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# Two Tier Reforms of Employment Protection: A Honeymoon Effect?<sup>1</sup>

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### **Abstract**

Labor market reforms increasing flexibility at the margin have been recently paying out in terms of employment growth. This paper argues that two-tier labor market reforms have a transitional honeymoon, job creating effect. In a dynamic model of labor demand under uncertainty, the paper predicts that in the aftermath of reforms, beyond an increase in employment, there should be a reduction in employment inaction and in the mean and cross sectional variance of labor productivity. Based on a variety of firm-level data on Italy in the period 1995-2000, we find evidence of our empirical implications.

JEL Classification: J30

Keywords: Labour demand, firing costs, employment protection reform

Over the last few years several European countries experienced protracted employment growth despite moderate output growth. This performance stands in sharp contrast with the "jobless growth" of the 1980s and mid 1990s. To date, no satisfactory explanation has been offered for this sea change in the responsiveness of employment to output growth.

This paper argues that there is a link between growthless job creation and the asymmetric labour market reforms in Employment Protection Legislation (EPL) carried out in several European countries in the 1990s. Such reforms introduced two tier systems, as the increase labour market flexibility took place mainly through a series of *marginal* reforms that liberalized the use of *temporary* (fixed term) contracts while leaving largely unchanged the legislation applying to the stock of workers employed under *permanent* (open-end) contracts.

While the effects of EPL on labour demand have been thoroughly investigated, the theoretical literature has devoted much less attention to the transitional dynamics of such two tier reform strategies. The traditional analysis goes back to the framework of labour demand under uncertainty pioneered by Nickell (1986) and extensively analysed by Bentolila and Bertola (1990) and Bertola (1990). In general, one should not expect any sizeable permanent employment effect associated with EPL reforms. The reduction in EPL is bound to increase employment volatility over the business cycle, but should not have any obvious effect on average labour demand. This is because EPL affects both the incentives to hire and to dismiss workers, and there is no reason to expect a-priori that one effect could dominate the other. Messina and Vallanti (2007) recent evidence on job turnover confirms these predictions

The political economics of marginal reforms has been extensively analysed by Saint-Paul (1997, 2002) who showed that marginal labour market reforms offer a viable mechanism to win the political opposition of insider workers. More recently, Blanchard and Landier (2002) argued that the macroeconomic effects of marginal flexibility may be perverse, since they involve high turnover in fixed term jobs, leading in turn to higher, rather than lower, unemployment. Similar results were obtained by Cahuc and Postel-Vinay (2002).

All these studies focus mainly on the steady state effects of the reforms. Little research has been carried out on the transitional dynamics of EPL reforms, and, to the best of our knowledge, no research at all on the productivity effects of these reforms.<sup>1</sup>

This paper looks empirically and theoretically into the transitional effects of marginal EPL reform. Theoretically, it focuses on a standard labour demand problem under uncertainty and argues that a move from a fully rigid to a two tier regime should indeed be associated with a transitional increase in employment, and a fall in average productivity. Empirically, it uses macro data to describe the employment and output dynamics in several countries that experienced marginal EPL reforms, and a variety of micro data on Italian firms to look closely at the employment and output dynamics at the firm level.

The results are as follows. Theoretically, the paper solves a dynamic and stochastic labour demand problem with decreasing returns to scale, natural turnover and large firing costs. In this setting, employment

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<sup>1</sup>Autor et al. (2007) study the productivity effects of EPL across U.S. states and find that more stringent EPL reduces productivity, but they do not focus on two tier reforms.

dynamics is described by instantaneous hiring in favorable business conditions followed by optimal inertia through natural turnover in adverse business conditions. When temporary contracts are suddenly introduced, the firm exploits any hiring flexibility in good business conditions, but *can not* exploit downward flexibility in bad times, since it is constrained by the stock of insider workers. As a result, the lower the attrition, the larger is employment growth during the transition. The model predicts the emergence of a *honeymoon* effect in employment. Eventually, the employment gains are dissipated by the decline of insider workers. The model predicts also a fall in average productivity in the aftermath of the reform, as a consequence of decreasing marginal returns. As the firm expands in good periods, its employment pool increases along a downward sloping labour demand, with additional workers who are less productive at the margin.

Empirically, we first provide the key macro facts of employment behaviour in countries that experience marginal reforms. Our analysis complements here the findings of Garibaldi and Mauro (2002), who found that the employment intensity of growth in Europe had increased since the second half of the nineties. We find that countries having introduced flexibility at the margin experienced an increase in the employment content of growth *after* the reforms. We also find that temporary contracts accounted for a large component of the jobs created *after* the reforms. In the final part of the paper, we use a variety of firm-level data to assess some of the key empirical implications of our analysis. We find that the Italian labour market experienced a decline in inaction as temporary contracts expanded and a negative association between average productivity and temporary contracts. Looking at the employment behaviour of a panel of roughly 1,300 Italian firms between 1995 and 2000, we find a sizeable negative effect of temporary contracts on changes in productivity at the firm level, even when we control for industry, size and region effects, as well as the skill level of the workforce. We also find that the time-series and cross-sectional properties of firm-level employment growth are in line with the empirical implications of our model.

The paper proceeds as follows. Section 2 presents the basic stylized facts of employment and output dynamics in countries that experienced marginal labour market reforms. Sections 3 and 4 present the theoretical model. In particular, Section 3 presents the main results regardless of the role of attrition, while Section 4 solves the general model when attrition is explicitly taken into account. Section 5 uses micro data on two panels of Italian firms to assess some empirical implications of the model.

## 1 Employment Gains and Marginal Reforms: The Basic Facts

Economic theory on the effects of Employment Protection Legislation yields predictions as to labour market adjustment in environments having a varying strictness of EPL involving *all* workers. However, many EPL reforms are asymmetric in that they change regulations only for a subset of the eligible population. As discussed extensively by Saint-Paul (1997), this unbundling of reforms is a viable strategy when there are strong political obstacles to reducing EPL.

In order to select the countries that experienced two tier reforms we draw on the EPL index of the

strictness of legislation compiled by the OECD (2004) on the basis of an assessment of national legislations. In particular, we define as  $I_t^{ij}$  the index of EPL strictness in country  $i$  for employment of type  $j$ . The employment type  $j$  can be either  $j = P$  or  $j = T$  where the former refers to permanent (open end) contracts while the latter to temporary (fixed term) contracts. Larger values of the index correspond to more stringent legislation. A two tier reform leaves unchanged the strictness of employment protection for permanent contracts while it reduces the strictness of EPL for temporary contracts. Formally, we define a two tier reform occurring between time  $t$  and time  $t - 1$  as

$$Two\ tier_t^i = \begin{cases} I_t^{iP} = I_{t-1}^{iP} \\ I_t^{iT} < I_{t-1}^{iT} \end{cases}$$

The emergence of the two tier reforms can be well characterized by Fig.1. The figure on the left-hand-side analyses the evolution of the OECD indicator of the strictness of EPL (OECD, 2004) for permanent contracts ("regular" workers in the OECD definition) between the late 1980s and 2003, while the figure on the right-hand-side concerns the evolution of regulations on temporary contracts over the same time-period. A very few countries are located below the bisecting line through the origin in the figure on the left-hand-side, suggesting that norms on permanent contracts were not changed, while quite many countries are below the 45 degrees line in the figure on the right-hand-side, pointing to several episodes of liberalisation of temporary contracts. From Fig. 1 it appears that the countries that experienced a two tier reform between the late 1980s and the early 2000s are Belgium, Germany, Italy, The Netherlands, Sweden and Portugal. In the remainder we exclude Germany from the sample of two tier reformers since the unification shock experienced during the 1990s would call for splitting the data between Eastern Germany and western Germany, an exercise that is not easily doable for both employment (by contractual type) and output statistics. Further, our analysis will also consider Spain: even though in the period covered by data, Spain actually tightened the regulation on temporary contracts, it experienced a dramatic two tier reform early in the 1980s, and is indeed considered by many scholars "the country" of temporary contracts (Bentolila and Dolado, 1994). We thus believe that Spain should be included in the sample of two tier reformers. To sum up, the countries that are analysed in this section are Belgium, Italy, the Netherlands, Portugal, Spain and Sweden.

While the OECD index allows us select the set of countries to analyse, it does not provide the dates in which the two tier reforms were implemented. The OECD index compiled statistics for 3 different points in time, namely late 1980s, late 1990s and early 2000s. In order to be more precise about the dates of these reforms, we used then the *frdb* inventory of social policy reforms<sup>2</sup>. The dataset classifies each regulatory change in EPL as radical or marginal reforms, where the latter coincides with the two tier reforms identified above. In all countries there is more than one reform, as the liberalisation process was rather gradual. In what follows we identify reform dates on the basis of the most important regulatory change in this sequence of reforms. Annex 1 offers details about the EPL reforms carried out in each of the above 6 countries.

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<sup>2</sup>See [www.frdb.org](http://www.frdb.org) for details

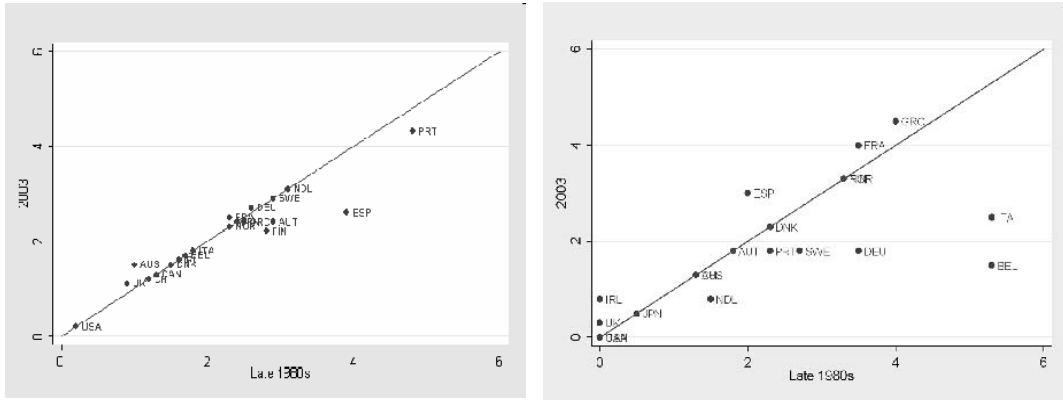


Figure 1: Index of regulation of permanent contracts (left) and temporary contracts (right)

The institutional details provided therein indicate very clearly that the liberalization was fairly gradual and occurred as a sequence of incremental reforms in all countries. To give an example, in Italy, the country taken as reference in the last section of the paper, the most significant reform took place in 1997, but temporary contracts had been introduced up to 10 years before that date. The initially low take up of these contracts was due to the fact that their introduction was conditional on collective agreements. Hence, the growth of temporary contracts was constrained by the timing of the renewals of collective agreements and by the resistance of unions to the expansion of the new contractual arrangements. For all these reasons, there is not a unique date for these reforms. They occurred as a sort of continuous process.

With those caveats in mind, Table 1 compares the pre-reform and the post-reform periods in each of the above 6 countries, documenting the following three macrofacts characterizing the aggregate labour markets in the countries undergoing a two tier reform:

1. an acceleration of employment growth;
2. an increase in the employment content of growth (involving a declining labour productivity growth);
3. a significant contribution of temporary contracts to aggregate employment growth.

The increase in employment growth is documented in the third column of Table 1, which displays the average yearly growth of total employment ( $g_E$ ). The acceleration is particularly evident in the reforming Olive Belt countries (Italy, Spain and Portugal) and in Sweden that moved from negative to positive employment growth. The Netherlands is the only country that did not experience an acceleration of employment growth, which nevertheless remained around 1 percent throughout the period. The Dutch economy had already embarked on a large scale substitution of full-time with part-time jobs in the decade before the EPL reforms.

The fourth column of Table 1 characterizes the second fact, that is, the increase in the employment intensity of growth. In particular, the apparent employment-to-output elasticity before and after the reforms

Table 1: Employment and Output Before and After the Reforms

Country	Time Period	Employment Growth <sup>a</sup> $g_E(\%)$ ;	Employment to Output elast. <sup>b</sup>	Temporary Emp. Growth <sup>c</sup> ( <sup>''</sup> 000); $\Delta ETt$	Contribution of Temporary jobs <sup>d</sup> $\frac{\Delta ETt}{E_0}$
Belgium	1987-1996	1.12	0.40	22.7	0.66
	1997-2005	1.36	0.64	135.3	3.54
	$\Delta$	0.25	0.24	112.6	2.89
Italy	1987-1997	-0.22	-0.10	402.9	0.02
	1998-2005	1.61	1.84	823.2	4.11
	$\Delta$	1.85	1.95	420.3	4.09
The Netherlands	1987-1995	3.73	0.29	340.1	5.79
	1996-2005	0.75	1.24	288.8	3.80
	$\Delta$	-2.98	0.95	-51.3	-2.00
Portugal	1987-1996	0.42	0.10	-168.9	-4.10
	1997-2005	2.18	1.01	431.8	10.09
	$\Delta$	1.76	0.91	600.6	14.19
Spain	1981-1984	-1.20	-0.74	0	0
	1985-1995	1.30	0.38	3377.1	28.50
	$\Delta$	2.50	1.12	3377.1	28.50
Sweden	1987-1996	-1.02	-0.70	-138.9	-3.22
	1997-2005	1.35	0.41	189.2	4.82
	$\Delta$	2.37	1.11	328.1	8.04
<sup>a</sup> Aggregate employment growth (in percentage). <sup>b</sup> Apparent elasticity: employment growth on output growth. <sup>c</sup> Cumulative variation of temporary jobs (in thousands). <sup>d</sup> Contribution of temporary jobs on total initial dependent employment. Source: OECD, LFS Database and Country Profile Database					

is tabulated. In all countries the difference between the two elasticities is positive. Countries like Italy, Spain and Sweden move from a zero or negative employment-to-output elasticity (employment declining at times of positive real GDP growth) to an apparent elasticity well above zero. As output growth decelerated in many of these countries, this regime change has often been labelled as a shift from *jobless growth* to *growthless job creation*.

Finally, the last two columns of Table 1 point to the third common denominator of these country experiences, namely the strong contribution offered by temporary contracts (including fixed term contracts, according to the definition provided by Eurostat) to dependent employment. Net variations in the stock of temporary workers were large both in absolute terms (forth column) and relative to the stock of employees at the beginning of the period (fifth column). In Spain, in particular, 3.3 million jobs were created in the *contractos temporales*, contributing to a net growth of almost 30 per cent in the stock of employees.

Notice that employment growth was *not* concentrated in low skilled positions. With the exception of



Portugal, Eurostat records a decline in the total number of employees with primary or lower educational attainments. This is relevant in discussing the labour productivity developments in the various countries.

## 2 Marginal Reforms and Labour Demand

### 2.1 *Permanent Contracts with Fixed Wages*

We consider a pure labour demand model with a single factor of production. The model is in line with the classic dynamic labour demand model with costs of adjustment under uncertainty developed by Nickell (1986) and Bertola (1999), even though most results can be obtained within the static version of the model described by Schivardi (2000) and Garibaldi (2006).

Labour is the only factor of production and is homogenous. There are decreasing returns to scale and the production function at time  $\tau$  for a representative firm reads

$$y_\tau = A^i \log l_\tau, \quad (1)$$

where  $l_\tau$  is labour,  $y_\tau$  is output and  $A^i$  is the productivity level.

There are business fluctuations in the productivity of the firm;  $A^i$  assumes only two values  $A^h > A^l$ . Shocks to the productivity are *i.i.d.* In every period, there is a probability  $p$  that productivity be equal to  $A^h$  and a probability  $1 - p$  that productivity be equal to  $A^l$ ; we refer to periods in which the productivity is  $A^h$  as *good times*, while periods in which the productivity is equal to  $A^l$  are *bad times*. Fluctuations in  $A^i$  are akin to fluctuations in the marginal product.

The *i.i.d.* shocks to productivity are firm specific and idiosyncratic. We assume that there is a continuum of firms and in each instant a fraction  $p$  of the firms is in the good productivity state and a fraction  $1 - p$  is in the bad productivity state. As a result, the aggregate conditions are unchanged. While the production function of equation (1) describes both type of firms, the average employment of the representative firm corresponds to average aggregate employment.

The wage  $w$  is constant under good and bad business conditions. We discuss later on and in the empirical section other possible interpretations. The price that the firm charges for simplicity is set equal to 1 and does not change between good and bad times. The key firm decision is the quantity of labour to be hired.

The time horizon is infinite and the firm faces a pure time preference  $r$  as well as an exogenous turnover rate  $\delta$ . This implies that the expected profits can be written as

$$E\Pi_{\{l_\tau\}_{\tau=0,\dots,\infty}} = \sum_{\tau=0}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} [pA^h \log l_\tau + (1-p)A^l \log l_\tau - wl_\tau]$$

To focus on the main intuition, this section analyses the model when the exogenous turnover rate  $\delta$  is equal to 0 while in Section 4 we extend the model to the case where  $\delta > 0$ .

We initially consider two different scenarios under which the firm operates: the flexible regime and the rigid regime. Their key characteristics can be summarised as follows. In the *flexible regime*, hiring and firing

can take place at no cost, and the firm can choose its employment level after observing the realization of the value of  $A$ . The firm in the flexible regime hires workers on a *temporary basis* and can freely dismiss workers at no costs. In the *rigid regime*, the firm can only choose the average employment, and can offer only permanent contracts that can never be broken. Firing is unboundedly expensive.

In section 3.2 we consider a *two tier regime*, characterised by flexible contracts with a stock of permanent contracts. In such a regime, which involves the possibility that the firm combines *temporary* and *permanent* contracts, we derive the intuition of our results. Section 4 considers the role of the exogenous turnover rate and simulates the dynamic transition of a firm toward a two tier regime.

**Flexible Regime or First Best.** We first consider the behaviour of the firm if there were no restrictions on the type of contracts and the firm could choose employment after observing the productivity level.

In the frictionless scenario the firm chooses employment  $l_\tau$  in each period, conditional on the realization of the productivity shock at time  $\tau$ . The expected profits conditional on the time  $\tau$  realization of the shock are

$$\Pi_{\{l_\tau, A^i\}} = A^i \log l_\tau - w l_\tau + E \Pi_{\{l_k\}_{k=1, \dots, \infty}}$$

so that by simple differentiation the optimal employment reads

$$\begin{aligned} \frac{\partial \Pi_{\{l_\tau, A^i\}}}{\partial l_\tau} &= 0 \\ l^{*i} &= \frac{A^i}{w} \quad i = h, l; \forall \tau \end{aligned}$$

In this case the model is analogous to a static problem of labour demand, with the wage rate equal to the marginal product. Note also that the discount rate  $r$  does not play any role in the determination of optimal employment at time  $\tau$ .

As the wage is fixed and equal to  $w$ , the flexible firm will fire (hire)  $\Delta l = \frac{A^h - A^l}{w}$  when it moves from high (low) productivity to low (high) productivity. Because a fraction  $p$  of firms are high productivity and a fraction  $(1 - p)$  are low productivity, the average aggregate employment is simply a weighted average of the two static employment levels

$$\bar{l}^F = \frac{(1 - p)A^l + pA^h}{w}$$

**Rigid Regime.** Let us now examine the behaviour of the firm when it is forced to hire only permanent contracts that can never be broken. This implies that the firm must choose a level of employment before the realization of the shock and in such a way that the employment level can never be adjusted. We thus assume that the firm must choose the level of employment without even knowing the realization of the shock in the initial period. The rigid firm can only choose the employment maximizing the expected value of the profits. When the attrition rate is 0, the expected profits of the rigid firm can be written as

$$E \Pi_{\{l^R\}} = \sum_{\tau=0}^{\infty} \frac{1}{(1+r)^\tau} [pA^h \log l^R + (1-p)A^l \log l^R - w l^R] \quad (2)$$

where  $l^R$  is optimal *rigid* employment. The formal derivation of  $l^R$  is the result of  $\frac{\partial E\Pi_{\{l^R\}}}{\partial l^R} = 0$  and reads

$$l^R = \frac{pA^h + (1-p)A^l}{w} \quad \forall \tau \quad (3)$$

The value  $l^R$  is some average between the level of employment in the flexible economy during the expansions and its level during recessions. Moreover,  $l^R$  coincides with  $A^l/w$  if the economy is always in low productivity ( $p = 0$ ). Since all firms are identical, equation (3) describes also aggregate employment. We are now in the position to derive three implications on the effect of the employment protection regimes.

- Implication 1: average employment under the rigid regime is the same as under the flexible regime;
- Implication 2: the volatility of employment is higher in the flexible regime;
- Implication 3: the firm and the aggregate economy in the flexible regime are more efficient and profits are higher.

Implication 1 is immediately verified. We have seen that  $l^R = \bar{l}^F$ , or that average employment in the flexible regime is the same as in the firm in the rigid environment. Implication 2 is also easy to show. By construction, in the rigid regime there are no employment variations, while the flexible economy in every period fires (hires)  $\Delta l = \frac{A^h - A^l}{w}$  as its firms transit from the low to the high productivity state. Implication 3 is also easy to demonstrate: the employment level chosen by the flexible employer in each period is the only level that maximizes profits *in each period*. Consequently, in each period profits are higher in the flexible regime. With the same level of employment, the flexible economy is able to make, on average, a higher level of profits and is more efficient.

## 2.2 Two Tier Regime: Flexible Contracts with a Stock of Insiders

We now consider a two tier regime. The idea works as follows. Starting from the rigid setting, we let the firm enjoy “marginal flexibility”. We assume that unexpectedly the firm can hire and fire workers on a temporary basis, but, at the same time, it cannot break the existing stock of permanent contracts. In reality, such contracts do expire through natural turnover. We consider such a possibility in Section 4.

Formally, we have a stock of permanent workers equal to  $l^R$ , whose contract can never be broken and acts as a constraint to the firm. The formal value of  $l^R$  is given by equation 3. A firm that has suddenly the option to hire temporary workers should exploit this possibility. In good times the firm should hire temporary workers up to the optimal employment level in the frictionless regime, and dismiss such workers in bad times. Three key results emerge

- average employment increases permanently;
- average productivity falls permanently;

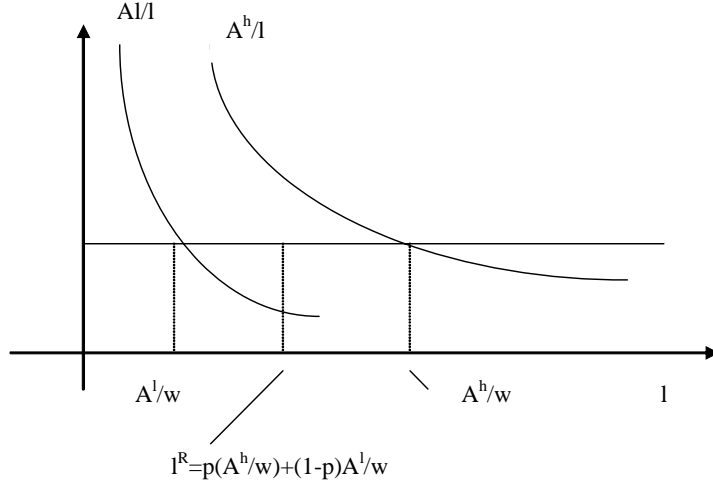


Figure 2: Employment in the Flexible and Rigid Regimes.

- average profits increase permanently.

Let us consider the two tier regime suddenly introduced at time  $\tau$  after the firm had experienced  $\tau - 1$  periods in the rigid regime. The firm hires a quantity of rigid employment  $l^R$  and of temporary employment  $l_\tau^{temp}$  to maximize

$$\begin{aligned} \Pi_{\{l^R, l_\tau^{temp}, A^i\}_{\tau=0}}^\infty &= [A^i \log(l^r + l_\tau^{temp}) - w(l^r + l_\tau^{temp})] \\ &+ \sum_{k=1}^\infty \frac{1}{(1+r)^k} [pA^h \log(l_{\tau+k}^{temp} + l^r) + (1-p)A^l \log(l_{\tau+k}^{temp} + l^r) - w(l_{\tau+k}^{temp} + l^r)] \\ & \text{s.t. } l_{\tau+k}^{temp} \geq 0 \quad \forall k \\ & l^R = \frac{(1-p)A^l + pA^h}{w} \end{aligned}$$

From simple differentiation it follows that  $l_\tau^{temp}$  is such that

$$\frac{A^i}{l_\tau^{temp} + l^R} = w \quad A^i = l, h$$

from which it follows that

$$l_\tau^{temp} = \begin{cases} \text{Max}[-\frac{p(A^h - A^l)}{w}; 0] & \text{if } A^i = A^l \\ \text{Max}[\frac{(1-p)(A^h - A^l)}{w}; 0] & \text{if } A^i = A^h \end{cases}$$

$$l_\tau^{temp} = \begin{cases} 0 & \text{if } A^i = A^l \\ \frac{(1-p)(A^h - A^l)}{w} & \text{if } A^i = A^h \end{cases}$$

We now establish the three results. The first refers to an increase in average employment, or  $l^w > l^R$  where  $l^w$  is average employment in the two tier regime. As a fraction  $p$  of firms are in good times and a fraction  $1 - p$  in bad times, average employment  $l^w$  is given by  $l^w = l^R + \frac{p(1-p)(A^h - A^l)}{w}$  which is necessarily larger than  $l^R$  as long as  $p > 0$ . As the firm can not hire a negative amount of temporary workers in bad times, it can only exploit upward flexibility in good times. There is an everlasting honeymoon effect on employment.

To establish the results on average productivity we first define the value of average productivity in the rigid and the two tier regime as, respectively,

$$\left(\frac{y}{l}\right)^R = \frac{pA^h \ln l^R + (1-p)A^l \ln l^R}{l^R}$$

and

$$\left(\frac{y}{l}\right)^w = (1-p)\frac{A^l \ln l^R}{l^R} + p\frac{A^h \ln \frac{A^h}{w}}{\frac{A^h}{w}}$$

For  $\left(\frac{y}{l}\right)^R > \left(\frac{y}{l}\right)^w$  it is necessary that

$$\frac{\ln l^R}{l^R} > \frac{\ln \frac{A^h}{w}}{\frac{A^h}{w}}$$

which is satisfied as long as  $\frac{A^h}{w} > e$ . Fig. 3 provides a graphical representation of this result. The intuition of the productivity result is a simple application of the law of diminishing return. Since firms in good times expand in a region in which the marginal productivity of labour is decreasing, the average productivity must necessarily fall. The technical condition  $\frac{A^h}{w} > e$  ensures that the region in which output has negative value does not influence the result. Indeed, if the production function were crossing the origin the condition would not even be necessary.

The results on profits are self-evident. Since the firm enjoys the first best profits in good times, while in bad times it enjoys the same profits as in the fully rigid regime, average profits necessarily increase.

### 3 The Honeymoon Effect with Attrition

Before turning to the model with attrition, we consider the role of the discount rate  $r$  in the rigid regime when employment is chosen conditional on the state of the economy in the initial period. While in the model of equation (2) employment  $l^R$  is chosen under a veil of ignorance, we now assume that the permanently rigid employment level  $\tilde{l}^r$  is chosen when the economy is in the good state  $A^i = A^h$ , so that the problem reads

$$\text{Max}_{\tilde{l}^r} \Pi(A^h, \tilde{l}^r) = A^i \log \tilde{l}^r - w\tilde{l}^r + E\Pi_{\{i^R\}_{k=1, \dots, \infty}}$$

whose solution is

$$\tilde{l}^r = \frac{A^h + \frac{pA^h}{r} + \frac{(1-p)A^l}{r}}{w[1 + \frac{p}{r} + \frac{1-p}{r}]} > l^r \quad (4)$$

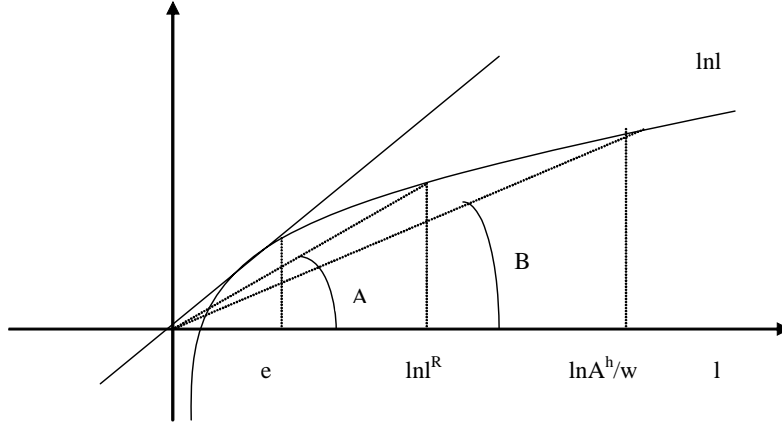


Figure 3: Average Productivity with a Two Tier Reform

Not surprisingly, when the firm chooses the rigid employment level conditional on a good productivity shock, the employment level is larger than that of equation (3). This is due to the effect of discounting, and one can easily show that  $\frac{\partial \tilde{l}^r}{\partial r} > 0$ , since the larger the discount rate, the lower the cost associated to bad business conditions in the future. One can also show that the permanently rigid employment level (4) coincides with employment in good business conditions in the frictionless economy when the discount rate tends to infinity ( $\lim_{r \rightarrow \infty} \tilde{l}^r = l^{*h}$ ).

We are now in a position to investigate the effect of positive attrition and assume that workers previously hired leave the firm at rate  $\delta > 0$ . We initially work with the scenario where only permanent contracts are allowed, and firing is impossible, or it is so costly that it never happens in equilibrium; there is, however, employment attrition at rate  $\delta$ , where  $\delta$  is the spontaneous (and costless) attrition of additional employment through quits and retirements.

The expected profits in this case are

$$\Pi_{\{l_0, A_0=A^i\}} = A^i \log l_0 - w l_0 + \left[ \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} [p(A^h \log l_{t+\tau} - w l_{t+\tau}) + (1-p)(A^l \log l_{t+\tau} - w l_{t+\tau})] \right]$$

Under our very specific productivity shocks, with only two values of the productivity parameter  $A^i$ , the optimal policy is such that the firm hires in good times and let employment decline by natural turnover in bad times. The firm will have a target employment level in good times, that we label  $l^u$  so that the employment dynamics reads

$$l_t = \begin{cases} l^u & \text{if } A^i = A^h \\ (1 - \delta)l_{t-1} & \text{if } A^i = A^l \end{cases}$$

In light of the attrition rate  $\delta$ , we need to take into account all possible successive sequences of employment reductions through natural turnover in bad times, as well as their attached probabilities. The expected profits in good business conditions are

$$\begin{aligned} \Pi_{\{l^u, A^h\}} = & A^h \log l^u - wl^u + \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} p(A^h \log l^u - wl^u) + \\ & \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} \left[ (1-p) \left( A^l \sum_{j=0}^{\tau-1} \binom{\tau-1}{j} (1-p)^j p^{(\tau-1)-j} [\log l^u (1-\delta)^{j+1} - wl^u (1-\delta)^{j+1}] \right) \right] \end{aligned} \quad (5)$$

The first term on the right-hand-side of (5) is simply the current marginal profits. The second term refers to the expected profits when the economy is in good times and the firm jumps to  $l^u$ . In the second line of (5) we consider the situation in bad business conditions, when the firm let employment decline at rate  $\delta$ : the size of the profits depends on how long the firm has been experiencing an unfavorable business condition. The last term should be interpreted as follows. The longer the spell, the larger the employment reduction, and the Bernoulli distribution takes into account all such possibilities.<sup>3</sup> Differentiating the expected profit, the marginal shadow value for a firm in good business conditions reads

$$\begin{aligned} \frac{\partial \Pi_{\{l^u, A^h\}}}{\partial l^u} = & \frac{A^h}{l^u} - w + \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} \left[ p \left( \frac{A^h}{l^u} - w \right) + (1-p) \frac{A^l}{l^u} \right] \\ & - (1-p)w \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} \left( \sum_{j=0}^{\tau-1} \binom{\tau-1}{j} (1-p)^j p^{(\tau-1)-j} (1-\delta)^{j+1} \right) \end{aligned} \quad (6)$$

which indicates that the attrition rate reduces the expected marginal cost of labour in bad times. Formally, the condition to solve for employment in good times reads

$$\frac{\partial \Pi_{\{l^u, A^h\}}}{\partial l^u} = 0$$

Using the results from the Bernoulli distribution illustrated in Annex 2, the optimal employment level  $l^u$  reads

$$l^u = \frac{A^h + \frac{pA^h}{\delta+r+r\delta} + \frac{(1-p)A^l}{r+\delta+\delta r}}{w \left[ 1 + \frac{p}{r+\delta+r\delta} + \frac{(1-p)(1-\delta)}{r+\delta r+\delta+\delta(1-p)} \right]} \quad (7)$$

Few results follow

**Remark 1** *Employment in good times declines with wages,  $w$ .*

<sup>3</sup>We assume here that the probability that the firm hits the lower threshold is infinitesimal. Considering explicitly such a case requires numerical simulation that do not change the substance of the result and the spirit of the analysis. The code generating Table 2 takes into account this possibility.

**Remark 2** *Employment in good times  $l^u$  converges to permanently rigid employment  $\tilde{l}^r$  as  $\delta \rightarrow 0$ .*

**Remark 3** *A positive attrition rate  $\delta$  induces an increase in the employment in good times  $l^u$  relative to a rigid regime.*

All these results are easily obtained. A larger wage reduces the optimal target in good times. This is obvious, and is consistent with any labour demand model (Hamermesh, 1996). Second, as the natural attrition  $\delta$  converges to zero, the employment in good times tends to the employment level described by equation (4). Next, we let  $\tilde{l}^{r+\delta}$  be the rigid level of employment in good times when  $\delta$  acts simply as a discount rate, in line with the role of the pure discount rate model in equation (4). One can then show that  $l^u > \tilde{l}^{r+\delta}$  (Annex 2). The intuition of the result is that a larger  $\delta$ , inducing a lower employment cost in bad times, reduces the cost associated to a larger workforce in good times. As a result  $l^u$  increases.

We now introduce the two tier regime with a positive turnover rate  $\delta$ . We consider a firm operating over  $T^{\max}$  periods. We assume that unexpectedly after  $T^1 < T^{\max}$  periods the firm can hire workers on a temporary basis, but it cannot fire the stock of permanent workers  $l_t^{perm}$ . From  $T^1$  onwards the firm will change its employment policy. In good times the firm will hire workers on temporary contracts up to the point at which the marginal product is equal to the wage. In bad times, the firm will not use any temporary workers and will let permanent workers decline at the attrition rate  $\delta$ . The total stock of employment in this dual regime at any time  $t$  is given by

$$l_t^{tot} = l_t^{temp} + l_t^{perm} \quad t > T^1$$

where the permanent workers will decline at the attrition rate while the temporary workers will be used as a buffer stock so that

$$l_t^{temp} = \begin{cases} \frac{A^h}{w} - l_{t-1}^{perm} & \text{if } A^i = A^h \\ 0 & \text{if } A^i = A^l \end{cases}$$

and

$$l_t^{perm} = (1 - \delta)l_{t-1}^{perm}$$

The transitional dynamics will take place as long as the firm reaches a position in which the stock of permanent workers is identical to the frictionless employment level in good times. In other words, at time  $T^2$ , the stock of permanent workers is such that

$$l_{T^2}^{perm} = \frac{A^h}{w} \tag{8}$$

From  $T^2$  onwards, firm dynamics will be identical to a frictionless equilibrium.

We simulate the employment dynamics of firm-level employment over the transition from a rigid regime to a two tier regime. Our emphasis is on the effects of a two tier regime on total employment, temporary employment, and on productivity. The spirit of our simulations is simply to derive testable empirical implications. Specifically, we simulate the time path of 100 firms that transit from a fully rigid to a two



tier regime, obtaining a large sample of statistics that can be aggregated to shed light on the behaviour of employment and productivity across different regimes.

We are interested in average employment and productivity, as well as their standard deviation before and after the regime change.<sup>4</sup> We also define a firm as *inactive* at time  $t$  when it does not respond, in terms of hiring and firing, to a productivity shock. Formally, this implies that a firm is inactive if, conditional on  $\Delta A < 0$ , it relies on natural turnover for downsizing the workforce. Formally, the firm is inactive if

$$\frac{\Delta l_t^{tot}}{l_{t-1}^{tot}} = \delta \quad \text{and} \quad \Delta A < 0$$

In the spirit of the model, the state of inaction is defined only in response to a negative productivity shock. Conversely, with costless hiring, the firm always responds to a positive productivity shock with  $\Delta A > 0$ . In the fully rigid regime, all firms are, *by definition*, inactive

The time profile of a typical firm is depicted in Fig. 4, where we display the time path of total employment, labour productivity, temporary and permanent contract. The transition begins at  $T^1 = 25$ . The Fig. clearly shows that employment increases during the transition, since the (slow) effect of turnover is more than compensated by the hiring of temporary workers in good times. The standard deviation of total employment also increases. Because of the decreasing returns to scale, average productivity falls. Note, however, that the standard deviation of productivity increases. A quantitative accounting of the time profile is offered in Table 2, where we report summary statistics obtained for 100 firms with a time profile similar to that described in Fig. 4. The exercise offers implications as to the mean and standard deviation of employment and labour productivity in the aftermath of the introduction of a two tier regime

The following remark summarizes our main findings.

**Remark 4** *The transition from a rigid to a two tier regime features a honeymoon effect involving:*

- (i) a permanent reduction of the inaction region, hence of the share of firms not adjusting employment levels;
- (ii) a temporary positive effect on average employment, and an increase in its standard deviation;

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<sup>4</sup>With  $I$  firms the definition of average employment and its standard deviation in each of the regimes is

$$\bar{l}^r = \frac{1}{I} \sum_{i=1}^I \left[ \frac{\sum_{k=1}^{T^1} l_{i,k}^{tot}}{T^1} \right]; \quad \bar{l}^{trans} = \frac{1}{I} \sum_{i=1}^I \frac{\sum_{k=T^1+1}^{T^2} l_{i,k}^{tot}}{T^2 - T^1};$$

$$\sigma_{l^r}^2 = \frac{1}{I} \sum_{i=1}^I \frac{\sum_{k=1}^{T^1} (l_{i,k}^{tot} - \bar{l}_i^r)^2}{T^1}; \quad \sigma_{l^{trans}}^2 = \frac{1}{I} \sum_{i=1}^I \frac{\sum_{k=T^1+1}^{T^2} (l_{i,k}^{tot} - \bar{l}_i^{trans})^2}{T^2 - T^1}$$

where  $\bar{l}^r$  and  $\bar{l}^{trans}$  refer, respectively, to average employment in the rigid and transitional regime. The statistics in the second line refer to the average standard deviations. Similar statistics can be obtained for average productivity, where the productivity at time  $t$  is just the ratio of output to total employment.

- (iii) a temporary negative effect on average productivity, and a decline in its standard deviation;
- (iv) a permanent increase in profits.

The results can be further described as follows. The decrease in inaction (result *i*) is just the result of the increased flexibility, and would be true under any model that reduces firing costs, whether at the margin or for the entire stock of workers. The effect of the increase in average employment (result *ii*) during the transition is the basic honeymoon effect that motivates this paper. It is simply the counterpart of the average employment effect analysed in section 3.2. The increase of the standard deviation of employment (again result *ii*) is the natural corollary of the employment effect, since the availability of temporary employees leads to larger employment variability. The effect on the average productivity is rather novel. The fall in productivity (result *iii*) is linked to the law of diminishing returns, and to the fact that the increase in average employment takes place over a declining marginal product. The effect on its standard deviation (second part of result *iii*) can be further discussed as follows. In the fully rigid regime output does fluctuate in response to changes in productivity while employment is roughly constant. In terms of average productivity this implies large movements in the numerator (output) with almost no action in the denominator (employment). During the transition, also employment starts fluctuating markedly (the denominator in the definition of productivity), while the numerator is more stable. Hence, the standard deviation of labour productivity necessarily falls. The effect on profits (result *iv*) is the result of the increase in flexibility and more efficient allocation of resources at the firm level. The next section uses microdata from Italy to assess these empirical implications.

Before going back to the data and test the empirical implications of the model, it is important to stress that the theoretical results above require diminishing returns only in the short to medium-run, along the transitional dynamics. This is sufficient to generate the honeymoon effect. Similar results in the long-run could be obtained by allowing for workers heterogeneity with low productivity types being hired after the introduction of the new contractual types. The role played by inflows into employment of low-skill workers is empirically assessed below.

## 4 Back to the Data

To check the empirical implications outlined above we use a variety of data. The implication on employment inaction (*i*) above) can be tested by integrating Italian social security records from the Work Histories Italian Panel (Whip) with Labour Force Survey data (LFS)<sup>5</sup>. Whip is an individual sample of the entire (dependent) Italian dependent employment pool with a sample share approximately equal to 1:90. Integrating Whip data with LFS data allows one to construct statistical indicators of employment inaction based on information

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<sup>5</sup>WHIP – Work Histories Italian Panel – Full Edition, work histories on Social Security Records compiled by Laboratorio R. Revelli – Centre for Employment Studies/Collegio Carlo Alberto, see <http://www.laboratoriorevelli.it/whip>, and EU LFS (European Union Labour Force Survey).

Table 2: Employment and Productivity Effects

	Employment	Productivity	Employment	Productivity
	$\delta=0.005$		$\delta=0.010$	
<i>Rigid</i> <sup>a</sup> : <i>mean</i>	4.18	28.18	4.27	27.67
<i>Rigid</i> : <i>st.dev.</i>	( 0.01 )	( 1.55 )	( 0.02 )	( 1.64 )
<i>Transition</i> <sup>b</sup>	4.47	26.43	4.42	26.68
<i>Transition</i> : <i>st.dev.</i>	( 0.11 )	( 1.18 )	( 0.13 )	( 1.24 )
Average results based on 100 iterations				
Parameters: $A^h = 100.00$ ; $A^l = 60.00$ ; $w = 20.00$ ; $p = 0.50$				
(a), No firing and permanent workers decline by attrition				
(b), Temporary Contracts Allowed				
Results based on 100 iterations of firm time profile before and after reform				
Source: Authors' calculation				

of one data source that can be matched with cells from the other source. The final dataset results in approximately 3,500 cells defined in terms of sectoral, regional and firm size characteristics. The dataset covers the period from 1994 to 1998. More recent data are not yet available at Whip, whose details are described in Annex 3.

The rest of the implications are tested with pure micro data. The data on firm level employment and productivity come from a survey administered by Capitalia bank since 1992 and covering roughly 4,500 Italian firms with an average size of 263 employees<sup>6</sup>. Firms are sampled with a stratified design on location, industrial activity and size. About two thirds of the sample is renewed at each wave. Thus, by merging any two consecutive waves, the number of observations collapses dramatically and is advisable not to work on panels covering more than two waves. However, the questionnaire elicit retrospective information on the two years before the interview. Thus, a two-wave panel actually covers six years. Respondents are generally the head of the personnel of the firms.

The questionnaire elicits information on the size and composition of the workforce, by educational attainment and by main contractual type (fixed term vs. open-ended contracts). It is also matched to data on the firm's balance sheet, obtained from Amadeus (Bureau van Dijk), so that it is possible to obtain information on firm level value added and productivity. It is thus an ideal dataset for testing the empirical implications of our model.

We focus below on the panel built on the two waves 1995-7 and 1998-2000 which covers the period immediately before and after the June 1997 Pacchetto Treu reform which gradually expanded the scope of fixed term contracts by relying on industry-level collective bargaining agreements extending the range of occupations (and the industry or firm-level quotas) in which such contracts could be enforced. This made fixed term contracts a sort of normal entry job. The sanctions applied to employers violating the maximum duration of the fixed term assignment, as specified in the contract, were also reduced. In particular, the

<sup>6</sup>See Lugaresi (2005) for a detailed description of the database.

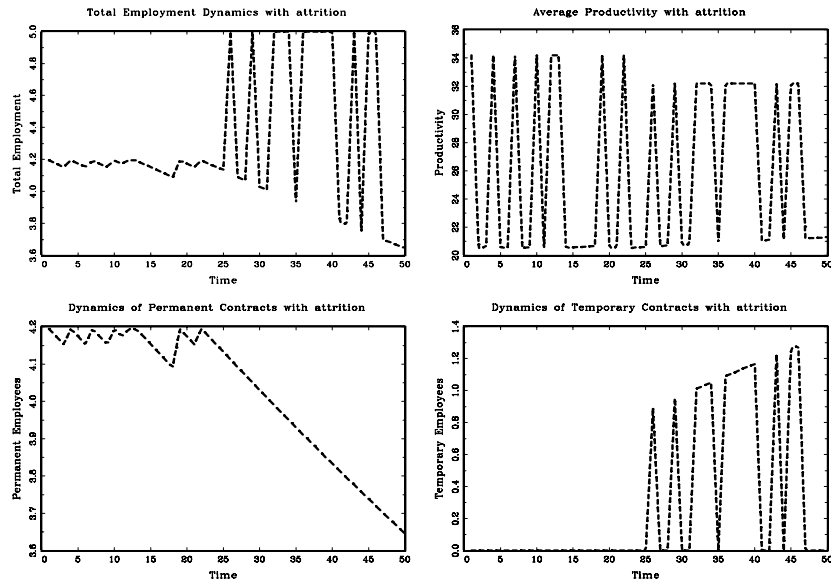


Figure 4: Employment and Productivity Dynamics during the Transition from a Rigid to a Two Tier Regime.

reform allowed employers to extend fixed term contracts for up to 30 days without having to transform them into open end contracts (as in the previous norm). The Pacchetto Treu also introduced Temporary Work Agency in the Italian system of labour laws. Despite its rapid growth, TWA currently accounts for less than 1 percent of total employment.

The following wave of the survey (2001-2003) covers the period after the introduction, in the 2001 Budget Law, of rather generous fiscal incentives to the transformation of fixed term into permanent contracts. These incentives, which had to be discontinued in 2003 for fiscal consolidation purposes, significantly reduced the share of fixed term contracts in total employment (Cipollone and Guelfi, 2003).

Descriptive statistics for the two waves 1995-7 and 1998-2000 and for the 6-years panel obtained by merging the two datasets are reported in Table 3. As can be seen, the two waves display a remarkably different size distribution of firms: the 1998-2000 wave has a much larger representation of units with less than 21 employees (38% of the total) than the 1995-7 wave (27%). This change in the composition of the sample affects the share of firms using fixed term contracts, which declines from 31% in the first wave to 25% in the second wave, just while the aggregate incidence of fixed term contracts reported by Istat was increasing (see Table 1). Fixed term contracts are used more by large firms than by small firms as units with less than 15 employees are exempted from the most rigid employment protection regulations (Boeri and Jimeno, 2005).

Hence, we thought it would be preferable to work with the closed 1995-2000 panel, involving 1,295 firms having roughly 100 employees (increasing over time) and with about 22-23% of units using temporary contracts both in 1995 and 2000 (see Table 3). Annex 4 reports a probit of the probability of being included

in the 6-years panel vis-a-vis being in only one of the two waves. As shown by the regression results, the size of the firm positively affects the probability of being included in the long panel. We correct below for the potential bias induced by this over-representation of large units, as well for fixed firm effects.

Table 3: Descriptive Statistics in Firm Level Data

	Repeated Cross Section		Panel			
	1995-1997 <sup>a</sup>	1998-2000 <sup>b</sup>	Mean	S D	Median	Iqr
Percentage Variation in value added	0,77	0,09	0,94	6,97	0,14	0,65
Share of Firms Using Temporary Workers in 1995	22,99	-	23,09	0,42	-	-
Share of Firms Using Temporary Workers in 2000	-	21,99	22,23	0,42	-	-
Share of Firms ever Using Temporary Workers	31,22	25,30	68,66	0,5	-	-
Share of Traditional Sectors	41,78	52,22	49,26	0,5	-	-
Share of Sectors with Scale Economies	27,62	18,14	18,69	0,39	-	-
Share of Specialized Sectors	25,68	24,34	29,11	0,45	-	-
Share of High/Technology Sectors	4,91	5,30	2,93	0,17	-	-
Average employment in 1995	112,78	-	103,18	288,13	31	48
Average employment in 2000	-	87,75	114,5	317,52	35	55
Share of Firms with less than 21 Employees	27,13	38,93	28,49	0,45	-	-
Share of Firms with 21 to 50 Employees	36,98	37,14	40,15	0,49	-	-
Share of Firms with 51 to 250 Employees	14,96	16,15	20,85	0,41	-	-
Share of Firms with 251 to 500 Employees	10,38	3,86	5,71	0,23	-	-
Share of Firms with more than 500 Employees	5,91	2,90	4,79	0,21	-	-
Share of Unskilled Employees 1997	57,92	-	59,25	25.65	65.54	34.36
Share of Unskilled Employees 2000	-	59,42	54,84	32.82	66.67	49.62
<sup>a</sup> 4,497 firms in the dataset.						
<sup>b</sup> 4,680 firms in the dataset.						
<sup>c</sup> 1,295 firms in the dataset.						

#### 4.1 *Inactivity and Temporary Employment*

The first implication (*i* in previous section) that we want to test is that the Italian two tier reform strategy should have reduced the inaction region, that is, the percentage of firms keeping employment levels unchanged from year to year. We test this implications using the *pseudo* firms (or cells) defined by employment cells obtained by merging the Whip and the LFS data. The share of temporary workers in each sector is defined as the actual share of temporary workers in each cell, as obtained from the LFS. The share of inactive firms in a given cell is derived from the Whip database, and each firm in a cell is defined as inactive in a given year if the employment variability is below 2 percent.<sup>7</sup> Between 1994 and 1998 the average share of temporary

<sup>7</sup>The only exception to the 2 percentage threshold rule is made for firms with less than 50 employees, that are considered inactive insofar as employment varies by less than 2 employees in modules.

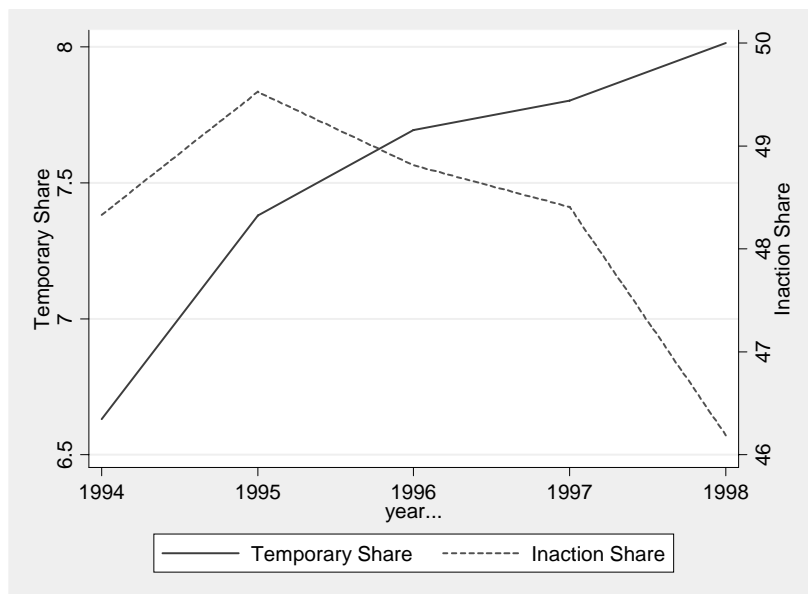


Figure 5: Share of Temporary Workers and Share of inactive firms. 1994-1998

workers across cells increased from 6.5 percent to 8 percent (left-hand scale of Fig. 5). The average share of inactive firms is plotted in the same figure and measured along the right-hand scale. With the exception of one step increase in 1995, the share of inactive firms declined throughout the period. The negative correlation between the share of temporary workers and inaction is exactly what our theoretical model would predict.

To go beyond the graphical representation of the result, in Table 4 we report a set of regressions in which the share of inactive firms in cell  $i$  at time  $t$  is regressed against the share of temporary employment in the same cell. In the various specifications offered in Table 4 we control for size, yearly, industry and region effects. The multivariate correlation is negative and significant. The results suggest that an increase in the share of temporary employment of 1 percentage point is associated with a reduction in the share of inactive firms of approximately 0.1 percent.

## 4.2 *Employment Growth*

Our second implication is that average employment and the cross-sectional standard deviation in the size of firms should increase during the honeymoon (implication *ii* in the previous section). Fig. 6 reproduces, on the left-hand side, 95% confidence intervals of average employment level of firms over time in the Capitalia panel. In order to correct for selection in the panel, we also display, on the right-hand-side diagram, confidence intervals around the coefficients of yearly dummies in a panel regression of employment against firm-specific fixed effects (capturing time-invariant characteristics of each firm) and variables interacting the 5 size class dummies displayed in Table 3 with yearly dummies (in order to capture the effects of changes over time in the size distribution of firms). Both bands are consistent with the model: the average employment level is

Table 4: Inactivity and Share of Temporary Workers 1994:1998

	Dependent variable: Inaction Rate <sup>a</sup>			
Temporary Share <sup>b</sup>	-0,16 (0,04)	-0,16 (0,03)	-0,15 (0,03)	-0,05 (0,03)
	***	***	***	*
Size Dummies	YES	YES	YES	YES
Year Dummies	NO	YES	YES	YES
Geographical Dummies	NO	YES	YES	YES
Sectoral Dummies	NO	NO	YES	YES
Observations	3573	3573	3573	3573

<sup>a</sup> Share of firms in cells *it* with employment changes below  $\pm 2$  percent

<sup>b</sup> Share of temporary workers in cells *it*

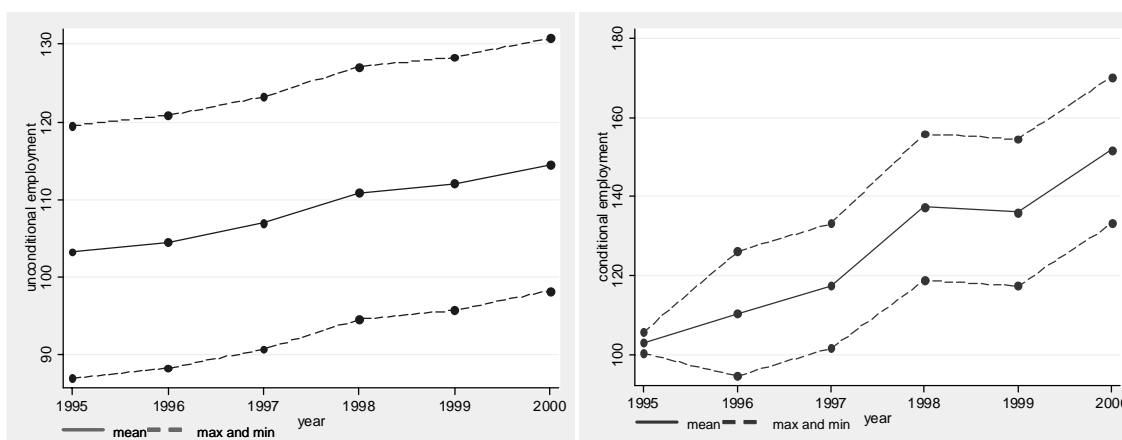


Figure 6: Coefficient and 95% confidence intervals of yearly dummies in regressions of employment without (left) and with (right) fixed firm effects

increasing over time, together with its cross-sectional standard deviation.

### 4.3 Labour Productivity

The third implication of the model has to do with the evolution of labour productivity (implication *iii* above). Our model predicts that *a*) average, firm-level, labour productivity should *decline* and *b*) the cross-sectional dispersion of labour productivity levels should *decrease* during the honeymoon. The two bands in Fig. 7 describe 95 confidence intervals around the unconditional and the conditional (using fixed effects and time dummies interacted with yearly dummies as described above) means of value added per worker, expressed in thousand of Euros, in the panel.

There is no clear pattern in the overall sample. In order to test implication *iii* of our model we look also at multivariate correlations.

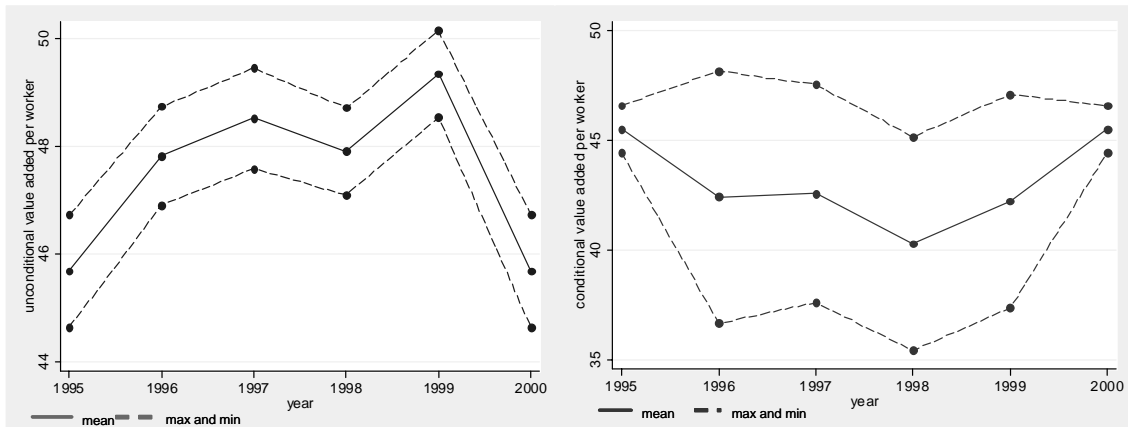


Figure 7: Year dummies in regressions of value added per worker without (left) and with (right) fixed firm effects

The evolution of labour productivity can be attributed to a variety of factors, including changes in the composition of the workforce by size, industry and region or by skill. A number of authors (including Daveri, 2004) attributed the increase in the employment content of growth (the rather poor labour productivity performance) of two tier countries in the last decade, to compositional factors, such as inflows into employment of low skilled workers. As the Capitalia dataset provides information on educational attainments of the workforce, it is possible to evaluate the role played by the growth of fixed term contracts and the entry of low skilled workers in the decline of labour productivity in Europe. Table 5 displays the results of a regression where the dependent variable is the 1995-2000 variation in labour productivity per worker and the explanatory variables include the firm-specific share of fixed term contracts in the total workforce and percentage of workers with primary or lower levels of education. In some specifications we also include industry dummies (traditional, scale intensive, specialized and technologically advanced sectors), firm size and regional dummies, together with real investment. In all specifications, the coefficient for the stock of temporary workers is negative and statistically significant, while the share of low-skilled workers is not significant.<sup>8</sup> It should be stressed that the negative effect of the spread of fixed term contracts on labour productivity is a distinguishing feature of our model.

Table 6 reports the regressions in which the independent variables are expressed in first differences rather than in levels in order to control for time invariant fixed effects. We still find a negative and statistically significant effect of temporary employment on labour productivity. This suggests that firms that *increased* more the incidence in their workforce of fixed term contracts experienced a larger decline in average productivity than the other firms in the sample. Although for some firms the use of fixed term contracts was not an option, we are, of course, aware of the fact that the share of fixed term contracts is itself an endogenous

<sup>8</sup>Missing values on the covariates, as well as on real investments, explains the reductions in the number of observations.



variable for several firms. Thus, our regressions should be interpreted as tests of the correlation between labour productivity and use of fixed term contracts in a multivariate correlation setting.

Table 5: Labour Productivity and Temporary Employment: 1996-2000

Dependent: Change in Value Added per Worker <sup>a</sup>					
	I	II	III	IV	V
Temporary <sup>b</sup>	-0.22 (0.083) ***	-0.22 (0.083) ***	-0.38 (0.09) ***	-0.42 (0.104) ***	-0.45 (0.105) ***
Low Skills <sup>c</sup>	-0.03 (0.032)	-0.035 (0.032)	-0.021 (0.032)	-0.03 (0.04)	-0.04 (0.04)
Investment <sup>d</sup>	-	-	-	0.001 (0.001)	0.001 (0.001)
Sectoral Dummies	NO	YES	YES	YES	YES
Size Dummies	NO	NO	YES	YES	YES
Geographical Dummies	NO	NO	NO	NO	YES
$R^2$	0.0102	0.0114	0.0403	0.0534	0.0606
Observations	843	843	843	630	625

<sup>a</sup> Change in Value Added per worker  
<sup>b</sup> Average Temporary Workers Between 1996 and 2000  
<sup>c</sup> Average Low Skill Workers Between 1997 and 2000  
<sup>d</sup> Average Real investment between 1996 and 2000

## 5 Conclusions

Existing models of EPL do not yield implications as to the effects of labour market reforms increasing flexibility only “at the margin”, the dominant type of reforms of EPL occurred in European countries in the last 20 years. In this paper we develop a dynamic labour demand model under uncertainty to analyse the effects of these two tier labour market reforms on employment and labour productivity. We show that these reforms have a transitional “honeymoon”, job creating effect, which contributes to explain the progress made by many countries, notably the Olive belt ones, towards the Lisbon employment targets. We also find that labour productivity should decline during this transition and obtain other empirical implications as to the cross-sectional and time-series variation of productivity and employment, which are tested against firm-level data on Italy.

The implications of the model are supported by our analysis. If policymakers takes it seriously, they should be aware that this job creation effect, like any honeymoon, cannot go on for ever and that other reforms are needed if they want to make further progress towards Lisbon.

Table 6: Change in Labour Productivity and Change in Temporary Employment: 1996-2000

Dependent: Change Value Added per Worker <sup>a</sup>					
	I	II	III	IV	V
Change Temporary <sup>b</sup>	-0.27 (0.072) ***	-0.27 (0.073) ***	-0.25 (0.072) ***	-0.3 (0.08) ***	-0.31 (0.08) ***
Change Low Skills <sup>c</sup>	-0.013 (0.021)	-0.014 (0.021)	-0.009 (0.022)	-0.011 (0.025)	-0.012 (0.025)
Change Investment <sup>d</sup>	-	*	-	- (5.107)	- (0.0003)
Sectoral Dummies	NO	YES	YES	YES	YES
Size Dummies	NO	NO	YES	YES	YES
Geographical Dummies	NO	NO	NO	NO	YES
$R^2$	0.0166	0.0183	0.0333	0.0435	0.0454
Observations	843	843	843	677	677
<sup>a</sup> Change in Value Added per worker					
<sup>b</sup> Change in Temporary Workers Between 1996 and 2000					
<sup>c</sup> Change in Low Skill Workers Between 1997 and 2000					
<sup>d</sup> Change in real investment between 1996 and 2000					

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## Annex 1: Marginal reforms of employment protection in Europe

Reforms of Employment Protection Legislation in the period 1987 to 2005. Source: frdb inventory of social policy reforms ([www.frdb.org](http://www.frdb.org)). More details on these reforms can be found in the website.

### Belgium

1994: Notice periods for high-income white collars are made subject to negotiation (only permanent workers). Introduction of a new kind of contract ("emploi-tremplin"): specific categories of workers (aged less than 30 years and with less than six months of experience) can interrupt the employment relationship on the basis of a shorter notice period.

1997: Reduction of restrictions on temporary work, while fixed term contracts become renewable.

1998: Local employment agencies are allowed to offer part-time jobs with reduced salaries to long-term unemployed.

2001: Law proposed by the Ministry of Employment and Labour. It includes several measures to reduce working time, by collective agreement or individually.

2003: Provision of equality of treatment between private and public sector employees in the area of notice periods on termination of the employment contract.

2003: Collective agreement in temporary agency work sector:

- 1) creation of a specific 'mobile' social fund for agency workers;
- 2) creation of a fund for training for the temporary agency work sector.

2003: Flexibilisation of the regulation on childcare facilities, in order to allow young parents to participate in the labour market.

### Italy

1987: A wider use of fixed term contracts is introduced, if allowed by sectoral collective agreements. Increase of the age limit for craftsmans' apprenticeship to 29 years. Reorganization of public employment agencies. Law 28/2/1987 nr.56.

1989: The employment threshold guarantees in case of dismissal on disciplinary ground are extended to small firms (with less than 16 employees).

1990: Compulsory reinstatement and/or compensation in case of unfair dismissal is extended to employers of non-commercial organisations employing more than 15 employees in the same production unit and to companies with more than 60 employees. Law 11/5/1990.

1991: Law on collective redundancies 23/7/1991 nr.223, establishing standards related to notice and consultation. Reinstatement in case of dismissal not communicated in written form.

1997: "Treu Package" is enacted: reduction of the drastic sanctions in case of violation of the fixed term contracts' discipline (conversion of fixed-term contract into an open-ended one). Legalisation of temporary work agencies. "Atypical" labour contracts are encouraged by reducing social security contributions and pension provisions and by removing automatic transformations of fixed term contracts into open-ended ones. The package eases regulation of new apprenticeship and work-training contracts and sets incentives for on-the-job training (stages), temporary work via private agencies and intra regional labour mobility. Private employment and temporary work agencies are allowed.

1998: The labour agreement for Civil Service (Contratto dei ministeriali) increases the flexibility of working time, labour mobility, and the right to implement performance related pay.

2000: More flexibility on part-time work, implementing the EU part-time work directive 97/81/EC.

2001: By Decree-Law 368, EU Directive 1999/70/EC on fixed-term work is implemented through a joint statement signed by CISL and UIL (despite CGIL). The new legislation removes the explicit list of the specific circumstances in which the use of fixed-term employment is legal.

2002: Liberalization of private placement services. In particular, the "telematic labour exchange market" is adopted.

2003: The "Biagi Law" is adopted: New types of labour contracts: job-on-call, job sharing, supplementary work, "lavoro a progetto", which slightly tightened the regime for the already existing "Co.co.co".

2003: Single text that sets out all regulations on working time in the private and public sector. Implementation of the EU Directive on working time of 1993.

## **The Netherlands**

1989: Dismissals which result from bankruptcy no longer need authorisation from the public employment office (PES).

1991: The public employment services are overhauled by the provisions of the Employment Act. The ban on private recruitment agencies for permanent employment is lifted.

1994: Implementation of the EU Directive on proofs of employment contracts (91/533/ec art 653 civil code). This requires employers to inform in written form every employee about the basic terms and conditions that apply to the employment relationship.

1995: Dismissal procedures eased. An employer can dismiss an employee at the same time or even before asking permission to the director of the Public Employment Office.

1999: "Flexibility and Security Law": Flexible working contracts are introduced with a limited duration and a variable number of working hours. Renewals of fixed term contracts: a maximum of 2 renewals in 3 years is allowed. Similar rules apply for employees of temporary work agencies: the employees have the right of holding a permanent contract after 3 consecutive contracts with the same agency. Many of the rules of this Law can be overruled by alternative arrangements in collective agreements.

1999: New rules governing dismissals approved. To unilaterally terminate an open-end contract it is no longer necessary to obtain prior authorisation from an administrative body.

2000: New legislation on flexible organisation of working time. It gives workers the right to request a change in their working hours, either for shortening or lengthening their working week.

2001: The EU Directive 1999/70/EC on fixed-term work is implemented on the basis of a joint statement signed by many social partner organisations.

## **Portugal**

1989: Several restrictions on lay-off legislation are phased out. The length of the decision process and red tape are reduced. At the same time, the list of circumstances that allows individual dismissals for economic reasons is broadened. Part time employees have the same contractual rights as full time employees.

1991: Firing restrictions are eased, through a wider range of admissible layoffs.

1996: Government, employers' associations (AIP) and trade unions sign the Strategic Social Pact. It includes: a wider use of atypical work contracts; in the public sector, fixed term contracts can be extended beyond the normal time limits, incentives on using temporary employment agencies.

1998: Public servants nearing retirement age are allowed to complete their careers on a part-time basis, while commensurate recruitment takes place.

1999: The Law 32/99 transposes the EU Directive on Collective Redundancies: workers who receive a compensation or severance payment at the time of dismissal is no longer prevented from legally contesting the redundancy later on.

1999: Introduction of new labour legislation on part-time work.

1999: Reforms of the Labour Code. These changes increase workers' protection, establishing the trade unions can provide legal assistance to workers and may represent them in court.

1999: A new law of Temporary Agency Workers comes into force. It defines stricter rules on the use of temporary workers and on their working conditions. It is forbidden to use temporary agency workers for jobs that are particularly hazardous.

2001: EU Directive 1999/70/EC on fixed-term work is implemented on the basis of a joint statement signed by many social partners.

## Spain

1994: Individual dismissals are eased: no notice is required when the length of the contract is below 15 days for blue collar workers or below 1 month for white collar workers. Moreover, in case of objective dismissal, the notice period is: one month when the length of service is below one year, 2 months when the length of service is between one and two years and 3 months for two or more years of service.

1994: Tightening of restrictions on the use of fixed term contracts. Temporary work agencies are legalised.

1997: The reform extends the reasons that may give rise to an individual dismissal, including problems related to a lack of competitiveness. Decree 17/5/1997 nr.8. Introduction of a new kind of permanent contract with reduced severance payments: payment for unfair dismissal is reduced to 33 days per year of seniority for new permanent employment contracts (intended for young and disadvantaged workers), with a maximum of 24 months wages.

1999: The reduced contribution rate is prolonged for a third year to permanent contracts signed since 1997; the regime was extended up to 1/2000 with lower subsidies for all categories (between 25 and 50%). Introduction of a 5% differential in favour of female workers. Contribution rate for temporary contracts is increased by 0,5%, up to 1,5%. Reduction of unemployment insurance contributions (less 0,25%) for all permanent contracts.

1999: Reduction of social security contributions on part-time contracts. Part-time contracts become more rigid: reduction in the maximum number of hours allowed (from 99% to 77% of standard working time), while the distribution of complementary hours during the year becomes not flexible. The social security contribution for temporary work agencies is raised by 1,5% (only 0,5% for normal temporary contracts).

1999: New Law on Temporary Employment Agencies comes into force to improve the rights of workers employed by these agencies.

2001: A labour market reform is approved. The main measures include:

1) liberalisation of part-time contracts;

2) extension of permanent contracts with lower severance payment introduced in 1997 to new groups of workers

and new severance payments for temporary contracts.

## Sweden

1992: The government wage guarantee in case of employer's bankruptcy is lowered.

1996: Local union may freely agree on recruitment and dismissal provisions.

1997: The length of notice periods is now determined on the basis of tenure rather than age. Enterprises' rehiring obligation vis-à-vis of dismissed workers now expires after nine months instead of twelve. Twelve-months fixed term contracts are available with no restrictions. All enterprises are allowed to employ up to five persons on such contracts; the fixed term contracts can be prolonged up to 18 months. Introduction of a three-year limit after which temporary contracts have to be turned into permanent contracts.

2001: A new legislation on part-time work is approved by the government implementing the EU Directive 97/81/EC on part time work.

2001: The EU Directive 1999/70/EC on fixed-term work is implemented on the basis of a joint statement signed by many social partners.

2004: Extension to 2004 of a pilot schemes for lower working hours and parental leave

2004: Introduction of the sabbatical leave scheme.

2005: The average weekly working time is fixed at the most 48 working hours and the night/day rest at least 11 continuous hours. Exceptions are allowed for public tasks (e.g. police, armed forces).

### Annex 2: The Formal Derivation of the Model

The marginal profits of the model with attrition read

$$\begin{aligned} \frac{\partial \Pi_{\{l^u, A^h\}}}{\partial l^u} &= \frac{A^h}{l^u} - w + \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} \left[ p \left( \frac{A^h}{l^u} - w \right) + (1-p) \frac{A^l}{l^u} \right] \\ &- (1-p)w \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} \left( \sum_{j=0}^{\tau-1} \binom{\tau-1}{j} (1-p)^j p^{(\tau-1)-j} (1-\delta)^{j+1} \right) \end{aligned}$$

Recalling that the binomial coefficients are in the expansion of the general binomial  $x + y$  so that

$$(x + y)^n = \sum_{k=0}^n \binom{n}{k} x^{n-k} y^k$$

and that  $(p + (1-p))^n = 1$ , the marginal profits read

$$\begin{aligned} \frac{\partial \Pi_{\{l^u, A^h\}}}{\partial l^u} &= \frac{A^h}{l^u} - w + p \left( \frac{A^h}{l^u} - w \right) \frac{1}{r + \delta + r\delta} + (1-p) \left( \frac{A^l}{l^u} - w \right) \\ &- (1-p)(1-\delta)w \sum_{\tau=1}^{\infty} \frac{1}{(1+r)^\tau (1+\delta)^\tau} \left( \sum_{j=0}^{\tau-1} \binom{\tau-1}{j} [p + (1-p)(1-\delta)]^{\tau-1} \right) \end{aligned}$$

Expanding the summation yields

$$\frac{\partial \Pi_{\{l^u, A^h\}}}{\partial l^u} = \frac{A^h}{l^u} - w + p \left( \frac{A^h}{l^u} - w \right) \frac{1}{r + \delta + r\delta} + (1-p) \left( \frac{A^l}{l^u} - w \right) - \frac{(1-p)(1-\delta)w}{r + \delta + r\delta + \delta(1-p)}$$

And the value  $l^u$  is the result of

$$\frac{\partial \Pi_{\{l^u, A^g\}}}{\partial l^u} = 0$$

$$l^u = \frac{A^h + \frac{pA^h}{\delta+r+r\delta} + \frac{(1-p)A^l}{r+\delta+\delta r}}{w \left[ 1 + \frac{p}{r+\delta+r\delta} + \frac{(1-p)(1-\delta)}{r+\delta r+\delta+\delta(1-p)} \right]}$$

Three results follow easily.

An increase in the wage reduces optimal employment  $l^u$ . To see this simply note that a larger wage reduces the right-hand side of the previous expression. Also, as  $\delta = 0$  one easily has that

$$l^{u(\delta=0)} = \tilde{l}^r = \frac{A^h + \frac{pA^h}{r} + \frac{(1-p)A^l}{r}}{w \left[ 1 + \frac{p}{r} + \frac{1-p}{r} \right]}$$

Finally, setting  $\tilde{l}^{r+\delta} = \frac{A^h + \frac{pA^h}{r+\delta+r\delta} + \frac{(1-p)A^l}{r+\delta+r\delta}}{w \left[ 1 + \frac{p}{r+\delta+r\delta} + \frac{1-p}{r+\delta+r\delta} \right]}$  one can show that

$$\tilde{l}^{r+\delta} < l^u$$

The previous condition is satisfied as long as

$$\frac{1}{r + \delta r + \delta} > \frac{(1-\delta)}{r + \delta r + \delta + \delta(1-p)}$$

$$r + \delta r + \delta + \delta(1-p) > (r + \delta r + \delta)(1-\delta)$$

$$\delta(r + \delta r + \delta) + \delta(1-p) > 0$$

### Annex 3: The Whip-LFS Data Set

This archive integrates the database “WHIP – Work Histories Italian Panel ” developed by laboratorio R. Revelli – Centre for Employment Studies/Fondazione Collegio Carlo Alberto in Turin (see <http://www.laboratoriorevelli.it/whip>) with the EU LFS (European Union Labour Force Survey) .

The Whip database is a representative sample of Italian dependent private sector employees with a sampling probability equal to approximately 1:90. It is an Employer-Employee Database, since the information on workers can be matched with records from the INPS social security archive. There is thus also basic information on the firms in which the workers is employed. The time period goes from 1985 to 1999. The EU-LFS is the standard European Union Labour Force Survey.

From the integration of the two datasets, which was based on observable cell characteristics, the following indicators were recorded:

- 1 – the share of firms “movers” in cell  $i$  between  $t$  and  $t - 1$ ;
- 3 – the share of temporary workers;



The first indicator is obtained through WHIP (where the average size of firms is available) while the second indicator was obtained from the EU-LFS (which records the difference between fixed term and open ended contracts). The cell  $i, t$  was defined on the basis of information available from both archives. Specifically, it is based on the following three dimensions:

- Industry specification ATECO91 (10 units)
- Regional place of work (20 italian regions)
- Firm size (4 class size: 1-10, 11-19, 20-49 and 50 and more). The first variable represents the average number of firms

that are classified as inactive and are expressed as a fraction of the total number of firms. A “mover” firm is one that between the year  $t - 1$  and  $t$  had experienced an absolute variation in the number of employees larger than 2 percent of the initial employment level or, if the firm has less than 50 employees, of at least 2 employees in modules. We define a firm as inactive if it is not a mover. The share of temporary contracts is simply defined as the share of temporary contracts on the total number of employees in a given cell.

#### Annex 4: Assessing Selection in the the Capitalia Long Panel

The following table reports the results of a probit regression of the probability of being included in the long panel (1995-2000) vis-a-vis being in any of the two short panels 1995-7 and 1998-2000

Table 7: Probability of being in the 1995-2000 panel (vs. in any of the two waves 1995-1997 and 1998-2000)

Dependent variable: dummy inclusion in the 1995-2000 panel	
small size (21-50 employees)	0.89 (0.05) ***
medium size (51-250 employees)	0.88 (0.06) ***
large size (251-500 employees)	1,00 (0.92) ***
very large size (over 500 employees)	1.20 (0.11) ***
share of workers with low education	0,004 (0.05)
scale intensive sectors	0.51 (0.05) ***
specialized sectors	0,43 (0.49) ***
Observations	4506
pseudo R <sup>2</sup>	0.14
The reference group is a firm with less than 20 employees in traditional sectors. Standard errors in parentheses. *** significant at 1 percent Source: Capitalia data.	

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