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Tax Credit Policy and Firms' Behavior: The Case of Subsidies to Open-End Labor Contracts in Italy

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Tax Credit Policy and Firms' Behavior: The Case of Subsidies to Open-End Labor Contracts in Italy

By

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Abstract

In this paper we look at tax credit policy as an instrument to foster hiring with open-end rather than with fixed-term contracts. In particular, we examine a specific regulation adopted in Italy in the year 2000 (Credito d'Imposta). This policy offers a generous and automatic tax credit to all firms hiring workers with open-end contracts. The eligibility criteria are very mild for both firms and workers. Our results seem to indicate, both formally and empirically, that firms used this subsidy to hire under open-end contracts primarily those workers who would have been hired under such a contract regardless the subsidy, even though after a short transition into temporary employment. Our estimates suggest that, compared to 2000, in 2001 the subsidy did not increase the overall probability to be hired, but changed the composition of new employees. It increased the chances to find an open-end contract but in a rather uneven way across workers. Conditional on being hired, the probability rose by about 10 per cent for workers holding a college degree, by about 4 per cent for people with a high school diploma, while did not change or might have even slightly declined for less educated workers.

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1. Introduction

In the last few years, fixed-term contracts have gained the center stage in the economic debate on labor market reforms in Europe. The debate has mostly focused on two main features. The first one deals with the magnitude of the phenomenon: very rapidly, temporary jobs have indeed become a major novelty in the European labor markets. Table 1 shows that in many OECD countries a sizeable share of employees work under fixed-term contracts in year 2000. In some countries (such as Ireland, UK, Luxemburg and Hungary) they still represent a small share, but in most cases they appear to account for at least 10 per cent of total employees; in few countries these shares are even higher: 32.1, 20.4, 20.4 per cent in Spain, Portugal and Turkey respectively. Only ten years earlier temporary occupation represented a much smaller fraction of employment.
The second feature originates from the observation that in several countries – such as Austria, Czech Republic, Finland, France, Germany and Italy - a sizeable portion of newly created jobs in the 1990s has taken the form of fixed-term contracts (Table 1)

This rapid expansion has fuelled researchers' effort to understand the effects of fixed-term contracts on labor market outcomes. At this stage there exists indeed an unsettled dispute in the literature concerning their effectiveness. On the one hand it is suggested that, by introducing some form of flexibility into an otherwise highly regulated labor market, they tend to provide young workers with a stepping-stone towards permanent employment (Booth, Francesconi, Frank 2000 for UK; Contini, Pacelli and Villosio 2000 for UK, Germany and Italy). On the other hand, there is increasing evidence that they might represent a "dead-end", in that they further segment the labor market between insiders holding open-end contracts and outsiders who find themselves confined at the margins, trapped between repeated spells of unemployment and fixed-term contracts (Blanchard and Landier 2001 for France, Güell 2002a and Güell and Petrongolo (2002), Amuedo-Dorantes (2000, 2001) for Spain, Istat 2000 for Italy).

In its 2002 Employment Outlook, OECD attempts to strike a fair balance suggesting that "Depending on the country considered, between one-third and two-thirds of temporary workers [including Temporary Help Agency workers] moves into a permanent job within

a two-year time interval, suggesting some potential for upward mobility. The other side of the coin is that one out of five temporary workers drops out of employment in the succeeding two years and there is some evidence that employers provide less training to temporary than to permanent workers" (OECD 2002).

This kind of concerns led policy makers in the recent years to intervene on fixed-term contracts in an attempt to reduce their negative effects, while retaining their positive sides. According to OECD (2002), governments have intervened both by setting restrictions to the adoption of temporary contracts (and the degree of employment protection accorded to "permanent" employees), and by establishing equal-treatment standards requiring employers to harmonize pay or fringe benefits between temporary and permanent employees, as well as by providing employers with incentives to either hire certain disadvantaged job-seekers on temporary jobs or move them into permanent positions.

Notwithstanding these legislative activities, best practices are yet to be found and there seems to exist a substantial uncertainty about the best way to go, perhaps because of the lack of clear-cut evidence from empirical research.

As in others countries, fixed-term contracts have received in Italy a great deal of attention from policy makers, business associations as well as unions. In the 1990s, the adoption of fixed-term contracts was encouraged by widening their scope and easing their regulatory burden; at the same time firms received incentives to transform temporary into permanent jobs[1]. However, policy design was not always fully consistent and might have induced unwanted and non-trivial negative implications.

In this paper we examine the effects of the most important and recent financial incentive of this kind, i.e. a generous tax credit granted to firms choosing to hire workers under open-end contracts. In particular, two questions have been addressed. On the one hand,

[1] In Spain this same strategy has been adopted since the second half of the 1990s with two important laws (Royal Decree 8/1997 and Royal Decree 9/1997), which reduced social security contribution and dismissal costs for employers who transform temporary into permanent contracts (Amuedo-Dorantes 2000, 2001).

we examined whether this new incentive did actually increase an average worker's probability to be hired with an open-end contract. On the other hand, we investigated whether this probability increase has been homogenous across workers, i.e. whether it provided everybody with an additional opportunity to enter permanent employment or rather favoured only specific workforce groups.

Our results seem to suggest firms used this tax credit provision in order to hire under open-end contracts mostly those workers who, on average, turn out to have the highest probability to be permanently hired even without the subsidy, perhaps after a short transition into temporary employment. Our estimates suggest that, compared to 2000, in 2001 the subsidy did not increase the overall probability to be hired, but it changed the composition of newly hired employees. It in fact increased the chances to find an open-end contract but in a rather uneven way across workers. Conditional on being hired, the probability rose by about 10 per cent for workers holding a college degree, by about 4 per cent for people with a high school diploma, while did not change or might have even slightly declined for less educated workers.

The rest of this paper is organized as follows. Section 2 defines the context, by highlighting the basic facts about fixed-term contracts in Italy with special regards to regulation, figures as well as reasons for concern. Section 3 explains in some detail the nature of the tax credit provision put forward in Italy at the end of 2000. We focus the attention on the regulatory aspects, the incentive magnitude and its actual usage. Section 4 presents a simple conceptual framework that helps to predict what type of workers turns out to benefit most from the tax credit provision. Section 5 describes the information we use to take these predictions to the data. Evaluation of the prediction is carried out in section 6 in a preliminary, descriptive way. Section 7 extends the analysis of section 6 through a simple econometric framework to estimate, on the one hand, the effects of the new regulation on the probability of being hired with an open-end contract, conditional on having been employed in the subsidized period; on the other hand, its impact on the overall hiring probability. Section 8 finally concludes.

2. Context. Basic facts about fixed-term contracts in Italy: regulation, figures, concerns.

2.1 Regulation

As a general rule the Italian law prohibits any time limitation to a labor contract except for some specific circumstances clearly stated by the law itself[2]. These exceptions are: 1) seasonal activities; 2) temporary replacement of an employee on leave; 3) occasional activities which are time predetermined and not usually carried out by the firm; 4) special contracts requiring different skills that are not usually provided by the firm; 5) special skills in the movie and airline industries; 6) technical and administrative top management[3].

A fixed-term contract can be renewed only once under special circumstances for at most the same original duration and in any case with worker's agreement. If the contract extends beyond the original duration, the corresponding wage rate has to be increased by 20 per cent for each day following the deadline up to the 10th day, and by 40 per cent thereafter. Moreover, if the contract goes beyond the 30th day after the deadline it is automatically considered an open-end contract.

Alongside with this type, there are special fixed-term contracts that are designed to provide young workers with work experience along with formal training (Apprenticeship and Work and Training contracts, "Apprendistato e Contratti di Formazione Lavoro"). The duration of these contracts stretches from 18 months to 4 years; they can be signed by workers aged 16 to 32 (with different duration and regulation depending on age and level of education). They are different in nature from the normal fixed-term contracts as they are thought of as stepping-stones into permanent employment for younger workers. Because of this special status they are rewarded with lower than regular social security

[2] This general rule was true until a new law was passed in the summer of 2001. Since then, fixed-term contracts are not regarded any longer as an exception to the general rule but are awarded equal dignity to permanent contracts as long as there exist valid technical-organizational reasons for their adoption. A complete history of the regulation of fixed-term contracts is presented in Appendix 1.

[3] For a full description of the regulation for these and other types of contracts, see Ministero del Lavoro 2001.

contributions for amounts that differ according to contract type, firm size, economic sector and geographical area and range from a minimum of 25 per cent to a virtual maximum of 100 per cent.

An important feature of the Italian institutional setting is that a great deal of labor market regulation is left to the negotiation between business organizations and unions. The law sets indeed the general framework, while the actual details are decided in the national sector contracts. Thus, even in the absence of normative intervention there might be important changes in the actual regulation of specific issues. A pivotal example of this pattern is the fixed-term contract regulation. In the early 1990s, national sector contracts set ceilings to fixed-term contract adoption at the firm level at around 5 to 7 per cent of employment in the manufacturing sector and 10 per cent in the construction and retail industries. However, actual usage was below these ceilings because unions managed to narrow the set of specific situations in which fixed-term contracts were allowed. As the industrial relation climate became less conflicting in the 1990s, unions agreed to widen the scope for temporary jobs and relaxed their maximum usage constraint. For example, in 1998 ceilings were substantially increased up to 20 per cent in construction and 25 per cent in the chemical sector (Bank of Italy 2000).

2.2 Figures

Fixed-term contracts have become a relevant feature of the Italian labor market in the 1990s. From the second half of the 1970s up until the early 1990s, they have represented a non-trivial but constant share of total employment, concentrated in the agricultural sector. In the second half of the 1980s this share grew because of the introduction of the Work and Training contracts in 1984, but the actual take-off occurred between 1993 and 1999 when they have been growing at a double-digit rate from 6.1 to 9.8 per cent of total employees (Fig.1). In this same period they represented the only expanding type of employment and accounted for the virtually whole growth of dependent employment (Fig.2). This increase was encouraged by the easing of the existing constrains established by national labor contracts.

In 2000 their expansion was accompanied by a recovery of permanent employment that picked up as a consequence of the strong up-turn in labor demand, especially in the northern regions of the country[4].

Fixed-term contracts tend to be equally distributed among males and females, mostly young (in 2001, 60 per cent of them was less than 35 years old; Table 2), with lower than average years of schooling (in 2001, half of them held at most a lower secondary school diploma[5]), working in the services (63 per cent in 2001) and agriculture (12 per cent). The great majority of people (44.4 per cent in 2001) holding a fixed-term contract do so because they could not find a job with an open-end contract (heading "*No better opportunities*" in Table 2). About one-third of them is in an Apprenticeship and Work and Training type of contracts.

2.3 Concerns

In many OECD countries fixed-term contracts have been welcomed as a mean to foster younger workers' opportunities to gain access to their first job. However, they are also a source of concern since they might lead to an increase in worker's insecurity and precariousness (OECD 2002). These same reasons for concern seem to hold true in Italy. The growth of precarious jobs has been paralleled by an expansion in the share of low-paid workers[6] among all employees. As illustrated in Figure 3, this share went up from 8 per cent in 1989 to more than 18 per cent in 1998, reversing the trend of the previous 15 years (Brandolini et. alt. 2001).

We cannot directly and immediately attribute this reversal to the spread of fixed-term contracts, although we do have evidence that people in temporary jobs earn less and work fewer hours than people in permanent jobs. In Table 3 we computed the differential in

[4] In 2000, as many as 6.6 per cent of firms in the north-eastern regions and 3.4 in the north-western ones claimed they could not find enough workers (Bank of Italy 2001). For a discussion of the mismatch measure in Italy, see Brandolini and Cipollone 2001.

[5] The Italian schooling system is organised along eight years of compulsory education (five years of primary education and three additional years of lower secondary school leading to a junior high-school diploma), which can be followed by 4-5 years of upper secondary education (terminating with a high-school degree) and by further years of tertiary education leading at least to a college degree (a college degree is obtained on average after 4 years of tertiary education).

log hourly wages and worked hours between workers with open-end contracts and workers with temporary jobs (distinguishing between fixed-term contracts and workers hired by Temporary Help Agencies), using the Bank of Italy Survey on Household Income and Wealth for the year 2000. The raw differential suggests that males in fixed-term jobs (Temporary Help Agency jobs) earn 32 (43) per cent less than those with open-end contracts. The adjusted differential shrinks considerably but remains sizeable: 12 per cent for fixed-term and 21 per cent for Temporary Help Agency workers. About the same story holds true for females in temporary jobs; the wage differential for those in fixed-term occupations is considerably smaller and not significantly different from zero once adjusted for observable characteristics.

The wage differential cumulates with the hours of work differences to further widening the overall annual earnings gap between workers in permanent and temporary jobs. On average, a male worker with a fixed-term contract works 530 hours less than a correspondent open-end contract worker. This gap reduces to 390 hours when worker's characteristics are taken into account, but it still remains quite sizeable. About the same pattern can be observed for females.

Mobility out of fixed-term employment seems to be rather low. In October 1999 out of 100 workers whose first job was a temporary job, 38 were still in a temporary position after three years (20 in the same initial job and 18 in a different fixed-term job, Table 4), 38 exited the employment status either into unemployment or out of the labor force, 4 have changed status into self-employment and 21 gained access to permanent positions.
Workers whose first job was a permanent position faced much brighter prospects; after three years 90 per cent of them were still into permanent employment (81.3 per cent in the same job and 8.8 in a different one), 1.3 per cent moved into self-employment, 1.8 into a temporary occupation and 6.8 per cent exited the employment status. Self-employed workers faced similar probabilities.

[6] Low-paid workers are here defined as those earning less than two-thirds of the median income.

After 5 years from the first job the chances for fixed-term workers look slightly better: 36 per cent of them have gained access to an open-end contract, 27 remained in a temporary occupation (10 per cent in the same job and 17.2 in a new fixed-term contract) and 30 per cent exited into either unemployment or inactivity. These figures would imply an annual transitional probability into permanent occupation of about 11.5 per cent that translates into an average waiting time of about 8.7 years. This is a considerably longer period than that suggested by OECD, and is similar to that reported by Blanchard and Landier for France (8.2 years for young workers in 1996) and that reported by Amuedo-Dorantes for Spain (8.3 for all workers in 1996).

Low mobility does not only affect marginal workers, looking instead quite widespread. Table 5 reports transitions from fixed-term contracts (towards all status in the labor market) by some basic worker characteristics. Compared to females, males show slightly better chances to enter open-end jobs but, at the same time, they tend to suffer higher risks to exit employment. Holding a college degree, as opposed to a high school diploma, does not improve the probability to gain access to permanent employment in the first three years after entering the first job. However, more years of schooling seem to reduce the risk of exiting employment while workers with shorter education appear doomed at the margins of the market, wandering between unemployment and temporary occupations. Indeed, even after 5 years from the first job, 40 per cent of them are either unemployed or inactive while 25 per cent find themselves into transient jobs.

3. Subsidy to open-end contracts: regulation, magnitude, usage

3.1 Regulation

Like many other OECD countries, Italy has attempted to reduce the negative effects of fixed-term contracts. The strategy adopted aims at increasing the mobility out of fixed-term contracts by providing fiscal incentives to firms that either transform temporary into permanent positions or directly hire workers under open-end contracts. There are several

examples of this strategy[7]. However until the year 2000 these incentives have been small, often targeted to particular areas, firm types or worker categories.

The Italian fiscal law for the year 2001 (issued at the end of 2000) has instead provided a new incentive in the form of a general, automatic and quite generous tax credit to all firms hiring workers with open-end contracts. In particular, this provision states that, every firm hiring a new worker on a permanent basis is rewarded with a tax credit of about 413 € (620 for workers in the South) per month and per worker from the hiring moment until the end of December 2003. This new tax credit applies to all new hires taking place from October 2000. Thus, for a southern worker hired in October 2000 and retained until December 2003 each firm will receive about 24.200 €. The tax credit is awarded only if both worker and firm are eligible. A worker is eligible if at least 25 years old and not working with an open-end contract in the 24 months preceding her/his hiring. A firm is eligible if the newly hired worker increases the overall level of permanent employment - at the firm level - over the average recorded in the period ranging from October 1999 to September 2000. The tax credit can be claimed against any kind of taxes such as income tax, social security contributions, value-added tax. Furthermore, it can be passed over to different fiscal years.

3.2 Magnitude

The contribution provided by this subsidy looks quite generous. Figure 4 shows the percentage reduction in the per-capita labor cost due to the tax credit (using data for the year 2000) by sector and geographical area. This reduction is variable because the tax credit is a fixed amount that only increases for southern workers, while the average labor cost differs both across sectors and geographical areas. The evidence shows a labor cost reduction, which ranges from 9.2 per cent in the banking sector in the central and northern regions to almost 60 per cent in the agricultural sector in the South. On the average of the private, no-farm sector the reduction amounts to more than 30 per cent in the South and to 16 per cent in the central and northern regions. These estimates understate the effect of the tax credit because labor cost data refer to an average worker,

[7] For example, the incentives to the transformation of work and training contracts into permanent ones or

while the correct reference should be the labor cost of a new young worker, which is usually below the average. It should be mentioned however that national accounts also include estimates of the labor cost in the underground economy, which is most likely smaller than the legal labor cost for a new entrant; however, this effect only attenuates underestimation.

3.3 Usage

The new tax credit seems to have been very successful in 2001. We have two sources of information about the actual usage of this new instrument. The first source is the Labor Force Survey, which provides data on the number of newly hired employees distinguishing between open-end and fixed-term contracts. Figure 5 extends the numbers of Figure 2 to the year 2001. It reports the quarterly absolute growth of total employees by type of contract with respect to the corresponding period of the previous year. It suggests that in January 2001[8] - i.e. the first survey since the new tax credit was in force - fixed-term contracts halted their expansion, which had been the only source of dependent employment growth since 1993; in October 2001 the number of fixed-term contracts was smaller than one year before. It must be remarked however that a slow-down had already occurred in 2000, but most of it was due to a strong labor demand that, especially in the northern regions, turned the labor market into a seller market, thereby allowing workers to negotiate hires with open-end contracts[9]. In 2001, open-end contracts went up and fully compensated the slow-down in fixed-term contracts. This represents the strongest increase of permanent employment since 1993 and looks quite remarkable given the sharp slow-down in the economic activity registered in 2001 (the value-added growth in the private sector fell from 4.2 to 2.5 per cent between 2000 and 2001).

The second source of information consists of the figures collected by the Ministry of Finance (and reported by the Ministry of Labor 2001), keeping track of the foregone

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the tax credit provision for small firms hiring permanent workers in economically depressed areas.

[8] Italian Labor Force Surveys are conducted in the first week of, respectively, January, April, July, and October.

[9] Maya Guell (2002b) explains this effect in an efficiency-wage context in which the type of contract each worker is offered represents a discipline device.

revenues due to the tax credit. Figure 6 shows these foregone revenues as a share of total social security contributions in 2001 and the correspondent number of involved workers. Between January and December 2001, the monthly flow of foregone revenues increased from 0 to more than 0.7 per cent of the monthly flow of social contributions. This implied 188.000 involved workers in November 2001, that is about 1.2 per cent of total employees. These figures suggest the tax credit has been a large success, much beyond the 83.000 workers initially foreseen for the entire subsidized period, i.e. October 2000-December 2003 (Bank of Italy 2001).

4. Who is better off? A simple conceptual framework

In this section we set up a simple conceptual framework to answer the following question: will all workers equally benefit from the tax credit? In other words, will firms choose to hire all types of workers, regardless of their observable characteristics? The simple framework we use suggests this is not the case. It shows indeed that the best workers (in terms of their observable characteristics) will be most probably hired with open-end contracts. These workers are those the firm would have most likely hired on a permanent basis even in the absence of this subsidy, perhaps after a period of temporary employment. At the same time less able workers would not be affected by the new tax credit and could be even harmed by it.

4.1 Setting

Suppose the firm does not know the productivity of new workers. Let y be worker's productivity when matched with a job and assume this value is drawn from one out of the following two alternative productivity distributions $G(y)$: either a uniform $[0,y_H]$ or a uniform $[0,y_L]$. To make things simpler, let us assume the second distribution is degenerate to 0.

Given workers' observable characteristics, each firm assigns to each new worker a probability λ to be drawn from $[0,y_H]$. There exist two types of contracts in this economy, namely fixed-term and open-end contracts. They both last two periods. With

the first type firms hire a new worker in the first period, observe her/his productivity and then decide whether to hire the worker for the second period or let her/him go. In this last case no firing cost has to be born. We finally assume that in the second period there is no need to fire the worker.

With the second type of contract (open-end contract), firms face the same sequence of decisions: they hire a new worker in the first period, observe her/his productivity and then decide whether to hire the worker or let her/him go. However, in the latter case a firing cost has to be born. As in the fixed-term case, in the second period there is no need to fire the worker. Wages are exogenously given to firms[10].

4.2 The value of contracts

In order to decide which contract to offer to each worker, firms need to compute the value of both contracts.

The value to a firm of a fixed-term contract is given by:

$$V_{FT} = E(y) - w_1 + P(hired) * \frac{1}{(1+r)}\left[E(y \mid hired) - w_2\right] \qquad (1)$$

that is the sum of the expected profits from the two periods. Second period expected profits depend on the probability that workers will be retained and on the expected productivity of the retained workers. Since we assumed that worker's productivity has a uniform $[0, y_H]$ distribution with probability λ and 0 with probability $(1-\lambda)$, then it follows that

$$E(y) = \lambda \frac{y_H}{2};$$

$$p(hired) = 1 - p(fired) = 1 - [\lambda G(\bar{y}_{FT}) + (1-\lambda) * 1] = \lambda[1 - G(\bar{y}_{FT})] = \lambda\left(\frac{y_H - \bar{y}_{FT}}{y_H}\right)$$

$$E(y \mid hired) = \left(\frac{y_H + \bar{y}_{FT}}{2}\right)$$

and $\bar{y}_{FT}$ is the cut-off level of productivity below which a firm fires the worker.

Each firm has to choose this cut-off level of productivity ($\bar{y}_{FT}$) and needs to compute the threshold λ below which the contract value turns out to be negative (so that no worker

[10] We remove this assumption later on.

with an attached λ below this threshold is going to be hired). The optimal value of cut-off productivity is $\bar{y}^{*}_{FT} = w_2$ [11]. This implies that the firm will enjoy extra profits for any worker retained in the second period. The threshold value for λ is

$$\lambda^{*}_{FT} = \frac{2 w_1 y_H (1+r)}{y_H^2 (1+r) + (y_H - \bar{y}^{*}_{FT})^2} \qquad (2)$$

To make sense this value needs to be less than one[12].

The value to a firm of an open-end contract is instead:

$$V_{OE} = E(y) - w_1 - (1 - P(hired))* C + P(hired) * \frac{1}{(1+r)}[E(y \mid hired) - w_2] \qquad (3)$$

where C is the firing cost. The only difference between this value and the one assigned to a fixed-term contract is the expected firing cost $(1 - P(hired))* C$, which has to be born at the end of the first period.

Given our productivity assumptions, the following holds for an open-end contract

$$E(y) = \lambda \frac{y_H}{2};$$

$$p(hired) = 1 - p(fired) = 1 - [\lambda G(\bar{y}_{OE}) + (1-\lambda)* 1] = \lambda[1 - G(\bar{y}_{OE})] = \lambda\left(\frac{y_H - \bar{y}_{OE}}{y_H}\right)$$

$$E(y \mid hired) = \left(\frac{y_H + \bar{y}_{OE}}{2}\right)$$

The value of this contract is then maximum when

$$\bar{y}^{*}_{OE} = w_2 - (1+r)C \qquad (4)$$

Notice that this value lies below that of fixed-term contracts; thus firms would retain in the second period a worker, who would be fired in case of temporary employment. This happens because when the firm retains a worker it saves on firing costs. With this cut-off productivity value, the threshold for the probability λ turns out to be

[11] This value is derived by maximizing the value function with respect to $\bar{y}_{FT}$.

$$\lambda^*_{OE} = \frac{2(w_1 + C)y_H(1+r)}{y_H^2(1+r) + (y_H - \bar{y}^*_{OE})^2} \qquad (5)$$

which is always greater than the threshold corresponding to fixed-term contracts.

Notice moreover that bearable firing costs have an upper bound, that is

$$C^{max} = \frac{w_2}{1+r} = \frac{\bar{y}^*_{FT}}{1+r} \qquad (6)$$

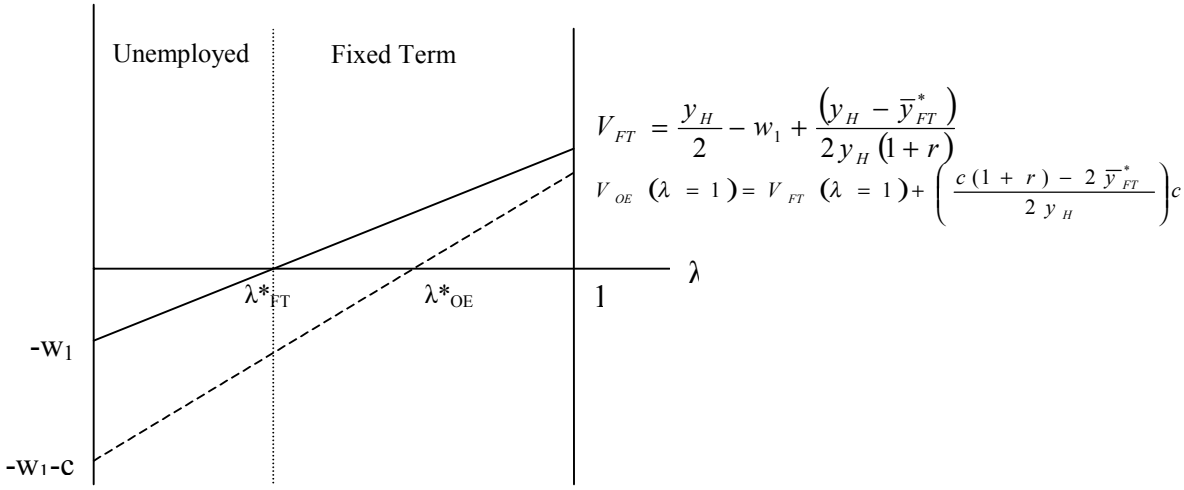
that derives from the observation that the lowest value of $\bar{y}^*_{OE}$ is zero.

Using the fact that $\bar{y}^*_{OE} = w_2 - (1+r)C = \bar{y}^*_{FT} - (1+r)C$, it is possible to write the value of one contract as a function of the value of the other one, i.e.

$$V_{OE} = V_{FT} + \lambda\left[\frac{C^2(1+r)}{2y_H} + \frac{(y_H - \bar{y}^*_{FT})}{y_H}C\right] - C \qquad (7)$$

This relationship is shown in Graph 1.

Graph 1: the Labor Market Before the Subsidy



[12] This constraint poses an upper bound to the first period wage; the bound to the second period wage is the highest productivity value y_H. If the second period wage is higher than this value, no worker will be hired for the second period.

Two facts are here worth noting. The first one is that open-end contracts are dominated by fixed-term contracts for every value of λ; this result captures in a simple way the idea that all new workers enter employment with a fixed-term job, a feature which does not appear too far from the Italian experience in the 1990s[13]. The second noticeable fact is that the slope of the value of open-end contracts with respect to the quality index λ is higher than the correspondent slope for fixed-term contracts. In other words as λ increases, the value of the first contract grows faster than the value of the second one. This happens because of the reduction in the expected firing costs. However, this second effect does not overcome the reduction in the overall values due to firing costs.

4.3 The effect of the subsidy

Let us now introduce the subsidy to open-end contracts in the form of a lump sum $\boldsymbol{K}$ given in the first period to each firm hiring workers with such contracts. Thus, the value of an open-end contract will be shifted upwards by an amount $\boldsymbol{K}$ for any given level of $\boldsymbol{\lambda}$:

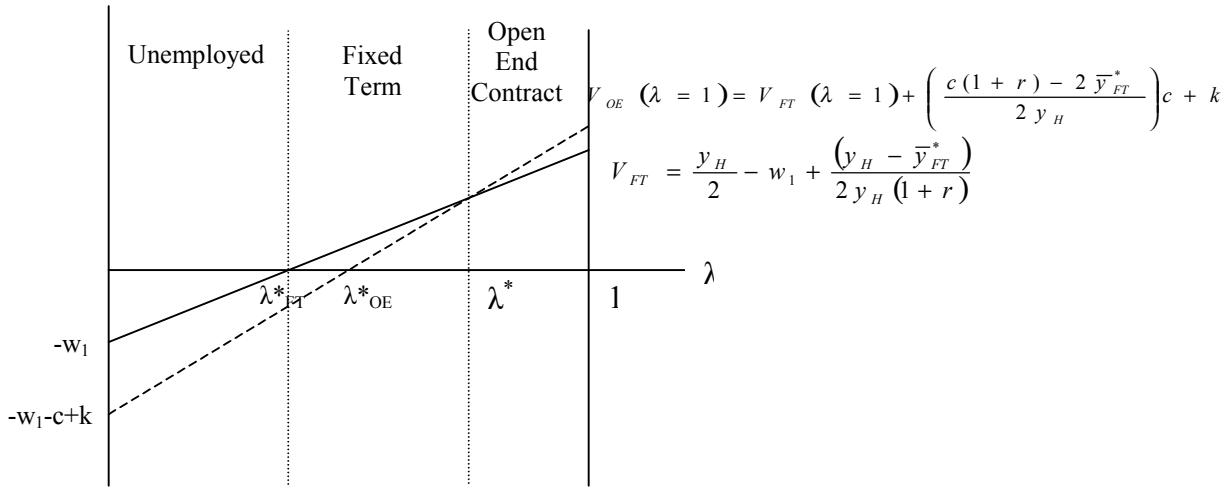
$$V_{OE} = V_{FT} + \lambda\left[\frac{C^2(1+r)}{2y_H} + \frac{\left(y_H - \bar{y}^*_{FT}\right)}{y_H}C\right] - C + k \qquad (8)$$

If the subsidy is nor too small or too high[14], the value of an open-end contract will be shifted in such a way to ensure the coexistence of the unemployed, fixed-term contracts and open-end contracts (Graph 2).

[13] Admittedly only about half of the newly hired workers (those who are not job switchers) are open-end contracts. This is due to the fact that firms are not allowed to hire as many workers as they wish under fixed-term contracts because of the existence of contractual upper limits to the adoption of temporary contracts.

[14] In particular the lowest level of $\boldsymbol{K}$ has to be such that $V_{OE} - V_{FT} > 0$ when evaluated at $\lambda = 1$; this value is $K\min = \left(\frac{2\bar{y}^*_{FT} + (1+r)C}{2y_H}\right)C$. The highest value of $\boldsymbol{K}$ has to be such that $V_{OE} - V_{FT} \leq 0$ when evaluated at $\lambda = \lambda^*_{FT}$. This value is $K\,max = \left(1 - \lambda_{FT}\left(\frac{y_H - \bar{y}^*_{FT}}{y_H}\right)\right)C - \frac{\lambda_{FT}(1+r)C}{y_H}$. It is true that $Kmax > Kmin$ for all $\boldsymbol{C}$.

Graph 2: The Labor Market after the Reform



The decision rule implied by this new setting is:

- Do not offer workers any contract if $\lambda \leq \lambda^*_{FT}$;
- Offer a fixed-term contract if $\lambda^*_{FT} < \lambda \leq \lambda^*$;
- Offer an open-end contract if $\lambda^* < \lambda$;

Thus, newly hired open-end workers are those the firm assigns the highest probability λ and are probably those who are most likely retained in the second period. This result does not come as a surprise given that firms try to balance off the subsidy (that is identical for all workers) with the additional expected firing costs; since these costs are smaller for expected better workers, these are the ones preferred by firms. Thus, the policy intervention we are examining seems to foster the probability of being permanently employed for people who have the highest chance to be employed in permanent jobs regardless the subsidy.

4.4 Extensions

This paragraph is devoted to illustrate what happens to the model if we allow for an endogenous wage in the second period. In this section we present the major results[15]. The criterion we adopted to let the wage be determined within the model is the fact that in the second period wages are equal to the outside opportunities for workers as measured by the average productivity of not employed workers. With this rule, before the introduction

of the subsidy there exists a unique equilibrium and the wage turns out to be a value lower than the expected productivity of workers and the quality index threshold is different than zero.

Results are less clean when we introduce the subsidy. In this case the model might have either no equilibrium, or one or two equilibria. However this last case can be ruled out on the basis that we are interested in those equilibria in which both contracts are implemented.

The last question we address concerns the comparison between pre- and post-subsidy wages. Results show that pre-reform wages are higher than post-reform ones. This effect depends on the fact that, because of the firing costs, the productivity threshold for an open-end contract turns out to be lower. Thus, the major effect of endogenous wages is given by the fact that, by lowering the overall wage, the subsidy has a small effect on total employment.

5. The Data.

In order to verify whether the new subsidy has having any effect on the level and composition of new workers' flow, we resorted to the Labor Force Survey and defined as new hires those employees who have been holding their current job for less than 13 months[16]. In particular, computations have been carried out on data deriving from the October 2001 wave of the Italian LFS. Thus, all new workers selected from this survey are potentially covered by the new subsidy (since it was granted starting from October 2000). To avoid problems related to seasonal patterns, we chose the October survey of every year comprised in our sample (i.e. from 1993 on). Finally, we only included new hires into the private, no farm sector[17].

[15] The formal development of the model is long and space consuming. Thus we report it in Appendix 2.
[16] To compute this tenure variable we used the question "When did you begin to work with the current employer?"
[17] To be precise we excluded sectors ("branca di attività economica") coded "01" and "10" in the LFS.

These selection rules leave us with a number of observations that ranges from a lowest 3593 in 1993 (representing just over 1 million new hires) to a highest 5474 in 2000 (representing 1.6 million new workers, Table 6). In 2001, less than two-thirds of new workers were hired with open-end contracts. This share was 71 per cent in 1993. This decline has been mirrored by a corresponding increase in fixed-term contracts of the Apprenticeship and Work and Training type, whose share went from 8.2 in 1993 to 14.4 in 2000, before falling to 10.8 per cent in 2001[18]. Fixed-term contracts due to lack of better opportunities represented a steady 15 per cent of all new contracts. In 2001, 53 per cent of new workers were males. This share was about 60 per cent at the beginning of the 1990s and has been constantly declining since. More than 50 per cent of newly hired workers were less than 30 years old (60 per cent in 1993), and their decline is due to workers younger that 20, only partially compensated by workers in their twenties. It is interesting to note that a steady 10 per cent of new hires consists of workers 45 years and older.

From 1993 to 2001, the share of newly hired workers with a low level of education (lower secondary school or less) declined of about 14 percentage points. At the same time the shares of high school and college graduates rose respectively of about 10 and 5 percentage points. Most of the growth was driven by the service sector.

6. A preliminary look at the evidence.

This section provides a preliminary evidence that firms most probably used the tax credit to selectively hire under open-end contracts only particular types of workers who, according to their own observable characteristics, look the most suitable to be hired into permanent jobs regardless the subsidy. In this preliminary presentation of the evidence we look at the share of both new open-end contracts by age and level of education and fixed-term contracts by reasons for holding such a contract.

[18] In May 1999 the European Commission established that Work and Training contracts for people older than 25 (29 for people with a college degree) could no longer be granted the entire social contribution reduction. There is some evidence that this provision has reduced the number of these contracts in the year 2000.

6.1 Question one: did the share of new open-end contracts increase?

Our simple model suggests that, because of the new subsidy, the share of open-end contracts should have gone up. The first question we pose is therefore whether in 2001 there has been an increase in the share of open-end contracts and, perhaps more importantly, whether this increase has been stronger for the eligible workers (i.e. people 25 years and older) than for the remaining groups. Table 6 answers the first part of the question, as it shows that the share of open-end contracts increased of 2 percentage points (from 62.5 to 64.5) between 2000 and 2001. This synchronism is particularly remarkable since before 2000 this share was declining almost steadily.

To answer the second part of the question figure 7 tries to evaluate which worker group turns out to be responsible for this increase. The figure plots the share of open-end contracts for different age groups between 1993 and 2001. Again, one could read the rise in the share for all workers. However, we found evidence that the share for the eligible workers (25 years and older) increased slightly more than the control group (workers less than 25 years old). Most of the growth in the share of the eligible group is due to the youngest people: the share of workers 25 to 40 years old went from 64.3 to 67.5 per cent, that is 1.2 percentage points above the average increase.

To summarize, two main facts can be recorded: i) the share of open-end contracts increased between 2000 to 2001, thereby inverting a previous declining trend; ii) the treated group – especially the younger component - enjoyed a slightly higher growth than the control group. Both results square with our priors.

6.2 Question two: for which group did the share of new open-end contracts increase? Evidence from the years of schooling

What kind of workers did the firm hire with open-end contracts in 2001? Figure 8 tries to answer this question by comparing the average number of schooling years of, respectively, new permanent and new fixed-term workers between 1993 and 2001. The relative level of education of permanent workers declined until 1995, with a small recovery in the following years even if the overall changes were quite small until 1999. In

2000, people with more years of schooling entered open-end contracts more frequently than before, bringing about the first sizable rise in the overall level of education for these contracts. In 2001 an analogous increase took place. Thus, it may appear that the increase in the relative quality of open-end contracts preceded the subsidy. Nonetheless, a closer look at the age composition reveals that in the year 2000 there was an almost equal size increases in both treated (eligible) and control groups (less than 25 years old). By contrast, in 2001 relative education remained constant for the control group while it rose further for the treated group, especially for the older ones (40 years and older).

This evidence seems therefore to support the idea that, compared to the previous years, in 2001 firms chose to hire under open-end contracts people with more years of education. This increase was however limited to people 25 years and older.

6.3 Question two: for which group did the share of new open-end contracts increase? Evidence from the age distribution

Figure 9 shows the age distribution of new open-end contracts as a share of total new hires. We divided the overall share into 5-year-brackets, ranging from 15 to 65 years old. The sum over the 10-age-brackets gives the total share plotted in figure 7. The overall age structure appears stable overtime, except for the decline in the share of the 19-24 age group and the rise of the 25-29 year olds in 2001. The latter increase is remarkable both in size and given the relative stability of the previous years.

6.4 Question three: what type of fixed-term contract declined?

Figure 10 illustrates the share of fixed-term contracts by reasons for holding such a contract among workers 25 years and older (the category "*other reasons*" includes the answer "*don't want an open-end contract*"). The crucial fact to note here is that the drop in the total share is not evenly distributed across contract types but is fully concentrated in the Apprenticeship and Work and Training category. In the previous years (at least since 1993), this type of fixed-term contracts never declined.

This pattern can be interpreted as an indication of the fact that firms, while hiring more people with open-end contracts, selected those workers they would have alternatively

hired with a Work and Training Contract, which usually represents the main avenue towards permanent employment. Thus, this might imply that firms used the subsidy to anticipate what they would have done later on.

However, it must be stressed that a part of this decline could also be the consequence of the 1999 provision of the European Commission, recalled in footnote 18. The major effect of such a provision should have been recorded in the year 2000 rather than in 2001, but we can anyway allow for this additional explanation without altering the basic message of our conclusion.

7. The effects of the subsidy on the probability of being hired with an open-end contract

7.1 Empirical specification and identification strategy

In this section we use a simple econometric model to evaluate whether the subsidy exherted any causal effect on the probability of being permanently hired. We want to address two specific questions: 1) did the subsidy increase the probability of being hired with an open-end contract? And if so, by how much? 2) was the effect stronger for people with higher probability to access lasting jobs (even in the absence of the subsidy)? The econometric specification adopted to answer these two questions is a simple probit model, in which the probability of being hired with an open-end contract depends on age, education and a series of other demographic characteristics, year dummies and a dummy that takes value 1 if the worker is eligible for the subsidy and zero otherwise. We also include an interaction between this dummy and the worker's schooling years:

$$Pr(\,HiredwithaopenendContract\,) = \Phi\left(x_{it}'\beta\right)$$

$$x_{it}'\beta = \beta_o + \beta_1 Treated_{it} + \beta_2 Treated_{it} * educ_{it} + g(educ_{it}, age_{it}) + demografic\ characteristics_{it} + yeardummies \qquad (1)$$

The value of the coefficient β_1 provides an answer to question 1, as it measures the average additional effect of being eligible for the subsidy on the probability of being hired with a permanent contract. The value of the coefficient β_2 provides instead an answer to question 2 if we are willing to assume that education is an indicator of the

likelihood to be hired with an open-end contract. It measures the additional effect (over β_1) of having a given level of education.

On the basis of both our conceptual framework and the preliminary look at the evidence we expect both coefficients to be positive, implying that the subsidy increased the chances to be hired with an open-end contract with a stronger effect on more educated people.

Before turning to the actual estimation of the empirical model we still need to clarify two issues. The first one deals with the conditioning population we are referring to in estimating equation (1). As we explained in the data description section, we only have access to cross-section data and cannot therefore evaluate transitions from different labor market status into employment. We are able to identify new hires because of a specific question in the survey but we do not know where do they come from. They could be transiting indeed from any status into employment, including from open-end to open-end contracts. Given this sample limitation we decided to lower our expectations and asked a simpler question, namely we looked at the effect of the tax credit on the probability of being hired with an open-end contract, conditional on having been hired in the past 12 months. This implies that we restricted our sample to the population that has actually been hired in the preceding 12 months.

The second issue refers to the strategy we used to identify β_1 and β_2. Here several approaches can be adopted; they are summarized in Table 7. The first strategy, referred to as W1, exploits only overtime differences in the share of open-end contracts for the treated group, which in this case we assume to include all workers 25 years and older. Thus the effect of the subsidy in 2001 would be the difference between this year and a reference year in the share of open-end contracts for the treated group. The second strategy, referred to as W2, is also a within age group strategy and identifies the effect of the subsidy as the difference between the value of the coefficient in 2001 and the corresponding value in another reference year. It differs from W1 in that it restricts the treated group to workers 25 to 35 years old who, we believe, should be more sensitive to

the new regulation. However, these strategies might deliver very misleading results if the rise in the probability of being hired with open-end contracts were also shared by other age groups that cannot be affected by the subsidy, namely workers younger than 25. In this case there should be some other reason, common to all workers, which explains the registered increase.

To control for those possibly common effects we include in the sample people who do not belong to the treated group. The next three strategies, referred to as AW1, AW2 and AW3, serve this purpose. Here the identification relies on both within (different effects for the same group overtime) and across age group (different effects across groups in the same year). In particular strategy AW1 is a "diff and diff" estimator that identifies the effect of the subsidy as the change, in year 2000 with respect to some reference year, of the difference between the effect of cohort "25 and older" and the cohort "younger than 25". Strategy AW2 is also a diff and diff estimator that uses as treated group only workers 25 to 35 years old in 2001 and as control group the remaining workers between 15 and 65 years old. Finally, the strategy AW3 is similar to AW2 except for the control group only including people older than 35.

Before turning to the results, we want to stress a last point: while our sample is not well suited to estimate the effect of the subsidy on the unconditional probability to be hired with a permanent contract, we could still provide an approximated evaluation of its impact on the overall level of employment in 2001 for the treated group. This is what we did in paragraph *7.5*, where we estimated the effect of the new regulation on the probability to be hired as an employee in the 12 months preceding October 2001. The corresponding sample was then extended to include every potentially eligible person, i.e. everybody who, in the previous 12 months, was not working in a permanent position.

7.2 Results.

Before taking model (1) to the data we need to specify the function *g()* and comment on the demographic characteristics that have been included. The *g()* function is specified as a cubic in age, a quadratic in schooling and the interaction between the two variables. The demographics include gender, regional dummies and marital status. We estimate such a model under all 5 strategies presented in table 7. Results are shown in table 8.

The overall message coming out from the 5 models is that, when the reference year is 2000, the average effect (β_1) is zero for an average worker, while the effect is more relevant for the youngest among the eligible workers.

In detail, results suggest that in 2001 the probability of being hired with an open-end contract went up anything between 0.7 to 4.2 percentage points depending on the model chosen (heading "*Treated*" in the table). The effect would be smaller (often negative), had we chosen as reference a year before 1998. Moreover, only in two out of five cases the coefficient is statistically different from zero. The average effect is clearly zero in the AW1 model; this means that for the average worker the subsidy did not change the probability of being hired as a permanent worker when considering that people younger than 25 experienced a similar increase, even without being affected by the subsidy. However, when we restrict the treated group to people between 25 and 35, we find a bigger effect both in the overtime comparison (2 percentage points in model W2) and in the "diff and diff" specification (3.3 in model AW2). This result means that the subsidy did not have any effect on people older than 35 even if they were eligible. It also explains why we did not find any effect of the subsidy in model AW1: the effect for the 25-35 year olds is washed out by the lack of impact on older workers. This explanation is supported by the results of the AW3 model, where we directly compare only subgroups of the eligible population. For an average worker aged 25 to 35 years the probability of being hired in a permanent job went up of 4.2 percentage points between 2000 and 2001 when compared to a worker 36 or older.

There might be an alternative explanation for these differences in the effect of the subsidy across age groups that is based on the fact that we measure our treated group with errors.

We know that some new hires among people 25 years and older are indeed not eligible for the subsidy because they are just moving between two permanent positions. If the variance of this measurement error turns out to be large, it might be seriously attenuating the average effects of the subsidy. If these movers between permanent positions are particularly concentrated among older workers, say those older than 35, the effect of the subsidy estimated for younger workers represents more a measure of the attenuation bias due to a measurement error, rather than a hint on firms' age preferences. We will come back to this issue later on.

When we address the second question - whether the effect of the subsidy significantly differs across workers (β_2, heading "*treated*educ*" in the table) - we get a clearer answer: one year of education above the average increases the probability to be a permanent worker of 1 percentage point. This marginal effect implies that for a college graduate the probability was between 7 and 9 percentage points higher in 2001 compared with the 1990s; for a high school graduate this increase was about 2-3 percentage points. For less educated workers, instead, these estimates suggest the effect might even be negative: for a lower secondary graduate the probability reduction consists of about 2 to 3 percentage points with respect to average workers, which implies, with respect to 2000, an overall small negative effect (including β_1). In sharp contrast with the average effect, the interaction between treatment and schooling effect (β_2) is very stable across specifications (it ranges from .96 to 1.2 percentage points) and always precisely estimated.

One additional comment on table 8 is necessary to explain the negative slope of the education variable on the probability to be hired with a permanent contract. The effect is due essentially to the fact that, by controlling for age, workers with more years of schooling, compared to workers with less education, either have been searching for shorter time or are facing their first work experience, which is more likely to occur in a temporary job.

7.3 Robustness checks

7.3.1. Check of the functional form

In order to evaluate the robustness of our results we estimated equation (1) with a fully non parametric specification that allows for one dummy for each age, level of schooling and the interaction of the two sets of dummies; in addition we include gender, regional and marital status as well as year effects. However we regrouped the schooling variable in three levels: college or more, high school, lower secondary school or less[19].

This fully non-parametric specification seems to confirm most of the results of the more structured model (table 9). The effect for people with at most a lower secondary education (which in this specification can be directly read looking at the heading "*treated*") is zero in all but AW1 specification where it is negative but still poorly estimated. The effects for high school graduates range from 3 to 4.6 percentage points. Larger values are found when we restrict the treated cohort to younger workers (25-35 years old). However the small t-stats of these estimates point to the fact that, again, the effects are weak. In contrast, the effects are stronger and precisely estimated when we look at college graduates. For this group, estimates range from 10.4 to 11 percentage points.

7.3.2. Check of the identification strategies

We run an additional set of controls that address the following question. We need to be sure that the effects we have identified in 2001 for the treated cohort were absent in the years immediately before, say in 2000 and 1999. Otherwise the additional probability of being hired with an open-end contract cannot be attributed to the subsidy, which has been in force only from October 2000. To carry out this control we estimated equation (1) under the same specification discussed above but adding to every year (1993 to 2000) a dummy for the same group of people who, in 2001, were eligible for the subsidy. We also include the usual interaction with the years of schooling. This specification allows us to

[19] College or more also includes degrees granted after 2-3 years of college studies (Diplomi Universitari e Lauree Brevi); high school also includes technical high school degrees, which are acquired in 2 or 3 years rather than the usual 5 ones following lower secondary education.

estimate one β_1 and one β_2 for every single year comprised in our sample (i.e. from 1993 to 2001); thus a direct comparison of this marginal effect would provide an answer to our concerns. In table 10 we report the results of this estimation for all our strategies.

For the average effects (β_1), table 10 tells about the same story of the previous two tables. When we use only within age group differences (models W1 and W2) we obtain virtually the same results of the previous model since β_1 is simply the year effect. The estimates of the effect for the year 2001 are small, positive (1.8 and 2.9 per cent increases in the probability) and hardly different from zero; however they compare with a zero effect for the years going from 1998 to 2000. Again the effects are stronger when we exclude older workers from the treated group. The effect in 2001 is not different from the previous years when we include in the control group workers 15-24 years old (model AW1), meaning that the small increases we registered for the treated group in model W1 and W2 were not specific to that group. In contrast, in the remaining two models (AW2, AW3) the small average effect is still there in the new specification. Indeed we find a positive marginal effect in the years 1998-2000, but the difference between 2001 and the average of these previous years remains in the order of magnitude of 1 to 2.4 percentage points.

Results change instead when we look at the interaction with the years of schooling. Two results need to be highlighted: the marginal effect for the year 2001 - with respect to 2000 - of the interaction term halves with respect to the estimate in table 8[20] and it seems to be the case that firms began to hire people with higher schooling level even before the subsidy was in place. These results apparently weaken our story. However the rises in the marginal effect for the year 2000 can be fully accounted for with the sharp rises in the labor demand, mainly in the northern regions of the country: firms facing labor force scarcity competed over workers by offering permanent contracts. Whatever the reasons behind the year 2000 rise might be, it is interesting to note that firms selected again better-educated workers. This suggests that the best educated workers turn out to be those who exploit more promptly the favorable shifts in the probability of being hired in a

[20] The differences between 2001and 2000 vary from 0.5 to 0.7 in the 5 models.

permanent position. In some sense this observation can represent an implicit confirmation of our story.

Before providing statistical evidence of this labor demand explanation we want to make one more comment on table 10. The interaction effect is smaller than that of table 8 when referred to the year 2000, but is equal or even stronger when referred to almost every other year. Thus, if we can provide an explanation for 2000 results we have also confirmed the results of table 8.

To ground our speculation for the year 2000 into statistical evidence we have run two additional tests: the first one entails re-estimating the model (we chose specification AW1) after adding to the specification of table 10 a set of interaction effects between treated, years of schooling, and northern regions. The idea is to use the northern regions dummies to control for labor shortage that was most severe in these areas (Fig.11). With this new specification the effect for the year 2000 disappears: the marginal effect for that year is identical to that of the previous years (1.04 in 2000, 0.95 in 1999 and 1.12 in 1998, see column three of table 11). At the same time the dummy for the year 2000 in the northern area is the highest in the whole period (it was zero in that year and about -0.01 per cent in the preceding period). Moreover the marginal effect for the year 2001 rises of about 0.3 percentage points compared to the basic specification; the difference with the year 2000 goes back to about 1 percentage point for every additional year of education above the average, that is the basic value we found in table 8.

In the second test we directly use an indicator of labor shortage to control for labor demand. The indicator is the share of firms in the manufacturing sector that in the forth quarter of each year registered difficulties in recruiting workers. It is plotted in Figure 11. Using the interaction of this indicator with the years of schooling, we obtain about the same result of the previous control specification. The year 2000 effect disappears and the gap between 2001 and 2000 is again around 1 percentage point for every additional year of schooling.

Overall we read the outcomes of our robustness checks as supportive of our results that we have summarized in figure 12. In synthesis we believe that these results suggest firms did use the subsidy to hire new workers with open-end contracts but they were very selective in choosing workers. The differences in the average effect (β_1) across the five specifications suggest they mostly hired young workers (25 to 35 years old), and the interaction between treated group and years of schooling tells they mostly selected highly educated people. Since this group is the most likely to hold a permanent contract, regardless the subsidy, our results might suggest that the new subsidy fostered the probability of being hired with a permanent contract of those people who would have been hired in such a position even without financial support. In other words the new incentive did not created additional opportunities to enter permanent jobs for everybody but rather for the strongest group in the labor market .

7.4 The effects on the probability to be hired

In this section we investigate whether the tax credit, while not improving the relative position of the least educated workers, did improve the overall hiring rate in the year 2001 for the treated group. To this end we estimated the probability to be hired in the preceding 12 months as a function of some worker's demographic characteristics, year dummies and a dummy that indicates if the worker is eligible for the tax credit:

$$Pr(Hired) = \Phi\left(x_{it}'\delta\right)$$

$$x_{it}'\delta = \delta_o + \delta_1 Eligible_{it} + g(schooling_{it}, age_{it}) + demografic\ characteristics_{it} + yeardummies \qquad (2)$$

We estimated this equation on a sample that was extracted from the October releases of the 1993-2001 Labor Force Surveys and includes all people aged 15 to 65 who were either hired in the last 12 months, or are alternatively self-employed, unemployed or out of the labor force. Notice that we included among new hires the permanent to permanent switchers and excluded from the sample workers having held a permanent position for more than 12 months. This sample selection could generate an overestimation of the

possible positive employment effect of the subsidy. We adopted an identical specification to that of equation (1), but we left out the interaction between the eligibility status and the years of education. We estimated equation (2) under the 5 identification strategies reported in table 7. Results are presented in table 12.

Table 12 shows the effect of the tax credit on the probability to be hired in the period ranging from October 2000 to October 2001. The overall message is that it did not change the probability to be hired in 2001 compared to the year 2000. The "diff and diff" estimator using the whole sample (model AW1) shows that the tax credit increased the chances to be hired of 0.3 percentage points, a very small number if compared to the mean of the dependent variable (10.2 per cent) and statistically not different from zero. The effect is small even if we compare the treated group with itself overtime: in model W1 the marginal effect is 0.2 percentage points while the corresponding likelihood to be hired is about 10.6 per cent. The tax credit seems to have had some effect only for the 25-35 year olds and only compared to older workers: in model W2 we estimate an overtime effect of 1 per cent (17.7 per cent is the average likelihood to be hired), in model AW3 the "diff and diff" estimate is 0.5 percentage points. But even for this group, the "diff and diff" estimate drops to zero when we include in the control group people at most 24 years old.

To sum up, the introduction of the tax credit does not seem to have increased the overall probability to be hired in 2001 with respect to the previous year. This result reinforces our previous conclusions, according to which the major impact of the new provision has been almost exclusively a pure substitution effect between temporary and open-end contracts. However, these higher chances to step into permanent jobs seem to have been limited to better-educated workers.

7.5 Indications of dead-weight losses

Throughout the whole paper we have been claiming that firms chose to hire under open-end contracts those workers they would have anyway hired, regardless the subsidy. We have provided some bits of evidence to support this claim. Figures presented in Table 4 suggest that people with more years of schooling have higher chances to move eventually into an open-end contract. Additional evidence is provided in Table 10, which shows a higher probability to be hired with an open-end contract among people with a higher level of education even before 2001. We also emphasized how a favorable shift in labor demand tends to be better exploited by more educated people.

In this paragraph we reinforce these indications through a complete analysis of the observed transitions between different labor market status, whose results tend to confirm that better educated people have indeed higher chances to end up working in permanent positions.

To this end we use some additional information provided by a special data set, covering a panel of workers who have been observed for two subsequent periods, namely from 1999 to 2000. This special data source has been constructed by Italian statistical office (ISTAT) by matching workers across surveys, thereby exploiting six key variables that either do not change overtime or vary in a deterministic and perfectly predictable way[21]. Because of the rotation mechanism characterizing the sample (a "two in, two out, two in" scheme), we can look at transitions on a quarterly and annual basis. Unfortunately, transition data are presently available only for the period 1999 to 2000.

We exploited the annual matches (pooling together the matches relative to the four quarters of every year) to construct a matrix of transitions among the existing labor market status. This matrix was then used to construct the equilibrium distribution among the labor market status of 100 people who, at time zero, were out of the labor force. Formally, we iterated the following equation 30 times starting from an initial vector V_0 with all elements equal to zero except for the out of the labor force status that equals 100:

[21] This data-set is not available to the general public. We are allowed to use it because it was exploited in a joint research project between ISTAT and the Bank of Italy

$$V_{t+1} = T\, V_t$$

where T is the transition matrix with the generic elements T_{ij} representing the probability of moving from state j (at time t) to state i (at time $t+1$). We allowed for the maximum detail by considering 11 labor market statuses (open-end contracts, Work and Training fixed-term contracts, fixed-term contracts due to lack of better opportunities, freely chosen fixed-term contracts, fixed-term contracts due to a trial period, other fixed-term contracts, self-employment, unemployment because of firing, unemployment after entering the labor market for the first time, other unemployed people, out of the labor force).

Our exercise entails estimating and comparing several equilibrium distributions, one for every schooling level. In particular we estimated an equilibrium distribution for people with at most a lower secondary diploma (8^{th} grade), another one for people with a high school degree and a third one for college graduates. Panel (a) of Figure 13 reports the four equilibrium distributions (we aggregated fixed-terms contracts as well as unemployment), the first three ones referring to every single education level and the last one covering the aggregate category. The evidence seems to support our claim. Compared to people holding at most a lower secondary diploma, high school graduates show indeed a 24 per cent higher probability to end up working in an open-end contract. A college degree further increases this chance by about 4 percentage points. Moreover, higher educated people have a much higher chance to be employed in general, no matter if they work as employees or self-employed (i.e. their overall employment rate is higher compared to less educated workers); this especially happens to those holding a college degree.

It might appear uncomfortable that, compared to a high school diploma, a college degree turns out to increase the chance to work with an open-end contract by only 4 percentage points. The reason behind this apparently disappointing result is that many college graduates work as professionals (e.g. lawyers, accountants, physicians as well as engineers). This implies that if working arrangements required this kind of occupations to be organized within a firm with a traditional subordinate labor contract, then the share of

college graduates employed with an open-end contract would appear to be much higher. An indirect way to support this last claim is to look at the same evidence broken down by gender. Since professionals look more represented among male college graduates, the college-high school spread in the probability to work with a permanent contract should be lower for males (in Figure 13, panel (b), it is actually negative), than for females (10 percentage points, as shown by Figure 13, panel (c)).

7.6 Check on measurement errors

Our data set is a collection of surveys that prevents us from measuring people transitions among different labor market status. This feature does not allow us to identify whether or not a newly hired person was eligible for the subsidy. We have overcome this shortcoming by assuming that all people newly hire between October 2000 and October 2001 were eligible as long as they were at least 25 years old. This implies that we are measuring the eligibility status with an error, since new hires also include people moving between two permanent jobs, who are therefore not eligible for the subsidy.

Measurement errors for the eligibility status may be responsible for the weak average effects estimated in Table 8 and may also underestimate the interaction with schooling. In order to address this problem we resort to an instrumental variable estimation method. The instrument we use is the share of the people who, in October 2000, would have been eligible for the subsidy. Practically, we divided the October 2000 sample into cells showing the intersection of age, gender and region (50*2*19); for every cell we computed the share of people who were not employed in permanent positions with respect to total cell population.

We use this indicator and its interaction with the school variable to estimate with instrumental variables the usual 5 models with the same specification adopted in table 8. Results are presented in Table 13. To make comparison easier, we also estimated the 5 different strategies with a linear probability model in order to highlight the slope variations generated by the changes in the functional form (i.e. from probit to linear model) as well as those due to the instrumental variables.

Using a linear probability model (with robust standard error) hardly changes any of the existing slopes. Instrumental variables, instead, marginally change the coefficient and in all but one case they appear to increase the slopes. This upward revision is coherent with the idea that the dummy used to indicate the eligibility status is affected by measurement errors, which, however, appear to be small. In most cases, average effects (shown under the label "treated" in Table 13) tend to rise by about a half percentage point, while the interaction coefficient changes at most by one fifth of a decimal point. The largest change occurs in model AW3 (where the treated group is restricted to people 25 to 35 years old). In this case the average effect increases from 4 to 5.2 per cent (and the interaction rises from 1 to 1.2 per cent). On the one hand, this result suggests the attenuation bias mostly affects younger workers; on the other hand it indicates that instrumental variable estimates tend to reinforce our conclusion that firms prefer to hire on a permanent basis young and well educated people.

8. Conclusions.

In this paper we examined the effects of a new normative provision put forward in Italy at the end of 2000 to foster employment with open-end rather than fixed-term contracts. We provided basic information about temporary contracts in Italy; in addition we explained why they might be a source of concern and how policy-makers are trying to reduce their negative effects while retaining their positive sides. One attempt in this direction has been the introduction of the tax credit we examined in this paper. The effects of this new provision have been examined both formally and empirically. Two basic questions have been addressed, namely whether the new incentive has created additional opportunities to enter permanent jobs, and whether these chances have either been available for every worker or rather limited to specific groups. In other words we asked whether firms did take advantage of government's financial support by anticipating the employment of people they would have anyway hired regardless the incentive.

Our analytical and empirical framework is not specific to the Italian case and might prove to be useful to analyze similar programs that have been adopted in many other European countries in order to foster hiring into permanent rather than temporary employment.

Results seem to indicate that, while overall employment probability did not change, firms used this subsidy to hire on a permanent basis mostly young and well-educated workers; perhaps those who would have been hired with such contracts regardless the subsidy, even though after a short transition into temporary employment. Our estimates suggest that, compared to the previous year, in 2001 the subsidy did indeed increase the probability of being hired with an open-end contract, conditional on being hired, but in a rather uneven way across workers. The probability rose by about 10 per cent for workers holding a college degree, by about 4 per cent for people with a high school diploma, while did not change or might have even slightly declined for less educated workers. The empirical evidence squares with formal prediction.

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Appendix 1: Fixed Term Contract Regulation, historical overview

1. The origins of fixed-term contracts

According to the Italian labor law, open-end contracts have always been the rule. However, in the 1920s Italian legislation already provided for the possibility to set a time limitation to labor contracts, the only condition being the existence of a "special relation" between employer and employee[22]. This provision was then included in the 1942 Civil Code (atr.2097). Originally, the adoption of contracts of limited duration implied strong differences in worker treatment: according to the Private employment act of 1924 and, later on, to the first version of the 1942 Civil Code, fixed-term workers were not entitled to most of the rights an open-end worker usually had (e.g. holidays, longevity pay, Christmas bonus). In order to avoid the fraudulent use of these flexible contracts[23], in 1962 a specific legislation for fixed-term contracts (l.230/1962) was introduced, which established a general ban for the adoption of fixed-term contracts except for a very specific list of circumstances, namely[24]: i) seasonal activities[25]; ii) temporary replacement of an employee on leave; iii) occasional activities which are time predetermined and not usually carried out from the firm; iv) special contracts, requiring skills that are not usually provided by the firm; v) top management. Therefore, instead of representing a valid

[22] See art.1, co.2, R.D.L. 1825/24 ("Il contratto di impiego privato può anche essere fatto con prefissione di termine; tuttavia saranno applicabili in tal caso le disposizioni del presente decreto che presuppongono il contratto a tempo indeterminato, quando l'aggiunzione del termine non risulti giustificata dalla specialità del rapporto ed apparisca invece fatta per eludere le disposizioni del decreto").

[23] The 1950s registered a strong expansion of temporary work, helped by the increasing weakness of trade unions. This phenomenon looked more and more unacceptable, given the strong economic growth phase Italy was experiencing.

[24] See l. 230/1962, art.1, co.1-2 ("Il contratto di lavoro si reputa a tempo indeterminato, salvo le eccezioni appresso indicate. E' consentita l'apposizione di un termine alla durata del contratto: a) quando ciò sia richiesto dalla speciale natura dell'attività lavorativa derivante dal carattere stagionale della medesima; b) quando l'assunzione abbia luogo per sostituire lavoratori assenti e per i quali sussiste il diritto alla conservazione del posto, semprechè nel contratto di lavoro a termine sia indicato il nome del lavoratore sostituito e la causa della sua sostituzione; c) quando l'assunzione abbia luogo per l'esecuzione di un'opera o di un servizio definiti e predeterminati nel tempo aventi carattere straordinario od occasionale; d) per le lavorazioni a fasi successive che richiedono maestranze diverse, per specializzazioni, da quelle normalmente impiegate e limitatamente alle fasi complementari od integrative per le quali non vi sia continuità di impiego nell'ambito dell'azienda; [….]") and art.4 ("E' consentita la stipulazione di contratti di lavoro a tempo determinato purchè di durata non superiore a cinque anni, con i dirigenti amministrativi e tecnici, i quali possono, comunque, recedere da essi trascorso un triennio e osservata la disposizione dell'art.2118 c.c.").

[25] In order to delimit the area of application of this hypothesis, a decree was issued in 1963 providing a rigid list of activities which could be thought of as "seasonal" (e.g. agricultural activities, but also summer movie workers).

alternative, the adoption of temporary contracts was only recognized as an eventual exception. This law was also very restrictive as far as the possibility of renewal was concerned: in particular, it established that fixed-term contracts could only be renewed once and for a time period not exceeding the original one. In case of renewals exceeding 30 days the original deadline, contracts were automatically converted to open-end ones. Unlike the previous regulations, it also extended to fixed-term workers some of the guarantees previously recognized only to permanent workers.

2. The normative evolution of fixed-term contracts during the 1970s and 1980s

The 1962 law has been representing the basic reference for temporary work regulation in the last forty years. Starting from 1977, however, its original rigidity has been partly smoothed overtime through a series of normative interventions, aiming at progressively expanding the application area of fixed-term contract. The worsening condition of the Italian labor market led indeed policy makers to partially abandon the traditional negative view on temporary work, which could represent at that time a useful flexible tool to fight against rising unemployment. For example, compared to the original list of "exceptions" to open-end contracts provided by the first paragraph of the 1962 law, the possibility to hire under fixed-term contracts in case of particular activity hikes was progressively extended to the tourist and commerce sectors (law 876/1977), and later on to the remaining part of the economy (law 79/1983). Besides, the increasing need for labor market flexibility led in 1984 to the introduction of special types of temporary contracts specifically designed to facilitate the initial entry into the labor market (particularly for the youth) and hence partially departing from the general rule in order to escape its rigidity. In particular, two different contract typologies were introduced – the Apprenticeship contract and the Work and Training contract – both aiming at providing work experience together with professional training to young workers (16 to 24 years old in case of Apprenticeship contracts, 16 to 32 years old in case of Work and Training contracts) entering the labor market. According to the law, the duration of these contracts can range from 18 months to 4 years, with different length and rules according to worker's age and education. Unlike the original idea of fixed-term contracts, these contract models have been thought of as "stepping stones" towards permanent

employment and thus enjoy a favorable tax treatment. In particular, firms hiring under these special contractual forms are rewarded through lower social contributions, where the magnitude of this reduction ranges from 25 per cent to 100 per cent according to the specific type of contract, the size of the firm, the economic sector as well as the geographical area.

3. The EU Directive on Temporary Contracts and the latest Italian reform

In 1999 the European Union issued a specific Directive of temporary work, aiming at facilitating the adoption of this contractual form across the Member States. After two years, in August 2001 Italy implemented this Directive through a legislative act which represents the first actual reform of the existing regulation in 40 years. Indeed, for the first time the new regulation explicitly rejects the negative prejudice towards fixed-term contracts. In particular, it succeeds in overcoming the original principle according to which "if none of the listed exceptions apply", then "the contract has to be considered an open-end one". Through this reform the Italian law system changes from a situation where every employer could hire under fixed-term contracts only if some very precise and limited circumstances apply to one in which the possibility to put a duration limit to a contract is merely conditioned to the existence of "technical, productive, organizational as well as substitution reasons". At the same time, worker's guarantee is ensured through the provision according to which these reasons must be explicitly (through a written act) stated by the employer. Therefore, this new regulation inverts the logic of the previous one in that the new decree specifically lists the hypotheses under which a fixed-term contract cannot be adopted. Moreover, it delegates to the collective bargaining process at the sector level the task to establish the quantitative limits, even though it explicitly lists a number of cases which must be excluded from any limitation (e.g. fixed-term contracts signed during start-ups).

Appendix 2: the model with endogenous wages

In this appendix we extend the model presented in the text by endogenizing second period wages. We resume the analytical development from the end of paragraph 4.3.

1. Pre-reform wage determination

We assume that second period wages are set by a workers' participation constraint; that is, second period wage equals worker's outside opportunity as measured by the expected productivity of not employed workers.

Thus we have three equilibrium conditions:

1) A labor demand condition (derived from the maximization of the value of a fixed-term contract):

$$\bar{y}_{FT} = w_2 . \qquad \textbf{(9)}$$

2) A firm participation condition that defines the minimum level of λ, below which the value of a fixed-term contract is negative:

$$\lambda_{FT} = \frac{2 w_1 y_H (1 + r)}{y_H^2 (1 + r) + (y_H - \bar{y}_{FT})^2} \qquad \textbf{(2)}$$

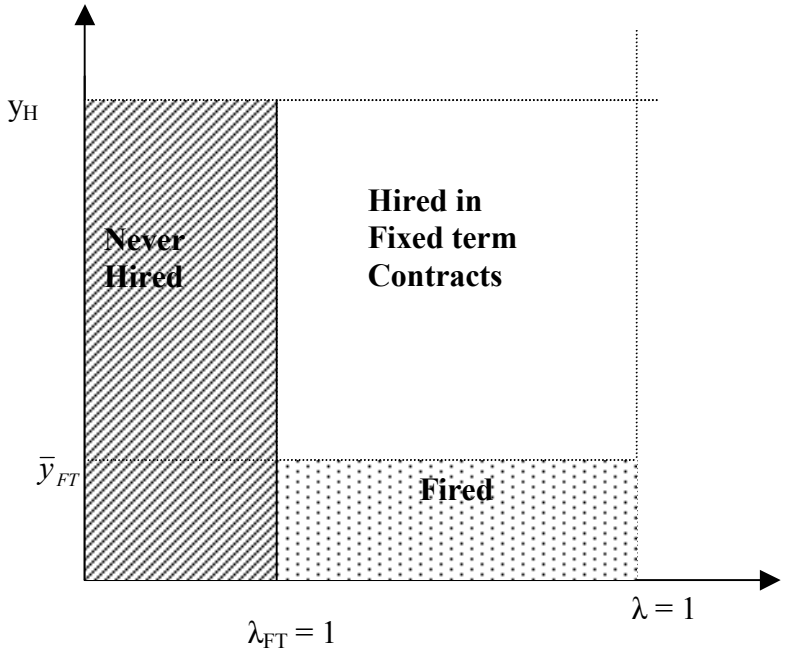
3) Workers' participation condition:

$$w_2 = E(y \mid unemployed \quad) \qquad \textbf{(10)}$$

Equilibrium wage is then obtained by solving simultaneously the above three equations. The only element we need to solve system ***(9),(2),(10)*** is the unemployed expected productivity. To this end, we go through a small detour.

Graph (a1) represents the market structure before the reform.

Graph a1: Workers distribution among labor market status before subsidy



This graph shows that workers will not be hired when their attached λ is smaller than λ_{FT}; they will be fired if their attached λ is larger than λ_{FT} and the observed productivity is less than $\bar{y}_{FT}$; they will be hired otherwise. This classification is used to compute the expected productivity of non-employed workers and, thereby, an analytical expression for equation ***(10)***.

The expected productivity of unemployed workers is a weighed average of the expected productivity of never hired and fired workers. It is worth recalling that we are assuming that the distributions of y and λ are independent. For the first group the expected productivity is

$$E[y \mid never\ hired] = E[y \mid \lambda \le \lambda_{FT}] = \frac{\lambda_{FT}}{2}\frac{y_H}{2}$$

The number of never hired workers is $\lambda_{FT}\frac{y_H}{y_H} = \lambda_{FT}$.

The expected productivity of not hired workers is the average productivity of all workers discounted by the fact that their quality indicator is less than the threshold level λ_{FT}

The expected productivity of fired worker is

$$E[y \mid fired] = E[y \mid \lambda > \lambda_{FT}, y < \bar{y}_{FT}] = \frac{1+\lambda_{FT}}{2}\frac{\bar{y}_{FT}}{2}$$

that is the product of the expected productivity of those with a productivity level less than $\bar{y}_{FT}$ and the expected value of the quality indicator when λ is larger than the threshold λ_{FT} .The number of fired workers is $(1-\lambda_{FT})\frac{\bar{y}_{FT}}{y_H}$.

The expected productivity of unemployed workers is then obtained by aggregation:

$$E[y \mid unemployed] = \frac{\lambda_{FT}^2 y_H^2 + (1-\lambda_{FT}^2)\bar{y}_{FT}^2}{4\lambda_{FT} y_H + 4(1-\lambda_{FT})y_{FT}^2};$$

the aggregation weights are the shares of never hired and fired workers on the sum of the two ($\lambda_{FT} + (1-\lambda_{FT})\frac{\bar{y}_{FT}}{y_H}$).

Table (1a) synthesizes workers' and their productivity distribution among labor market status. For completeness we included hired workers.

Table 1a: number of workers and expected productivity in different labor market status.

Labor Market Status	Number of workers	Expected Productivity
Hired	$(1-\lambda_{FT})\frac{y_H - \bar{y}}{y_H}$	$E[y \mid \lambda > \lambda_{FT}, y \geq \bar{y}_{FT}] = \frac{1+\lambda_{FT}}{2}\frac{\bar{y}_H + \bar{y}_{FT}}{2}$
Unemployed	$\lambda_{FT} + (1-\lambda_{FT})\frac{\bar{y}_{FT}}{y_H}$	$E[y \mid unemployed] = \frac{\lambda_{FT}^2 y_H^2 + (1-\lambda_{FT}^2)\bar{y}_{FT}^2}{4\lambda_{FT} y_H + 4(1-\lambda_{FT})y_{FT}^2}$
Never Hired	$\lambda_{FT}\frac{y_H}{y_H}$	$E[y \mid \lambda \leq \lambda_{FT}] = \frac{\lambda_{FT}}{2}\frac{y_H}{2}$
Fired	$(1-\lambda_{FT})\frac{\bar{y}_{FT}}{y_H}$	$E[y \mid \lambda > \lambda_{FT}, y < \bar{y}_{FT}] = \frac{1+\lambda_{FT}}{2}\frac{\bar{y}_{FT}}{2}$

With this result at hand we can rewrite equation ***(10)*** as

$$w_2 = E[y \mid unemployed] = \frac{\lambda_{FT}^2 y_H^2 + (1-\lambda_{FT}^2)\bar{y}_{FT}^2}{4\lambda_{FT} y_H + 4(1-\lambda_{FT})\bar{y}_{FT}} \qquad \textbf{(10')}$$

and we can compute the equilibrium values for the wage and the two thresholds.

To solve the system we first note that it can be reduced to two equations in λ and w_2:

$$\lambda = \frac{2 w_1 y_H (1 + r)}{y_H^2 (1 + r) + (y_H - w_2)^2} \qquad \textbf{(2')}$$

and

$$w_2 = \frac{\lambda^2 y_H^2 + (1 - \lambda^2) w_2^2}{4\lambda\ y_H + 4(1 - \lambda) w_2} \qquad \textbf{(10'')}$$

where we have dropped the subscript FT to simplify notation.

Condition ***(2')*** describes λ as a quadratic, continuous and concave function of w that in the relevant range *[0, Y_H]* is increasing from $\frac{2(1+r)w_1}{y_h(2+r)}$ for $w_2=0$ to $\frac{2w_1}{y_h}$ when $w_2=Y_H$.

In graph (a4), we plotted it assuming that w_1 is such that $\frac{2w_1}{y_H} < 1$.

Condition (10'') can be regarded as a second-degree equation in λ whose coefficients depend on w_2:

$$-\lambda^2 (y_H^2 - w_2^2) + (4 y_H w_2 - 4 w_H^2)\lambda + 3 w_2^2 = 0$$

The solutions to this equation are two functions of λ in w_2, one positive and the other negative valued in the relevant range of w_2. The positive[26] one is

$$\lambda = \left[1 + \sqrt{1 + \frac{3(y_H + w_2)}{4(y_H - w_2)}}\right] \frac{2w_2}{y_H + w_2} \qquad \textbf{(11)}$$

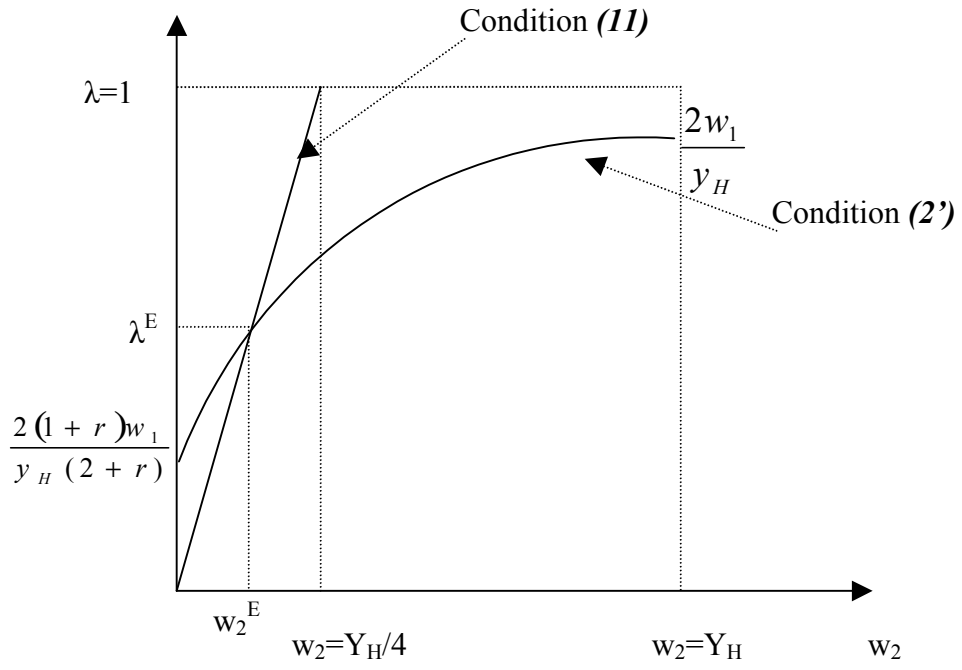
This is an increasing function of w_2, which grows from a minimum of 0 for $w_2=0$ to 1 for $w_2 = \frac{y_H}{4}$. This is the relevant range of admissible solutions.

While the analytical solution is a rather messy expression that is obtained by equating *(2')* and *(11)*, it is easy to see that this solution is represented by the crossing point of these two curves. It occurs for λ values which are positive and less than one (provided w_1 is not too large) and for a wage level lower than the unconditional mean of the

[26] The negative solution is $\lambda = \left[1 - \sqrt{1 + \frac{3(y_H + w_2)}{4(y_H - w_2)}}\right] \frac{2w_2}{y_H + w_2}$, which decreases with w_2.

productivity distribution ($\frac{y_H}{4}$). A simple equilibrium representation is shown in Graph (a2).

Graph a2. The equilibrium before the subsidy

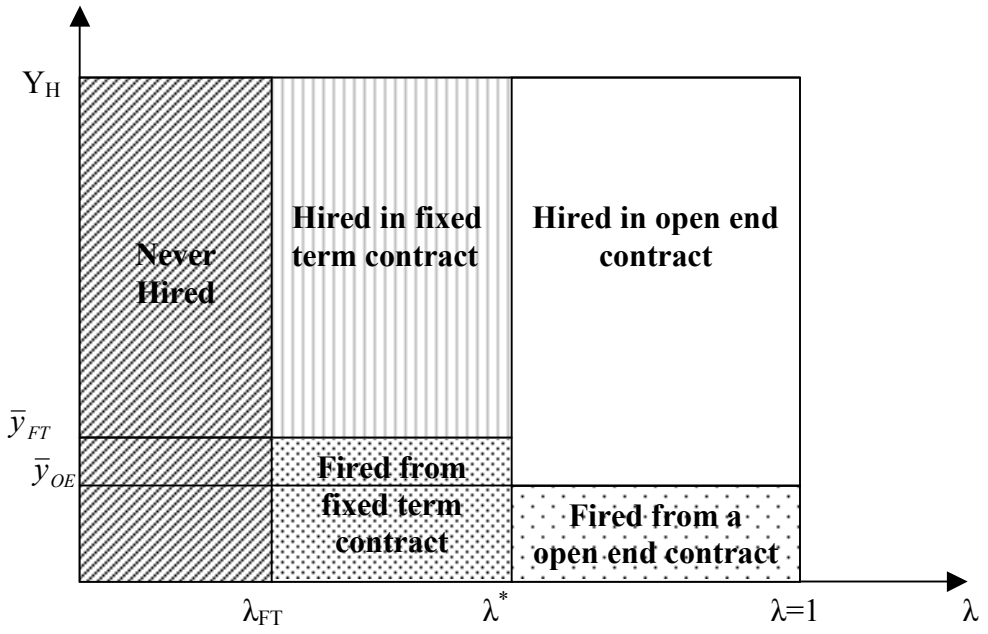


5 Post-reform wage determination.

After the reform, wage determination closely follows the logical development of the previous paragraph. However, because of the coexistence of two types of contracts we have two additional variables to take care of: the threshold levels for λ and y for an open-end contract. These two additional conditions complicate the algebra, but leave the basic features of the model unchanged. As we did in the previous paragraph, we begin by

showing a graphical representation of workers' distribution among different labor market status.

Graph a3: Workers distribution among labor market status after the subsidy



This graph shows that workers will never be hired in either contracts when their quality index is smaller than λ_{FT}; they will be hired in a temporary contract if their quality index is between λ_{FT} and λ^* (that is the level of the quality index above which the value of an open-end contract is positive and larger than the value of a fixed-term one) but will be fired if their observed productivity turns out to be less than $\bar{y}_{FT}$. Finally, workers will be hired into open-end positions if λ is larger than λ^* but will be retained only if their productivity is above the threshold $\bar{y}_{OE}$.

In this model, equilibrium is represented by a vector of 5 numbers, which solves the following system of equations[27]:

1) A labor demand for fixed-term contracts (identical to condition ***(9)***):

$$\bar{y}_{FT} = w_2 \qquad \textbf{(12)}$$

2) A labor demand for open-end contracts:

$$\bar{y}_{OE} = w_2 - c(1+r) \qquad \textbf{(13)}$$

3) A firm participation constraint for fixed-term contracts, which identifies the minimum level of λ below which the value of a fixed-term contract is negative (identical to condition ***(2)***):

$$\lambda_{FT} = \frac{2 w_1 y_H (1+r)}{y_H^2 (1+r) + (y_H - \bar{y}_{FT})^2} \qquad \textbf{(14)}$$

4) A condition which ensures the coexistence of both fixed-term and open-end contracts

$$\lambda_{FT} < \lambda^* = \frac{2 y_H (c-k)}{[(1+r)c + 2(y_H - \bar{y}_{FT})]c} < 1 \qquad \textbf{(15)}$$

5) A workers' participation condition (identical to condition ***(10)***):

$$w_2 = E(y \mid unemployed) \qquad \textbf{(16)}$$

Again, to solve the system we need an analytical expression for condition ***(16)***.

The expected productivity of unemployed workers is a weighted average of the productivity of those never hired, of those fired from a temporary contract and of those fired from an open-end contract. As before, expected productivity for the first group is the average productivity of all workers discounted by the fact that their observed quality index is less than the λ_{FT} threshold:

$$E[y \mid never\ hired] = E[y \mid \lambda \le \lambda_{FT}] = \frac{\lambda_{FT}}{2}\frac{y_H}{2}$$

The number of these workers is $\lambda_{FT}\frac{y_H}{y_H} = \lambda_{FT}$. For workers who have been laid-off from a temporary contract, expected productivity is the product of the expected value of the quality index when this is in the range (λ_{FT} , λ^*], and the expected productivity of those with y smaller than $\bar{y}_{FT}$:

$$E[y \mid fired\ fron\ FTC] = E[y \mid \lambda_{FT} < \lambda \le \lambda^*, y < \bar{y}_{FT}] = \frac{\lambda^* + \lambda_{FT}}{2}\frac{\bar{y}_{FT}}{2}$$

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[27] To be more precise we also require the solution to have economic meaning, which implies several restrictions on the sets of admissible solutions. Thus, we require 1> λ^* > λ_{FT} >0 and $y_H \ge \bar{y}_{FT} > \bar{y}_{OE} > 0$.

Their number is $\left(\lambda^* - \lambda_{FT}\right)\frac{\bar{y}_{FT}}{y_H}$. Finally, the expected productivity of workers fired from an open-end contract is given by the product of the expected value of the quality index when this is in the range (λ^*,1], and the expected productivity of those with y smaller than $\bar{y}_{OE}$:

$$E[y \mid fired\ from\ OEC] = E[y \mid \lambda^* < \lambda \le 1, y < \bar{y}_{OE}] = \frac{1+\lambda^*}{2}\frac{\bar{y}_{OE}}{2}$$

Their number is $\left(1-\lambda^*\right)\frac{\bar{y}_{OE}}{y_H}$.

The expected productivity of unemployed workers is obtained by aggregating these three productivities using as weights the shares of each group on the total number of workers who are out of work. Thus condition ***(16)*** is

$$w_2 = E(y \mid un.) = \frac{\lambda_{FT}^2 y_H^2 + \left(\lambda^{*2} - \lambda_{FT}^2\right)y_{FT}^2 + \left(1-\lambda^{*2}\right)\left[y_{FT} - c(1+r)\right]^2}{4\left[\lambda_{FT} y_H - \lambda_{FT}\bar{y}_{FT} + \left(y_{FT} - c(1+r)\right)\right) + \lambda^* c(1+r))]} \quad \textbf{(16')}$$

We have used relation ***(12)*** and ***(13)*** so that $\bar{y}_{OE} = \bar{y}_{FT} - c(1+r)$. The complete description of workers and productivity distributions among labor market status is provided by Table a2.

Using the fact that $\bar{y}_{OE} = \bar{y}_{FT} - c(1+r)$ and $w_2 = \bar{y}_{FT}$, we are left with a system of three conditions that - if a solution exists - provides an equilibrium value for the two thresholds λ^* and λ_{FT} and for the second period wage. However, to keep the analysis along the same lines as in the pre-reform case (discussed in the previous paragraph), we now derive a condition that ties the two thresholds λ^* and λ_{FT} in such a way to grant the coexistence of both contracts for every given subsidy level.

Let K_{FT} be the value of the subsidy that equates the value of fixed-term and open-end contracts for $\lambda=\lambda_{FT}$. Consider next a marginally lower level of the subsidy *K'*. In this case the level of λ which equates the value of fixed-term and open-end contracts is $\lambda^* > \lambda_{FT}$. The difference $\lambda^* - \lambda_{FT}$ has the following form:

$$\lambda^* - \lambda_{FT} = -\frac{k' - k_{FT}}{c\left[\frac{1+r}{2y_H}c + \frac{y_H - w_2}{y_H}\right]} = \frac{\Delta k_{FT}}{c\left[\frac{1+r}{2y_H}c + \frac{y_H - w_2}{y_H}\right]} \equiv m \quad \textbf{(17)}$$

We can always find a level of ΔK_{FT} which grants the coexistence of both contracts unless $\lambda_{FT}=1$.

Table 2a: workers and expected productivity in different labor market status.

Labor Market Status	Number of workers	Expected Productivity
Hired	$(1-\lambda_{FT})\frac{y_H - \bar{y}_{FT}}{y_H} + (1-\lambda^*)\frac{\bar{y}_{FT} - \bar{y}_{OE}}{y_H}$	$E(y \mid hired) = \frac{(1-\lambda_{FT}^2)(\bar{y}_H^2 - \bar{y}_{FT}^2) + (1-\lambda^{*2})(\bar{y}_{FT}^2 - \bar{y}_{OE}^2)}{4[(1-\lambda_{FT})(\bar{y}_H - \bar{y}_{FT}) + (1-\lambda^*)(\bar{y}_{FT} - \bar{y}_{OE})]}$
Into FTC	$(\lambda^* - \lambda_{FT})\frac{y_H - \bar{y}_{FT}}{y_H}$	$E[y \mid \lambda_{FT} < \lambda \le \lambda^*, y \ge \bar{y}_{FT}] = \frac{\lambda^* + \lambda_{FT}}{2}\frac{y_H + \bar{y}_{FT}}{2}$
Into OEC	$(1-\lambda^*)\frac{y_H - \bar{y}_{OE}}{y_H}$	$E[y \mid \lambda^* < \lambda \le 1, y \ge \bar{y}_{OE}] = \frac{1+\lambda^*}{2}\frac{y_H + \bar{y}_{OE}}{2}$
Unemployed	$\lambda_{Ft} + (\lambda^* - \lambda_{FT})\frac{\bar{y}_{FT}}{y_H} + (1-\lambda^*)\frac{\bar{y}_{OE}}{y_H}$	$E(y \mid un.) = \frac{\lambda_{FT}^2 y_H^2 + (\lambda^{*2} - \lambda_{FT}^2)y_{FT}^2 + (1-\lambda^{*2})y_{OE}^2}{4[\lambda_{FT} y_H + (\lambda^* - \lambda_{FT})\bar{y}_{FT} + (1-\lambda^*)\bar{y}_{OE}]}$
Never Hired	λ_{FT}	$E[y \mid \lambda \le \lambda_{FT}] = \frac{\lambda_{FT}}{2}\frac{y_H}{2}$
Fired from FTC	$(\lambda^* - \lambda_{FT})\frac{\bar{y}_{FT}}{y_H}$	$E[y \mid \lambda_{FT} < \lambda \le \lambda^*, y < \bar{y}_{FT}] = \frac{\lambda^* + \lambda_{FT}}{2}\frac{\bar{y}_{FT}}{2}$
Fired from OEC	$(1-\lambda^*)\frac{\bar{y}_{OE}}{y_H}$	$E[y \mid \lambda^* < \lambda \le 1, y < \bar{y}_{OE}] = \frac{1+\lambda^*}{2}\frac{\bar{y}_{OE}}{2}$

Using this manipulation inside condition ***(16')*** leaves us with a system of two relationships that relate the quality threshold level for the fixed-term contract λ_{FT} and the

second period wage w_2. The first relation is again condition ***(14)***, which is identical to condition ***(2')***. We have discussed it in the previous paragraph. Therefore we concentrate on the second relationship, which is obtained by using ***(17)*** into equation ***(16)*** to get

$$-\lambda_{FT}^2\left(y_H^2-\widetilde{w}_2^2\right)+\lambda_{FT}\left(4w_2y_H-4\widetilde{w}_2w_2-2mw_2^2+m\widetilde{w}_2^2\right)+4mw_2^2+4\widetilde{w}_2w_2-4m\widetilde{w}_2w_2-m^2w_2^2-\widetilde{w}_2^2+m^2\widetilde{w}_2^2\equiv-\lambda_{FT}^2\alpha(w_2)+\lambda_{FT}\beta(w_2)+\gamma(w_2)=0$$

where $\widetilde{w}_2=w_2-c(1+r)$. This relationship traces the values of λ as a function of w_2 and qualitatively has the same characteristics of the analogous relationship for the pre-reform case. It has two sets of solutions, one with positive values for λ in the relevant range of w_2 and one that has negative solutions. We only concentrate on the set of positive solutions:

$$\lambda_{FT}=\frac{\beta(w_2)}{2\alpha(w_2)}\left[1+\sqrt{1+\frac{4\alpha(w_2)\gamma(w_2)}{\beta^2(w_2)}}\right] \qquad \textbf{(18)}$$

This solution has however several characteristics such that no equilibrium, one, or more than one equilibrium are all possible depending on the value of the parameters.

The first characteristic is that, since $\bar{y}_{OE}=w_2-c(1+r)$, then the lowest meaningful value for w_2 is $c(1+r)$; let λ_{FTmin} be the correspondent value of λ. If for this minimum wage level the correspondent value of λ generated from condition ***(2')*** is lower than λ_{FTmin}, then there might be no equilibrium (Graph a3a).

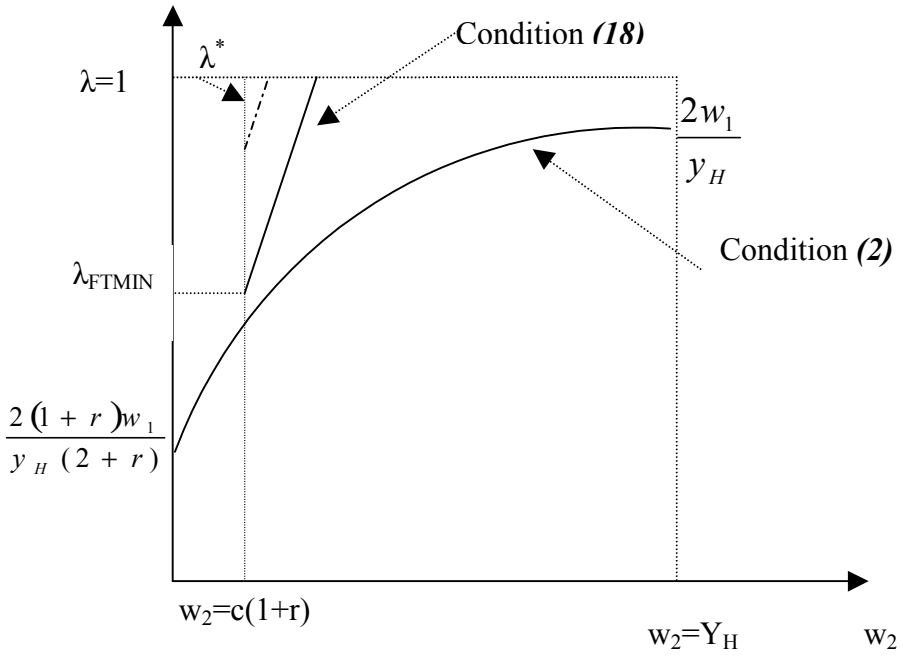
The second characteristic is the fact that equation ***(18)*** is not a monotonic increasing function of w_2 in the relevant range [$c(1+r)$, y_H]. In particular, it is an increasing function for w_2 less than a critical value[28] and a declining function for higher values. We can therefore have two equilibria for the same set of parameters (graph a5b). This multiplicity

[28] In particular, the slope of function $\beta(w_2)$ is positive for w_2 less than $\frac{4y_H+2(1+r)(2-m)}{2(4+m)}$ and negative for w_2 above this threshold

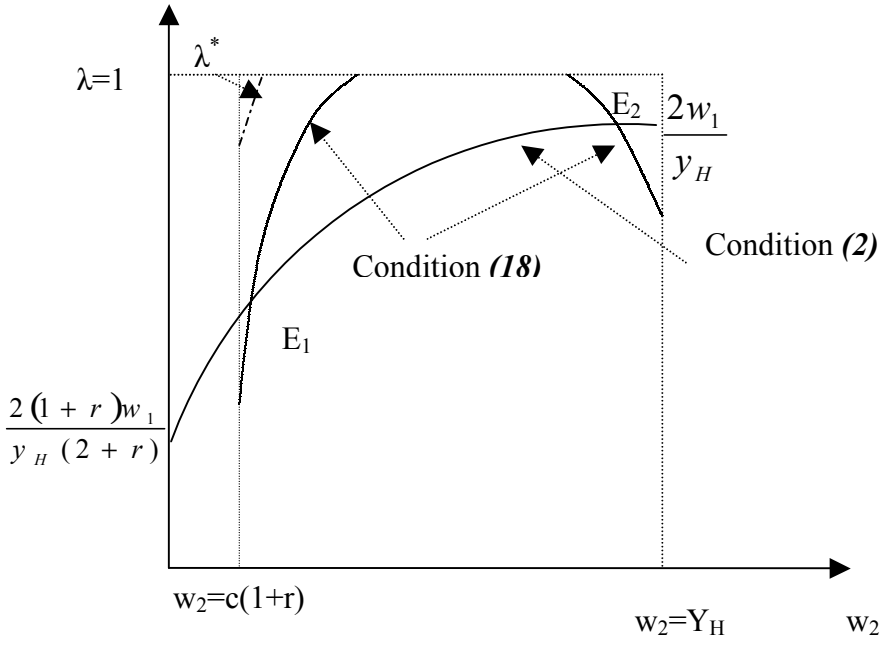
of equilibria can be removed if we take as admissible only the equilibrium which grants the coexistence of both contracts, because the second equilibrium in general occurs for values of w_2 that imply λ^* larger than 1 (graph a5b).

The one equilibrium case is shown in graph a3c.

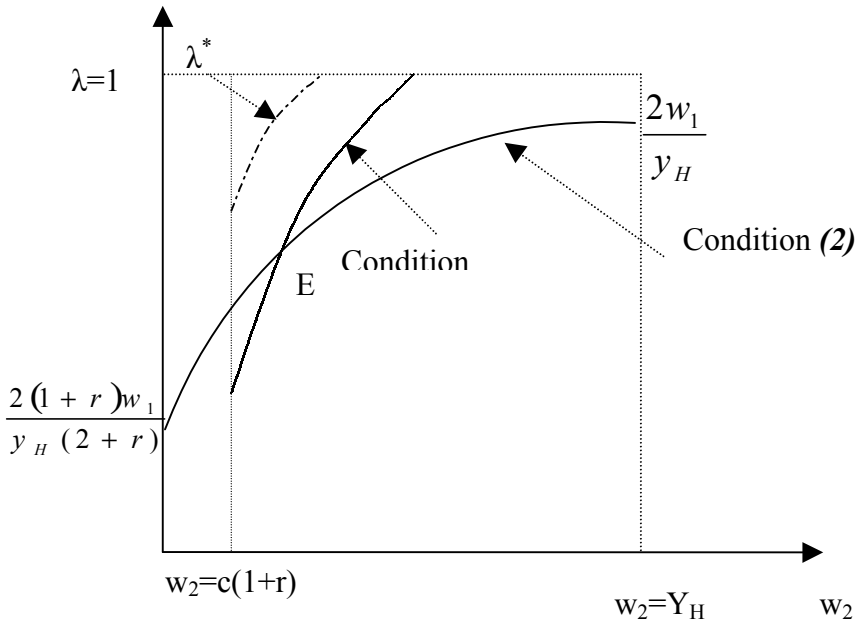
Graph a3a. Post reform analysis: No equilibrium case.



Graph a3b. Post reform analysis: Two equilibria case.



Graph a3c. Post reform analysis: one equilibrium case.



6 Comparison between pre- and post-subsidy equilibria.

The last question we want to address concerns the comparison between pre- and post-subsidy wages. To this end, we first notice that since condition ***(2')*** is common to both pre- and post-equilibria we only need to compare ***(11)*** with ***(18)***. The analytical expression for the difference between the two functions is rather messy. We therefore simulated the wage differences for some parameter values (compatible with the existence of an equilibrium and the coexistence of both contracts). Simulations show that pre-reform wages are higher than post-reform ones. This effect depends from the fact that, because of the firing costs, the productivity threshold for an open-end contract is relatively lower. Thus, the major effect of endogenous wages is that, by lowering the overall wage, the subsidy exherts a small impact on total employment.

Table 1

Fixed-Term Contracts In OECD Countries;
Share And Contribution To Employment Growth 1990-2000
(*Percentage Points*)

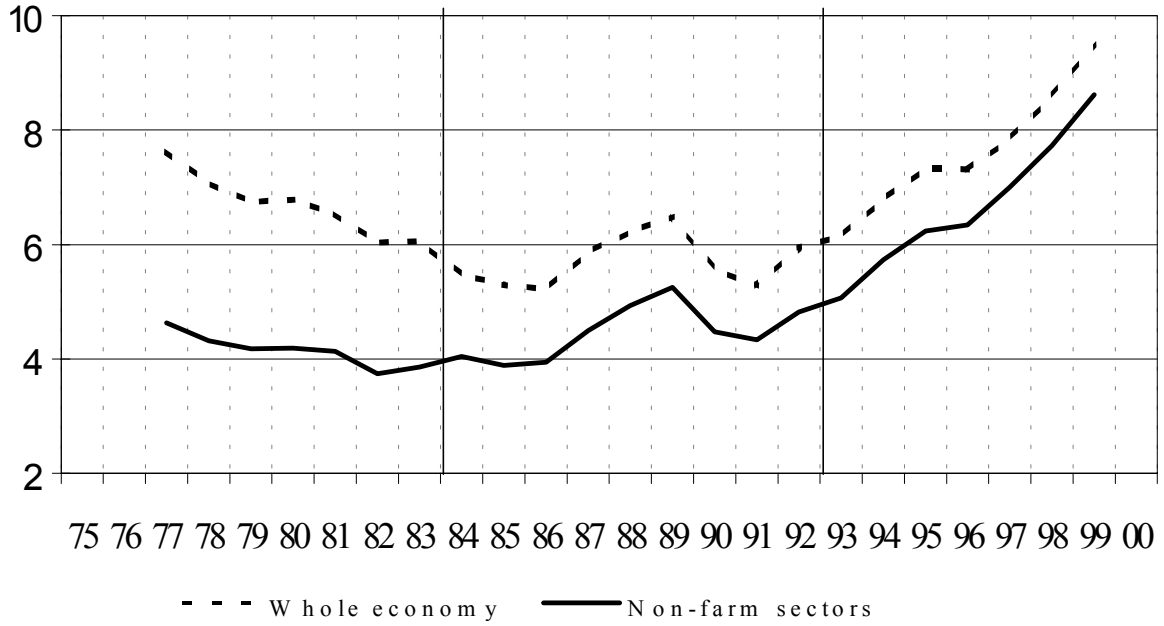
	Employment Growth contributions			Share of temp Job on dependent employment	
	Temp jobs	Permanent Jobs	Total	1990	2000
Austria[d]	2.0	-0.9	1.1	6.0	7.9
Belgium	5.3	12.4	17.7	5.3	9.0
Canada[f]	2.3	7.0	9.3	11.3	12.5
Czech Republic[b]	2.4	-5.4	-2.9	5.5	9.3
Denmark	-0.1	5.0	4.8	10.8	10.2
Finland[a]	4.4	2.7	7.1	13.2	16.5
France	5.9	3.9	9.9	10.4	14.5
Germany[a]	2.4	-4.5	-2.1	10.3	12.6
Greece	-1.0	19.5	18.5	16.6	13.1
Hungary[f]	2.2	5.5	7.7	5.6	7.0
Iceland[a]	38.3	-20.8	17.5	14.7	45.3
Ireland	-1.6	48.9	47.4	8.5	4.4
Italy	4.8	-6.0	-1.2	5.2	10.1
Japan	3.8	7.6	11.4	10.6	12.9
Luxemburg	0.6	16.6	17.2	3.6	3.7
Mexico[d]	3.0	24.2	27.2	23.1	20.5
Netherlands	9.9	15.2	25.1	7.6	13.8
Norway[e]	-2.8	10.8	8.0	12.9	9.3
Portugal	3.9	4.8	8.7	18.3	20.4
Slovak Republic[c]	1.8	-2.2	-0.4	2.9	4.9
Spain	10.2	14.4	24.7	29.8	32.1
Sweden[d]	1.7	5.0	6.6	12.4	14.6
Switzerland[a]	-1.4	0.8	-0.5	13.0	11.7
Turkey	14.1	25.8	39.9	14.4	20.4
United Kingdom	1.9	4.6	6.5	5.2	6.7

a) 1991-2000; b) 1993-2000; c) 1994-2000; d) 1995-2000; e) 1996-2000; f) 1997-2000;

Source: OECD Employment Outlook , 2002

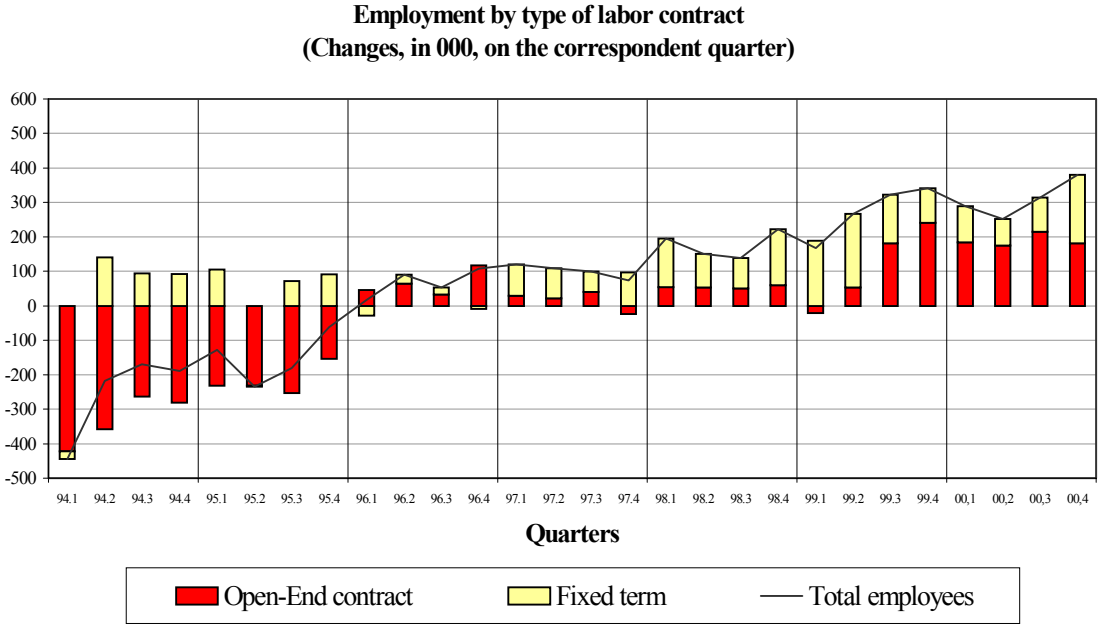
Figure 1

Employees With Fixed-Term Contracts As A Share Of All Employees
(*Percentage Points*)



Source: Bank of Italy, Annual report for the year 2000

Figure 2



Sources: Authors' calculation on Labour Force Survey data

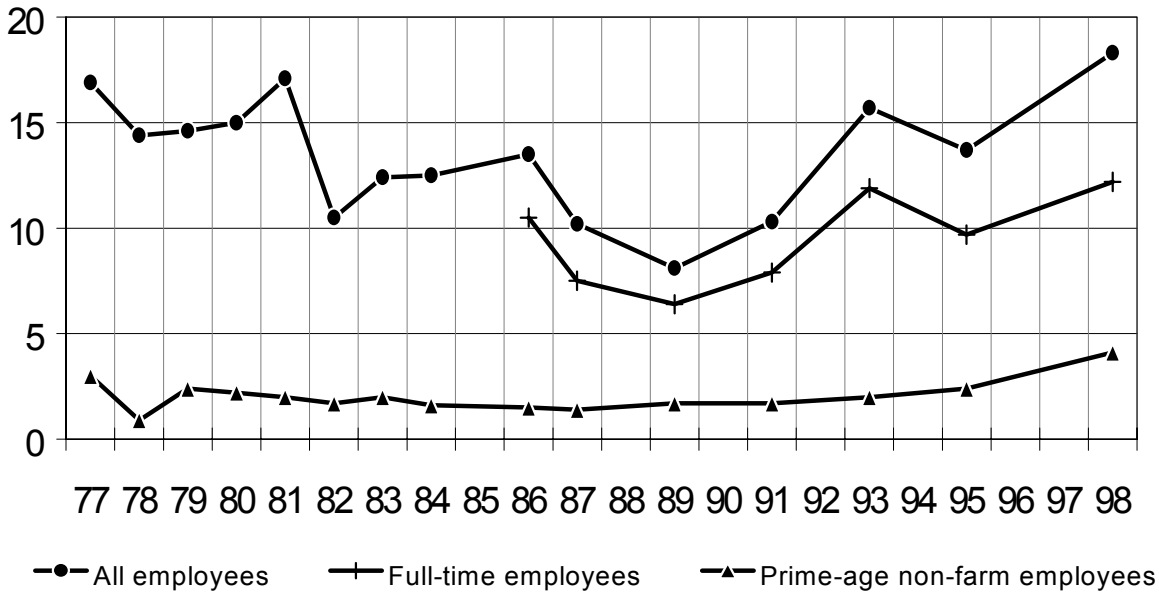
Table 2
Basic Characteristics Of Fixed-Term Contracts In Italy[1]
(*Percentage Points*)

	1993	1994	1995	1996	1997	1998	1999	2000	2001
By gender									
Males	51.2	52.9	52.5	54.3	53.9	53.4	52.3	51.9	50.4
Females	48.8	47.1	47.5	45.7	46.1	46.6	47.7	48.1	49.6
By Age									
15-19	10.5	9.0	8.8	8.1	7.2	7.3	6.5	6.2	5.7
20-24	22.9	21.8	22.2	22.1	21.0	21.8	21.6	19.5	18.0
25-29	19.1	20.6	19.9	19.7	20.2	19.5	20.0	19.5	20.3
30-34	14.2	14.2	16.0	16.3	17.3	16.4	16.3	15.9	15.8
35-39	10.0	10.6	10.1	11.1	11.1	11.3	11.7	13.2	13.6
40-44	6.8	7.5	7.3	7.5	7.7	8.3	8.7	9.0	9.5
45 and over	16.5	16.4	15.7	15.2	15.5	15.4	15.2	16.8	17.1
By School level									
Lower secondary school or less	63.9	60.0	58.4	56.4	54.8	52.3	49.8	48.0	48.0
High School	28.4	31.3	32.3	34.2	34.6	36.8	38.2	39.5	39.4
College	7.6	8.7	9.3	9.3	10.6	10.9	12.0	12.4	12.6
By Sector									
Agriculture	20.8	18.7	18.0	16.2	13.7	12.9	12.1	11.1	11.7
Manufacturing	14.9	16.6	17.6	17.5	17.9	19.3	18.1	18.4	17.1
Construction	12.4	11.5	10.7	10.9	11.1	9.9	8.8	8.4	8.4
Services	51.9	53.2	53.7	55.4	57.3	57.9	60.9	62.1	62.8
By Reasons for Fixed Term Contract									
Work and Training	23.6	23.3	23.3	24.5	24.8	29.9	32.3	31.4	29.2
No better opportunities	51.7	52.3	51.0	49.9	49.3	45.3	40.7	43.1	44.4
Don't want a Open End Contract	7.2	5.4	5.2	4.8	4.7	3.9	4.6	4.3	4.3
Other reasons	17.5	19.0	20.5	20.8	21.2	20.9	22.4	21.2	22.1
As share of employees	6.1	6.8	7.3	7.3	7.9	8.6	9.5	10.1	9.8

(1) Workers 15-65 years old
Sources: Authors' calculation on Labour Force Survey data

Figure 3

Share Of Low-Paid Workers In Italy, 1977-1998
(*Percentage Points*)



Sources: Brandolini et. Alt. 2001

Table 3
Log-Hourly Wage And Hour Differentials In the Year 2000[1]

	Log of hourly wage		Annual hours of work	
	Males	Females	Males	Females
Unadjusted				
Fixed term	-.324 (.026)	-.089 (.030)	-533.3 (25.96)	-588.77 (32.69)
Temporary	-.433 (.079)	-.365 (.092)	-258.6 (78.21)	-261.93 (100.50)
Adjusted[2]				
Fixed term	-.117 (.023)	.019 (.028)	-391.3 (27.39)	-394.89 (29.71)
Temporary	-.211 (.068)	-.213 (.082)	14.60 (78)	-9.17(86.87)

1) References are wages and hours of Workers in Open End contracts, standard error in parenthesis.
2) Controls include age, age square, a full set of dummies for education (8 categories), for marital status (4 categories), for geographical area (3 categories), dummy for part time
Sources: Authors' calculation on Bank of Italy Survey on Household Income and Wealth

Table 4
Transitions Among Labor Market Status In Italy. October 1999
(*Percentage Points*)

Initial labour market status ↓	Labour market status at October 1999					
		Different job				
	Same job	Self-employed	Open-end contract	Fixed- term contract	Unemployed and Inactive	Total
	After three years from the first job					
Self-employed	82.2	3.4	3.5	1.7	9.2	100
Employee with an open-end contract	81.3	1.3	8.8	1.8	6.8	100
Employee with a fixed-term contract	20.3	3.6	20.8	17.6	37.8	100
All	62.4	2.3	11.6	6.7	16.9	100
	After five years from the first job					
Self-employed	79.3	5.1	7.5	2.8	5.3	100
Employee with an open-end contract	71.0	2.8	16.3	2.2	7.8	100
Employee with a fixed-term contract	9.9	6.1	36.4	17.2	30.4	100
All	54.6	4.2	20.5	6.7	13.9	100

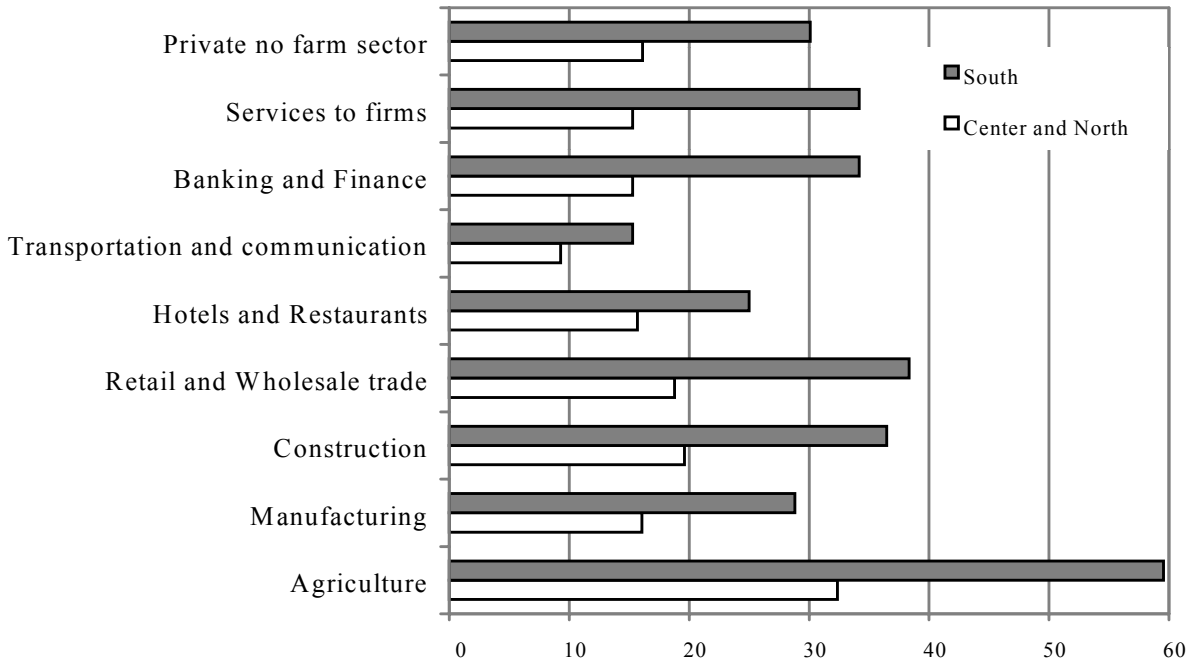
Source: Istat, Annual report for 1999

Table 5
Transitions Out Of Fixed-Term Contracts. October 1999
(*Percentage Points*)

Persons entering the labour market with fixed-term contract	Labour market status at October 1999					
		Different job				
	Same job	Self-employed	Open-end contract	Fixed- term contract	Unemployed and Inactive	Total
	After three years from the first job					
Male	19.2	3.3	23.2	14.6	39.7	100
Female	21.4	3.8	18.3	20.7	35.8	100
College graduate	43.2	3.8	23.0	17.2	12.9	100
High school graduate	14.9	5.2	23.3	18.0	38.9	100
8th grade graduate	18.5	0.7	15.4	16.9	48.5	100
All	20.3	3.6	20.8	17.6	37.8	100
	After five years from the first job					
Male	8.0	6.2	38.3	19.6	27.9	100
Female	12.1	6.1	34.1	14.2	33.5	100
College graduate	17.1	12.5	38.1	19.6	12.7	100
High school graduate	8.0	5.1	40.4	17.9	28.5	100
8th grade graduate	10.7	5.8	28.6	15.0	40.0	100
All	9.9	6.1	36.4	17.2	30.4	100

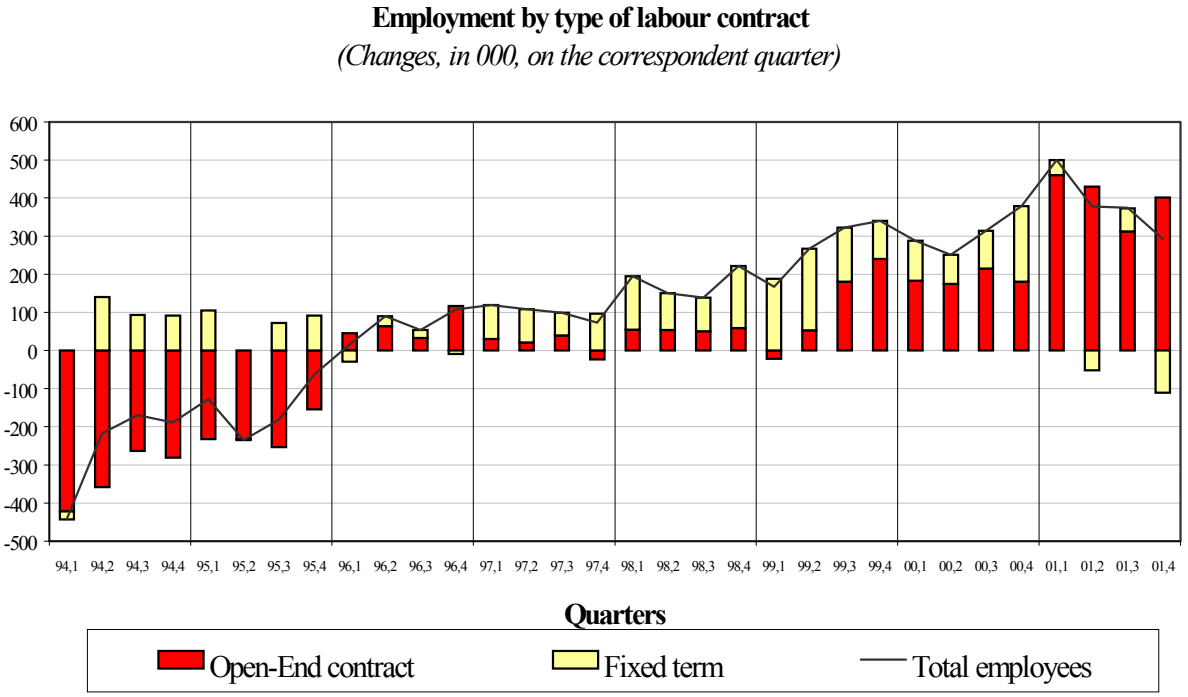
Source: Istat, Annual report for 1999

Figure 4
Reduction In The Labor Cost Due To The Tax Credit By Area And Sector
(*Percentage Points*)



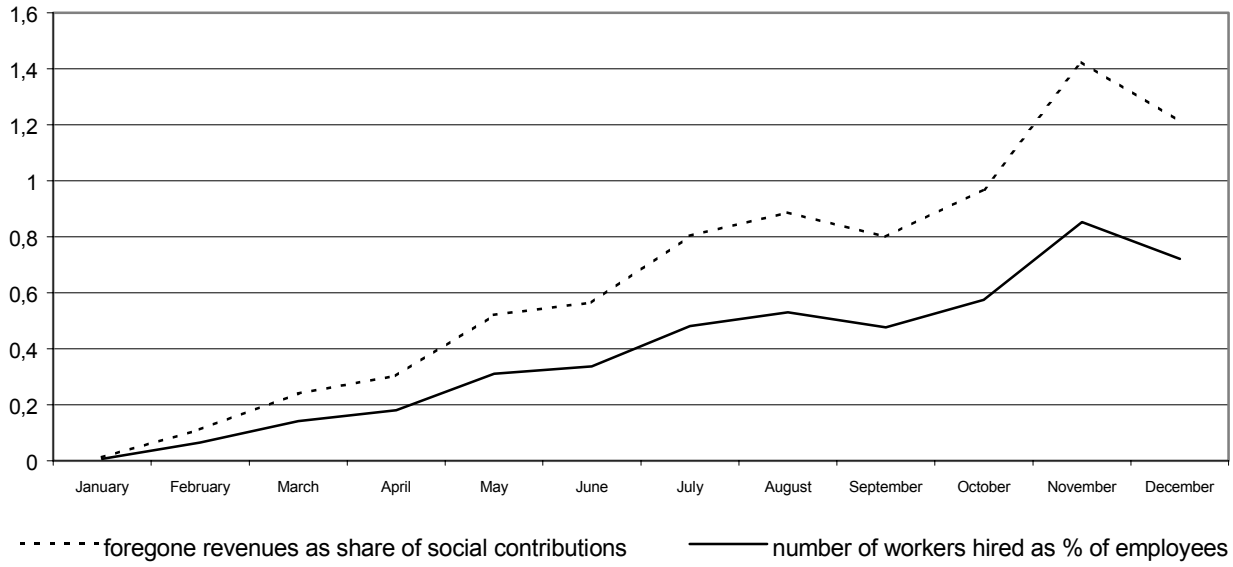
Sources: Authors' calculation on Istat data

Figure 5



Sources: Authors' calculation on Labour Force Survey data

Figure 6
Usage Of Tax Credit: Evidence From Fiscal Data For Year 2001
(*Revenues Figures Are Flows, Workers Figures Are Stocks*)



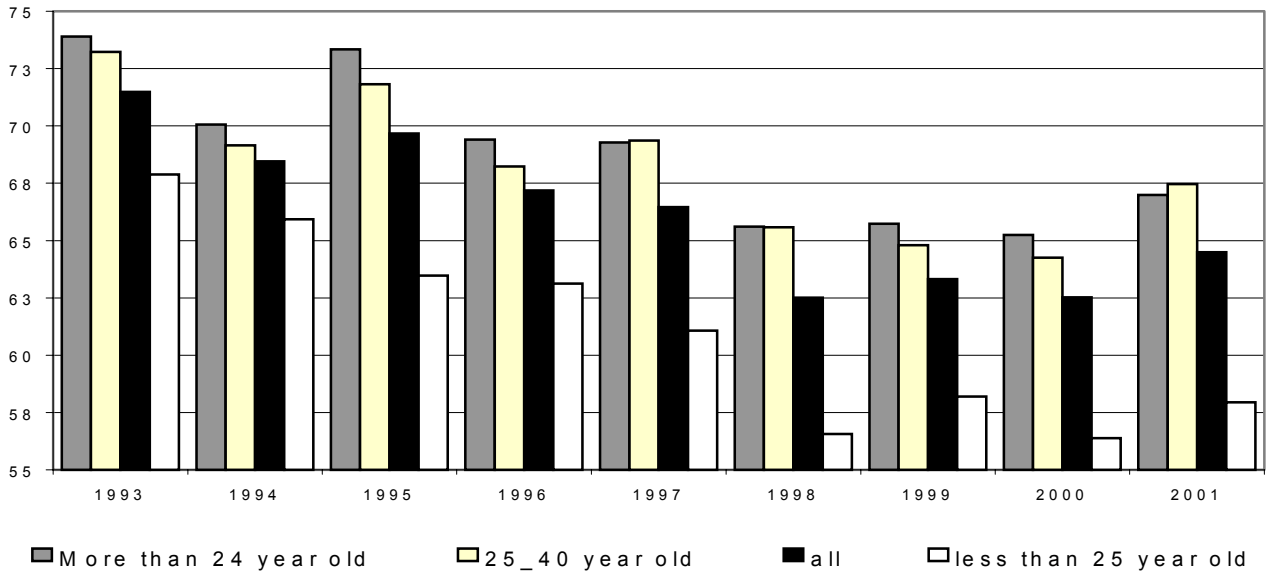
Sources: Authors' calculations on Ministry of Labor (2002) and Istat

Table 6
Basic Characteristics Of The Sample
(*Percentage Points*)

	1993	1994	1995	1996	1997	1998	1999	2000	2001
By gender									
Males	59.5	59.0	58.8	58.7	58.6	57.3	56.6	54.0	53.0
Females	40.5	41.0	41.2	41.3	41.4	42.7	43.4	46.0	47.0
Age									
15-19	11.9	11.4	10.4	9.0	8.1	7.7	7.3	7.3	6.2
20-24	28.1	27.3	26.7	26.4	26.1	26.5	24.6	23.4	21.5
25-29	19.4	20.2	19.8	22.6	22.3	22.7	23.1	22.5	24.4
30-34	14.3	14.4	16.4	15.8	16.2	16.9	17.1	16.6	16.8
35-39	9.6	10.4	9.7	9.7	10.5	10.2	10.3	12.2	12.3
40-44	6.2	6.5	7.1	7.2	5.9	6.7	7.9	7.7	8.5
45 and over	10.6	9.8	10.0	9.3	10.8	9.3	9.8	10.3	10.5
School level									
Lower secondary school or less	57.2	55.5	54.9	51.6	50.0	46.9	45.8	43.1	43.2
High School	34.9	36.3	37.9	39.9	40.3	42.2	42.5	45.5	43.6
College	7.9	8.2	7.2	8.4	9.7	10.9	11.7	11.5	13.2
Sector									
Manufacturing	30.0	33.3	34.9	31.9	32.2	31.7	29.0	28.8	26.9
Construction	16.3	14.1	14.0	14.3	14.2	12.4	12.1	10.7	10.7
Services	53.7	52.6	51.1	53.8	53.6	55.9	58.9	60.5	62.5
Type of Contract									
Open End contracts	71.4	68.5	69.7	67.1	66.4	62.5	63.3	62.5	64.5
Fixed term contracts	28.6	31.5	30.3	32.9	33.6	37.5	36.7	37.5	35.5
Work and Training	8.2	8.0	9.0	9.9	10.1	14.5	14.1	14.3	10.8
No better opportunities	14.0	15.5	13.4	14.6	15.0	14.9	13.2	14.4	14.9
Don't want a O. E.C.	1.2	1.1	1.2	1.0	1.3	1.3	1.2	1.6	1.4
Other reasons	5.2	6.9	6.7	7.3	7.1	6.8	8.2	7.2	8.3
Number of workers	1,033,806	1,180,133	1,363,629	1,305,653	1,319,812	1,482,466	1,516,225	1,619,386	1,560,900
Number of Observations	3,593	4,072	4,779	4,519	4,533	5,084	5,167	5,474	5,146

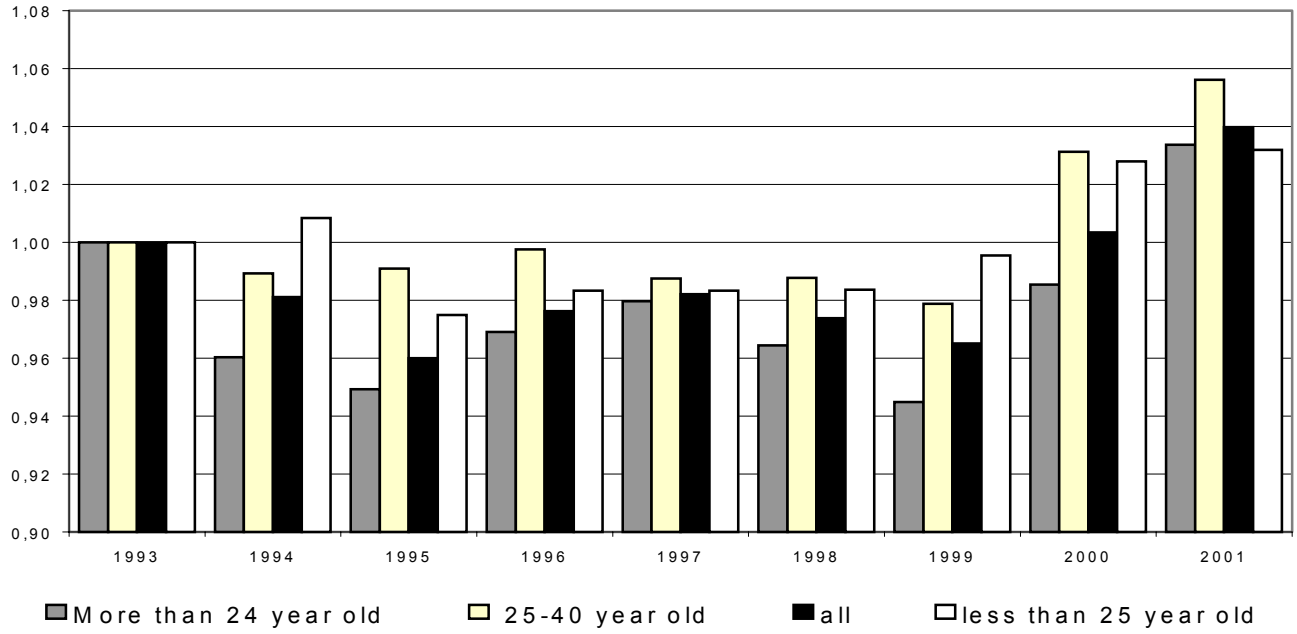
Sources: Authors' calculation on Labour Force Survey data

Figure 7
Share Of Open-End Contracts On Total New Contracts



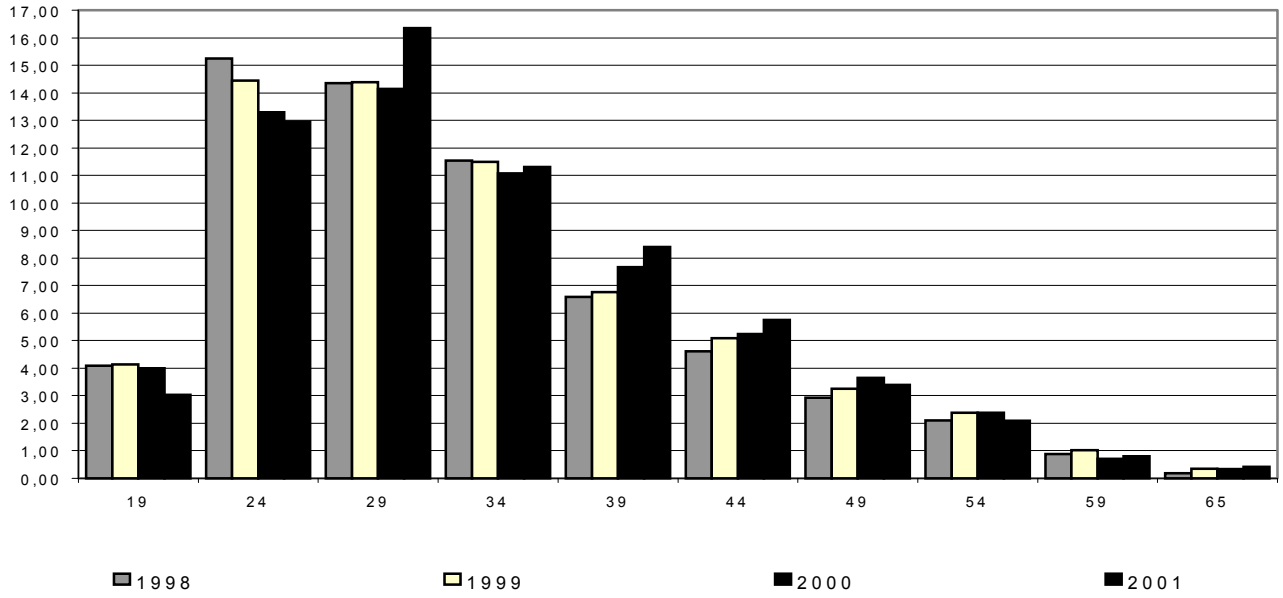
Sources: Authors' calculation on Labour Force Survey data

Figure 8
Years Of Schooling Of New Hires With Open-End Contracts Relative To New Hires With Fixed-Term Contracts
(*Indexes, 1993=1*)



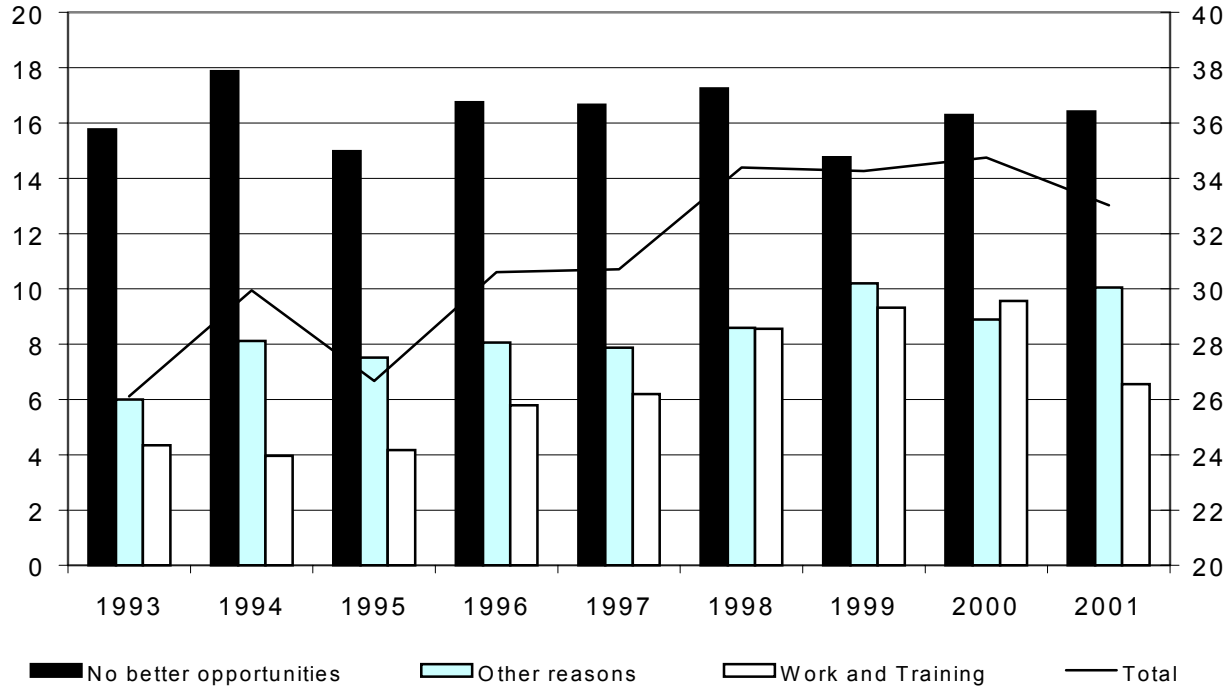
Sources: Authors' calculation on Labour Force Survey data

Figure 9
Age Distribution Of Share Of Open-End Contract On Total New Hires



Sources: Authors' calculation on Labour Force Survey data

Figure 10
Share Of Fixed-Term Contracts On Total New Hires (1)



(1) Workers 25 years and older
Sources: Authors' calculation on Labour Force Survey data

Table 7
Identification Strategies

	Model	**Treated**	**Sample**	**Control**
Within age group identification	W1	Aged 25 or more in 2001	Aged 25 or more in 1993-2001	Aged 25 and older in 2000-1993
	W2	Aged 25-35 in 2001	Aged 25-35 in 1993-2001	Aged 25-35 in 2000-1993
Across+within age group identification	AW1	Aged 25 or more in 2001	Aged 15 or more in 1993-2001	Aged 15-24 in 2001-1993 + 25 and older in 2000-1993
	AW2	Aged 25-35 in 2001	Aged 15 or more in 1993-2001	Aged 15-24 and 36 or more in 2001-1993+25 and older in 2000-1993
	AW3	Aged 25-35 in 2001	Aged 25 or more in 1993-2001	Aged 36 or more in 1993-2001 + 25 and older in 2000-1993

Table 8
Probability Of Being Hired With An Open-End Contract Conditional On Being Hired In The Previous 12 Months[1]

	Model W1		Model W2		Model AW1		Model AW2		Model AW3	
	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
treated	.016	1.37	.021	1.27	.007	0.45	.033	2.10	.042	2.36
treated*educ^2	.010	4.28	.011	3.57	.011	4.76	.012	3.79	.010	3.16
Age	.016	0.88	.331	.72	.045	6.44	.043	6.01	.013	.74
Age2	-.003	-0.68	-.001	-.68	-.001	-4.97	-.001	-4.59	.000	-.50
Age3	.000	0.53	.000	.64	.000	4.04	.000	3.74	.000	.35
Educ	-.001	-0.15	-.005	-.40	-.018	-3.57	-.019	-3.82	-.003	-.51
Educ2	-.001	-6.08	-.001	-5.70	-.001	-5.42	-.001	-5.55	-.001	-6.06
Age*educ^2	.001	5.06	.001	2.60	.001	9.99	.001	10.75	.001	5.68
Female	-.133	-20.6	-.110	-13.25	-.096	-18.15	-.096	-18.15	-.133	-20.6
1993	.077	5.80	.057	3.20	.087	7.97	.087	8.00	.078	5.85
1994	.040	3.12	.033	1.97	.055	5.25	.056	5.26	.041	3.15
1995	.069	5.76	.063	3.93	.063	6.23	.063	6.24	.070	5.79
1996	.032	2.61	.027	1.65	.041	4.00	.041	4.02	.032	2.63
1997	.032	2.67	.030	1.82	.034	3.33	.034	3.34	.033	2.69
1998	.003	0.28	.010	.62	.002	.28	.003	.30	.036	.31
1999	.004	0.39	-.001	-.09	.007	.75	.008	.76	.005	.40
2000	Reference		Reference		Reference		Reference		Reference	
2001	--		--		.012	.77	-.000	-.03	-.014	-.87
Number of observations	27847		16490		42367		42367		27847	

1. Probit model. ME stands for marginal effect. Data are from the October survey of each year, include regional and marital status dummies. 2. Scaled by the mean educ=10.24 years.

Table 9
Probability Of Being Hired With An Open-End Contract Conditional On Being Hired In The Previous 12 Months; Non Parametric Specification [1]

	Model W1		Model W2		Model AW1		Model AW2		Model AW3	
	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Treated	-.009	-.57	-.008	-.34	-.024	-1.20	-.006	-0.27	.007	0.29
Treated*high school	.029	1.49	.045	1.71	.031	1.55	.046	1.72	.043	1.69
Treated*college	.105	4.43	.107	3.62	0.11	4.51	.109	3.60	.104	3.58
High school	-.251	-.73	.035	.96	.214	0.96	.214	0.96	-.251	.345
College	-.486	-1.57	-.069	-1.44	-.457	-1.49	-.396	-1.35	-.416	-1.43
Female	-.133	-20.45	-.109	-13.11	-.096	-18.06	-.096	-18.08	-.133	-20.47
1993	.075	5.58	.056	3.14	.085	7.82	.085	7.82	.075	5.60
1994	.039	3.06	.034	1.96	.055	5.23	.055	5.23	.039	3.08
1995	.069	5.70	.063	3.90	.063	6.20	.062	6.20	.069	5.72
1996	.032	2.64	.027	1.65	.042	4.10	.042	4.11	.033	2.67
1997	.034	2.76	.030	1.87	.035	3.44	.035	3.44	.034	2.78
1998	.003	.29	.011	.68	.003	0.29	.003	.29	.004	.31
1999	.005	.46	-.001	-.04	.007	0.77	.007	.77	.006	.47
2000	Reference		Reference		Reference		Reference		Reference	
2001	--		--		.015	0.94	.004	.33	-.009	-.56
Number of observations	27817		16490		42335		42335		27817	

1. Probit model. ME stands for marginal effect. Data are from the October survey of each year, include age dummy fully interacted with school dummies: also include regional and marital status dummies

Table 10

Probability Of Being Hired With An Open-End Contract Conditional On Being Hired In The Previous 12 Months. Specification With Treated Group For Each Year [1]

	W1		W2		AW1		AW2		AW3	
	M.E.	T stat	M.E.	T stat	M.E.	T stat	M.E.	T stat	M.E.	T stat
Average effect										
2001	0.018	1.5	0.029	1.74	0.016	0.84	0.039	2.49	0.057	2.82
2000	Reference		Reference		0.018	1.02	0.020	1.26	0.027	1.3
1999	0.007	0.6	0.011	0.67	0.013	0.74	0.018	1.15	0.024	1.12
1998	0.005	0.4	0.018	1.11	0.024	1.34	0.039	2.48	0.050	2.39
1997	0.034	2.79	0.038	2.23	0.021	1.13	0.021	1.26	0.022	1.01
1996	0.034	2.72	0.036	2.15	0.002	0.11	0.007	0.4	0.019	0.83
1995	0.070	5.75	0.073	4.44	0.046	2.5	0.033	1.97	0.015	0.64
1994	0.041	3.16	0.041	2.36	-0.013	-0.68	-0.006	-0.33	0.014	0.59
1993	0.081	6.01	0.064	3.53	0.009	0.41	-0.021	-1.04	-0.028	-1.05
Interaction with school (2)										
2001	0.006	2.18	0.005	1.26	0.017	5.05	0.013	3.94	0.005	1.16
2000	0.002	0.31	0.001	0.05	0.010	2.95	0.008	2.23	0.000	-0.11
1999	-0.006	-2.03	-0.009	-2.15	0.004	1.09	-0.002	-0.54	-0.009	-2.29
1998	-0.003	-1.08	-0.006	-1.45	0.007	2.02	0.002	0.5	-0.006	-1.52
1997	-0.001	-0.35	-0.006	-1.27	0.009	2.45	0.002	0.5	-0.006	-1.37
1996	-0.003	-0.93	-0.008	-1.69	0.007	1.93	0.000	-0.02	-0.008	-1.84
1995	-0.007	-2.03	-0.010	-2.23	0.003	0.9	-0.002	-0.61	-0.010	-2.3
1994	-0.005	-1.65	-0.005	-1.13	0.005	1.29	0.003	0.65	-0.006	-1.28
1993	0.000	0.1	-0.004	-0.89	0.010	2.71	0.003	0.82	-0.005	-0.95
Year effect										
2001					0.020	1.11	0.009	0.68	-0.003	-0.16
2000					Reference		Reference		Reference	
1999					0.013	0.73	0.013	1.05	0.014	0.76
1998					0.001	0.04	-0.001	-0.1	-0.007	-0.4
1997					0.034	1.92	0.037	2.86	0.040	2.13
1996					0.052	2.99	0.050	3.83	0.043	2.23
1995					0.047	2.74	0.063	4.9	0.082	4.43
1994					0.074	4.22	0.068	5.11	0.052	2.66
1993					0.094	5.3	0.103	7.62	0.110	5.49

1. Model specified in table 8. Probit model. ME stands for marginal effect. Data are from the October survey of each year; in addition to the reported variables models include cubic in age, quadratic in year of schooling, interaction between age and year of schooling, female dummy and regional and marital status dummies. 2. Scaled by the mean educ=10.24 years.

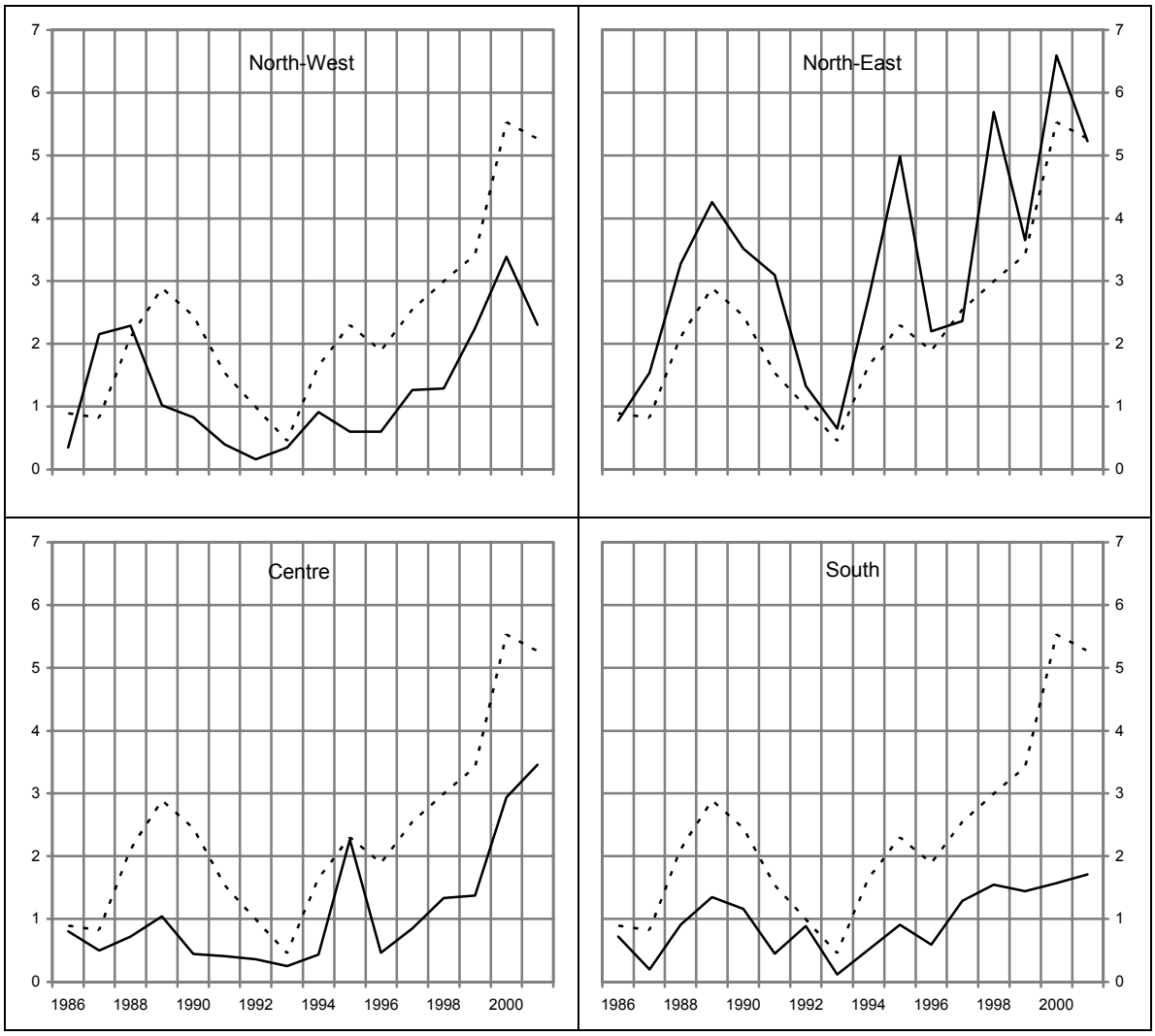
Table 11
Probability Of Being Hired With An Open-End Contract Conditional On Being Hired In The Previous 12 Months. Specification With Treated Group For Each Year[1]; Explaining Year 2000 Effects

		Model AW1					
		Basic		Basic and controls for northern regions		Basic and controls labor shortage	
		M.E.	T stat	M.E.	T stat	M.E.	T stat
Average effect	2001	0.016	0.84	0.017	0.9	0.017	0.91
	2000	0.018	1.02	0.018	1.02	0.021	1.17
	1999	0.013	0.74	0.015	0.84	0.015	0.86
	1998	0.024	1.34	0.025	1.43	0.023	1.32
	1997	0.021	1.13	0.023	1.24	0.020	1.09
	1996	0.002	0.11	0.002	0.11	0.002	0.09
	1995	0.046	2.5	0.050	2.74	0.046	2.54
	1994	-0.013	-0.68	-0.013	-0.67	-0.013	-0.67
	1993	0.009	0.41	0.011	0.52	0.011	0.54
Interaction with school(2)	2001	0.017	5.05	0.020	4.95	0.012	3.31
	2000	0.010	2.95	0.010	2.62	0.002	0.46
	1999	0.004	1.09	0.010	2.4	-0.004	-0.87
	1998	0.007	2.02	0.011	2.86	0.007	2.06
	1997	0.009	2.45	0.015	3.51	0.012	3.14
	1996	0.007	1.93	0.008	1.83	0.014	3.29
	1995	0.003	0.9	0.014	3.15	0.008	2.01
	1994	0.005	1.29	0.007	1.51	0.006	1.7
	1993	0.010	2.71	0.018	4.14	0.018	3.94
Labor shortage indicator* schooling(2)						0.004	3.1
Interaction with school (2) in the northern regions	2001			-0.005	-1.21		
	2000			-0.001	-0.16		
	1999			-0.011	-2.53		
	1998			-0.009	-2.02		
	1997			-0.012	-2.46		
	1996			-0.002	-0.34		
	1995			-0.019	-3.82		
	1994			-0.003	-0.62		
	1993			-0.017	-2.95		
Year effects	2001	0.020	1.11	0.020	1.11	0.021	1.18
	2000						
	1999	0.013	0.73	0.013	0.74	0.013	0.76
	1998	0.001	0.04	0.001	0.04	0.004	0.22
	1997	0.034	1.92	0.034	1.92	0.037	2.11
	1996	0.052	2.99	0.052	2.99	0.055	3.16
	1995	0.047	2.74	0.047	2.75	0.049	2.85
	1994	0.074	4.22	0.074	4.22	0.076	4.36
	1993	0.094	5.3	0.094	5.3	0.094	5.29

1. Model AW1 of table 10. Probit model. ME stands for marginal effect. Data are from the October survey of each year; in addition to the reported variables models include cubic in age, quadratic in year of schooling, interaction between age and year of schooling, female dummy and regional and marital status dummies. 2. Scaled by the mean educ=10.24 years.

Figure 11

Share Of Manufacturing Firms With Difficulties In Recruiting Labor Force



----- Italy —Specified geographical area

Source: Isae

Figure 12

Estimated Change In Probability Of Being Hired With An Open-End Contract For The Treated Group (Reference: Year 2000).

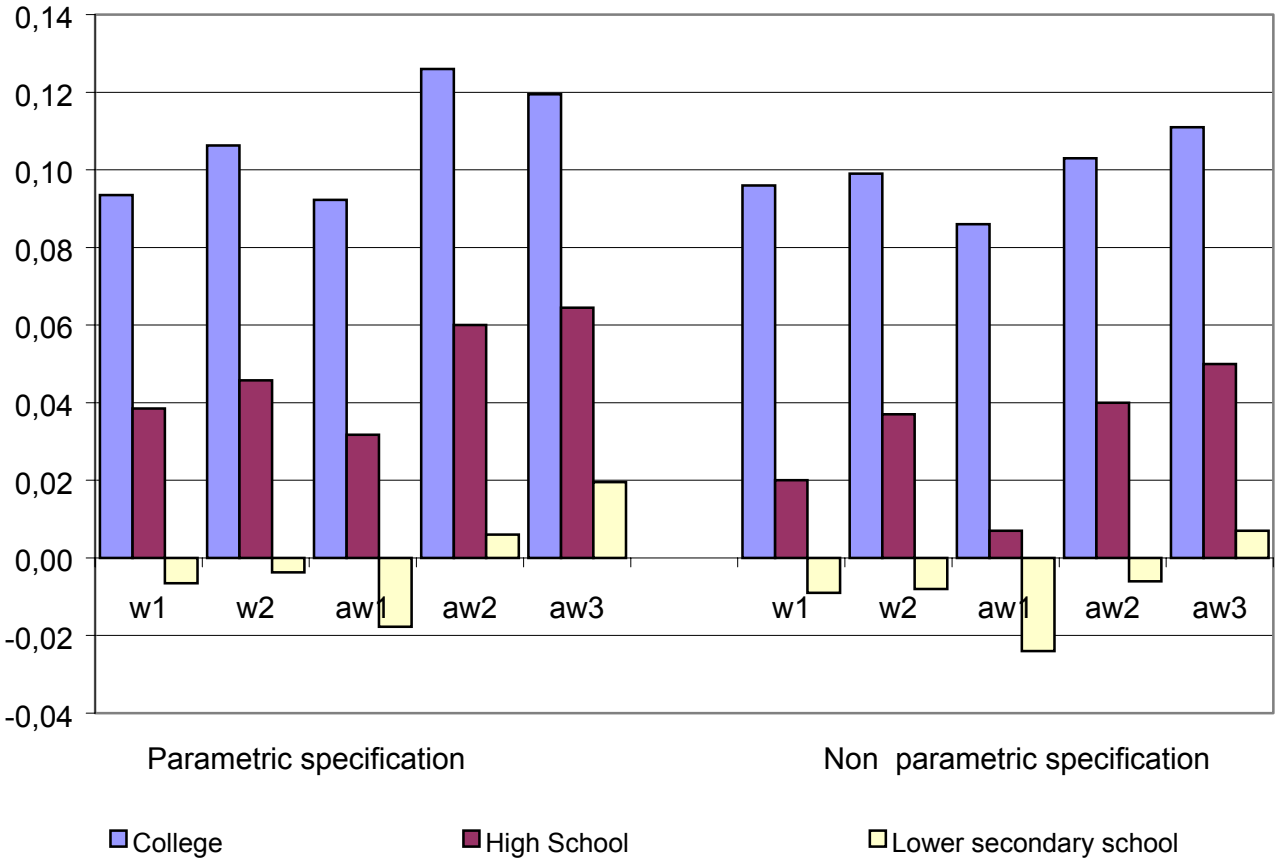


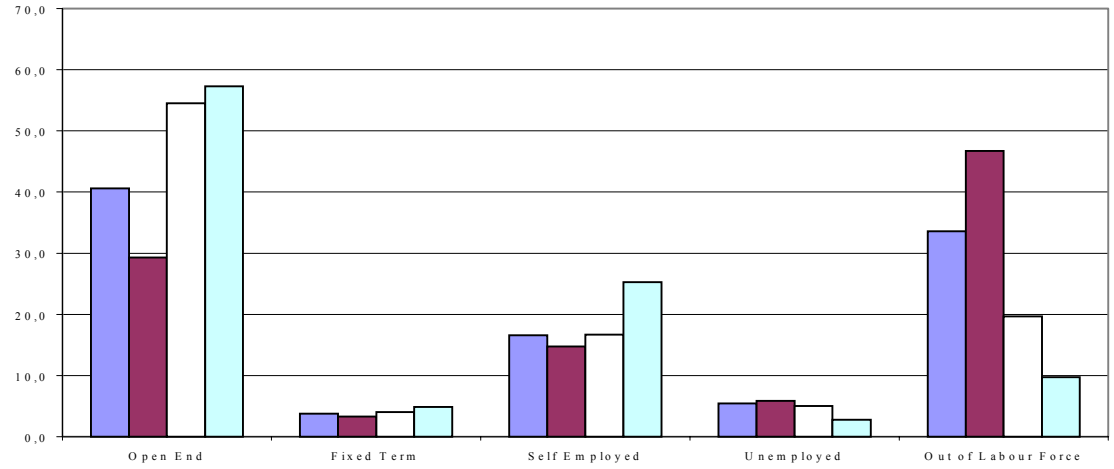
Table 12
Probability Of Being Hired in The Previous 12 Months[1]

	Model W1		Model W2		Model AW1		Model AW2		Model AW3	
	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
treated	0.002	1.68	0.01	2.23	0.003	1.34	0.001	0.74	0.005	2.48
Age*100	0.007	0.04	7.58	0.63	2.88	45.39	2.88	44.91	0.002	0.01
Age2*100	0.018	4.26	-0.19	-0.48	-0.05	-29.30	-0.05	-28.92	0.018	4.32
Age3*100	-0.03	-10.11	0.02	0.36	0.02	13.06	0.02	12.88	-0.03	-10.2
Educ*100	-0.25	-4.87	-3.01	-9.61	-0.67	-15.49	-0.67	-15.50	-0.25	-4.89
Educ2*100	0.02	9.13	-0.01	-1.72	0.02	10.60	0.020	10.58	0.02	9.08
Age*Educ^2*100	0.01	14.09	0.13	13.31	0.02	10.60	0.020	28.36	0.01	14.15
Female	-0.11	-120.5	-0.17	-63.6	-0.09	28.30	-0.085	-111.8	-0.11	-120.5
1993	-0.012	-9.23	-0.035	-8.28	-0.013	-11.15	-0.013	-11.13	-0.012	-9.22
1994	-0.015	-12.03	-0.039	-9.46	-0.016	-13.20	-0.016	-13.19	-0.015	-12.0
1995	-0.012	-9.28	-0.028	-6.61	-0.012	-9.97	-0.012	-9.96	-0.012	-9.28
1996	-0.012	-9.77	-0.028	-6.55	-0.014	-11.50	-0.014	-11.49	-0.012	-9.77
1997	-0.012	-9.17	-0.029	-6.88	-0.012	-10.46	-0.012	-10.45	-0.012	-9.17
1998	-0.011	-8.93	-0.022	-5.26	-0.010	-8.77	-0.010	-8.77	-0.011	-8.93
1999	-0.007	-5.15	-0.014	-3.22	-0.007	-5.64	-0.007	-5.64	-0.007	-5.15
2000	Reference		Reference		Reference		Reference		Reference	
2001	--		--		-0.002	-0.89	-.000	-0.11	0.000	0.03
Nobs	488374		140178		684061		684061		488374	
Mean dep.var.	0.106		0.177		0.102		0.102		0.106	

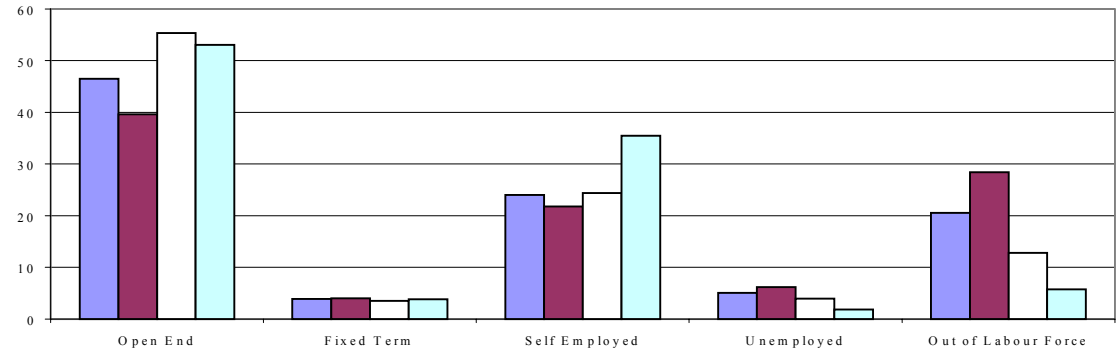
1. Probit model. ME stands for marginal effect. Data are from the October survey of each year, include regional and marital status dummies. 2) scaled by the mean educ==10.3 years

Figure 13
Equilibrium Workers' Distribution among labor market statuses estimated on the basis of 1999 to 2000 transition matrix
(*Percentage points*)

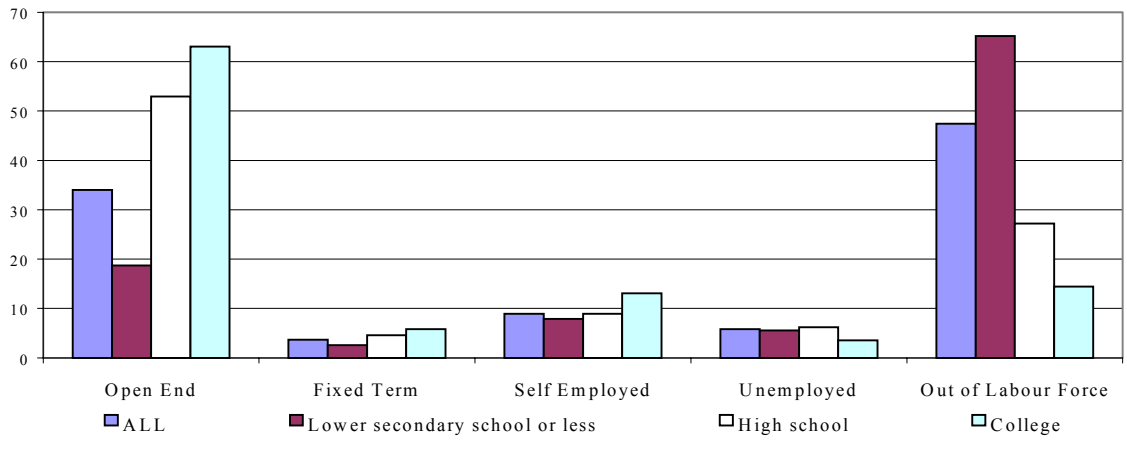
Panel a: All



Panel b: Males



Panel c: Females



Source: Authors' calculations on Istat data.

Table 13

Probability Of Being Hired With An Open-End Contract Conditional On Being Hired In The Previous 12 Months: alternative estimation methods[1]

	Model W1		Model W2		Model AW1		Model AW2		Model AW3	
	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Probit model										
Treated	.016	1.37	.021	1.27	.007	.45	.032	2.10	.042	2.36
Interaction with educ[2]	.010	4.28	.011	3.57	.011	4.76	.012	3.79	.010	3.16
Linear probability model										
Treated	.016	1.35	.020	1.27	.010	.60	.033	2.15	.040	2.27
Interaction with educ[2]	.010	4.26	.011	3.58	.011	4.78	.012	3.87	.010	3.18
Instrumental Variables										
Treated	.019	1.49	.024	1.41	.004	.20	.034	2.05	.052	2.64
Interaction with educ[2]	.011	4.80	.014	4.08	.012	5.22	.014	4.33	.012	3.71

1) Data derive from the October survey of each year and include regional and marital status dummies. 2) scaled by the mean educ=10.24 years