, this could be captured as direct movements from one job to the other instead of two transitions between employment and unemployment. Another moment that fits very poorly is the average wage growth after a job-to-job movement. In the data, the average is negative, while in the model it is high and positive. The data moment might be driven by the presence of some outliers or extreme values of wage growth when changing employers. It could have been more adequate to use the median in this case. Finally, the covariance between the maximum wage paid by the firm and the maximum wage received by the worker is lower in the model compared with the data. This could explain why the point estimate for ρ implies that there is not a very high degree of complementarity between worker and firm characteristics in the production process, which is at odds with other estimates in the literature.

Table 4.2: Fit of the moments used in the estimation (1/2)

Moment		Model	Data	Difference
Workers cross-sectional moments				
Wage across all the newly hired from unemployment	Mean	2.4268	2.5683	0.1415
	Variance	0.0945	0.1339	0.0394
Wage across all fixed-term workers	Mean	2.6331	2.5134	0.1197
	Variance	0.0956	0.1125	0.0169
Wage across all permanent workers	Mean	2.8881	2.7635	0.1246
	Variance	0.2298	0.1949	0.0349
Wage growth after conversion to permanent	Mean	0.0105	0.0542	0.0437
	Variance	0.0161	0.0209	0.0048
Wage growth after a job to job movement	Mean	0.2005	-0.0334	0.2339
	Variance	0.0774	0.0837	0.0063
Annual wage growth within the same job	Mean	0.0716	0.0702	0.0014
	Variance	0.1066	0.0109	0.0957
Maximum wage received over time	Mean	2.9150	2.8160	0.0990
	Variance	0.1989	0.1987	0.003
1st percentile of all wages		2.0208	2.1466	0.1258
5th percentile of all wages		2.1583	2.2398	0.0815
10th percentile of all wages		2.2851	2.3060	0.0209
Firms cross-sectional moments				
Percentage of fixed-term employees across firms	Mean	0.3121	0.0566	0.2555
	Variance	0.0444	0.0458	0.0014
Nr. of workers poached out of inflow of new workers	Mean	0.5146	0.4669	0.0477
	Variance	0.1188	0.2116	0.0929
Nr. of workers poached out of stock of employees	Mean	0.0878	0.0458	0.0420
	Variance	0.0252	0.0366	0.0114
Within firm average wage	Mean	2.7463	2.6586	0.0877
	Variance	0.2730	0.1505	0.1225
Within firm maximum wage paid	Mean	3.3779	2.7538	0.6241
	Variance	0.5670	0.2370	0.3300
Within firm variance of wages	Mean	0.1245	0.1027	0.0218
	Variance	0.0290	0.0357	0.0066
Worker and firm cross-sectional moments				
Covariance between maximum wage received by the worker and maximum wage paid by the firm		0.0760	0.1688	0.0929

Table 4.3: Fit of the moments used in the estimation (2/2)

Moment	Model	Data	Difference
Rates			
Conversion rate from fixed-term to permanent	0.2202	0.0694	0.1508
Destruction rate of fixed-term contracts	0.2531	0.2310	0.0221
Destruction rate of permanent contracts	0.0340	0.0277	0.0064
Job-to-job movement rate from a fixed-term contract	0.0515	0.0492	0.0023
Job-to-job movement rate from a permanent contract	0.0610	0.0203	0.0407
Job finding rate for unemployed workers	0.1768	0.1954	0.0186
Unemployment rate	0.1726	0.0800	0.0926
Rate at which wages are renegotiated in permanent contracts	0.0443	0.1427	0.0984
Other moments			
Percentage of fixed-term contracts in entries	0.9891	0.8100	0.1791
Percentage of fixed-term contracts in stock of employment	0.3414	0.1000	0.2414
Percentage of workers who receive training in fixed-term contracts	0.1497	0.1500	0.0032
Percentage of workers who receive training in permanent contracts	0.2965	0.2900	0.0065

4.5 Counterfactual Analysis

In this section, the parameters of the structural model are all set at their estimated values. One by one, I change some policy parameters so as to explore their impact in the share of fixed-term contracts in new hires, as well as in the sorting pattern of workers and firms between fixed-term and permanent contract.

4.5.1 Labour market segmentation and selection across different contract types

As a first counterfactual exercise, I look at how the red-tape component of the firing cost and the probability that fixed-term contracts can be converted into permanent affect the share of fixed-term workers in new hires. For that purpose, I keep all other parameters constant, and in particular, the destruction rates. Figure 4.7 shows that a 10% decrease in the red-tape cost τ generates a decrease in the share of fixed-term contracts in new hires by about half a percentage point. This is not a small effect if one considers that τ at its estimated value represented 1% of the annual match output. In fact, a 10% decrease in the red-tape cost of firing means only an additional 0.1% of the annual match output left untaxed. Nonetheless,

as explained in subsection 4.2.4.3, for a positive value of the probability that fixed-term contracts can be converted to permanent, even the total removal of the red-tape cost would not be enough to totally eliminate fixed-term contracts from new hires. Setting $\tau = 0$ and all other parameters at their estimated value would generate a share of fixed-term contracts in new hires of about 91%, compared to 99% at the estimated value for τ .

Figure 4.7: Percentage of fixed-term contracts in new hires for different values of the firing tax τ

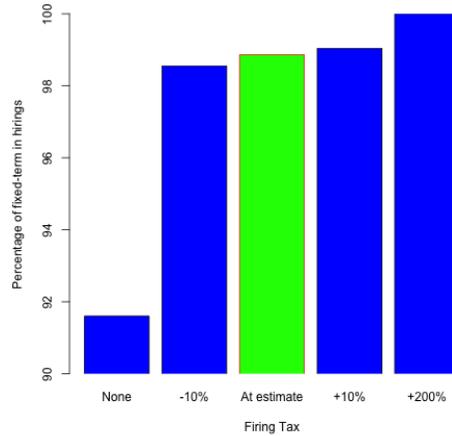


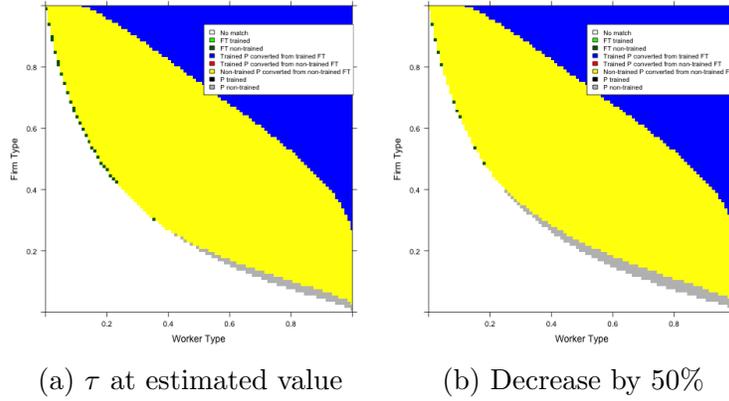
Figure 4.8 shows the matching patterns for different values of the red-tape component of the firing cost τ . The horizontal axis represents the worker ranking in the ability distribution (x). The vertical axis, on the other hand, depicts the firm ranking in the productivity distribution (y). Every small quadrant in the figure depicts the outcome when that particular worker x and firm y meet in the labour market. There are eight possible outcomes: (i) the match is not worth forming, worker and firm return to the search process; (ii) the match is worth forming under a fixed-term contract without investing in on-the-job training and the contract is not worth converting to permanent if the opportunity arises at the expiry date of the fixed-term contract; (iii) the match is worth forming under a fixed-term contract with investment in on-the-job training and the contract is not worth converting to permanent if the opportunity arises at the expiry date of the fixed-term contract; (iv) the match is worth forming under a fixed-term contract and worth converting to permanent if the opportunity arises at the expiry date of the fixed-term contract. Nevertheless, it is neither worth investing in on-the-job training at the initial stage of the match nor at the conversion stage; (v) the match is worth forming under a fixed-term contract and worth converting to permanent if the

opportunity arises at the expiry date of the fixed-term contract. Investment in on-the-job training is only worth at the conversion stage; (vi) the match is worth forming under a fixed-term contract with investment in on-the-job training from the beginning and the contract is worth converting to permanent if the opportunity arises at the expiry date of the fixed-term contract; (vii) the match is worth forming under a permanent contract without investing in on-the-job training; and finally, (viii) the match is worth forming under a permanent contract with investment in on-the-job training. To be precise, the figure does not depict the *de facto* outcome for each particular worker and firm. Instead, the figure represents the optimal outcome, conditional on the match not being destroyed in the meantime for other reasons. For example, it is possible that a fixed-term contract would have been optimal to convert to permanent, but never reaches that stage because the worker receives an outside offer and moves to a new firm. In equilibrium, it is optimal to convert fixed-term contracts into permanent in most of the cases. However, this does not mean that all these matches will eventually be converted into permanent. Workers can leave to other firms before the fixed-term contract expires and is converted, or the fixed-term contract might be exogenously destroyed together with the position, preventing the worker and firm to carry on with a permanent contract. Finally, in equilibrium, outcomes (iii) and (v) never occur. In fact, if the fixed-term contract is not worth converting to permanent at its expiry date, investment in on-the-job training is never optimal. Similarly, if the fixed-term contract is expected to be converted to permanent at its expiry date and investment in on-the-job training is worth it, then it must be optimal to provide such training from as early as possible so as to collect the benefits from a higher total factor productivity for as long as possible. Therefore, whenever the investment in on-the-job training is made, it is always at the hiring stage and never at the conversion stage.

As depicted in Figure 4.8, the model predicts that if the firing cost decreases, further matches are directly formed with a permanent contract (area in grey) and the fraction of fixed-term contracts that are not optimal to convert to permanent at their expiry date (dark green area) goes down. The workers that mostly benefit from the decrease in the red-tape cost of firing are the workers in the upper part of the ability distribution, between the 60th and 80th percentiles, as they are more likely to be hired directly with a permanent contract.

Curiously, the increased likelihood of being hired directly with a permanent contract is mostly felt when meeting lower productivity firms. When contacting highly productive

Figure 4.8: Match formation in equilibrium - Different values of the red-tape cost (τ)



firms, these workers will still be hired with a fixed-term contract first, even though that contract will be converted to permanent if nothing happens in the meantime. For this particular combination of estimated parameter values, this is mostly driven by the higher on-the-job contact rate that workers experience in permanent contracts. Since high ability workers have a very high opportunity cost when unemployed, they are willing to accept a contract from a lower productivity firm, despite the potential mismatch. Nevertheless, they will favour a permanent contract over a fixed-term contract since it allows them to contact potentially better firms more frequently. When high ability workers meet high productivity firms, starting the match with a fixed-term contract and convert it into permanent at the expiry date of the contract is still the preferred option. There are two reasons for this: the fixed-term contract in the first years of the match reduces the overall expected firing tax and it increases the expected duration of the match since these workers are unlikely to leave to another firm.

Figure 4.9 shows the impact of a decrease in the probability that fixed-term contracts cannot be converted to permanent at their expiry date for exogenous reasons, on the percentage of fixed-term contracts in entry flows towards employment. The effect is very large. An increase in the probability μ from its estimated value of approximately 11% to 20% leads to a fall in the percentage of fixed-term contracts in new hires from almost 100% to less than 20%. Figure 4.10 represents the changes in the optimal matching and conversion patterns for different values of μ . The last workers to benefit from an increase in the probability that fixed-term contracts cannot be converted to permanent are low ability workers. In particular, when these workers meet with highly productive firms.

Figure 4.9: Percentage of fixed-term contracts in new hires for different values of the probability μ

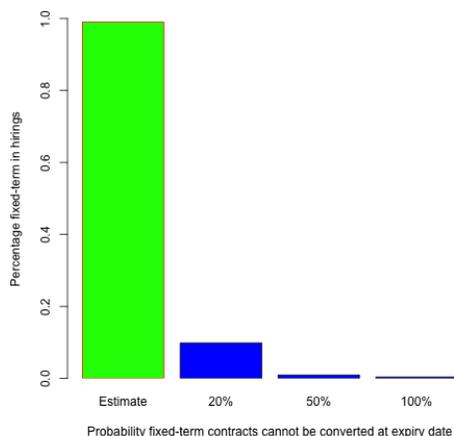
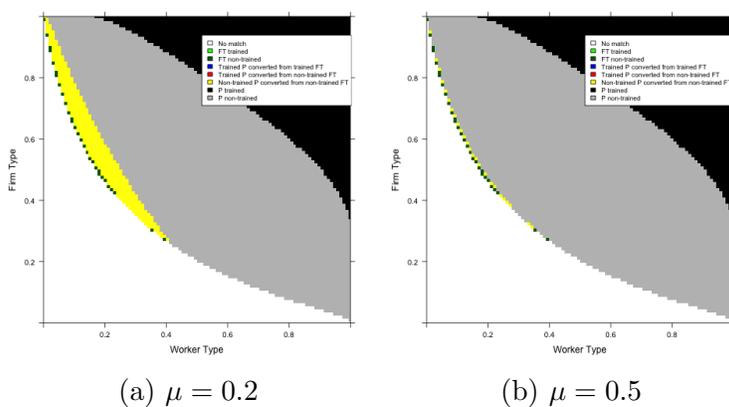
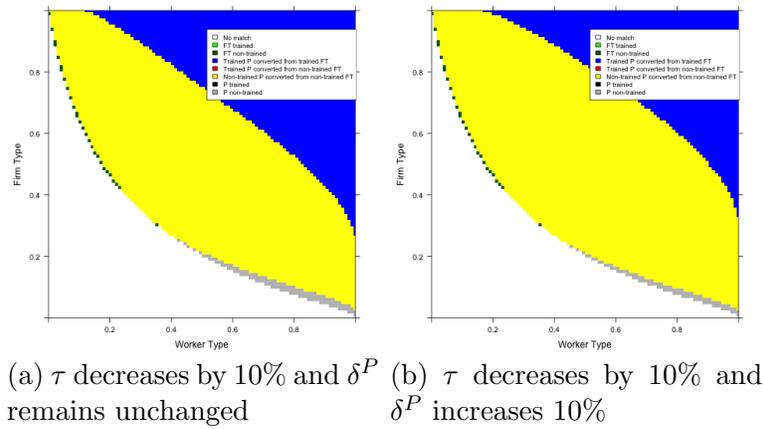


Figure 4.10: Match formation in equilibrium - Different probabilities that fixed-term can be converted (μ)



However, as discussed previously in subsection 2.4.3., since separations are kept exogenous, the model cannot quantify the amount of jobs that would be destroyed when the firing cost goes down. Therefore, as an additional counterfactual exercise, I look at the matching and conversion patterns when the red-tape firing cost decreases in 10% and the destruction rate of permanent contracts increases in 10%. Figure 4.11 shows that the positive effect from a reduced firing cost on the share of permanent contracts in hiring and employment is fully reverted by an increase in the destruction rate of permanent contracts.

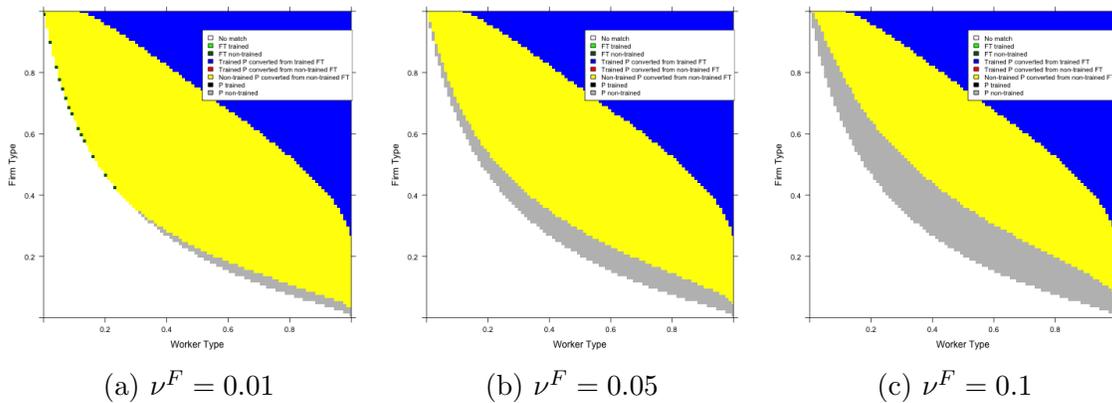
Figure 4.11: Match formation in equilibrium - When the destruction rate of permanent contracts adjusts



4.5.2 Taxing fixed-term contracts

For the estimation and in the counterfactual exercises discussed previously, the parameters ν^F and ν^P were kept to zero. These parameters measure the amount of social security contributions that must be paid each period that a fixed-term or permanent contract is in place. A potentially interesting counterfactual is to analyse how much increasing the taxation of fixed-term contracts relative to permanent contracts affects labour market segmentation. Figure 4.12 shows the matching and conversion patterns for different small values of ν^F when $\nu^P = 0$.

Figure 4.12: Match formation in equilibrium - Introducing higher social security contributions in fixed-term contracts



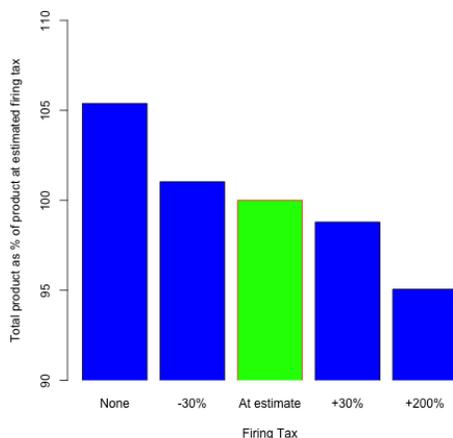
Increasing the taxation of fixed-term contracts while permanent contracts are left untaxed

has a significant effect in the percentage of workers that are hired directly with a permanent contract. The effect of increasing the taxation of fixed-term contract is much more effective in reducing the share of fixed-term contracts in hiring than reducing the firing tax.

4.5.3 Training, productivity and labour market segmentation

Another pertinent question is whether the total that is produced in the economy increases when the firing cost goes down, more matches start directly with a permanent contract, and more fixed-term contracts are converted to permanent at their expiry date. Figure 4.14 depicts the effect of a change in the firing cost τ on the total product, normalised by the total product in a simulated economy at the estimated parameters. It shows that a 30% decrease in the red-tape component of the firing cost, for example, would increase total product by 1%, keeping all other parameters constant. A total removal of the firing tax would increase total product in approximately 6%.

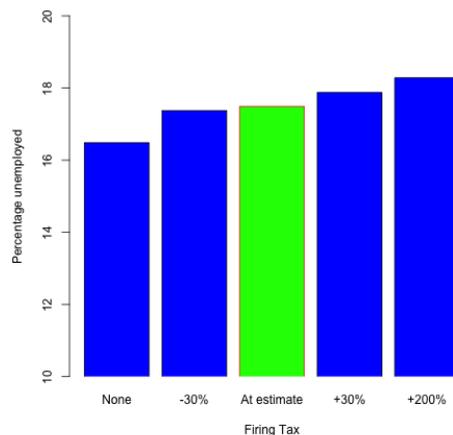
Figure 4.13: Total product for different values of the firing tax τ



The increase in total product comes from three channels. First of all, the increase in the share of permanent contracts in the economy means that matches last longer on average. Consequently, individuals go less often through periods of unemployment and more is produced. Second, although the effect is barely visible from figure 4.8, there are more worker-firm pairs willing to form a match when the firing cost is lower. Namely, matches directly with a permanent contract. In fact, the unemployment rate goes slightly down, as shown in figure 4.14. Finally, since there are more permanent contracts in the economy, it is also more likely

that for a given match, the worker receives on-the-job training. Since on-the-job training increases the match-specific productivity, total output becomes larger.

Figure 4.14: Unemployment rate for different values of the firing tax τ



It is worth stressing that the decreased unemployment rate is driven by an increase in job creation only. Since job destruction is exogenous and kept constant, the effect of a decrease in the firing cost on overall unemployment ignores the possibility that further destructions would occur as a result.

Finally, figure 4.15 depicts the percentage of workers who receive on-the-job training for different values of the training cost ξ , while figure 4.16 shows how the total product in the economy would change.

As evidenced by figure 4.15, the model predicts that for most values of the training cost, workers in a permanent contract are more likely to receive training on-the-job than workers in fixed-term contracts. More interestingly, as evidenced by figure 4.16, decreasing the training cost has a significant impact on the total product of the economy. As the cost decreases, more individuals receive on-the-job training and the total factor productivity of several matches increases. Added up at the aggregate level, this results in a significant increase in production. In fact, the gains in total output that can be achieved by reducing the cost of on-the-job training are more significant than the gains from reducing the red-tape component of the dismissal cost.

Figure 4.15: Percentage of workers who receive training in each contract type for different values of the training cost ξ

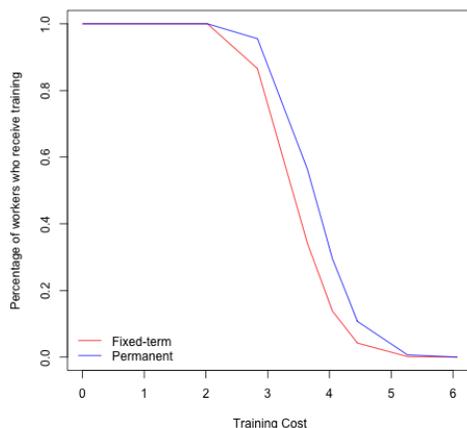
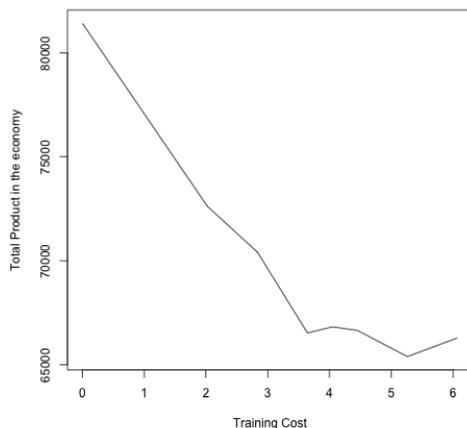


Figure 4.16: Total product for different values of the training cost ξ



4.6 Concluding remarks

This chapter develops an equilibrium model of the labour market, with frictions, in which two-sided heterogeneous agents optimally decide the employment contract type and whether to invest in on-the-job training. The model rationalises the co-existence of fixed-term and permanent contracts in equilibrium, even if there is no learning about the workers' ability. In other words, the model is able to explain the labour market segmentation between different types of contracts, even assuming that workers and firms' real productivity are fully observable to everyone in the economy. In this model, the trade-off between fixed-term

and permanent contracts depends on the expected duration of each contract, the expected dismissal cost, the likelihood that the worker leaves for another firm in the meantime, the likelihood that the fixed-term contract can still be converted to permanent at its expiry date, as well as the worker ability, the firm productivity and how much complementarity there is between worker and firm in the production process.

Using French matched employer-employee data from 2005 to 2008, the model is estimated using Simulated Method of Moments (SMM). By structurally estimating the parameters of the model, the work developed in this chapter is amongst the first research articles to quantify the red-tape cost of dismissing workers in permanent contracts - the cost associated with administrative procedures, legal expenses, additional financial penalties and the uncertainty about the outcome of a process in the labour court. According to the point estimates obtained, the red-tape component of the dismissal cost represents approximately 1% of the match output if the match would last one year. If the match only last a quarter, the red-tape firing cost represents about 4% of the match output. Decreasing this component of the dismissal cost in 10% would reduce the share of fixed-term contracts in new hires by half a percentage point, if the destruction rate of permanent contracts would remain unchanged. That is, if there is no surge in dismissals in permanent contracts after the decrease in the firing cost. The workers that would mostly benefit from such reform are those in the upper part of the ability distribution, namely between the 60th and 80th percentiles. These workers become more likely to be directly hired under a permanent contract, which increases their lifetime utility, measured as the value of being unemployed in this economy. Nevertheless, if the objective is to reduce the share of fixed-term contracts in new hires, the model with the structural parameters at their estimated values, predicts that taxing fixed-term contracts seems more effective than reducing the red-tape component of the dismissal cost. Finally, while there are potential gains in output by reducing the red-tape component of the firing cost, much larger gains in total output can be achieved by reducing the cost of training workers on-the-job. In fact, the training cost is estimated to represent approximately 6% of the match output if the match lasts one year and 25% of the match output if it only lasts one quarter. Even small decreases in the training cost from its currently estimated value would increase total output significantly.

There are several ways in which the analysis discussed in this chapter could be improved. To begin with, the process of vacancy creation is taken as exogenous in the model. It is

assumed that there exists a pool of available vacancies and the parameters that shape the distribution of the productivity for these vacancies are estimated. Nevertheless, a reform of employment protection legislation could also impact the vacancy creation process, apart from the decision of when and how to fill these vacancies. For instance, strict employment protection legislation, together with the existence of fixed-term contracts, may provide an incentive for firms to create vacancies of low productivity rather than high productivity. In other words, policy parameters could also influence the distribution of the vacancies' productivity. Ultimately, to evaluate the model fit, it would also be interesting to compare the earnings distributions in different types of contracts implied by the model at the estimated parameters with the empirical earnings distributions as described in Fialho *et al.* (2017). In particular, one could compare the implied earnings growth after conversion and after a job-to-job transition from a fixed-term to a permanent contract.

Chapter 5

Conclusion

In this dissertation, I start by reviewing the evolution of Employment Protection Legislation (EPL) strictness over time for regular and temporary contracts, and the many reforms that have affected open-ended and atypical employment contracts since the late 1970s in France, Italy, Portugal and Spain. This historical perspective on EPL attempts to clarify which measures progressively contributed for a segmented labour market. I also review the recent labour market reforms, compare the current legislation affecting both permanent and fixed-term contracts in the four countries considered, and describe the different proposals for future reforms. Overall, several measures have contributed for the segmentation of labour markets in France, Italy, Portugal and Spain until the early 2000s. These measures consisted mostly in the introduction of new atypical forms of employment or the extension of motives to use fixed-term contracts. Such measures were especially directed towards young and inexperienced workers or those further at risk of unemployment, and were unaccompanied by substantial reforms to EPL for permanent contracts. While there were several attempts at reverting the upward trend in temporary employment before the 2008 financial crisis, this was not reflected significantly in the percentage of temporary contracts out of total dependent employment. Since 2008, significant changes were introduced in rules governing permanent contracts in Italy, Portugal and Spain. In Portugal and Spain, severance payments were considerably reduced and dismissal procedures were simplified. Nonetheless, special regimes for temporary and fixed-term contracts were approved to contend the growing youth unemployment rate after the crisis, therefore preserving the dual structure of the labour market. In Italy, major EPL reforms have been implemented since 2014, which should be carefully monitored. The

Italian Jobs Act attempts to address one of the major concerns regarding EPL for permanent contracts: the large extent to which judges intervene and the high level of uncertainty associated with labour court processes. The evaluation of such reforms in the near future can be informative for policy makers in all countries.

The dissertation proceeds by conducting a number of empirical analyses to shed light on the extent in which labour markets in France, Italy, Portugal and Spain can be considered segmented between two groups of workers: a first group in permanent employment contracts, enjoying a relatively high degree of protection against dismissal, and a second group of workers in non-standard work forms, characterised by much greater flexibility and shorter durations. As discussed in the third chapter, defining a labour market as segmented should not follow only from institutional differences across the different types of employment relationships. Another important aspect is the mobility or permeability between contract types. In the context of a dual labour market, individuals that find themselves in one contract form tend to remain there for a long time with little scope for movements between contract types. Furthermore, a labour market can be considered segmented if the prevalence of non-standard work forms is much higher amongst particular groups of workers. Finally, on top of differences in terms of workers' pre-determined characteristics, such as age, schooling or previous unemployment spells, there could also exist important differences in terms of characteristics observed after the two types of employment relationships have begun. For instance, individuals that are employed in non-standard work benefiting from lower salaries and fewer training and promotion opportunities than similar colleagues employed under permanent contracts.

I find that temporary contracts shorter than a month account for the majority of entries into employment, at least in France and Spain. Moreover, the share of temporary contracts shorter than a month has increased substantially over time in France. Being employed in a temporary contract does not seem to be the result of workers preferences for more flexible jobs. Short-term contracts affect mostly young workers who recently left education, female, foreign born individuals, worker with lower tenure at the job, workers with primary education and workers with low-skilled occupations. It takes about 90 months (almost 8 years) after leaving education for the share of temporary contracts in total employment to reach its average level in the whole population. Transitions rates from fixed-term to permanent contracts with the same employer are relatively low: approximately 5% every quarter in France and 10% in Portugal. Workers employed in a fixed-term contract are more

likely to exit towards non-employment than towards a permanent contract at the same firm. In particular, we observe a pick of exits from fixed-term contracts to non-employment around 24 months in both France and Portugal. There is also some evidence suggesting that workers employed in temporary employment contracts do not have to perform complex tasks or learn new things at a fast pace. They receive significantly less training paid by their employer than workers in a permanent contract and believe that their jobs do not offer good prospects for career advancement. Finally, I also find that firms that do not change their total number of employees over time tend to exhibit a stable share of fixed-term contracts within the firm, suggesting that they rotate different employees over time with fixed-term contracts.

Overall, these findings indicate that labour markets in France, Italy, Portugal and Spain are effectively segmented between temporary and permanent workers, affecting one particular group of vulnerable workers, and with potentially negative consequences for training and productivity. Nevertheless, when controlling for worker and firm characteristics, the wage gap between permanent and fixed-term workers is about 3.5% in France and 1% in Portugal. When taking worker unobserved heterogeneity into account, the gap decreases to 1% in France and becomes statistically insignificant in Portugal. Therefore, the widely acknowledged fixed-term contract earnings penalty could be the result of pre-existing and unobserved worker characteristics. As most evidence described in this chapter is of a non-experimental nature, it is unclear how much of the differences in training and future job prospects, for example, are attributable to contract types and not other differences across the two groups of workers. Consequently, when evaluating the potential effects of employment protection legislation reforms, it seems important to acknowledge that individuals may be ex-ante heterogeneous and sorted across contract types depending on their personal characteristics.

In the fourth chapter, I therefore develop an equilibrium model of the labour market, with frictions, in which two-sided heterogeneous agents optimally decide the employment contract type. Worker and firm can decide to engage into a fixed-term contract - with a lower dismissal cost but lower duration - or a permanent contract - with a higher dismissal cost but higher expected duration. The agents can also decide to convert the fixed-term contract into a permanent contract at its expiry date. Another particularity of the model presented in this chapter is that the decision of whether to invest in job-specific human capital is also modelled. If worker and firm agree to invest in the accumulation of job-specific skills, the match has higher total factor productivity. Such investment has a fixed cost, which is irreversible

and non-transferrable to other jobs. The purpose of modelling investment in job-specific skills is to replicate the stylised fact that workers in fixed-term contracts are less likely to receive training sponsored by their employers (Fialho *et al.*, 2017). Ultimately, depending on the share of fixed-term contracts over total employment, this will be reflected in the total output produced. Accommodating the decision of whether to invest in job-specific skills into the model, therefore brings interesting implications for productivity. Finally, wages are determined by sequential auction, as in Cahuc, Postel-Vinay and Robin (2006), which performs remarkably well in replicating the empirical earnings distribution. Adapting the sequential auction wage determination mechanism to a context of multiple employment contracts brings additional advantages. For example, Fialho *et al.* (2017), using administrative data for France and Portugal, report that a significant fraction of movements from fixed-term to permanent contracts are associated with a fall in the hourly wage rate. With wages determined by sequential auction, the model developed in this paper provides a rational for that empirical finding. In fact, when a worker is converted to a permanent contract, or moves to a new firm from a fixed-term to a permanent contract, the model predicts that the worker suffers a wage cut if the move entitles a higher continuation value, *i.e.* better opportunities for moving along the wage ladder in the future.

Using French matched employer-employee data from 2005 to 2008, the model is estimated using Simulated Method of Moments (SMM). By structurally estimating the parameters of the model, this chapter aims at quantifying the red-tape cost of dismissing workers in permanent contracts - the cost associated with administrative procedures, legal expenses, additional financial penalties and the uncertainty about the outcome of a process in the labour court. The model with its parameters set at their point estimates is then used in counterfactual policy analysis.

The main findings are the following. First, fixed-term contracts appear not to function as stepping-stones. In fact, the estimated contact rate for workers employed in fixed-term contracts is very similar to the estimated contact rate for unemployed workers. Both are significantly lower than the contact rate estimated for workers in permanent contracts. Therefore, it seems that reaching employment through a fixed-term contract does not necessarily open doors to employment at other firms. Nevertheless, this result should be interpreted with caution. In fact, the model abstracts from general human capital accumulation while employed. Second, according to the estimation, the red-tape component of the dismissal cost

represents approximately 1% of the match output if the match would last one year. If the match only last a quarter, the red-tape firing cost represents about 4% of the match output. Decreasing this component of the dismissal cost in 10% would reduce the share of fixed-term contracts in new hires by half a percentage point, if the destruction rate of permanent contracts would remain unchanged. In other words, this result is conditional on the lower firing cost not resulting into more frequent dismissals from permanent contracts. The workers that mostly benefit from the decrease in this firing cost are those in the upper part of the ability distribution, namely between the 60th and 80th percentiles. These workers become more likely to be directly hired under a permanent contract, which increases their lifetime utility. Nonetheless, taxing fixed-term contracts seems much more effective in reducing the share of fixed-term contracts in the economy than reducing the red-tape component of the dismissal cost. Finally, much larger gains in total output can be achieved by reducing the cost of training workers on-the-job rather than by reducing the firing cost and the share of fixed-term contracts in new hires. In fact, the training cost is estimated to represent approximately 6% of the match output if the match lasts one year and 25% of the match output if it only lasts one quarter. Even a small decrease in the training cost would generate a significant increase in total output.

There are several ways in which the analysis initiated in this dissertation could proceed. To begin with, the process of vacancy creation is taken as exogenous in the model. It is assumed that there exists a pool of available vacancies and the parameters that shape the distribution of the productivity for these vacancies are estimated. Nevertheless, a reform of employment protection legislation could also impact the vacancy creation process, apart from the decision of when and how to fill these vacancies. For instance, strict employment protection legislation, together with the existence of fixed-term contracts, may provide an incentive for firms to create vacancies of low productivity, rather than high productivity. In other words, policy parameters could also influence the distribution of the vacancies' productivity. Ultimately, to evaluate the model fit, it would also be interesting to compare the earnings distributions in different types of contracts implied by the model at the estimated parameters with the empirical earnings distributions as described in Fialho *et al.* (2017). In particular, one could compare the implied earnings growth after conversion and after a job-to-job transition from a fixed-term to a permanent contract.

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