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Skilled Workers' Unemoloyment and firms' Training Decision

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***Abstract**: In this paper it is shown that by explicitly considering the existence of unemployed trained workers, some of the results shown by Acemoglu and Pischke regarding the effect of unemployment on the firms' training decisions become ambiguous. In fact, two contrasting effects have to be considered: on the one hand, unemployment encourages training provision by firms through the negative effect on wages; on the other hand, the search for trained workers becomes easier when the unemployment rate is higher. When wages are little responsive to unemployment, this second effect might prevail.*

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1. Introduction

In a paper published in 1962 Becker coined the term "investments in human capital" to define investments able to increase individuals' skills and productivity. This term has now become usual in social sciences attesting to the great influence that Becker's theory has had on the current thinking on skill acquisition. One of the main results of his theory is represented by the distinction between general and specific skills. General skills are useful not only in the firm in which those skills are acquired, but also with other employers. In competitive markets workers benefit fully through higher wages from improvements in their productivity and consequently they will undertake such investments by accepting a wage lower than their productivity during the period of training, while firms would never pay for general training investments. Instead, workers and firms might reach an agreement to share in the costs and the returns of specific training investments, since specific skills are useful only within the firm in which the worker is currently employed.

According to Becker, in perfectly competitive labour markets, a problem of market failure does not emerge either for general or for specific investment, since, in any case the parties sustaining the costs of investment receive corresponding full returns, without externalities. Therefore, an efficient amount of investment will be undertaken in free markets. This conclusion is in contrast with the widespread idea that there is a problem of under-

investment in training activities (Pigou, 1912; Rosenstein-Rodan, 1943), which motivates the training support policies followed in many countries.

A number of recent papers analyse investments in human capital removing the assumption of perfectly competitive labour markets. The basic idea of the non-competitive framework is that firms pay workers a wage lower than their productivity and this difference increases with the level of training (wage compression). The divergence between productivity and wages might arise for a number of reasons, such as workers' mobility costs, search and matching frictions, complementarity between general and specific skills, adverse selection or moral hazard problems. In addition, wage compression might be induced by the institutional structure characterising the economic system, such as minimum wages, union wage bargaining, etc.. All the mentioned factors, sometimes jointly considered, reduce the outside options of workers, and this reduction becomes greater as workers' skills increase. As shown by Acemoglu and Pischke (henceforth AP) (1998, 1999a, 1999b, 1999c), these imperfections, which "turn general skills into de facto specific skills", may lead firms to invest in general human capital, even in the absence of credit constraints limiting workers' ability to invest. In fact, in order to obtain additional rents from the workers, deriving from the increasing gap between productivity and wages, firms might be induced to pay for the costs of general training.

However, as the existence of imperfections in the labour market does not allow the investing subject to obtain a full return on its investment, the possibility of under-investment in human capital emerges. In fact, since general training often benefits future employers (in non-competitive labour markets they do not pay for the full marginal product of workers), the level of investment undertaken by the current firm will not be optimal.

The relaxing of the perfectly competitive labour market assumptions leads to some empirical predictions that are in sharp contrast with those deriving from Becker's analysis. The interest of firms in financing general skill acquisition by workers is greater when, as a result of firms' monopsonistic power or of institutional regulations, the wage structure is more distorted. Thus, in these new theories of training, more regulated labour markets encourage more firm-sponsored training. This helps in explaining the empirical findings which show that the US has less on-the-job training than Germany and Japan (see Freeman, 1995; Lynch, 1994).

However, the same framework does not seem to give satisfactory results when used to analyses differences between other countries. In a recent paper, Peraita (2001) shows that Spain, despite being one of the most regulated labour markets, presents very low investments in training, indicating that the highly compressed wage structure does not induce firms to invest in human capital. Similar considerations can be made for Italy where, despite the strongly centralised wage setting process and the resulting high minimum wages, the training incidence

is much lower that in countries with more flexible institutional structures, such as the UK, which shows a high level of training investments (Brunello, 2001).

In our view, one element that could help to explain the divergence between these findings and AP's predictions is represented by the effect produced by unemployment on training investments. A lot of empirical evidence shows a negative relation between the unemployment rate and the amount of formal training received by workers. Lynch (1992, p. 303) has observed that "as unemployment rises, firms are less likely to provide expensive formal on-the-job training to new employees". Studies by Bartel and Sicherman (1993) and Bishop (1991) show that, as far as the USA is concerned, the likelihood and amount of formal training in a given year is higher for workers employed in industries and areas with low unemployment rates.

Nevertheless, following the theory based on labour market imperfections (AP, 1999b) the effect of unemployment on training should be positive: a higher unemployment rate, causing a more distorted wage structure which benefits firms, would stimulate their investment in training. This result depends on the fact that AP's analysis often neglects the existence of trained unemployed workers who firms could hire as skilled workers, instead of providing training for the unskilled.

In this paper, considering a normal worker exogenous turnover and the presence of matching frictions, we proceed by introducing into the analysis the existence of trained unemployed workers with the aim of analysing the effect of unemployment on the training provided by firms. Thus, there could be a pool of trained unemployed workers willing to accept new job offers, even adopting the hypothesis of mobility costs implying that all workers would prefer to stay with their initial employer. This is consistent with the empirical evidence from many advanced economies showing large flows of workers moving in and out of jobs (Davis, Haltiwanger and Schuh, 1996).

Our main point is to clarify that the result reached by AP, showing that firms prefer skilled to unskilled workers, since the rent gained by firms is greater with the former, does not mean that firms actually want to train new workers, if and when there exists the possibility of hiring skilled workers available on the market and when the divergence between the workers' productivity and wages is not related to which firm has provided training. In general, it could be optimal for firms to save on training costs by searching for skilled workers on the market. This decision is determined by the comparison between training costs and the search costs incurred in hiring a skilled worker. In fact, it is reasonable to assume that hiring untrained workers does not imply considerable search costs for the firm, while hiring a trained worker could involve relevant recruitment costs, since it takes time and resources to fill a job vacancy, depending inversely on the number of unemployed.

In this enriched framework, a higher unemployment rate, on the one hand, stimulates training by reducing wages and increasing the rent obtained by firms, while, on the other hand, since a higher unemployment rate increases the probability of finding a trained worker on the market, it reduces the firm's incentive to provide training. Consequently, the net effect of unemployment on training is ambiguous. Even if it is hard to draw any conclusion about the amount of training provided in different institutional systems, as many other variables play an important role in defining this kind of decision, it is possible to say that the positive (negative) effect might prevail when wages are highly (scarcely) reactive to labour market conditions.

The paper is organised in the following way. In the next Section, the literature on training investment that has been developed given the hypotheses of non-competitive labour markets is shortly considered. Section 3 proposes a search and matching frictions model with the aim of taking into account how firms' training decisions are affected by the existence of skilled unemployed workers available on the labour market. Some concluding remarks follow in Section 4.

2. Training investments in non-competitive labour markets

The non-competitive labour market approach to human capital investments is based on two main hypotheses: a) the wage obtained by the worker is lower than his productivity; b) the gap between productivity and the wage (that is, the rent gained by the firm) is greater at higher levels of skill, since the worker's outside option grows less steeply than his productivity. The resulting match-specific rent is partially captured by the firm. This is defined as a "compressed wage structure" and implies that firms have some monopsony power that increases in relation to the skill levels of workers.

In order to make it clear how a compressed wage structure might emerge, it is sufficient to consider a wage function represented by $w(\tau) = \beta f(\tau)$, on the basis of which the worker gains a fraction β of his own productivity, $f(\tau)$, that is positively influenced by training, denoted by τ. This kind of function might arise from a Nash bargaining solution between the firm and its workers in the wage determination process. As the rent obtained by the firm increases with training, $\Delta(\tau)$, this implies that the firm will prefer to employ a trained worker rather than an untrained one. In AP's approach, this fact could lead firms to invest in general training. Depending on the assumptions of each model (regarding workers' credit constraints

and the possibility of firms and workers deciding cooperatively or not on the amount of investment[1]) the training is financed entirely by the firm or shared by firms and workers.

There are several factors that might cause a divergence, which may increase training, between the worker's productivity and his wage. An initial set of explanations is based on the presence of asymmetric information between the current employer and other firms that might employ its workers (adverse selection). Trained workers, when unemployed, become part of an adversely selected pool of workers. In fact, if potential employers do not have perfect information about the training acquired by workers, they might be unwilling to compensate workers for their skills. Then, the initial employer is able to pay its workers a relatively low wage since their outside option does not increase with skills in the same way as their productivity does (Katz and Ziderman, 1990; Chang and Wang, 1996). As argued by AP (1998), the lack of information, besides that of the training acquired, may concern the ability of workers currently employed in other firms. If ability and training are complements, firms generally will lay off workers with low ability who benefit little from training: as a consequence, trained workers available on the market will have, on average, lower abilities. This entails that high ability workers leaving their current employer will become part of a low ability workers' pool without the possibility of distinguishing themselves by signalling their own ability. In this way, given the poor outside options, current employers can pay skilled workers less than their productivity and so are induced to train their workers (see also Autor, 1998; Malcomson, Maw and McCormick, 1997).

A similar result is obtained when there is complementarity between specific and general skills, such as where the amount of general skill a worker possesses increases the productivity of his specific skills (AP, 1998; Stevens, 1994; Franz and Soskice, 1995), or when any single skill is general, but the mix of general skills possessed by the employee could be firm specific (Bishop, 1996). This interaction between general and specific skills makes the workers' outside option less attractive and stimulates firms to train them.

In both these cases, trained unemployed workers do not represent a good alternative for firms wishing to employ skilled workers. Therefore, when the sources of wage compression are adverse selection or specificity, unemployment has only a positive effect on training as it increases the bargaining power of the firm and reduces wages.

On the other hand, other sources of wage compression considered by AP (1999a, 1999b, 1999c) do not suggest the firm's lack of interest in hiring already trained workers who are unemployed. One of these sources is represented by worker's mobility costs and search and

[1] Training decisions are made cooperatively when the worker and the firm can write an enforceable contract before the employment relationship starts. If such a contract is not feasible, the firm and the worker may decide independently how much to contribute to the investment.

matching frictions, which create a match-specific rent that will be shared between the firm and its employees. As the surplus deriving from the employment relation is greater when the employee is more skilled, the firm could be willing to invest in training. However, in a realistic environment characterised by a normal worker turnover, one has to take into account the existence of trained unemployed workers who are searching for a new job. These workers are not considered in AP's model: in this way the opportunity for firms to save on training costs by searching for skilled workers on the market is excluded.

A similar possibility should also be evaluated in those versions of the theory based on labour market institutions, such as unions (Freeman and Medoff, 1984) and minimum wages. AP (1999c) argue that minimum wage determines a compressed wage structure for workers with low productivity and then stimulates firms' training provisions. In fact, even if the wage paid by the firm does not directly imply a rent increasing along with the level of skills (for example, because the wage function is represented by $w(\tau) = f(\tau) - \Delta$, where Δ is the constant rent obtained by the firm), with a minimum wage, the firm is interested in increasing its workers' productivity until $f(\tau) - \Delta$ is equal to the minimum wage. Then, firms may decide to provide training for workers whose productivity is below the minimum wage (since it pockets the productivity increase, as the wage they have to pay does not change) rather than lay them off. Therefore, while Becker (1964), Ben-Porath (1967), Mincer (1972) argue that a minimum wage reduces training, as it prevents workers from accepting the necessary wage cuts, AP reach a different conclusion arguing that a minimum wage may increase training of low paid workers.

This result emerges crucially from the fact that AP's analysis does not consider the existence on the market of already trained workers who are searching for a job. In this way, the possibility that firms might find it profitable to substitute their low productivity workers with already trained workers (whose productivity is already such as to maximise the firm's rent) is neglected.

Another context in which there exists an incentive for firms to invest in workers' general skills is when there is a problem of asymmetric information about workers' effort, and firms need to pay an "efficiency wage" to induce employees to work hard. This situation is very similar to the minimum wage case analysed above. Since the firm cannot pay a wage below the efficiency wage level, AP (1999b) and Loewenstein and Spletzer (1998) show that the firm has interest in training its least productive workers, because the increases in their productivity, up to their reaching a certain level of skill, can be pocketed by the firms. In this case, again, the possibility for firms to hire skilled workers from the unemployment pool could be a less costly alternative than paying directly for general training.

To sum up, in a number of explanations of firm provided training, it seems to us worthwhile to consider the effects on firms training decisions of trained workers being available

on the market, having been separated from their initial firms for exogenous reasons. When these workers are short-term unemployed and their skills are still of value on the market, firms who need skilled workers have to compare the search and matching costs deriving from finding and hiring them with the costs of training unskilled workers.

3. The model

In this Section we present a discrete time model with infinite horizon that considers a labour market which is populated by a large number of firms and workers who are infinitely lived and risk-neutral.

The matching between firms and workers takes place through a process characterised by frictions: this is represented referring to models of search and matching frictions (Pissarides, 1990; Mortensen and Pissarides, 1998; Blanchard and Diamond, 1989), diffusely used in the recent literature on investment decisions in human capital (AP, 1999a, 1999b; Brunello and Medio, 2001; Saint-Paul, 1996; Jansen, 1998; Fella, 2000). Because of these frictions, there is no instantaneous balancing between labour demand and supply, and in equilibrium a certain amount of workers will remain unemployed, while a number of firms will have unfilled job vacancies.

Models based on search and matching frictions take into account the intense activity in job creation and destruction which characterises many economies, and gives rise to a large number of workers who, in any given period, flow in and out of jobs (see Davis, Haltiwanger and Schuh, 1996). As formally shown by Mortensen and Pissarides (1998), search and matching frictions determine match specific rents, that firms and workers divide through wage determination. Under standard bargaining rules (for example, Nash bargaining) it is possible to show that the rent division process may lead to a "compressed wage structure". As explained above, with this wage structure, firms, preferring more skilled workers to less skilled ones, might be interested in investing in training in order to increase their profits. On the basis of this conclusion (in contrast to Becker's), we assume that firms pay for the training costs of their employees. To be more precise, for the sake of simplicity, we suppose that firms pay entirely for the training costs since workers cannot invest in training as a result of imperfect capital markets.

We consider an investment in general human capital, which increases the worker's productivity in any firm by which he may be employed. Skills cannot be provided by the education system and must be acquired on-the-job. For simplicity, any firm can hire only one worker.

We assume that training is indivisible: there are two possible levels of training, $\tau=0$ ("no training") or $\tau=1$. The productivity of a trained worker is equal to y, while the unskilled

worker's productivity is 0. The hypothesis that unskilled workers are not productive permits us to focus the analysis only on the employment relationships that involve firms' decisions relating to training investments. Unskilled workers cannot be productively employed without having followed a training process that we assume takes a single period to be completed. On the other hand, skilled workers, who are unemployed and searching for a job, can be productively employed without such training activity.

The consideration of an external labour market made up of trained workers who, because of exogenous separation from their training firms, are searching for a job, distinguish our contribution from AP's framework. We show that this market influences firms' training decisions. In fact, any firm has to decide whether to hire an unskilled worker and pay to train him or to search for a skilled worker incurring search costs that depend on the labour market conditions. On the other hand, searching for an unskilled worker does not entail any cost for the firm, since we assume a large supply of these workers. Moreover, because of the assumption of positive mobility costs, we do not consider poaching between firms in order to attract skilled workers already employed.

We model firms undertaking training as heterogeneous: they bear different training costs, which we denote with $c = c(\tau = 1)$, where c is a random variable with cumulative distribution function $G(c)$ defined in the range $(\underline{c}, \bar{c})$, where $\underline{c}$ and $\bar{c}$ represent respectively the minimum and maximum cost of training. Thus, more efficient firms are able to pay lower training costs.

Firms training decisions are analysed by using dynamic programming equations to determine the firm's expected profits. Let F^E be the expected profits of a firm employing a trained worker:

$$[1] \qquad F^E = \frac{y-w}{1+r} + \frac{qF^V + (1-q)F^E}{1+r} \qquad \rightarrow \qquad F^E = \frac{y-w+qF^V}{r+q}$$

The first term is the profit that the firm makes in the current period; in the following period the firm has the same opportunities with probability (*1–q*), while there is a probability *q* that it will be separated from the worker, creating a job vacancy (with profits indicated by F^V). Then *q* defines the exogenous rate of separation (turnover) between firms and workers, determined by negative shocks that make the relationship unprofitable; *r* indicates the interest rate at which firms and workers discount the future.[2]

[2] Pay-offs are discounted since it is assumed that they are received at the end of each period.

A job vacancy can be filled by the firm either by training a new worker (obtaining profits F_T^V) or by hiring a skilled unemployed worker (which gives profits equal to F_M^V). It is assumed that both these options correspond to higher profits for the firm than producing with an untrained worker. In other words, AP's conclusion regarding the firm's convenience in undertaking training when no skilled unemployed worker is available on the market is taken for granted.

The expected profits for a firm with a vacancy searching for a trained worker on the market is equal to:

[2] $$F_M^V = \frac{pF^E + (1-p)F_M^V}{1+r} \quad \rightarrow \quad F_M^V = \frac{pF^E}{r+p}$$

In the current period, the firm makes no profit; in the subsequent periods, with probability (1-p) the job will remain vacant, while there is probability *p* that the firm will find a trained worker getting F^E. *p*, as shown below, depends on the relative number of unemployed skilled workers.

Profits for a firm deciding to train an unskilled worker, indicated by F_T^V, are equal to:

[3] $$F_T^V = \frac{-c}{1+r} + \frac{F^E}{1+r}$$

In the current period the firm incurs training costs *c*, while in the following period it will obtain F^E. It is assumed that by hiring an untrained worker the vacancy will be immediately filled without incurring any search costs.

By substituting F^E respectively in expressions [2] and [3], it is possible to show that the firm will decide to train workers rather than searching for them on the skilled labour market if $F_T^V \geq F_M^V$, that is, if its own training costs are such that:

[4] $$c \leq \hat{c} = \frac{[y-w](1-p)}{(r+q+p)}$$

$\hat{c} = \frac{[y-w](1-p)}{(r+q+p)}$ indicates the threshold training cost that makes the firm indifferent between training the worker or searching on the skilled labour market. Any firm with training costs lower than $\hat{c}$ will prefer to train its worker ($G(\hat{c})$ represents the proportion of firms undertaking training), while any firm with training costs higher than $\hat{c}$ will prefer to search on the market (so $1-G(\hat{c})$ is the proportion of firms that do not train their workers).

On the basis of expression [4], one can ascertain that the amount of training provided by firms in this economy is positively related to the rent they gain on trained workers $(y-w)$, and negatively related to the separation rate, *q*, and to the interest rate, *r*. These findings are consistent with the results which have emerged from many other works.

In addition, from [4] it is shown that there exists an inverse relation between the employer-provided training and *p*: the higher the probability of finding a worker on the market, the lower the number of firms which undertake training. However, since, as shown in many models, *p* is a variable that affects the wage, *w*, it is necessary to determine the latter endogenously in order to fully evaluate the effects of labour market conditions on training.

Wage determination

Following the framework of search and matching models, the wage is determined using the Nash bargaining solution. Adopting a quite common hypothesis, it is supposed that firms and workers have equal bargaining power.

We need first to determine through the asset equations the value that a worker derives from being employed (denoted by *E*) and from being unemployed (denoted by *U*).

The return on being employed for a trained worker is equal to:

[5] $$rE = w + q(U - E)$$

The return is given by the wage gained in the current period and by the loss in value resulting from a separation $(U-E)$, which occurs with probability *q*.

Being unemployed brings the worker a return equal to:

[6] $$rU = b + f(E - U)$$

where b indicates unemployment benefits and the second term on the right-hand side shows the increase in value when the worker finds a job (f is the probability of finding a new job, once unemployed).

Using expressions [5] and [6], we can determine the surplus for an employed worker:

[7] $$E - U = \frac{w - b}{r + q + f}$$

As regards the firm, using the expressions [1] and [2], we can obtain the surplus of the firm with a filled job:

[8] $$F^E - F_M^V = \frac{y - w}{r + q + p}$$

The Nash bargaining solution, with the hypothesis of equal bargaining power, implies that the wage is chosen so as to split equally the total surplus. Therefore, $E - U = F^E - F_M^V$. Then:

[9] $$\frac{y - w}{r + q + p} = \frac{w - b}{r + q + f}$$

from which it is possible to determine the wage level:

[10] $$w = \frac{y(r + q + f) + b(r + q + p)}{p + f + 2(r + q)}$$

Using this expression for the wage in the equation [4] defining the critical level of $\hat{c}$, the following is reached:

[11] $$\hat{c} = \frac{\left[y - \frac{y(r + q + f) + b(r + q + p)}{p + f + 2(r + q)} \right](1 - p)}{(r + q + p)}$$

Now we are able to analyse the complete effect of labour market conditions on firms training decisions. Deriving $\hat{c}$ with respect to *p*, we get:

[12] $$\frac{\partial \hat{c}}{\partial p} = \frac{-(y-w)(1+r+q) - \frac{\partial w}{\partial p}(1-p)(r+q+p)}{[r+q+p]^2}$$

Expression [12] shows that the overall effect of *p* on $\hat{c}$ depends on the comparison between $-\frac{\partial w}{\partial p}(1-p)(r+q+p)$, that is positive (given that from [10] it can be seen that $\frac{\partial w}{\partial p} < 0$), and $-(y-w)(1+r+q)$ that is negative.

On the basis of this result it is also possible to draw conclusions about the effect of unemployment on the training offered by firms in this system. With this aim, we need to make the link explicit between *p* and *w*. In fact, assuming a matching function with the following form $\frac{M}{L} = m\sqrt{uv}$ (with constant returns to scale), it is possible to write *p* as $p = \frac{M}{vL} = \frac{m\sqrt{uv}}{v} = m\sqrt{\frac{u}{v}}$ and *f* as $f = \frac{M}{uL} = \frac{m\sqrt{uv}}{u} = m\sqrt{\frac{v}{u}}$ (where *M* is the total number of matches, *L* is the trained labour force, *m* is a parameter indicating the efficiency of matching, *u* is the unemployment rate and *v* the ratio between vacancies and labour force). Consequently, it is possible to distinguish two effects of unemployment (or more precisely the ratio unemployment/vacancies) on firm's training decisions:

a) the first one, already considered by AP (1999), refers to the influence of unemployment on wages and then on training decisions: unemployment reduces wages and then increases the rent firms gain in their relations with workers, encouraging them to provide more training;
b) the second effect, which has been neglected so far, regards the effect of the availability of trained unemployed workers that can be hired by firms without incurring training costs; so, when there is a high number of trained workers on the market, firms search costs are low and there is little incentive for firms to train new workers.

Thus, in general, the overall effect of unemployment on training is ambiguous. However, it is possible to infer that in situations in which wages are only slightly responsive to unemployment (that is, when $\frac{\partial w}{\partial u} \to 0$) a negative relation between training and unemployment might prevail.

4. Conclusions

The previous analysis has shown that unemployment could influence training in two ways: the first one works through the negative effect of unemployment on wages that, increasing the firm's rent, stimulates training; the second effect is related to the availability of trained unemployed workers that reduces the incentive for firms to train unskilled workers. The second effect might prevail in situations in which wages are scarcely responsive to unemployment, giving rise to a negative relation between the level of training paid by firms and the level of unemployment.

As most of the training is informal and very difficult to quantify, it has been traditionally hard to collect data concerning investment in human capital. When this investment concerns on-the-job training, the measurement of the relevant variables is even more complicated (Barron, Berger and Black, 1997). This has prevented accurate empirical verification of human capital theories, notwithstanding the great importance that training activities have in the economy. The lack of reliable data has especially regarded European countries, which only very recently have started to collect data on training realised by firms.[3]

Furthermore, an empirical analysis of the relation examined in the paper, at the cross-countries level, is hindered by the fact that, as shown by the new approach to on-the-job training, the different institutional arrangements (minimum wages, employment protection legislation, wage bargaining systems, etc.) characterising each country have a strong influence on training investment.

On the other hand, some very preliminary insights about the effect of unemployment on training could be drawn for a single country, as Italy, where the institutional system is uniform, but where there are heterogeneous rates of unemployment in different areas of the country. In Table 1 data are reported concerning the training activities realised by Italian firms located in different regions. These data have been collected by ISTAT in the Census on Firms and Services (Censimento intermedio delle imprese e dei servizi) and refers to 1997.

Tab.1 Percentage of firms providing training for their workers, divided by regions (ISTAT, Censimento intermedio delle imprese e dei servizi, 1997).

Regions	***T***	***U***	***Regions***	***T***	***U***
Piemonte	7,1	4,02	Marche	6,0	3,85
Valle d'Aosta	7,6	3,18	Lazio	5,4	4,17
Lombardia	8,7	3,02	Abruzzo	5,9	3,50

[3] Starting from 1994, Eurostat has built up a comprehensive survey of households (the European Community Household Panel or ECHP), that covers 14 European countries and includes questions about training.

Liguria	5,1	2,04	Molise	5,8	6,18
Trentino Alto Adige	10,5	3,03	Campania	3,6	6,80
Veneto	9,9	3,78	Puglia	5,5	6,54
Friuli Venezia Giulia	8,6	4,24	Basilicata	5,2	8,29
Emilia Romagna	9,4	3,63	Calabria	3,7	7,67
Toscana	5,7	3,92	Sicilia	4,2	7,92
Umbria	6,9	3,68	Sardegna	7,1	7,88

T: Training; *U*: Unemployment rate (short and medium term), 1997

From these data, a negative relation of training with regards to the unemployment rate recorded in each region emerges clearly. The correlation coefficient is equal to -0,70. The considered unemployment rate refers exclusively to the short and medium term unemployed, since it is reasonable to assume that the skills of these workers are still useful to firms. On the other hand, we have excluded long-term unemployed, to take into account the progressive obsolescence of skills as unemployment spells become longer. The negative effect of unemployment on training is also confirmed when controlling for firm's size. In fact, even though large firms provide more training than smaller ones, the negative effect of unemployment on training persists regardless of a firm's size.

A correlation between unemployment and training has been estimated also using the 1991 Bank of Italy Survey of Households (SHIW): the resulting coefficient is negative (-0,43), but lower compared with the former.[4]

In our view, these findings are quite significant, since one peculiar feature of Italy is that of its highly centralised wage bargaining system and a number of studies documents that wages are little responsive to local labour markets (Faini, 1999; Casavola, Gavosto and Sestito, 1995). As a result of this, the positive effect of unemployment on training, shown by AP (1999b), could be neutralised, leaving at work only the effect deriving from the fact that a higher unemployment rate could make it less costly to find skilled workers on the market.

The negative correlation between training and unemployment is also consistent with some other empirical evidence regarding different countries – for the US, see Bishop (1991, 1996) and Lynch (1992); for Europe, see Brunello (2001) and Peraita (2001) – which often shows that training is greater in industries and areas with low unemployment.

According to the analysis made by Brunello (2001) and based on the ECHP dataset, Italy is one of the countries with the lowest incidence of training, together with other countries characterised by high unemployment rates such as Greece and Spain.[5] On the other hand, countries with the highest incidence of training, such as Sweden, Denmark and UK, are

[4] Only the survey realised in 1991 contains a question about the training (number of weeks) organised by firms.

[5] The incidence of training in Italy is equal to 0.076 for men and 0.118 for women, while data for Sweden (the best performer) are equal to 0,515 for males and 0,565 for females.

characterised by low unemployment rates. However, as said above, cross-country comparison of this kind, should be carefully interpreted.

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