The Effect of Product Market Competition on Job Instability

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Abstract

The proportion of fixed-term over total employment in Spain is the highest in Europe. Today 32 per cent of all workers in Spain have a fixed-term contract. Since 1992 Spanish authorities have unsuccessfully intended to reduce fixed-term contracts incidence.

In Spain a huge majority of workers are first hired under a fixed-term contract and transitions to permanent employment occur mainly after fixed-term employment. I propose a theoretical model that accounts for the causal relationship between product market competition and workers' transitions out of fixed-term employment. To empirically test my hypothesis I combine individual data from the Spanish Labor Force Survey with many other data sources that provide variables varying at the industry level. I propose a discrete-time duration model with competing risks to study the transitions from temporary to permanent employment. Competition is measured using Lerner Indexes. However, due to its potential endogeneity, I provide two additional estimations: One instrumental variable specification and a quasi-experiment using the European Single Market Program. Results show that a change towards a more competitive environment for an industry makes workers employed in that industry more likely holding fixed-term contracts. Therefore, the increase in competition experienced by the Spanish manufacturing industry may partially explain firms' resistance to hire workers on a permanent basis.

1 Introduction

In order to fight unemployment, European countries flexibilized their labor markets during the eighties by allowing the use of fixed-term contracts. These are labor contracts with a predetermined duration that have negligible firing costs. They are still widely used, see table 1. Spain leads the classification of European countries with the highest proportion of fixed- term contracts (temporary rate) followed by Poland, Portugal, Slovenia and the Netherlands. In Spain, the temporary rate suffered a sharp increase after the liberalization imposed by the 1984 Law. Before 1984 the use of temporary contracts was restricted to special cases and sectors and its use was completely marginal. After the 1984 Law avoided any restriction for the use of fixed-term contracts (legally denominated "employment protection contracts"), a huge proportion of the new signed contracts in all sectors and occupations had a pre-determined duration. As Güell and Petrongolo (1998) show, from 1986 to 1992, 98 percent of new contracts registered at the employment office were fixed-term contracts. Additionally, the majority of transitions to permanent employment occur from fixed-term employment. Only 9.64% of all fixed-term workers that move to a new industry are offered a permanent position in a first place while for those that were previously unemployed, this figure reduces to 8.71%. For this reason, I decided to focus on the transitions from temporary to permanent employment in this study.

Simultaneously, European good markets have experienced increases in the level of competition motivated by deregulation processes promoted by governments, product market integration processes (European Single Market Program), arise of new competitors (Asian countries) among other reasons.

This piece of research aims to abridge a gap in the literature dealing with labor contracts and product market competition. This article studies how competition alters job instability in terms of the type of contract workers have. I propose a theoretical model that interacts the product and labor market to derive some implications for the effect of changes in the level of competition in transition rates between types of contracts.

When trying to empirically test the hypothesis of a causal effect from product market competition on type of labor contract, one encounters a potential endogeneity problem. Taking this into account, I perform an instrumental variable approach and make use of a quasi-experiment based on the application of the European Single Market Program in Spain.

To perform the empirical specification I use data from the Spanish Labor

Force Survey which contains data on individuals type of contract, contract duration and working industry. This is combined with some data at the industry level, namely, the Industrial Enterprise Survey, the OECD International Regulation Database and Cañada and Carmena (1991).

The finding that product market competition has a causal effect on type of contract means that the general trend towards increasing competition in product markets through sector deregulation, economic integration between countries and reduction in transport costs can be thought of as an explanation for the sharp increase in the overall temporary rate since 1984 as well as for the difficulties the authorities are finding in promoting permanent contracts.

Soon after the generalization of the use of fixed-term contracts, those revealed to have some unwilling features. For workers an indefinite contract is always preferred to a fixed-term one. Fixed-term contracts do not present any advantage for the worker over indefinite ones. The latter are more stable, better paid and the number of hours worked in each type of contract is basically the same. Therefore, any worker would choose an indefinite contract if she could choose among them. This suggests that for workers, the type of contract is chosen by the employer and they may be willing to influence the employer towards indefinite contracts. In Spain, 87.95 % of all fixed-term workers employed from 1987 to 2001 declare to have a fixed-term contract because they could not find a permanent one in contrast to the 0.65% that assert to have this type of contract because they wanted[1]. Workers distaste for fixed-term contracts can be partially explained by the existence of a wage premium between permanent and temporary workers. Jimeno and Toharia (1993) estimate this wage premium to be between 9% and 11%. Therefore, fixed-term contracts increased inequality among workers. Additionally, the perception of instability a worker gets out of a job is related to the legal status of her contract. For Spain, this fact has been documented. De la Rica and Iza (2003) explore the role of fixed-term contracts on the delay in the age at marriage and maternity. Additionally, Albarrán (2001) studies the effect of uncertainty on household's saving behavior. He points out at fixed-term contracts' expansion as an important source of uncertainty for Spanish households. In addition to its negative effect on workers' welfare, the macroeconomic perverse effects of fixed-term contracts include inducing

[1]In a 1991 survey, the fraction of workers who assert that they held a temporary job because they could not find a permanent one were 28% in the UK, 38% in Denmark, 68% in Portugal, 77% in Greece, and 89% in Spain (OECD, 1993).

more employment variability over the business cycle. This contributes to the general increase in general labour turnover which has a negative impact on long-term productivity and contributes to the disequilibrium in public finances (see Bentolila and Dolado (1994) for a deeper analysis on this issue). Moreover, the spread of fixed-term contracts provoked a phenomenon called dualism in the Spanish Labor Market. This refers to one part of the working population being protected by indefinite contracts and enjoying high wages and good working conditions whereas the rest are moving from one temporary employment to another, suffering bad wages and amenities. This undesirable consequences of the 1984 Law are stronger because fixed-term workers tend to be younger and are less likely to be married than workers with indefinite contracts. Additionally, they are also less educated and less skilled, (see table 2). Therefore, fixed-term employment affects the workers with the worst outside options and those that enjoy less household insurance. Consequently, Amuedo-Dorantes and Serrano-Padial (2005) show that fixed-term contracts have implications in terms of poverty rates. This causality varies even depending on the length of the contract. Lower contract duration is associated with a higher likelihood of becoming poor.

In order to fight the expansion of fixed-term contracts, the government promoted the 1992 Law which increased the minimum duration of the fixed-term contract from three to six months. However, this measure revealed to be ineffective. Then, the government redacted new Laws in 1994, 1997 and 2000. The evolution of the Spanish temporary rate stabilized in 1992 and started to decline smoothly after 1997, (see Figure 1). This aggregate pattern is highly influenced by legislation as shown by Güell and Petrongolo (2003).

Although this sequence of legislation changes may seem to explain a big part of the national temporary rate, they did not affect all Spanish industries equally. The level of concentration in an industry can be used to proxy competition. More concentrated industries have few firms that provide goods to high proportions of the market[2]. Figure 2 displays the pattern for the five most concentrated industries in 2001 (in the top of the figure) in contrast to this same pattern for the least five concentrated industries (at the bottom). Whereas the most concentrated industries seem to follow very distinct tendencies and in general, seem to continue increasing the proportion of tem-

[2]Concentration is measured according to the Herfindahl index, which is computed as the sum of the market shares of all firms in an industry. In this case market shares are computed approximately using the share of the firm in total employment of the industry.

porary workers at the end of the period, the graphs for the less concentrated industries have an inverted U-Shape. This article reveals that the distinct levels of competition faced by industries are underlying these differences.

Table 3 displays the correlations among the Herfindahl index and the temporary rate by year. The majority of correlations have a negative sign which indicates that the higher the degree of concentration, i.e., the less competitive the industry is, the lower the proportion of temporary contracts is. This coincides with the final results of my empirical estimation and may be interpreted as a higher capacity to capture benefits by workers under less competitive environments which may occur because managers are more likely to satisfy workers requirements if they are capturing rents more easily.

The Lerner Index has some desirable features that make it a more appropriate measure of competition than concentration indexes in this context. It is the most widely used competition measure based on markup. The Lerner Index is computed as price minus marginal cost divided by price[3]. It reflects the extra benefits that the industry gets by non being perfectly competitive. In the perfect competition case the value of the Lerner Index is zero. Hence, even if an industry is formed by many small firms the Lerner Index may be able to capture a low level of competition if they are colluding. Table 4 shows the correlations among the Lerner Index and the temporality rate. It indicates that the Lerner Index is more ambiguous on the relationship among level of product market competition and temporality. This ambiguity may be caused by the different pool of workers in each industry, the different sensitivity to the cycle or to the macroeconomic conditions of each industry or to location, industry and time characteristics. This justifies the use of an econometric specification to capture all the different sources of variation in the proportion of fixed-term contracts among industries along time.

In the next section I discuss previous literature on the effects of product market competition on the labor market. Section 3 provides some intuition on the relationship between product market competition and type of labor contract. Section 4 presents the model and discusses the results. Section 5 describes the empirical strategy. Section 6 depicts the different data sources. Section 7 analyzes the empirical results. Finally, section 8 concludes.

[3]The Lerner Index is computed assuming that average costs correctly approximate marginal costs.

2 Literature Review

The level of product market competition has been proven to affect many labor outcomes. One of the most studied outcomes is labor productivity. Different competition measures have been used to empirically address this question. Nickel (1996) considers that firms face a competitive environment if they have five or more competitors. Similarly, Zitzewitz(2001) uses changes in the number of firms to identify changes in the level of competition. Whereas Borenstein and Farrell (1999) study the effect on productivity of changes in the final product prices. Galdón and Schmitz (2002) identify this effect by focusing on how the sharp increase in competition experienced by the world iron-ore markets during the eighties affected the different industries depending on their locations and production costs. They motivate that this causality goes through an increase in the risk of bankruptcy subsequent to a shrink in the market.

Other variables that are more related to worker welfare have been under focus.

Bertrand and Kramarz (2002) study how the existence of distinct levels of competition by region and time in the French retail sector as a result of entry regulations affect the level of employment. Goldberg (1999) focuses on the effect of exchange rates variation on job turnover in the United States. She finds that dollar exchange rates movements through changing the degree of competition firms are exposed to have some effect on job instability as measured by job turnover[4]. In particular, dollar appreciation, after which American firms are weaker in competitive terms, increases job turnover. However, this effect depends largely on the specific sector of analysis and whether the dollar impact comes from the export or the import channel.

As in Goldberg (1999), the majority of these papers use changes in the levels of international competition to identify the effect of competition. This is also the case in Bertrand (2004). She addresses the influence of import penetration on the employment relationship, in particular, she studies how the distinct levels of import penetration faced by industries affect the insurance provided by the employer to the worker through wages. She encounters some potential endogeneity problem and accounts for it by using exchange rates as instruments.

[4]Goldberg (1999) proposes three different notions of job turnover: individuals who changed jobs during the year, 2-digits and 3-digits level industry changes by workers.

A quite similar strategy is followed by Cuñat and Guadalupe (2006) when analyzing how the increase in competition inherent to the globalization process modifies executives incentives at the firm level.

A different approach is followed by Guadalupe (2007) that analyzes how product market competition shapes the wage distribution. This is done by means of two difference-in-difference specifications based on two quasi-experiments, one on the application of the Single Market Program and a second, taking advantage of a sudden depreciation of the pound that took place in 1996.

There is also a branch of the literature that address the effects of product market competition on the labor market theoretically.

Probably, the most widely cited paper is the one by Nickell (1999) which studies how firm market share influences workers' wages and productivity under unionized and non-unionized labor markets.

Raith (2003) studies the effect of competition on managerial incentives. In his model, firms provide incentives to manager to exert effort in order to reduce its marginal cost. He sheds light on the ambiguity of previous theoretical results by showing how the effect of product market competition on incentives depends on the channel through which competition increases.

Berges-Sennou and Caprice (2004) focus on the impact of collusion between firms on the product market. According to their results, collusion leads to higher wages, more able workers hired and a decrease in the number of unable workers and employment.

3 On the causality from product market competition to type of contract

There is no clear prediction on the economic relationship between product market competition and type of contract.

Boone (2000) asserts that an increase in competition always rises the profits of the more efficient firms under different marginal costs. This implies that, as competition increases the mapping from costs to profits gets steeper. This makes firms more averse to cost increases when the level of competition is higher. Based on this argument, one could argue that two contradictory effects are operating over type of contract.

On the one hand, the fact that an industry is subject to a more competi-

tive environment may make firms in that industry more inclined to enhance a higher degree of flexibility in their labor relationships in order to provide incentives for workers to be more productive. Additionally, fixed-term contracts provide the opportunity to discriminate among low and high ability workers which are more highly valued the more competitive the market is.

On the other hand, a more competitive product market may imply a higher degree of competition for skilled, able or experienced workers which may make firms post permanent employment to attract the best type of workers. Guadalupe (2007) identifies higher levels of product market competition as a source of increased returns to skill. This may be indicating that firms facing more competition are more inclined to reward skilled workers more which may also be done by providing them more insurance through permanent contracts. In this same direction points out the assumption that even though permanent and fixed-term work are perfect substitutes, permanent work is relatively more productive. This is fact has been used as an assumption, as in Caggese and Cuñat (2006) but was derived endogenously from the model in Cipollone and Guelfi (2003). If hiring workers on a permanent basis is cost-saving, this may increase the amount of permanent contracts in highly competitive environments.

Addressing which of these mechanisms will be finally prevailing is the purpose of this paper.

4 Model

This model relates the product and labor markets through the cost function of the firm, in the spirit of Raith (2003). Competition is measured through three parameters, namely, entry cost, market size and product substitutability. The firm decides on a parameter determining the probability of transitioning to permanent employment. Workers can also increase this probability by exerting more effort. Results show that while increases in the level of competition motivated by increases in product substitutability make workers more likely holding fixed-term contracts, increases in the level of competition through increases in market size and decreases in the cost of entry in the market provoke more workers transiting to permanent employment.

4.1 Model Setup

There are n firms positioned symmetrically around a circle of circumference one. Each firm consists of a risk-neutral principal and several risk averse agents. There are two types of agents, fixed-term and permanent workers, modeled by means of two representative workers. Each worker produces one unit of final product for the firm she is currently working in. The firm makes all entry, personnel and pricing decisions while the agents influence costs. Any firm can enter the market by paying a fixed amount F and all firms in the market can exit freely. This implies that by treating n as a continuous variable, one can assert that firm's profit net of entry costs is zero.

Each firm has a unit cost given by: $c_i = \bar{c} - e_i - a_i$ where $\bar{c}$ is a constant, e_i is the amount of effort exerted by the agent producing that unit and a_i is the ability inherent to that agent. a_i follows a uniform zero to one distribution. Both e_i and a_i are unobserved by the firm for fixed-term workers. Realized cost is assumed to be contractible.

Each agent receives utility from the probability of having a permanent contract next period and some disutility from exerting effort. The disutility of exerting effort decreases proportionally to the ability of the worker. In particular, the utility a worker gets while working in firm i in a given period is $U_i = P_i(permanent) - ve_i(1 - a_i)$ where the first term is the probability of being hired under a permanent contract next period that equals 1 for permanent workers while for fixed-term workers, $P_i(permanent) = \lambda \frac{(\bar{c}-c_i)}{1+(\bar{c}-c_i)} = \lambda \frac{(e_i+a_i)}{1+(e_i+a_i)}$, where $\frac{(e_i+a_i)}{1+(e_i+a_i)}$ lies between 0 and 1 by construction, and λ is the parameter of interest which is chosen by the firm. It can vary between 0 and $\frac{1+e_i+a_i}{e_i+a_i}$ in order to $\lambda \frac{(e_i+a_i)}{1+(e_i+a_i)}$ be restricted between 0 and 1. e_i is chosen by the agent under the restriction e_i being non-negative.

The proportion of fixed-term workers θ is considered as fixed for any given period.

After each agent decides her exerted level of effort, e_i, each firm learns its level of marginal cost. This information is private. The firms then, set the prices that maximize their expected profit.

The demand is conformed by a continuum of consumers that populate the circle with a uniform density of m. Each consumer buys exactly one unit of the good. If a consumer located at x purchases from firm i located at z_i, receives a utility of $V_i(x) = y + b - p_i - t(x - z_i)^2$ where y refers to income, b is the utility one gets from consuming her preferred variety (namely, x), p_i is the price and $t(x - z_i)^2$ is the disutility from consuming variety z_i instead which

is quadratic in the distance between the consumer and the firm. Therefore, in this context the demand is defined by the standard Salop model.

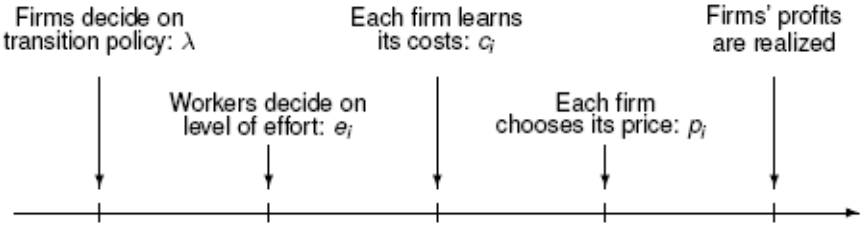
In this setup, the level of competition is defined according to three parameters: The cost of entry, F, the market size, m, and transportation cost, t. Markets with a higher level of F are less competitive. Similarly, if the market gets larger, i.e. m rises, the industry becomes more competitive. Finally, t can be interpreted as a measure of the degree of product differentiation. For higher levels of t, the products are less substitutable and then the level of competition in the industry is lower.

For tractability reasons, the parameters must be restricted so that each firm competes only with those immediately on the right and left hand sides. This is done by simply limiting the maximum number of firms to $\bar{n} = bm/F$.

This model is solved by backward induction.

Solving the model

In order to solve this model, we must acknowledge the timing of events:



First, the firm decides on the transition rate probability. One can think as firm and workers making an implicit contract over the conversion rate according to their productivity[5]. Once all workers are aware of their chances of becoming permanent workers, they decide on the level of effort they exert. After this, production is realized and each firm learns the unit cost at which each worker produces but other firms' costs are ignored. Next, taking into account their own costs, their expectations on other firms' costs and the demand determined by the Salop model, firms set prices. Finally, profits are realized.

[5]Workers are considered to be more productive the lower the cost of producing one unit is for them.

The model is solved by backward induction. The first step will be to maximize the profit function to find the optimal prices.

The standard solution for the Salop model gives an expression for the demand of final product.

$$q_i = m\left\{\frac{1}{n} + \frac{n}{2t}\left[(p_{i+1} - p_i) + (p_{i-1} - p_i)\right]\right\}$$

Additionally, taking into account that competitors' prices are unknown and substituting the expression for product demand, firm i's expected net gross profits can be written as follows.

$$\Pi_i = (p_i - c_i)E(q_i) = (p_i - c_i)m\left\{\frac{1}{n} + \frac{n}{t}\left[E(p) - p_i\right]\right\}$$

Deriving the previous expression with respect to firm i's price provides the solution for the profit maximization problem:

$$p_i(c_i, E(p)) = \frac{t}{2n^2} + \frac{E(p) + c_i}{2}$$

$$\Pi_i(c_i, E(p)) = \frac{nm}{4t}\left[E(p) - c_i + \frac{t}{n^2}\right]^2$$

In a symmetric equilibrium, the expected value of prices is computed using the expression for prices above and taking each firm expected costs equal to $E(c)$:

$$E(p) = E(c) + \frac{t}{n^2}$$

There exists a unique Nash Equilibrium in prices. It is found by substituting in the expression for the optimal prices the expected value of other firms' prices. It results in:

$$p_i(c_i, E(c)) = \frac{t}{n^2} + \frac{E(c) + c_i}{2}$$

$$\Pi_i(c_i, E(c)) = \frac{mt}{n}\left\{\frac{1}{n} + \frac{n}{2t}[E(c) - c_i]\right\}^2$$

A second step implies solving the utility maximization problem faced by the two types of workers. This will allow us to obtain an expression for the optimal level of effort each type of agent will finally exert.

A permanent worker faces each period the following problem:

$$\begin{aligned} MaxU_i^P &= 1 - v(1 - a_i^p)e_i^p \\ s.t. \quad e_i^p &\geqslant 0 \end{aligned}$$

Hence, a permanent worker exerts no effort ($e_i = 0$).

A fixed-term worker faces each period the following problem:

$$\begin{aligned} MaxU_i^{FT} &= \lambda \frac{e_i^{FT} + a_i^{FT}}{1 + e_i^{FT} + a_i^{FT}} - v(1 - a_i^{FT})e_i^{FT} \\ s.t. \quad e_i^{FT} &\geqslant 0 \end{aligned}$$

The optimal level of effort a fixed-term agent exerts any given period is:

$$e_i^{*FT} = \lambda^{1/2} v^{-1/2} (1 - a_i^{FT})^{-1/2} - 1 - a_i^{FT}$$

A sufficient condition for e_i^{*FT} to be positive is that the parameter measuring the disutility of exerting effort, v, is small enough. In particular, v must fulfill the condition: $v \leq \frac{\lambda}{1+3a_i^{FT}+3a_i^{FT2}+a_i^{FT3}}$. This can also be interpreted as ability not being too high.

The previous derivations imply that the effective unit cost function for the firm is:

$$c_i = \theta(\bar{c} + 1 - \lambda^{1/2} v^{-1/2} (1 - a_i^{FT})^{-1/2}) + (1 - \theta)(\bar{c} - a_i^p)$$

The final step consists of maximizing profits before realization of c_i with respect to the transition parameter, λ in order to obtain the optimal transition rate policy for the firm. The expected value of other firms' cost is taken as given in the following optimization problem:

$$\begin{aligned} & Max \quad \Pi_i(c_i, E(c)) \\ = \quad & \frac{mt}{n} \left\{ \frac{1}{n} + \frac{n}{2t} [E(c) - \theta(1 + \bar{c} - \lambda^{1/2} v^{-1/2} (1 - \mu_{FT})^{-1/2}) + (1 - \theta)(\bar{c} - \mu_P)] \right\}^2 \end{aligned}$$

where $\mu_{FT} = E(a_i^{FT})$ and $\mu_p = E(a_i^P)$. It is true that $\mu_P > \mu_{FT}$.

The optimal lambda appears as a function of the rest of parameters of the model:

$$\lambda^* = v(1+\mu_{FT})[1+\bar{c}\theta^{-1}+\mu_P - \frac{2t}{n^2}\theta^{-1} - E(c)\theta^{-1} - \mu_P\theta^{-1}]^2$$

Analogously to the previous profit maximization in prices, the unique Nash Equilibrium in transition rates is obtained by accounting for the fact that in a symmetric equilibrium, all firms choose the same λ and all fixed-term workers choose the same level of e. This implies that:

$$E(c) = \theta[1+\bar{c} - \lambda^{1/2}v^{-1/2}(1-\mu_{FT})^{-1/2}] + (1-\theta)(\bar{c}-\mu_P)$$

Substituting this expression into the previous one, we obtain that:

$$\lambda^* = v(1+\mu_{FT})\theta^{-2}\frac{t^2}{n^4}$$

This is such that the probability of becoming a permanent worker next period is less than one $\iff n \geqslant \frac{t^{1/2}}{(2\theta)^{1/2}}\left[v(1-\mu_{FT})\left(\sqrt{1+4v^{-1}(1-\mu_{FT})^{-1}}-1\right)\right]^{1/2}$. If the number of firms n is smaller than that quantity, the probability of being offered a permanent contract must be restricted to one and then, all fixed-term workers are immediately converted to permanent workers.

Implications of the model

Differentiating the expression for the optimal transition parameter, we find that λ is increasing in t, the level of product differentiation, and decreasing in the number of firms, n. The other two competition parameters, cost of entry, F, and market size, m do not enter directly in this expression but they do alter n.

The level of profits is $\Pi_i = \frac{mt}{n^3} - F$. Profits are decreasing in n and F and increasing in m and t. Hence n must be decreasing in F and increasing in m.and t However, the total effect of t is positive given that n increases less than proportionally with t. This is shown by multiplying n and t by a factor $\lambda > 1$ in the expression for profits and computing the derivative of the resulting expression with respect to λ at $\lambda = 1$, which gives $-2\frac{mt}{n^3} < 0$. This establishes the result.

Hence the transition rate increases t and m decreases with F. The intuition behind these different effects of increases in product market competition is that changes in t, m and F provoke firms' willingness to decrease cost through diverse mechanism. While decreases in the degree of product market differentiation provoke decreases in the number of firms and increases in the level of output by firm, increases in market size are followed by increases in the number of firms and increases in the level of output by firm. Finally, decreases in the cost of entry induce greater number of firms and less output by firm. In order to know the overall effect of product competition on transitions between type of contracts, one needs to know which of the competition channels predominates. This reveals the necessity of performing an empirical analysis.

5 The empirical approach

Each individual must be placed under any of the following conditions at each point in time: Working under a fixed-term contract, working under a permanent contract, unemployed, out of labor force and self-employed. I am interested in how the type of contract signed is altered according to the degree of product market competition. The probability that a particular type of contract is signed highly depends on her previous state and the amount of time the individual spent in the previous state. Therefore, I study how transitions between labor contracts are affected by the level of competition inside each type of industry by means of a duration model. Given that almost all transitions to permanent employment occur from fixed-term employment, I focus on transitions out of fixed-term employment. Table 5 shows the number of workers that transit for fixed-term employment to any of the other states in my sample.

My sample consists of those individuals that fulfilled six questionnaires, reported being hired under a fixed-term contract in any of them and declared not working or working in a manufacturing sector along the survey time.

Even though contracts may be signed and finished at any point in time, I only observe contract duration at a monthly or yearly frequency. Hence, the model explaining this data must be discrete due to the grouping of continuous data. I redefined contract duration at the first interview to quarterly data and then added a new quarter to the duration variable in the next interview if the individual kept going in the same state, i.e., she is hired under the same

fixed-term contract in the subsequent interviews. Until the end of 1998, the variable "duration of the contract until present time" is reported in months if it is less than one year and in years otherwise. From 1999 on, this information is directly reported in months. For those observations in months, I compute easily the equivalent quarter duration. For those observations in years, I assign them the number of quarters by multiplying the number of years by four and using a realization of a uniform distribution to assign one, two or three additional quarters with equal probability.

I make use of this quarterly data on state duration to estimate discrete time competing risks duration models.

The explanatory variable of interest is the competition measure which varies over time and industry sector.

Any of the traditional measures of competition (concentration measures, those based on markups, etc.) are potentially endogenous in this setup. This may be caused by reverse causality in the sense that industries promoting workers at a certain rate may be more targeted by potential entrants that consider the possibility of lowering costs and, consequently, prices by applying a different contract policy. Additionally, some omitted variables may be influencing both the contract and the competition measure simultaneously. For instance, industries that use very complicated technology may need to contract indefinitely workers with specific knowledge about the technology while may have a lower degree of competition because the investment needed to buy that technology constitutes a barrier to entry. Moreover, the Lerner Index includes wages in its computation. Given that wages are higher for permanent workers, endogeneity is more likely for this measure.

A change in the level of competition in a sector makes workers in that sector change the degree of job security they are facing by both, provoking more or less workers' transitions among sectors and changing the propensity of firms in that sector to offer more or less fixed-term versus permanent contracts. Analogously to Guadalupe (2006), I apply three different strategies that allow us to separate the effect of competition on type of contract through employment change and through changes in the type of contracts offered in that sector.

First, I assign to each individual the industry they worked in at the beginning of the period and keep it constant throughout the time the worker is included in the sample. This allows me to estimate the overall effect of competition on the probability of transiting from one type of contract to another regardless of whether a worker changed industry. Clearly, this

approach is implicitly assuming that for an individual moving out of an industry, the effect on the probability of transiting among types of contracts is due to the level of competition in the industry of origin an not to the industry change. For the transitions out of fixed-term contracts, this specification defines five different states a worker can reach: another fixed-term contract, permanent contract, unemployed, out of labor force and self-employment. The variable of interest is the Lerner Index in the industry at which she had her initial fixed-term contract.

Second, I assign each individual the industry they actually work at each point in time. This strategy captures both, the effect of changes in the level of competition inside an industry and industry changes on the probability of contract transition. The destination states defined for transitions out of fixed-term employment are another fixed-term employment in the same sector, another fixed-term employment in a different sector, permanent contract, permanent contract in a different sector, unemployed, out of labor forced and self-employment. Hence, the coefficient for the competition variable in the transitions to contracts in the same sector provide the effect of changes in the level of competition inside an industry while the coefficient in the transitions to contracts in a different sector provide the effect of a change from an industry to another which usually imply distinct levels of competition as well.

Third, I treat every individual changing sector of employment as if it was a different individual. Therefore, the effect is estimated exclusively out of those individuals remaining in the same industry. This measures how changes in the level of competition inside an industry is affecting workers' transition probabilities. For the transitions out of fixed-term contracts, this specification is similar to the first one. It defines five different states a worker can reach: another fixed-term contract, permanent contract, unemployed, out of labor force and self-employment. The variable of interest is the Lerner Index in the industry at which she works along the survey period. Individuals changing industry are included in the sample but they are considered as censored observations by the time they effectively move out of the initially assigned industry. If the individual moves to another industry to work under a fixed-term contract, she is included in the sample as if he was a different worker.

5.1 Econometric specification

In processes with continuous time or intrinsically discrete data, the overall hazard is equal to the sum of the destination-specific hazards. However, with grouped data this is not anymore the case and this complicates estimation. It is necessary to make some assumption in order to identify this model.

I denote by T_{ik} the observed censored duration variable. It measures the amount of time hired under the same fixed-term contract for the observations for which the transition is observed, or time until a censoring point is reached for those whose transition is not observed.

$$T_{ik} = \begin{cases} T_{ik}^* & if \quad T_{ik}^* < C_{ik} \\ C_{ik} & otherwise \end{cases}$$

where T_{ik}^* denotes the spell length for individual i that ends up in state k in the absence of censoring and C_{ik} is the censoring time measured from the time origin for the spell. A particular observation may be censored for exits into state k because there is no further information on the individual (the survey time may be over) or because the individual moved to a state j different from k.

Let define c_{ik} be an state-specific indicator of lack of censoring, i.e. $c_{ik} = 1(T_{ik}^* < C_{ik})$. All individuals whose c_{ik} equals one are observed to transit into state k and those whose c_{ik} is zero have exited to an state different from k or they did not provide further information.

I define two additional variables, y_{ijt} and w_{ijt}. The first one is an indicator variable such that $y_{ijt} = 1(T_i = t), \quad t = 2, 3, ...$ which takes the value one if the observed censored duration for individual i working in industry j equals t and zero otherwise. This is, for a stayer, this variable takes the value zero for all periods while for exiters, it equals zero for all periods except for the exit one. Additionally, $w_{ijt} = 1(T_i \geqslant t)$ is equal to one for the exit period and all the periods after the exit. Let write the hazard function in terms of these two variables:

$$h_{ij}(t, x_i(t), z_j, v(t), \gamma_t) = \Pr(y_{ijt}^k = 1 | w_{it} = 1, x_i(t), z_j, v(t), \gamma_t)$$

where the subindexes i, j and t refer to individual working industry and time, respectively, and the superindex k refers to one particular state, $x_i(t)$ contains a vector of individual characteristics that may change over time (age, age squared, male, married, household head, education level, province

of residence and potential experience), z_j is a vector of industry dummies, $v(t)$ denotes some macroeconomic variables changing over time (gross domestic product, unemployment rate, temporary rate and interest rate) and γ_t is a vector of time (year and quarter) dummies. Given that some empirical studies (see Kluger, Jimeno and Hernanz, 2002) find a positive although rather small effect of the 1997 reform on the hiring of workers on an indefinite basis I include a dummy for the periods after the introduction of this reform. Time dependence is modelled as piecewise constant, i.e., groups of four months are assumed to have the same hazard rate, but the hazard rate differs between these groups. This is done in practise by including dummies for time under a fixed-term contract by quarters.[6]

I assume a particular form for the destination-specific hazards. The discrete time hazard for exit at time t to destination k is:

$$h_k(t) = \frac{\exp(\theta_k^{'} X)}{1 + \sum_{k=1}^{K} \exp(\theta_k^{'} X)}$$

where $\theta_k^{'} X = \gamma_t + x_{it}^{'} \beta_k + z_j^{'} \delta_k + v_t^{'} \rho_k$ and K stands for the total number of possible destinations. While the hazard function for staying in the initial state a at time k is:

$$h_a(t) = \frac{1}{1 + \sum_{k=1}^{K} \exp(\theta_k^{'} X)}$$

The likelihood contribution for the individual with spell length τ can be written:

[6] Given that panel data is available, one could have included unobserved fixed-effects into the estimation in order to account for unobserved, invariant over time individual characteristics like good appearance, charm, etc. However, estimation with fixed-effects requires there to be individual within-time variation in the rest of explanatory variables included in the analysis, and observations with no withing time variation are dropped from the estimation. In this particular case, variables like education or gender do not vary along the time dimension and if one uses fixed-effects, this may provoke loosing the majority of the sample.

Additionally, no term reflecting unobserved heterogeneity with a Gamma mixture distribution is included given that my sample is not random but selected according to age and working sector.

$$L = \prod_{k=1}^{K} \left[\frac{\exp(\theta_k' X)}{1 + \sum_{k=1}^{K} \exp(\theta_k' X)} \right]^{c_{ik}} \times \left[\frac{1}{1 + \sum_{k=1}^{K} \exp(\theta_k' X)} \right]^{1 - \sum_{k=1}^{K} c_{ik}} \times \prod_{t=1}^{\tau - 1} \left[\frac{1}{1 + \sum_{k=1}^{K} \exp(\theta_k' X)} \right]$$

which can be expressed in logarithmic terms and results in:

$$\begin{aligned} L_k &= \sum_{i=1}^{N} [c_{ik} \sum_{t=1}^{T_i - 1} \{\log[1 - h_{ik}(t)] + \log h_{ik}(T_i)\} + (1 - c_{ik}) \sum_{t=1}^{T_i} \log[1 - h_{ik}(t)]] \\ &= \sum_{i=1}^{N} \left[\begin{array}{c} c_{ik} \sum_{t=1}^{T_i - 1} \left\{ \log \frac{1}{1 + \sum_{k=1}^{I} \exp(\theta_k' X)} + \log \frac{\exp(\theta_k' X)}{1 + \sum_{k=1}^{I} \exp(\theta_k' X)} \right\} \\ + (1 - c_{ik}) \sum_{t=1}^{T_i} \left\{ \log \frac{1}{1 + \sum_{k=1}^{I} \exp(\theta_k' X)} \right\} \end{array} \right] \end{aligned}$$

However, as Allison (1982) pointed out, this likelihood has the same form as the likelihood for a standard multinomial Logit model applied to reorganized data.

Note that one can also derive the same estimator by assuming a extreme value type I distribution for the errors in the equation explaining the underlying continuous dependent variable[7].

This approach has the caveat that it is not possible to relate this model to an underlying process in continuos time[8]. On the other hand, estimation

[7]Let define $y_{ijt}^k = 1 \Longleftrightarrow \tilde{y}_{ijt}^k = \max\{\tilde{y}_{ijt}^1, \tilde{y}_{ijt}^2, ..., \tilde{y}_{ijt}^K\}$ where K is the number of states. In notational terms,

$$\tilde{y}_{ijt}^k = \gamma_t + x_{it}' \beta_k + z_j' \delta_k + v_t' \rho_k + \varepsilon_{ijt}^k = \theta_k' X + \Sigma_k$$

is the equation explaining the underlying continuous variable where ε_{ijt}^k follow a extreme vale type I distribution with mode 0 and mean equal to 0.577. The log-likelihood function that allows for the estimation of these parameters is exactly the one shown above.

[8]In order to relate duration models with grouped data to continuous time models, the most commonly used assumptions are: First, transitions can only occur at the boundaries of the intervals. Second, destination-specific density functions are constant within each interval, and third, destination-specific hazard rates are constant within each interval. Fourth, the hazard rate takes a particular proportional hazard form and finally, the log of the integrated hazard changes linearly over the interval. Some of these assumptions are really inadequate for the case of study.

by means of the Generalized Method of Moments is computationally easy which is particularly useful in models with discrete time. This reveals to be determinant for the instrumental variable estimation.

The Maximum Likelihood estimate sets the score of the log-likelihood function to zero:

$$\frac{\partial L}{\partial \theta_k} = \sum_{i=1}^{I} \sum_{k=1}^{K} \left[c_{ik} \frac{h_{ik}(1-h_{ik})}{h_{ik}} - \sum_{\substack{j=1 \\ j \neq k}}^{K-1} c_{ij} \frac{h_{ij} h_{ik}}{h_{ij}} - \left(1 - \sum_{k=1}^{K} c_{ik}\right) \frac{h_{ik}(1-h_{ik}) - \sum_{\substack{j=1 \\ j \neq k}}^{K-1} h_{ik} h_{ij}}{1 - \sum_{k=1}^{K} h_{ik}} \right] Xi$$

Hence, our moment conditions are the K conditions that result from equalizing the previous expression to 0.

The weighting matrix used for estimation is the inverse of the spectral density matrix. This is formed by K^2 blocks with dimension LxL where L is the number of explanatory variables in the model. Each block has in the diagonal elements with the form:

$$\frac{\partial^2 L}{\partial \theta_k^2} = -\sum_{i=1}^{I} (h_{ik}(1-h_{ik})) X_i X_i^{'}$$

while the out-diagonal elements can be expressed as:

$$\frac{\partial^2 L}{\partial \theta_k \partial \theta_j^{'}} = \sum_{i=1}^{I} (h_{ik} h_{ij}) X_i X_i^{'}$$

Then, my GMM estimator minimizes:

$$\underset{\Theta}{Min} \left(\frac{\partial L}{\partial \Theta}\right)^{'} \left(\frac{\partial^2 L}{\partial \Theta' \partial \Theta}\right)^{-1} \left(\frac{\partial L}{\partial \Theta}\right)$$

where Θ is the vector formed by all θ_k for $k = 1, ..., K$.

Using a multinomial Logit structure allows me to apply instrumental variables by means of a Generalized Method of Moments procedure. Instrumenting may be quite cumbersome under any of the assumptions proposed in the literature for discrete multi-risk models while through a GMM estimation, it is relatively simple. The moment conditions are transformed as follows:

$$\sum_{i=1}^{I} \sum_{k=1}^{K} \left[c_{ik} \frac{h_{ik}(1-h_{ik})}{h_{ik}} - \sum_{\substack{j=1 \\ j \neq k}}^{K-1} c_{ij} \frac{h_{ij} h_{ik}}{h_{ij}} - \left(1 - \sum_{k=1}^{K} c_{ik}\right) \frac{h_{ik}(1-h_{ik}) - \sum_{\substack{j=1 \\ j \neq k}}^{K-1} h_{ik} h_{ij}}{1 - \sum_{k=1}^{K} h_{ik}} \right] Z_i = 0$$

for a suitable vector Z_i containing all exogenous controls plus some suitable instruments. The spectral density matrix is defined according to the new moment conditions. It has K^2 blocks whose diagonal elements are:

$$\frac{\partial^2 L}{\partial \theta_k^2} = -\sum_{i=1}^{I}(h_{ik}(1-h_{ik}))Z_i Z_i^{'}$$

while the corresponding out-diagonal elements are:

$$\frac{\partial^2 L}{\partial \theta_k \partial \theta_j} = \sum_{i=1}^{I} h_{ik}h_{ij}Z_i Z_i^{'}$$

5.2 Instrumental variable approach

In order to account for the potential endogeneity of any competition measure in my empirical specification, I provide an instrumental variable estimation. I instrument the Lerner Index by means of the Regulatory Impact (RI) measure published by the OECD. The RI indicator measures the potential costs of the anti-competitive regulation in non-manufacturing sectors on sectors of the economy that use the output of these sectors as intermediate inputs in the production process.

The reasoning underlying the choice of this instrument is that changes in regulation on non-manufacturing products affect the price and quality of these products that are used as intermediate inputs in the manufacturing sector. This has some impact in the manufacturing sector by altering the costs of entry for new firms that want to use those services, the extent to which existing firms outsource these services, the allocation of resources between firms and ultimately, the score of the associated productivity improvements.

The RI indicator is calculated for 39 sectors in 21 OECD countries over the period 1975 to 2003. It is computed in four steps:

1. The basic information is coded into quantitative scores from 0 to 6 that are increasing in restrictions to competition.

2. These basic scores are weighted and aggregated into low-level indicators that cover specific areas of regulation, namely, state control, barriers to entry, involvement in business operations and, in some cases, market structure.

3. These low-level indicators are aggregated into an overall indicator of regulation of the sector. In particular, the three sectorial indicators that form the RI indicator are: The energy, transport and communication regulation (ETCR indicator), the retail distribution and some business services regulation (RBSR indicator), and an indicator of anti-competitive regulation on the finance sector.

The way in which the basic scores and the low-level indicators are aggregated implies certain degree of discretion and depends on how many regulatory data is available in each sector. For further information on this issue, see Conway and Nicoletti (2006).

4. The construction of the RI indicator takes into account that the "knock-on" effects of non-manufacturing regulation on the rest of sectors of the economy are a reflection of, on one side, the extent of anti-competitive regulation in non-manufacturing sectors as captured by the three sectorial indicators mentioned above and, on the other side, the importance of these sectors as suppliers of intermediate inputs for each industry. The influence of these two factors is combined according to the formula:

$$RI_{kt} = \sum_j NMR_{jt} \cdot w_{jk}, \qquad 0 < w_{jk} < 1$$

where the variable NMR_{jt} is an indicator of anti-competitive regulation in non-manufacturing sector j at time t and the weight w_{jk} is the total input requirement of sector k for intermediate inputs from non-manufacturing sector j. To provide some evidence on what provides variation in the Regulatory Impact index across industries and time, table 6 shows the variances of the subindicators and weights by industry.

One key advantage of the RI indicator is that the information summarized by it, is "objective" as opposed to survey-based and therefore, there is no subjectivity bias associated to it. Additionally, as it is based on legislation, this indicator can be held to be more exogenous to performance than traditional indicators of the degree of competition, such as concentration indexes and markups. Exogeneity is guaranteed by the fact that the weights used in constructing the RI are fixed along time, hence they are not reflecting changes in the input utilization due to changes in labor contracts.

The RI indicator constitutes a good instrument for the Lerner Index in this context. They are very correlated (see table 7 for the first stage regression). This is partially caused by: The fact that in Spain, between 50% and 80% of the output of the finance, electricity and post and telecoms sectors is destined to be used as intermediate inputs in the production process. Besides, the impact of anti-competitive non-manufacturing regulation is particularly high in this country (together with other Euro-area countries and Japan) where those services are not usually imported and then, national industries become dependent on the non-manufacturing sector degree of competition. Moreover, all the regulation indexes that form the RI index have been proven to be highly correlated with the level of anti-competitive regulation economy-wide. Additionally, this instrument fulfills the exclusion restriction. Given that anti-competitive regulation in non-manufacturing sectors is altering mainly the cost structure of the manufacturing sector, it is hard to come out with a channel through which anti-competitive regulation in non-manufacturing sectors may be affecting contracts of employers working in manufacturing sectors other than these sectors markups as measured by the Lerner Index.

All the information on the Regulatory Impact Indicator is been obtained from Conway and Nicoletti (2006).

5.3 The European SMP: 1986-1992

The Single European Act signed in 1986 intended to progressively establish the internal market of goods, services, capital and labor in the European Union over a period expiring on 31 December 1992. Some measures were designed to gradually achieve this. They were implemented from 1986 to 1992. Hence, during that period, Spanish firms were in a increasingly competitive environment.

The quantitative restrictions existent since 1960 were eliminated, even though many of the imports were already liberalized previous to the Spanish entry in the European Union. The VAT was introduced in 1986 to substitute previous taxes used as non-tariff trade restrictions. The general level of tariff decreased through two channels: First, the progressive elimination of the tariffs with respect to European Union members and second, the adaptation to the general tariff system agreed at the European Union level which represented much lower tariffs than the ones applied by Spain before. The

timing of the reductions was as follows:

Date	%
March 1986	10
January 1987	12.5
January 1988	15
January 1989	15
January 1990	12.5
January 1991	12.5
January 1992	12.5
January 1993	10

The papers by Viñas et al. (1979), De la Dehesa, Ruiz and Torres (1991) and Cañada and Carmena (1989 and 1991) show that the levels of nominal protection in Spain displayed a pattern similar to the rest of industrialized economies. In particular, the degree of protection increased as the products became more and more elaborated. Hence, raw materials were lowly covered up, intermediate goods were more protected as they required elaboration, equipment goods followed and finally, consumption goods were the most guarded. According to Cañada and Carmena (1991), in 1985 the most protected industries were those of automobile, together with other traditional industries, like shoe and textile. In the subgroup of intermediate goods, agricultural and industrial machines, electric and electronic devices were on the top of the ranking of protection, raw materials presented a really low level of coverage, and so did alimentary goods.

According to regions, the degree of trade regulation was much higher with respect to products originated in the European Union precisely because those were equipment and consumption goods, the ones in the higher positions in the ranking of protection. According to Cañada and Carmena (1991) the coefficient of global protection with respect to the European Union is 19.93%, which is very high, specially if compared with the correspondent coefficients with respect to the OECD countries (12.76%), and with respect to the rest of the world, 2.53%. Hence, after the process was completed, the majority of the previous effective barriers to trade were setup to zero.

The Spanish entry in the European Union implied an important challenge for the manufacturing sectors which got involved in greater competition, associated with the progressive tariff reduction plus the elimination of quotas and contingents over imports. In these circumstances, competition affected

not only the export activity but also the whole industrial sector. Commercial goods producers needed to model their price increases according to the conditions of the international market, in order not to be displaced by foreign producers. Therefore, cost rigidity implied a reduction in profitability in non-protected sectors with respect to the protected sectors in the economy and the European manufacturing sector. Therefore, fixed-contracts may have offered an opportunity to lower production costs.

To exploit the exogenous variation in competition generated by the introduction of the Single Market Program, I make use of the fact that different industries had different levels of effective rate of protection before the implementation together with the fact that this level evolved proportionally over time. My variable of interest is the interaction of the initial level of effective protection obtained from Cañada and Carmena (1991) (see table 8) with the remaining proportion of tariffs in each year according to the table displayed above[9]. The fact that my key variable is continuous allows for a richer identification than the one in cases in which the Single Market Program influence is measured through a dummy variable as in Guadalupe (2006) or Griffith (2001). This last paper shows that the SMP led to a decrease in the Lerner Index in industries that were ex ante expected to be affected by the Single Market Program. This allows us to assert that the Single Market Program operates significantly in the predicted direction.

The effective rate of protection as computed by Cañada and Carmena (1991) has the advantage of taking into account, not only the level of tariff protection in the corresponding industry but also the protection of the products it uses as intermediate inputs for production, as final consumption or as investment. Industries are defined following the CNE-85 classification at the 2-digits level. Input-output tables are used to assess the proportion of each product in the production process of each sector. The formula effectively used to compute the effective rate of protection is the following:

$$e_j = \frac{v_j^{'} - v_j}{v_j}$$

where $v_j^{'}$ represents the value added by output unit in industry j when tariffs are present both in the final and intermediate products and v_j is the

[9] This implies that the values of the effective rate of protection for each year are multiplied by the corresponding factor: 0.775 in 1987, 0.635 in 1988, 0.475 in 1989, 0.35 in 1990, 0.225 in 1991 and 0.1 in 1992.

value added by output unit in industry j in the absence of tariffs. Hence the difference between $v_j^{'}$ and the one computed by more simplistic procedures is that it incorporates the effect of tariffs on prices of production inputs, consumption goods and investment goods. This effective rate of protection is usually higher than the nominal rate of protection. This is because the protection on inputs is often used as a way to reinforce sectors' protection.

The sample for the quasi-experimental estimation is formed by workers who, in the period of implementation, are in a sector for which the experiment variable, i.e., level of effective protection in a given year, is non-missing.

In order to assess whether those industries that faced a less competitive environment or similarly, those facing a lower degree of effective protection were more likely to hire workers under permanent or fixed-term contracts, I estimate discrete multi-risk duration models as described in the econometric specification subsection but including my experimental variable instead of the Lerner Index.

To interpret the estimated coefficients as causal parameters it is necessary that the application of the SMP is exogenous to type of labor contract and that it has no other indirect effect on type of labor contract apart from its effect through the subsequent increase in competition. Exogeneity can be argued by highlighting the scarce influence of a sole country like Spain in the negotiations that took place at a European level. With respect to the channel through which an exogenous increase in external product market competition could affect type of contracts, one must acknowledge that Spain was facing a high unemployment rate at that time and hence the decision to hire workers under one type of contract was taken by firms which faced a changing competitive environment. These firms, acting as profit maximizers, were presumably taking into account the increase in competition provoked by the introduction of the SMP when deciding the type of contracts to offer. Hence, the identification variation is based on those changes in the level of product market competition that differed among industries.

6 Data

My main source of data is the Spanish Labor Force Survey. This survey is collected continuously on a quarterly frequency. It has been carried out by the Spanish Statistic Institute since 1964. The sample unit is the family and its main objective is to obtain data on individuals in relation with their

labor market status. It intends to be representative of the whole Spanish population. The initial sample size is 65000 families by quarter. However, in practice, this is reduced to 60000 effectively interviewed families that comprise approximately 180000 people. Since the second quarter of 1987, the survey has a panel structure. Each family is interviewed by a maximum of six consecutive quarters. Workers are asked about the type of labor contract they have and the uncompleted duration of this contract among many other personal and job characteristics. Unemployed and out of labor force population report their time in their actual status and information on their previous employment. In my regressions, I include age, marital status, household head, male, education, province of residence and activity of the firm as regressors while the endogenous variable is constructed combining type of contract and duration of the contract. Temporary rates are also computed out of this database.

Unfortunately, the Spanish Labor Force Survey does not supply any contract identifier. This forces me to trust in self-reported uncompleted duration and type of contract variables to be able to identify a transition between two contracts. Therefore, a contract is considered to end if the reported type of contract is different from the previous one or if there is a drop in the uncompleted duration of the contract. Accordingly, I construct the duration variable by using the measure of uncompleted duration in the first interview and adding one quarter by interview if the type of contract is the same and there is no drop in the uncompleted duration. This solution was already adopted by Güell and Petrongolo (2003).

An additional difficulty that is encountered when dealing with duration models using this data is that until 1998 uncompleted duration is reported in months whenever contract duration was lower than a year and in years otherwise. This is corrected in 1999 and since then, all durations are reported in months. However, for the previous years one must deal with the issue of aggregating data in months and years into an homogenous measure.

It appears to be some measurement error in the reported duration because some fixed-term contracts exceed the legal limit for fixed-term contract duration of three years (see the Appendix for further institutional details). I treat these observations as censored at the legal limit.

The data on product market competition is obtained from many different sources.

The Herfindahl Index used here for descriptive purposes arises from the Central Enterprise Directory. This is a unique information system that sam-

ples all Spanish firms and their local units located in the Spanish territory. It provides information on the distribution of firms according to their number of employees coded in intervals by sector of activity since 1999. Due to this, the Herfindahl index is computed inaccurately.

The computation of the Lerner Index is done combing two variables contained in the Industrial Enterprise Survey. This structural survey contains information on firms whose main activity has an industrial nature and are located in the Spanish territory. It provides information on a wide variety of items including production rents and costs which are used to compute the Lerner Index.

The OECD Dataset supplies the Regulatory Impact variable used as an instrument for the Lerner Index. The OECD has developed a range of indicators of product market regulation at both the economy-wide and sectorial levels. These indicators measure the extent to which policy settings promote or inhibit competition in areas of the product market where competition is viable. These indicators are combined to compute the Regulation Impact (RI) indicators that measure the 'knock-on' effects of regulation in non-manufacturing sectors on the different sectors of the economy. These indicators have been estimated over the period 1975 to 2003 for 36 sectors in 21 OECD countries. As it was already mentioned before, the main characteristic of this data source is that is built on objective data instead of reported information.

Additionally, a paper by Cañada and Carmena (1991) explains deeply how they compute an indicator of the effective rate of protection by sector previous to the Spanish entry in the European Single Market Program. This variation together with the time implementation of the tariffs reduction is used to perform a quasi-experiment.

Finally, some macroeconomic controls, namely, Gross Domestic Product, Unemployment Rate and Interest Rate are obtained from the Statistical Annex of European Economy elaborated by Eurostat by combining information originated from the Eurostat, national publications and the OECD.

7 Empirical Results

Table 9 displays the empirical results for the three specifications including the Lerner Index as explanatory variable. Additionally, complementary specifications adding the interactions of the Lerner Index with education levels are

included. This responds to the intuition provided in the model that changes in competition may affect workers according to their ability. Specifications (a), (b) and (c) corresponds to the sector assigning rules explained in the Econometric Specification section. In this chart almost no coefficient is significant. Exceptions to this rule are the coefficients that show a increase in the likelihood of becoming permanent when competition declines inside an industry and a decrease in the probability of moving to unemployment when competition decreases inside an industry, as shown in specification (b). Also specification (c) coincides in significance and interpretation in the negative relationship between unemployment and less competitive environments.

The comparison of tables 9 and 10 provides some intuition on the necessity of accounting for the potential endogeneity of the Lerner Index in this context. Here coefficients show the same pattern in all three specifications. A decrease in competition provokes decreases in the likelihood of renewing fixed-term contracts, becoming unemployed, going out of labor force or becoming self-employed, while it implies an increase in the probability of becoming a permanent worker. Specifications (a) and (b) show that the effect on the type of labor contract workers have gets lower the higher is the education level of the worker. That is, a decrease in competition makes workers less likely renewing their temporary contracts as they are less educated and more likely getting a permanent contract the more educated they are. Finally, the coefficient for getting a permanent contract in another industry is negative in specification (b). This is intuitive if one takes into account that less competitiveness implies more likelihood of getting permanent and even more for educated workers. Hence, workers moving to other industries may be usually not so good to achieve permanent positions.

Finally, table 11 shows the coefficients resulting from the SMP quasi-experiment. Here, magnitudes are much smaller but more significant. Two contradictions appear when comparing this results with previous ones. The coefficients for the probability of renewing a fixed-term contract and getting unemployed are positive. When comparing the probabilities of transiting among types of contracts the coefficient for getting a permanent position is still greater than the one for the influence of competition on fixed-term employment. These results are puzzling. One explanation for this finding is that there may be structural differences between the pre-1992 when the total temporary rate was increase and post-1992 period when the temporary rate was already stable. Another fact that could shed light on this is the possibility that highly protected industries were anticipating their decrease

in protection and then were acting already as competitive industries.

8 Conclusion

This paper contributes to the literature on the effect of product market competition on labor outcomes by introducing a new outcome of study. Type of labor contract is considered a good indicator of job instability in Europe and is proven to be influenced by the level of product market competition. Therefore, the increase in the level of product competition world wide may contribute to explain the increment in the level of job instability as determined by the legal status of workers' contracts.

In order to address this topic, a new theoretical model is proposed. It relates the product and labor markets through the cost structure of the firms. Permanent and fixed-term workers affect production costs differently. Due to this, the firm will decide on workers' transitions between types of contracts taking into account the level of competition it is facing.

Competition in my model is measured through three parameters, namely, entry cost, market size and product substitutability. This is the same strategy applied in Raith (2003). Results show that while increases in the level of competition motivated by increases in product substitutability make workers more likely holding fixed-term contracts, increases in the level of competition through increases in market size and decreases in the cost of entry in the market provoke more workers transiting to permanent employment. Given the ambiguity of this result, it is necessary to apply an empirical strategy to estimate the overall effect of increases in product market competition on job instability.

I use data from the Spanish Labor Force Survey in combination with several Spanish industry level surveys to estimate a discrete time duration model with competing risks. In particular, I define five different states for workers: Permanent employment, fixed-term employment, self-employment, unemployment and out of labor force and study how different measures of competition affect the transitions from fixed-term contracts to any them. I measure the level of competition by the Lerner Index. This index proxies competition in the product market by reflecting the level of rent extraction in an industry. However, the Lerner Index may be endogenous in this setup. To account for the potential endogeneity of the Lerner Index, I propose two different specifications, an instrumental variable approach and a

quasi-experiment.

The instrumental variable approach is performed by instrumenting the Lerner Index by the Regulatory Impact indicator provided by the OECD. The Regulatory Impact indicator measures the impact of anti-competition regulation in the non-manufacturing industries on sectors of the economy that use these products as intermediate inputs.

Additionally, a quasi-experiment is performed using the Single Market Program as an exogenous increase in competition in all industries. The necessary variation between industries is given by the distinct levels of tariff barriers previous to the Spanish entry in the European Union.

Empirical results show that increases in the level of competition decrease the likelihood of holding permanent contracts for all workers. However, this effect is not homogeneous by education groups. It tends to be higher for the more educated workers.

References

[1] Albarrán, Pedro, (2001). "The econometrics of income dynamics and rotating panels, with an application to precautionary saving" Mimeo.

[2] Allison P., 1982. "Discrete-time methods for the analysis of event histories". Sociological Methodology, Leinhardt S., ed., Jossey-Bass Publishers, San Francisco, 61-97.

[3] Amuedo-Dorantes, C. and Serrano-Padial, R. (2005). "Fixed-Term Employment and Its Poverty Implications. Evidence from Spain". Focus, vol. 23:3, pp. 42-45. 2005.

[4] Bentolila, S. and Dolado, J. J. (1994). "Labor Flexibility and Wages: Lessons from Spain" Economic Policy. April 1994.

[5] Bèrges-Sennou, F. and Caprice, S. (2004). "Is Competition or Collusion in the Product Market Relevant for the Labor Market?". Economics Working Paper Archive (Toulouse) 200412, French Institute for Agronomy Research (INRA), Economics Laboratory in Toulouse (ESR Toulouse).

[6] Bertrand, Marianne, (2004). "From the Invisible Handshake to the Invisible Hand? How Import Competition Changes the Employment Rela-

tionship." Marianne Bertrand; Journal of Labor Economics, 2004, 22(4), pp. 723.

[7] Bertrand, Marianne and Kramarz, Francis (2002), "Does Entry Regulation Hinder Job Creation? Evidence from the French Retail Industry", Quarterly Journal of Economics, Vol. 117, No. 4, November, pp. 1369-1413.

[8] Boone, Jan, (2000). "Competition," CEPR Discussion Papers 2636, C.E.P.R. Discussion Papers.

[9] Borenstein, Severin & Farrell, Joseph, (1999). "Do Investors Forecast Fat Firms? Evidence from the Gold Mining Industry," NBER Working Papers 7075, National Bureau of Economic Research, Inc, revised .

[10] Caggese, Andrea and Cuñat, Vicente (2006). "Financing Constraints and Fixed-Term Employment Contracts," Economics Working Papers 1010, Department of Economics and Business, Universitat Pompeu Fabra.

[11] Cañada, A.; Carmena, A., (1991). "Los cambios en el sistema fiscal-arancelario: repercusiones sobre la competitividad española", Boletín de Información Comercial Española, núm. 2263, pp. 11-27.

[12] Cañada, Agustín and Carmena, Ana, (1991). "Alternativas metodológicas para el estudio de la protección exterior de la industria española: Una nota". Investigaciones Económicas (Segunda época). Vol. XV, number 1 (1991), pages 203-214.

[13] Cañada, Agustión and Carmena Ana, (1989). "La protección de la economía española en el período 1980-1986", ICE, Boletín económico, num. 2195, August, 1989.

[14] Cipollone, P. and A. Guelfi, (2003), "Tax Credit Policy and Firms' Behaviour: the Case of Subsidy to Open-end Labour Contract in Italy," Economic working paper n.471, Bank of Italy, Economic Research Department.

[15] Conway, P. and Nicoletti, G., (2006). "Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and

Highlights", OECD Economics Department Working Papers, No. 530, OECD Publishing.

[16] Cuñat, Vicente & Guadalupe, Maria, (2006). "Globalization and the Provision of Incentives Inside the Firm," CEPR Discussion Papers 5950, C.E.P.R. Discussion Papers, revised .

[17] Dehesa, G. De La; Ruiz, J. J. y Torres, A., (1991). "Spain", D. Papageorgiou, M. Michaely y A. Choksi (eds.), Liberalizing foreign trade: New Zealand, Spain and Turkey, Basil Blackwell, Massachusetts.

[18] De la Rica, S. and Iza, A, (2005). "Career Planning Motive in Spain: Do temporary contracts delay marriage and motherhood?" Review of the Economics of the Household, 3, pp: 49-73.

[19] Galdón-Sanchez, Jose E. and Schmitz ; James A. Jr., (2002). "Competitive Pressure and Labor Productivity: World Iron-Ore Markets in the 1980's", The American Economic Review, Vol. 92, No. 4 (Sep., 2002), pp. 1222-1235.

[20] Goldberg, Linda, Tracy, Joseph and Aaronson, Stephanie, (1999). "Exchange Rates and Employment Instability: Evidence from Matched CPS Data". The American Economic Review, Vol. 89, No. 2, Papers and Proceedings of the One Hundred Eleventh Annual Meeting of the American Economic Association (May, 1999), pp. 204-210.

[21] Griffith, Rachel, (2001). "Product market competition, efficiency and agency costs: an empirical analysis", IFS working paper.

[22] Guadalupe, Maria, (2007). "Product Market Competition, Returns to Skill, and Wage Inequality". Journal of Labor Economics, 2007, vol. 25, pages 439-474.

[23] Güell, Maia & Petrongolo, Barbara, (2003). "How Binding Are Legal Limits? Transitions from Temporary to Permanent Work in Spain," IZA Discussion Papers 782, Institute for the Study of Labor (IZA), revised .

[24] Jimeno, J. F. and Toharia, L., (1993). "The Effect of Fixed-Term Employment on Wages: Theory and Evidence from Spain". Investigaciones Económicas. Volumen XVII (3) - Septiembre 1993 pp. 475-494.

[25] Kluger, A., Jimeno, J. F. and Hernanz, V., (2002). "Employment Consequences of Restrictive Permanent Contracts: Evicence from Spanish Labor Market Reforms". IZA Discussion Paper No. 657. November 2002.

[26] Nickell, S., (1996). "Competition and Corporate Performance", Journal of Political Economy, 104, 724-746.

[27] Nickell, S., (1999). "Product Markets and Labor Markets", Labor Economics 6 (1999) 1-20.

[28] Raith, M., (2003). "Competition, Risk, and Managerial Incentives", The American Economic Review, Vol. 93, No. 4 (Nov., 2003), pp. 1425-1436.

[29] Viñas, A.; Viñuela, J.; Eguidazu, F.; Pulgar, C.F. and Florensa, S. (1979). "Política comercial exterior en España (1931-1975)", Madrid, BEX.

[30] Zitzewitz, Eric W., (2003)."Competition and Long-run Productivity Growth in the UK and US Tobacco Industries, 1879-1939," Journal of Industrial Economics, Blackwell Publishing, vol. 51(1), pages 1-33, 03.

Tables

Table 1: Proportion of fixed-term contacts over total employment

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium		9.3	9.2	8.0	7.7	7.8	8.5	8.9	8.5	8.5
Czech Republic	6.1	6.9	7.7	7.6	7.2	8.2	9.0	8.1	8.2	8.4
Denmark		8.8	9.8	9.0	8.1	8.9	8.9	9.8	9.1	9.1
Germany								13.9	14.1	14.4
Estonia			2.5	2.5	2.7	2.2	2.2	2.1	3.6	1.4
Greece	12.1	11.0	11.9	13.1	10.6	10.1	11.2	11.4	9.5	10.3
Spain	33.3	32.6	31.8	32	31.8	31.2	31.6	31.9	33.3	32.0
France	13.8	13.9	15.4	14.9	14.1	13.4	12.9	13.3	13.4	13.6
Ireland			5.6	4.6	4.7	4.8	4.3	4.3	2.8	2.5
Italy	7.7	8.9	9.4	9.4	9.0	9.1	10.8	11.7	12.7	12.6
Cyprus								12.7	12.4	11.6
Latvia					15.6	12.2	10.6	8.6	7.7	4.4
Lithuania					6.2	6.0	6.2	5.5	4.4	3.7
Luxembourg						3.1	4.8	5.3	6.1	6.7
Hungary		5.5	6.1	7.0	6.8	6.6	6.0	6.1	5.8	6.7
Malta					4.4	3.7	2.4	5.4	3.7	4.3
Netherlands			12.9	13.9	13.9	14.0	14.1	14.9	15.8	17.3
Austria	7.8	7.9	7.9	8.1	7.4	7.2	9.5	8.7	9.1	8.8
Poland		4.8	5.2	10.0	13.4	17.2	20.3	19.1	19.2	21.5
Portugal	16.4	18	19.5	19.2	21.5	20.9	20.3	19.1	19.2	21.5
Slovenia		10.6	12.9	12.3	13.2	13.0	16.0	16.9	16.6	17.8
Slovakia	4.1	3.4	3.7	3.7	4.2	3.6	4.6	4.8	4.4	5.3
Finland	15.4	15.5	14.0	14.4	13.6	14.5	13.7	14.3	14.4	14.2
Sweden				14.5	13.7	14.1	13.8	14.5	15.3	16.4
United Kingdom			6.9	6.8	6.3	6.1	6.0	5.8	5.6	5.8
UE-25								13.9	14.3	14.7
UE-15								13.8	14.2	14.4

Data provided by OECD Data in Focus. Blanks are combinations of country and year for which there exists no data.

Table 2: Sample's description

	Permanent employment	Temporary employment	Unemployed	Out of labor force
Age	30.660 (10.083)	29.152 (10.013)	29.128 (9.91)	29.098 (11.577)
Married	0.419 (0.493)	0.376 (0.484)	0.345 (0.475)	0.375 (0.484)
Household head	0.312 (0.463)	0.262 (0.44)	0.216 (0.412)	0.125 (0.33)
Male	0.716 (0.451)	0.697 (0.46)	0.637 (0.481)	0.549 (0.498)
Dropouts	0.26 (0.439)	0.266 (0.442)	0.29 (0.454)	0.296 (0.457)
High-Shool	0.661 (0.474)	0.674 (0.469)	0.67 (0.47)	0.655 (0.476)
University	0.079 (0.269)	0.06 (0.237)	0.04 (0.195)	0.049 (0.217)
Lerner Index	0.072 (0.037)	0.069 (0.038)	0.069 (0.039)	0.07 (0.033)

This data corresponds to the Spanish Labor Force Survey containing individuals that entered the survey between 1993 and the first quarter of 2001.

Table 3: Correlation between Herfindahl Index and Proportion of fixed-term over total employment

	Correlation
1999	-0.1319
2000	-0.1301
2001	-0.1220

The Herfindahl Index is computed using data from the Spanish Central Enterprise Directory. The proportion of fixed-term over total employment is obtained by combining data from the Spanish Labor Force Survey.

Table 4: Correlation between Lerner Index and Proportion of fixed-term over total employment

	Correlation
1993	-0.0696
1994	-0.2427
1995	-0.3228
1996	0.0874
1997	-0.0258
1998	0.1881
1999	-0.0407
2000	-0.2246
2001	0.1605

The Lerner Index is constructed using data on rents and costs appearing in the Spanis Industrial Enterprise Survey. The proportion of fixed-term over total employment is obtained by combining data from the Spanish Labor Force Survey.

Table 5: Quarterly transitions out of temporary employment

Labor state in quarter t+1:	**Temporary contract in quarter t**
Same temporary contract	37,224
New temporary contract in the same industry	5,277
New temporary contract in a different industry	356
Permanent contract in the same industry	1,398
Permanent contract in a different industry	38
Unemployed	2,264
Out of labor force	920
Self-Employment[10]	112

The total number of individuals in my sample is 47,999. This data corresponds to the Spanish Labor Force Survey containing individuals that entered the survey between 1993 and the first quarter of 2001.

[10]This collective is formed by entrepeneurs, people helping in family business, etc. Therefore, these individuals are neither unemployed, out of labor force nor holding a contract.

Table 6: Variances of Regulatory Index' components

Sector	Weights	Index
Post and telecommunications	0,0006	0,528
Electricity, gas and water	0,002	0,95
Transport and Storage	0,007	1,217
Wholesale and retail trade	0,004	0,006
Renting of M&E and other business activities	0,002	0,183
Finance	0,002	0

Total Variance of the RI=0,019

This figures reflect variances for the different components of the Regulatory Impact Indicator. Data on weights proceeds from the Input-Output harmonized OECD Database. Data on Indexes comes from the OECD indicators of Product Market Regulation.

Table 7: First Stage of the Instrumental Variable Estimation

	LI	**LI*HS**	**LI*U**
RI	0.151***	-0.245***	-0.099***
	(0.008)	(0.011)	(0.006)
RI*HS	-0.006**	0.577***	0.007***
	(0.003)	(0.004)	(0.002)
RI*U	-0.006	0.066***	0.507***
	(0.004)	(0.005)	(0.003)
$\mathbf{R^2}$	0.9046	0.8769	0.8643

These values reflect the coefficients for the first stage estimations of the potentially endogenous variables: Lerner Index (LI), Lerner Index by High School Graduate (LI*HS), and Lerner Index by University Degree (LI*U) over the instruments: Regulation Impact (RI), Regulation Impact by High School Degree (RI*HS) and Regulation Impact by University Degree (RI*U). The last row reflects the magnitudes of the R-squared in each of the three regressions.

Table 8: Effective rate of protection

SECTOR	ERP
Food Products,beveradges and tobacco	0.1795432
Textiles, textiles products, leather & footwear	0.1646423
Wood except furniture	0.1954202
Pulp, Paper, paper products, printing & publishing	0.1771395
Coke, refined petroleum products	0.1816283
Chemicals	0.1983009
Rubber and plastics products	0.1713488
Other non-metallic mineral products	0.2118429
Basic metals and fabricated metal products	0.2051306
Fabricated metal products, except machinery and equipment	0.1885403
Machinery and equipment, n.e.c.	0.1720299
Office, accounting and computing machinery	0.1698343
Electrical machinery and apparatus, nec	0.1722945
Radio, television and communication equipment	0.1641019
Medical, precision & optical instruments, watches and clocks	0.1569504
Motor vehicles	0.177416
Other transport equipment	0.149771
Furniture; recycling	0.1868645
Electricity, gas and water supply [4]	0.5787984

Table 9: Plain estimates for the transitions out of fixed-term employment

	(a)				(b)				(c)			
	LI	LI	LI*HS	LI*U	LI	LI	LI*HS	LI*U	LI	LI	LI*HS	LI*U
(1)	0.136 (1.152)	-0.382 (1.331)	0.609 (0.878)	1.193 (1.447)	-0.786 (1.524)	-1.749 (1.741)	1.201 (1.125)	1.765 (1.886)	1.129 (1.342)	0.437 (1.539)	0.798 (0.982)	2.376 (1.732)
(2)	-	-	-	-	1.783 (1.106)	1.828 (1.264)	-0.068 (0.796)	0.074 (1.29)	-	-	-	-
(3)	1.332 (1.228)	0.236 (1.414)	1.295 (0.923)	2.631 (1.614)	2.68** (1.235)	2.059 (1.414)	0.738 (0.899)	1.69 (1.559)	1.527 (1.019)	1.11 (1.165)	0.498 (0.737)	1.151 (1.194)
(4)	-	-	-	-	-0.072 (1.07)	0.025 (1.225)	-0.097 (0.777)	-0.544 (1.237)	-	-	-	-
(5)	-1.918* (1.094)	-1.531 (1.285)	-0.478 (0.871)	-0.737 (1.339)	-3.436** (1.445)	-2.977* (1.706)	-0.593 (1.167)	-0.521 (1.743)	-2.28** (1.119)	-1.894 (1.303)	-0.476 (0.866)	-0.811 (1.296)
(6)	-0.35 (0.979)	-0.17 (1.138)	-0.236 (0.754)	-0.192 (1.213)	-0.604 (1.174)	-0.549 (1.353)	-0.099 (0.87)	0.352 (1.414)	-0.418 (0.995)	-0.288 (1.143)	-0.161 (0.731)	-0.27 (1.136)
(7)	0.04 (0.951)	0.225 (1.104)	-0.207 (0.73)	-0.623 (1.17)	0.14 (1.077)	0.124 (1.233)	0.046 (1.78)	-0.39 (1.238)	0.008 (0.959)	0.084 (1.099)	-0.072 (0.7)	-0.547 (1.088)

(a): Each individual is assigned the sector she is working in at the beginning of the period. The number of observations is 47872.

(b): Each individual is assigned the sector she is actually working in at each period. The number of observations is 47922.

(c): Each individual is considered as a different one as far as she moves sector. The number of observations is 51225.

(1): New temporary contract in the same industry

(2): New temporary contract in a different industry

(3): Permanent contract in the same industry

(4): Permanent contract in a different industry

(5): Unemployed

(6): Out of labor force

(7): Self-employment

LI: Lerner Index. LI*HS: Lerner Index by High School Degree. LI*U: Lerner Index by University Degree.

The coefficients starred *, ** and *** are significative at the 1%, 5% and 10% respectively.

Coefficients for the Lerner Index and its interactions with the education level in the specification for the transitions from a Temporary Contract to every other state. Individual data comes from the Spanish Labor Force Survey and the values of the Lerner Index are obtained from the Industrial Enterprise Survey. Individuals included in the sample were those that had ever reported having a Temporary Contract, filled in six interviews and report working in industrial sectors.

Table 11: Instrumental variables estimates for the transitions out of fixed-term employment

	(a)				(b)				(c)			
	LI	LI	LI*HS	LI* U	LI	LI	LI*HS	LI*U	LI	LI	LI*HS	LI*U
(1)	-1.654 (1.82)	-2.838 (1.981)	1.202 (0.743)	2.495** (1.121)	-4.744* (2.579)	-6.151** (2.729)	1.272 (0.948)	2.878* (1.511)	-5.813*** (2.065)	-6.226*** (2.181)	0.718 (0.764)	2.726** (1.238)
(2)	-	-	-	-	-1.832 (2.025)	-1.908 (2.152)	0.072 (0.735)	0.149 (1.07)	-	-	-	-
(3)	3.165* (1.678)	1.553 (1.815)	1.646** (0.681)	2.959*** (1.014)	6.368*** (1.72)	6.108*** (1.832)	0.256 (0.612)	0.341 (0.884)	3.722** (1.621)	3.764** (1.27)	-0.007 (0.578)	0.094 (0.826)
(4)	-	-	-	-	-0.243 (1.896)	-0.11 (2.009)	-0.112 (0.681)	0.175 (0.991)	-	-	-	-
(5)	-1.352 (1.859)	-0.83 (2.006)	-0.521 (0.752)	-1.383 (1.024)	-3.091 (2.632)	-2.909 (2.809)	-0.229 (0.958)	-0.659 (1.287)	-3.04 (1.998)	-2.883 (2.137)	-0.284 (0.719)	-0.931 (0.977)
(6)	-1.973 (1.645)	-1.566 (1.766)	-0.419 (0.663)	-0.72 (0.955)	-3.489 (2.36)	-3.319 (2.514)	-0.161 (0.841)	-0.267 (1.21)	-1.007 (1.725)	-0.859 (1.840)	-0.169 (0.621)	-0.377 (0.877)
(7)	-0.571 (1.523)	-0.208 (1.625)	-0.344 (0.621)	-0.738 (0.893)	-0.635 (1.92)	-0.581 (2.045)	-0.058 (0.696)	-0.217 (0.999)	-0.655 (1.628)	-0.57 (1.735)	-0.107 (0.599)	-0.261 (0.85)

(a): Each individual is assigned the sector she is working in at the beginning of the period. The number of observations is 47872.

(b): Each individual is assigned the sector she is actually working in at each period. The number of observations is 47922.

(c): Each individual is considered as a different one as far as she moves sector. The number of observations is 51225.

(1): New temporary contract in the same industry

(2): New temporary contract in a different industry

(3): Permanent contract in the same industry

(4): Permanent contract in a different industry

(5): Unemployed

(6): Out of labor force

(7): Self-employment

LI: Lerner Index. LI*HS: Lerner Index by High School Degree. LI*U: Lerner Index by University Degree.

The coefficients starred *, ** and *** are significative at the 1%, 5% and 10% respectively.

Coefficients for the Lerner Index and its interactions with education levels in the instrumental variable specification for the transition from a Temporary Contract to each other state. The instrument in use is the Regulatory Impact Indicator provided by the OECD. Individual data comes from the Spanish Labor Force Survey and the values of the Lerner Index are obtained from the Industrial Enterprise Survey. Individuals included in the sample were those that had ever reported having a Temporary Contract, filled in six interviews and report working in industrial sectors.

Table 10: Experimental estimates for the transitions out of fixed-term employment

	(a)				(b)				(c)			
	LI	LI	LI*HS	LI*U	LI	LI	LI*HS	LI*U	LI	LI	LI*HS	LI*U
(1)	0.004**	0.005***	-0.004	0.047	0.143	0.003	-0.006*	0.355	0.005***	0.007***	-0.007**	0.306
	(0.002)	(0.002)	(0.003)	(0.183)	(0.092)	(0.002)	(0.003)	(0.385)	(0.002)	(0.002)	(0.003)	(0.244)
(2)	-	-	-	-	0.015	0.005**	-0.0006	-0.022	-	-	-	-
					(0.057)	(0.002)	(0.003)	(0.12)				
(3)	0.006***	0.006***	-0.003	0.074	0.15**	0.007***	-0.005	0.161	0.006***	0.007***	-0.001	0.017
	(0.002)	(0.002)	(0.003)	(0.14)	(0.068)	(0.002)	(0.003)	(0.245)	(0.002)	(0.002)	(0.003)	(0.12)
(4)	-	-	-	-	0.028	0.003*	-0.002	-0.04	-	-	-	-
					(0.055)	(0.002)	(0.003)	(0.117)				
(5)	0.003**	0.003*	0.001	-0.107	-0.359***	0.004**	0.002	-0.175	0.003**	0.003*	0.001	-0.124
	(0.003)	(0.002)	(0.003)	(0.124)	(0.066)	(0.002)	(0.003)	(0.175)	(0.045)	(0.002)	(0.002)	(0.108)
(6)	-0.019***	-0.021***	0.01***	-0.09	-0.043	-0.035***	0.016***	-0.107	-0.024***	-0.026***	0.013***	-0.095
	(0.002)	(0.002)	(0.003)	(0.11)	(0.059)	(0.002)	(0.003)	(0.121)	(0.002)	(0.002)	(0.003)	(0.097)
(7)	-0.0012	-0.001	-0.0003	-0.043	0.008	0.647***	0.288***	1.097***	-0.002	-0.002	0	-0.068
	(0.002)	(0.002)	(0.002)	(0.108)	(0.055)	(0.061)	(0.058)	(0.077)	(0.001)	(0.002)	(0.002)	(0.096)

(a): Each individual is assigned the sector she is working in at the beginning of the period. The number of observations is 62690.

(b): Each individual is assigned the sector she is actually working in at each period. The number of observations is 62619.

(c): Each individual is considered as a different one as far as she moves sector. The number of observations is 66970.

(1): New temporary contract in the same industry

(2): New temporary contract in a different industry

(3): Permanent contract in the same industry

(4): Permanent contract in a different industry

(5): Unemployed

(6): Out of labor force

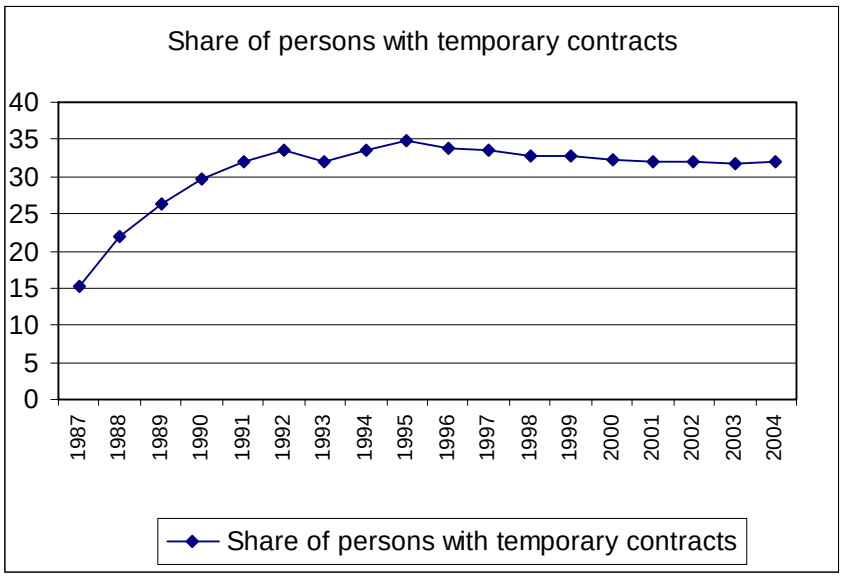
(7): Self-employment

LI: Lerner Index. LI*HS: Lerner Index by High School Degree. LI*U: Lerner Index by University Degree.

The coefficients starred *, ** and *** are significative at the 1%, 5% and 10% respectively.

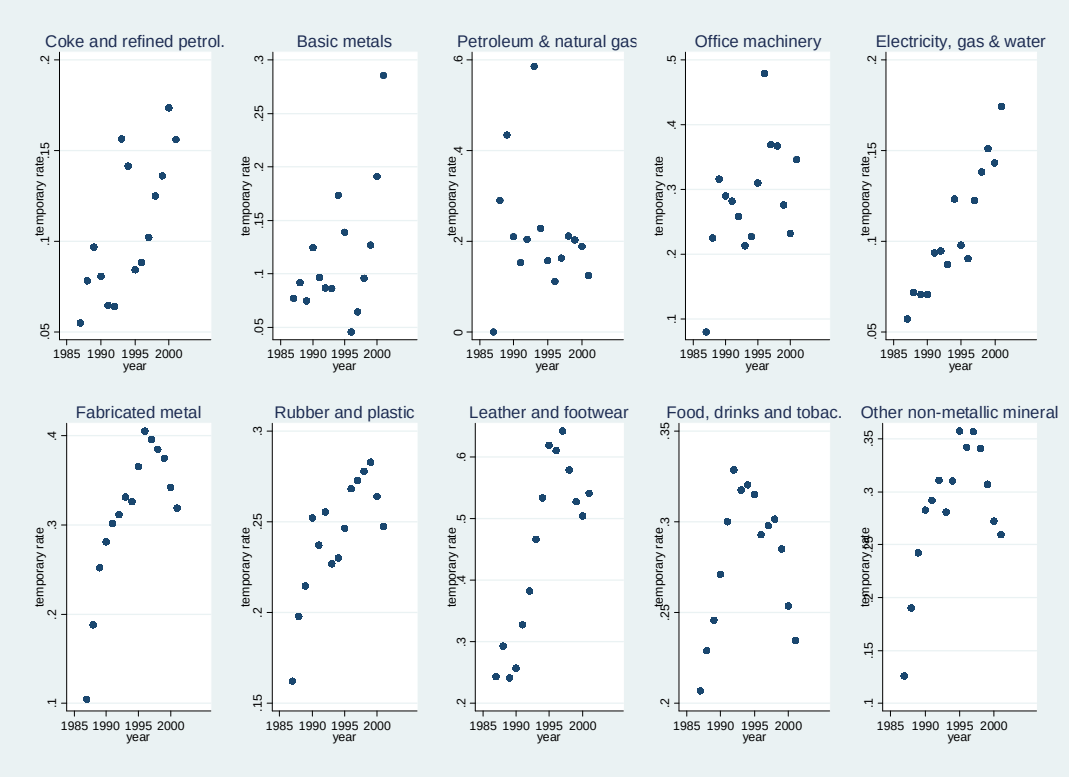
Coefficients for the Lerner Index and its interactions with the level of education in the experimental specification for the transition from a Temporary Contract to each other state. Individual data comes from the Spanish Labor Force Survey and the level of protection is obtained from Cañada and Carmena (1991) and the proportion of tariff barriers standing at each quarter according to the Single Market Program. Individuals included in the sample were those that had ever reported having a Temporary Contract, filled in six interviews and report working in industrial sectors.

Figure 1: Share of persons with fixed term contracts over total employment in Spain



Data from the spanish Labor Force Survey.

Figure 2: Evolution of the Temporary Rate over time for the five most and the five least concentrated industries



These graphs are constructed using data from the Spanish Labor Force Survey. The five figures displayed at the top correspond to the five most concentrated Spanish industries according to the Herfindahl Index while the five figures at the botton show the temporary rate pattern for the five least concentrated Spanish industries.

Appendix: The Spanish institutional framework

Spanish legislation on labor contracts is contained in the Workers' Statute of 1980. It established that labor contracts had an indefinite duration. However, it allowed the use of temporary contracts in some restrictive cases, i.e., seasonal jobs, temporary substitution of permanent workers, jobs taken by first job seekers or to fulfill positions created to face sudden increases in demand.

In the mid-80s, Spanish unemployed were about 20% of Spanish Labor Force. The Worker's Statute included the possibility for the government to use temporary contracts to promote employment. The government decided to take advantage of this opportunity. The Law of 1984 removed any restriction in the use of temporary contracts. As a result of this reform, the proportion of employees under temporary contracts increased from 10% to over 30% in the early 1990's.

Temporary contracts have negligible firing costs. These contracts can be signed for a period between a minimum of six months and a maximum of three years. After three years, an up or out clause applies. Workers' contracts can not be renewed and they must be either fired or offered a permanent contract by his current employer. In the case in which the worker is fired, no other employee can be hired for the same job.

The intensive expansion of fixed-term contracts made apparent the existence of a segmented labor market where some workers where jumping between temporary contracts with bad salary and bad amenities while others enjoyed better working conditions on a indefinite basis. This phenomenon was called dualism of the labor market. Authorities' reaction was to promote the 1992, 1994 and 1997 Laws. These new Laws progressively modified the Worker's Statute. The 1992 Law increased the minimum duration of a fixed-term contract from three to six month. The 1994 Reform restricted the applicability of general fixed-term contracts and introduced incentives to firms for their renewals. It improved renewal prospects for women, the youth and for the less-skilled. Targeted subsidies were promoted to enhance transition to permanent employment. Finally, the 1997 Reform introduced a new Permanent Contract with lower firing costs. According to Güell and Petrongolo (2003) only the 1994 Law proved to be effective.