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A TALE ON INFORMATION AND WAGE EXPECTATIONS

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ABSTRACT

The process of wage expectations formation in different regional labor markets is considered. We argue that when information is scarce or ambiguous, cognitive dissonance phenomena may play a relevant role in shaping expectations. The theoretical discussion is supplemented with an empirical analysis carried out on individual data of Italian unemployed using semiparametric techniques. Results show a marked difference in expectations formation, with the northern unemployed using information more efficiently.

JEL Classification: D83, D84, J64.

Key words: Wage, Expectations formation, Regional labor markets.

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NON TECHNICAL SUMMARY

This paper deals with the process of wage expectations formation in different labor market environments. We argue that psychological elements may enter the expectations formation process and that they are more likely to occur when information is more ambiguous and scarce. We investigate empirically this issue by considering how the subjective perception of the potential wage distribution is influenced by ”measurable” individual and household attributes in local labor markets characterized by different information availability. We refer to Italian northern and southern regions and apply semiparametric additive model techniques to individual data derived from the Bank of Italy Survey for the year 1995. We find that the distribution of expected wages is significantly shifted to the left in the southern regions with respect to the corresponding distribution in the North-Center of the country. A significantly larger proportion of variance of individual expected wages can be ”explained” by individual and household characteristics in the northern regions. The mechanisms underlying wage expectations formation are rather different in the two areas, with more efficient use of available information on the hand of the northern unemployed. At the same time, we argue that wage expectations in the South might show the effect induced by cognitive dissonance that arises when the information gathered by the local labor market greatly diverges from the individual aspiration level. The issue may be relevant in designing labor market policy due to the possible ineffectiveness of measures enhancing labor force participation in those areas, since reservation wages may be stacked at levels that are inconsistent with the local labor market conditions. At the same time, the aim of adjusting aspiration wages to the real labor market environment may be addressed improving the availability and transmission of information.

INFORMAZIONE E ASPETTATIVE SALARIALI

SINTESI

Questo lavoro studia il processo di formazione delle aspettative salariali in differenti mercati del lavoro regionali. Si mette in evidenza che quando l'informazione è scarsa o ambigua, fenomeni di dissonanza cognitiva possono giocare un ruolo rilevante nella formazione delle attese. La discussione teorica è accompagnata da un'analisi empirica effettuata su dati individuali relativi a disoccupati italiani, utilizzando metodi semiparametrici. I risultati mostrano una marcata differenza nei processi di formazione delle aspettative nelle diverse aree del paese, con i disoccupati settentrionali che utilizzano l'informazione disponibile in maniera più efficiente.

Classificazione JEL: D83, D84, J64.

Parole chiave: Salario, Formazione delle aspettative, Mercati del lavoro regionali.

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1. INTRODUCTION

Regional and demographic unemployment differentials are often related to differences in actual and expected wages. In this field, the relevance of reservation wages for understanding unemployment phenomena and labor market dynamics is undisputed. In Italy, for example, it is often argued that people living in the South experience high rate of unemployment due to high reservation wages. Measurement problems and time instability of this variable, if exceptions to the basic microeconomic model characterizing the optimal stopping rule are considered, suggest looking to an alternative source of information on expected earning which may more easily be gathered by households economic surveys. Hence, in this work we analyze a component of reservation wages, expected wages, and we evaluate the contribution of individual factors to wage expectation formation of the unemployed across individuals. The relevance of this exercise rests on the need for an assessment of the main difference characterizing the use of available information in different regional environments. We assume that individuals in their process of wage expectations formation may experiment cognitive dissonance that induce them to not consider or discount some of the available information. The attempt to avoid a psychological discomfort can also bring them to give importance to variables that usually are not relevant for wage expectations as sociological variables. Starting from these considerations, we analyze how individual perceptions of the potential wage distribution is influenced by personal and household characteristics in northern and southern Italian regions. In our empirical analysis we adopt an exploratory approach that exploits semiparametric additive models in order to uncover possible influential nonlinearities in the data. We believe this is an interesting exercise in order to evaluate the extent of local labor market effects on wage aspirations in different regional environments. Clearly, the issue may be relevant in designing labor market policy due to the possible ineffectiveness of measures enhancing labor force participation since reservation wages may remain anchored to levels inconsistent with the real labor market condition. At the same time, the aim of adjusting aspiration wages according to the actual labor market situation may be addressed improving the availability and transmission of information.

The paper is structured as follows. In the next section we outline the main theoretical arguments about wage expectations. We then discuss an extension of Akerlof-Dickens' model of cognitive dissonance to justify why people could rationally choose a wage expectation that does not reflect labor market conditions. Section 3 describes some properties of our data set. Section 4 is devoted to the main empirical analysis and to the interpretation of the results. The last Section concludes. An Appendix reports some simulations related to the methods used in Section 3.

2. WAGE EXPECTATIONS IN ECONOMIC THEORY

Expected wages are a useful concept to characterize individual economic behavior in the labor market and to derive important macroeconomic insights on unemployment dynamics. Economic theory stresses the role of wage expectations in determining wage setting mechanisms in non-competitive frameworks emphasizing the importance of this variable in union models and in efficiency wage setting. Furthermore, it is observed that wage expectations are essential components of reservation wages determination in job search models. In this case, given standard simple assumptions on risk neutrality, the optimal stopping rule predicts that individuals will equate the expected gain from continued search to the search costs. The individual judgement of potential gains from search depends on individual characteristics and attributes influencing labor productivity in the future employment and on the subjective perception of the job opportunities. To be more precise, if the job searcher has imperfect information about the n parameters, $\sigma \equiv (\sigma_1, \sigma_2, ...\sigma_n)$ of the wage distribution $\phi(w)$ and the wage structure changes over time, the process of expectation formation and the reservation wage are strictly dependent on the available information set. To form his conjectures, the job searcher assumes that his future wage will depend in part on conditions known to him at the moment of the survey and in part on events that have not yet occurred. Hence, the prior distribution over the unknown parameters $h(\sigma \mid \theta)$, with θ representing the parameters of the prior, depends on the subjective distribution for uncertainty. The optimal individual behavior in search models depends on a set of additional assumptions on the form of the prior distributions (Rotschild, 1973) and on recall opportunities (Lipmann and McCall, 1976). Buchinski and Leslie (1997), recently analyze the manner in which people update their beliefs about future distributions over time and accordingly modify their behavior pointing out that the effect of this learning process may not be satisfactorily captured by a traditional parametric static model. Comparing different types of forecasting behaviors they find that the method used has significant effects on individual actions including the educational choice. Interesting hypothesis on expectation formation may also be gathered from some new theories of individual choice that consider the influence of sociological and psychological variables (Akerlof and Dickens, 1982; Benabou and Tirole, 2000; Gilboa and Schmeidler, 1995 and 1997). In fact, as argued by Solow (1990)

"wage rates and jobs are not exactly like other prices and quantities. They are much more deeply involved in the way people see themselves, think about their social status and evaluate whether they are getting a fair shake out of society" (p.36).

If sociological and psychological variables are meaningful for the examination of labor market, there is no reason to exclude them from wage expectation analysis. Considering the importance that jobs and wages have in defining social status, wage expectation formation could be influenced by variables such as references to social classes or groups with which individuals want to identify. On the other hand, the social meaning of jobs can justify a more complex individual psychology, that can generate some kind of malaise (cognitive dissonance) when the idea individuals have about themselves is not confirmed by the treatment they receive in the labor market.

The attempt to avoid this kind of psychological pain is considered by the theory of cognitive dissonance (Festinger, 1957) that is based on the idea that individuals prefer to have some beliefs rather than others. Besides, thanks to information selection, they can manipulate their own beliefs in order to make them consistent with the desired ones. This behavior has been considered in economic analysis (Hirschman, 1965; Akerlof and Dickens, 1982; Rabin, 1994) to explain some phenomena that were hard to understand on the ground of the traditional individual choice theory. The idea that individuals may manipulate their own beliefs is not only considered in the cognitive dissonance theory, but also in the so-called egonomics (Schelling, 1978 and 1980; Kavka, 1991). In a recent paper Benabou and Tirole (2000) consider the manipulation of self-confidence and the use of a selective memory that filters agreeable information as a mean to automatic suppression of unpleasant information. In this view, as self-confidence often depends on what individuals obtain in the labor market, it could be difficult for an individual to accept the prospect of a low wage. Besides, establishing ambitious objectives (a high wage expectation) can be another way of maintaining self-confidence. In fact, the requirement of a high wage can make it easier for an individual to accept his own status as unemployed.[1]

On our view, the consideration of cognitive dissonance may be useful in explaining anomalies in wage expectation depending on local labor market environments. An example is that of an individual that has completed an university degree in the hope of obtaining a higher wage than the wage he could have obtained with a lower educational level. Whenever the belief that has motivated his choice is not confirmed by market information the individual may refuse to revise it, since this may generate a psychological malaise. In other words, the individual refuses to

[1] Clearly individuals pay a price in following these strategies in order to mantain self-confidence, as they renounce the wage they would have gained had they accepted a lower paid job. This is obviously true as far as reservation wages are concerned, but it could not be the same when we consider wage expectations. In fact, individuals could accept working at a low wage and still continue to hope for a higher wage leaving unaltered their wage expectations.

consider information deriving on local labor market as it does not confirm those beliefs that have motivated his past choice.

If we consider that the main source of information for people is represented by their own experience and by the experience of other subjects with whom they directly or indirectly interact (Gilboa and Schmeidler, 1995 and 1997), the emergence of cognitive dissonance can also explain the influence of some unusual variables in the determination of wage expectations. In fact, individuals attempting to avoid cognitive dissonance could allude to minor differences in their own characteristics and those of the observed subjects, giving attention to aspects that generally are not important in wage expectations, as social classes or other sociological variables.

Finally, it is important to notice that the appearance of anomalies in wage expectation will be more likely when information on labor market conditions is scarce and ambiguous. In fact, the lack of information will make the individual less prone to adjust his initial beliefs and the ambiguity will permit him to select the information that is less in conflict with his previous beliefs. On the contrary, when information is unique maintaining conflicting beliefs could be costly. Consequently, the relevance and persistence of cognitive dissonance phenomena in wage expectation formation could depend on the type and availability of information in the local labor market. In this sense, we expect that artificial beliefs may occur more frequently in less developed labor market environments.

2.1 A model of cognitive dissonance

A simple model of cognitive dissonance can theoretically justify why people could choose a wage expectation that does not reflect labor market conditions. In what follows, we show on the basis of the Akerlof and Dickens' (1982) model, that it can be rational for the individual to manipulate his own beliefs on wage prospects. In our model the emergence of cognitive dissonance derives from the individual's fear of gaining less than the average wage that has motivated his past choice to acquire a particular education level.

We assume a three periods horizon framework. In the first period individuals choose the educational level they want to acquire and after they become part of the labor force and decide whether to accept or refuse any job offer. They can choose an educational level H, that permits them to obtain an average wage $\widehat{w}$ with $w_L \leq \widehat{w} \leq w_H$ but involves a cost C_s, or L which does not generate any cost and assures a wage w_L. The probability of obtaining a wage w_H is q for educated people. In order to decide the education level they compare the utility deriving in the three periods from a low educational level L, $2w_L$, to the expected utility

deriving from the educational level H, $2\widehat{w} - C_s$. They decide in favor of H only if $2\widehat{w} - C_s > 2w_L$. In what follows we assume risk neutrality and no discount, we also consider that unemployed do not receive any benefit and, for simplicity, we assume that once an individual accepts a job offer he is never going to leave that job.

The cost of acquiring a high educational level increases with the demotivation that derives from the probability $(1 - q)$ of having a job that pays less than $\widehat{w}$. If the individual believes that, thanks to his degree, he will obtain a wage equal or greater than $\widehat{w}$ studying would be less hard. On the contrary, if he considers that he could receive only w_L his motivation will decrease and his effort would be more costly.

Initially, individuals have wage expectations consistent with information on the local labor market. The motivation cost grows as the probability of finding a job at w_L decreases. Moreover, if the probability of finding a job at a wage lower than $\widehat{w}$ is equal to zero, motivation cost will also be zero. In this case the motivation cost C_M, may be expressed as:

$$C_M = c\frac{(1-q)}{q} \tag{1}$$

where c is a parameter representing the psychological malaise associated to job finding uncertainty. Once they decide to start the course of study, they may decide to make their effort less costly throughout the alteration of their wage expectations by assuming that a high wage will occur with probability $q^* \geq q$. The cost of motivation,C_M, may then be expressed as:

$$C_M = c\frac{(1-q^*)}{q}. \tag{2}$$

The individual's decision to augment his own motivation will result in a higher expected wage. In this case, accepting a job that offers a wage w_L implies psychological unease deriving from the downward adaptation of aspiration levels. In other words, we are assuming that individuals who have imagined earning a high wage suffer a great discomfort from accepting a low wage compared to individual with less ambiguous objectives and a low level of education[2]. More precisely, we

[2] This effect is also considered by habit forming and reference point models (Becker and Murphy, 1988; Kahneman, Knetsch and Thaler, 1991; Orphanides and Zervos, 1998) assuming that individuals who have experienced a high level of consumption will suffer a greater disutility from a low level of consumption compared to individuals who have always had low level of consumption.

assume that:

$$C_A = \frac{d\,(q - q^*)}{q} \qquad \text{if} \qquad q^* > q \tag{3}$$

and

$$C_A = 0 \qquad \text{if} \qquad q^* \leq q \tag{4}$$

where C_A indicates the psychological cost of accepting a low wage.

In what follows we show that the choice of a wage expectation greater than that deriving from local labor market conditions may be a rational choice.

First consider the hypothesis that the individual fixes $q = q^*$, in the second period he will accept w_L only if the utility deriving from accepting, $U_A^q\,(w_L)$, is greater than the utility deriving from refusing it $U_R^q\,(w_L)$. Hence:

$$U_A^q\,(w_L) \;\geq\; U_R^q\,(w_L) \Rightarrow 2w_L > qw_H + (1-q)\,w_L \tag{5}$$

$$w_L \;>\; \frac{q}{1+q} w_H \tag{6}$$

Then, consider the hypothesis that individual fixes $q^* > q$. In this case, he will accept w_L if the utility deriving from this choice, considering the psychological cost due to the downward adaptation of his aspiration level, is at least equal to the perceived utility deriving from being unemployed in the second period and waiting to gain $\widehat{w}$ in the third period. Then:

$$U_A^{q^*}\,(w_L) \;\geq\; U_R^{q^*}\,(w_L) \Rightarrow 2w_L - d\frac{(q^* - q)}{q} \geq (1 - q^*)\,w_L + q^* w_H \tag{7}$$

$$q^* \;\leq\; \frac{q\,(w_L + d)}{q\,(w_H - w_L) + d}. \tag{8}$$

This means that the individual can choose $q^* > q$, but in order to make the right decision in the second period, condition (8) must be respected. If $q^* > \frac{q(w_L+d)}{q(w_H-w_L)+d}$ is chosen, the individual will erroneously refuse w_L in the second period. The cost of making this wrong choice is equal to $w_L + q\,(w_L - w_H)$ and will be the same for any value of q^*.[3]

Finally, consider that the variable q^* is chosen by each individual in period one to maximize his welfare. The individual correctly perceives that if he chooses q^* above the critical level he will make the wrong decision. On the other hand, he

[3] If we consider more than two wages the cost of making the wrong choice in the second period depends on the value of q^*.

knows that $q^* = 1$ is the value minimizing the cost of demotivation in period one. Hence we are restricted to consider two possible choices, since the individual in period one will choose:

$$q^* = \begin{cases} 1 \text{ if } \quad w_L + q\,(w_L - w_H) < c\frac{q(w_H - w_L) - qw_L + d(1-q)}{[q(w_H - w_L) + d]q} \\ \\ \frac{q(w_L+d)}{q(w_H - w_L)+d} \text{ if } w_L + q\,(w_L - w_H) > c\frac{q(w_H - w_L) - qw_L + d(1-q)}{[q(w_H - w_L) + d]q} \end{cases} \tag{9}$$

The choice of q^*clearly depends on the divergence between $w_L$and w_H, on the probability of obtaining a low wage, and on the parameters characterizing the psychological costs of demotivation and low wage acceptance, c and d.

On the basis of our tale on cognitive dissonance, differences in wage expectations can depend on elements that characterize different labor markets. The story does not tell that individuals that have chosen a high q^* will never adjust their wage expectations, but only that the adjustment process could be characterized by some new aspect, generally not considered in economic theory. Adjustment to labor market conditions can be more likely for some individuals rather than for others on the basis of the involved psychological discomfort.

2.2 A model of non instrumental cognitive dissonance

In this section we consider the effect of cognitive dissonance on wage expectations starting from the point that individuals may have an aspiration wage level which does not include all the information available on the local labor market. In the last section we have shown that this could be a rational choice as individuals were supposed to manipulate their beliefs in an instrumentally rational way. But on the view of many authors (Elster, 1983; Farber, 1976) this kind of instrumental rationality about cognitive dissonance is not psychologically credible. It seems more credible that cognitive dissonance involves some degree of self deception: it works until people recognize they are acting in that way. As argued by Elster (1983, p.43) some " mental states appear to have the property that they can only come about as the by-product of actions undertaken for other ends". Probably individuals cannot seek for motivation through the intentional alteration of their beliefs about future wage prospects. Even if motivation is instrumentally useful cannot be chosen for its instrumental utility.

On the other hand, there are many reasons that could explain why individuals formulate an aspiration wage that does not take in account all the conditions characterizing the local labor market. Wage aspirations depend on personal ambition, on educational and social variables, on reference wages like those established in

collective bargaining. Besides, in defining their aspiration level individuals may refer to a wider labor market compared to the one where they actually work. For example, a subject who has decided to begin a university degree could also have considered, in defining his aspiration level, the opportunities offered outside the local labor market.

Then in what follows, given a certain aspiration level w^*, we consider the effect of cognitive dissonance on individuals wage expectation formation process. More precisely, we assume that beginning from w^*, individuals formulate their wage expectation $E(w)$ taking in account new information deriving from their own experience and from the experience of other subjects with whom they interact. In fact, as in some recent theory of individual choice (Gilboa and Schmeilder, 1995 and 1997) we assume that individuals refer exclusively to what they directly observe. The observed variables that we consider are:

1. $w_{i,t-1}$= the wage gained by individual i in the past; $i = 1, 2, ...n$;
2. w_j^a=the wages $a = 1, 2, ...h$ gained by other subjects $j = 1, 2, ...n - 1$.

Individuals compare their aspiration level w^* to the information arising from the observed behavior of other people which is generally conceived more or less relevant depending on whether they are recognized as being more or less similar to themselves. Consequently, it is likely that wage expectations are more influenced by wages gained by individuals who have similar household and professional characteristics.

This kind of comparison could be influenced by cognitive dissonance: when the observed wage is too low compared to the initial aspiration level, individuals could attempt to reduce the deriving psychological discomfort looking for differences in their own characteristics and those of the considered people. Individuals try to justify the low wage gained by the observed person pointing to aspects that characterize that person (do not characterize that person) but do not characterize themselves (but characterize themselves).

This process seem to operate in many circumstances. For example, it has been noticed that when mountain walkers hear of a fellow walker who has died in an accident they always point to some precaution that the died person did not take but they always do[4]. Besides, it as been observed that when unemployed people hear of friends that have moved to find a job, often they refer to some difference

[4] We are grateful to Robert Sugden for this example.

in their own curriculum that should permit them to find a job in the place in which they live.

As far as wage expectations are concerned, this reducing cognitive dissonance strategy could induce individuals to take in consideration also variables that generally are less relevant for the determination of wage expectations as social variables, or could bring them to give importance to minor differences in personal, household and professional characteristics. A similar phenomena could emerge even when individuals refer to their own past experience, if the wage accepted in the past is far below their aspiration level, they could try to avoid cognitive dissonance finding differences in their actual condition compared to the past one. Therefore, individuals could especially refer to people that have similar characteristics and have found a job that pays a wage close to the individuals' aspiration level. For example, a young woman that has just fulfilled an educational course in order to become an accountant could exclusively consider the wage perceived by other women who have the same education and have found a job that pays an appropriate wage. Generally, this phenomenon involves a refusal to accept jobs that do not require the acquired qualification. In our example the refusal could regard a job as seller, waitress, etc.

Then we assume that the closeness to the educational (S), professional (X), personal (D), household (B), and social characteristics (C), of individual i to individual j is measured by a function

$$s_{ij} = g\left(S, X, D, B, C\right) \tag{10}$$

$$g = f(w_j^a - w^*) \tag{11}$$

with $f(w_j^a - w^*) = 1$ when $w_j^a > w^*$ and $0 \geq f(w_j^a - w^*) \leq 1$ when $w_j^a < w^*, f'(\cdot) < 0,\ f''(\cdot) > 0$. The function s_{ij} is continuous and assumes values in the range [0, 1]. The value 1 appears if the individual considers himself identical to the observed subject and the value 0 when he considers himself completely different to the observed subject. The way in which the observed wage w_j^a influences s_{ij} depends on the aspiration level and on the distance between aspiration and observed wages. Since function $f(w_j^a - w^*)$ has values in the range [0, 1]: when w_j^a is equal or greater than w^*, individual perception of differences in his own characteristics and those of other individuals is not affected by dissonance cognitive effects, on the contrary when w_j^a is lower than w^* larger differences are perceived according to the difference between the observed and aspiration wages level increases.

We also assume that the individual will give a greater weight to information that has been observed many times. As far as the individual observes the same wage earned by many individuals that he consider similar to himself he adjust his wage expectations. The adjustment process continues until there is a gap between the aspiration level and the observed wages weighted by the function s_{ij}. Once this condition has been reached additional observation of the same wage will not influence the process of wage expectation formation anymore.

The process of wage expectation formation takes then the following form

$$\begin{aligned} E(w_i) &= w^* + \frac{1}{s}\sum_{j=1}^{n} s_{ij}\left(w_j^a - w^*\right) \\ w_j^a &\neq w^* \end{aligned} \tag{12}$$

where s represents the number of observation for which the value of function s_i^j is not 0 and that includes also the past experience of the considered subject.

To show how this kind of wage expectation formation process works, let us consider an individual that has been awarded a qualification and on the basis of this has a higher aspiration level than individuals with a lower educational level. If he observes that on the local labor market all people with his own characteristics are paid regardless of the education level, he will adapt his aspiration to this information. In fact, even if he discounts all the information received, when there are many observation that give all the same signal they will produce an adequate adjustment in the initial aspiration level. Besides, if the information in univocal it would be psychologically costly to maintain the initial beliefs. As discussed by many authors cognitive dissonance can be more easily avoided when information is scarce and ambiguous. In our case, when information is poor and ambiguous it becomes easy for the individual to avoid the discomfort deriving from the downward adaptation of his aspiration level. Moreover ambiguity permits him to choose the most agreeable information. On the contrary, if all the information the individual gets do not give support to his aspiration level the adjustment of initial beliefs will be a more effective strategy. Simplifying, individuals can follow two strategies: maintaining their initial beliefs avoiding information that do not support them, or choose new beliefs consistent to the received information. When the information is ambiguous the first strategy is more likely. For example in a labor market where there are two sectors paying different wages for the same qualification, the individual could not adjust his aspiration level to the average wage maintaining high his wage expectations. In this case it is possible for him to mainly refer to the sector that pays high wages, alluding for reason that should permit him to find a job in that sector. Note

that the adjustment process may be less likely for individuals belonging to a social group whose members are almost all employed in the high wage sector. In fact, in such a circumstance the direct information the individual receives give support to his initial beliefs, and other information can more easily be avoided.

Similar results can be reached assuming that the expected wage will adjust to the available information on the basis of the distance between the aspiration level and the observed wage[5]. Formally, the value of the adjustment from the aspiration level is given by a function $v(w_j^a - w^*)$, with $v'(w_j^a - w^*) > 0$, $v"(w_j^a - w^*) < 0$ when $(w_j^a - w^*) > 0$ and $v"(w_j^a - w^*) > 0$ when $(w_j^a - w^*) < 0$. This means that if $(w_j^a - w^*) < 0$ the individual will be risk-taker as the expected wage $E(w_i)$ resulting from the described process of information processing will be higher when $(w_j^a - w^*)$ is greater. On the contrary, if $(w^* - w_j^a) > 0$ the individual is risk-averse so that the expected wage $E(w_i)$ increases less than proportionally with respect to the observed wage. The process of wage expectation formation takes then the following form

$$\begin{aligned} E(w_i) &= w^* + \frac{1}{n}\sum_{j=1}^{n} v\left(w_j^a - w^*\right) \\ w_j^a &\neq w^*. \end{aligned} \tag{13}$$

The difference between this formulation and the last one is that now the divergence between the observed and the aspiration wage does not influence the function s_{ij}, but directly applies to the value function. Obviously this formulation is an application of Kahneman and Tversky's prospect theory in which people are risk-averse with respect to gains, but risk-loving with respect to losses. As far as wage expectations are concerned the implication of this theory is that when the distribution of wages is high relative to individual's reference point he chooses a wage expectation that gives a high probability of finding a job. On the contrary, if the distribution is low relative to his reference point he chooses a reservation wage that gives him a low job finding probability.

If the just highlighted theoretical models have some role in describing the mechanics of wage expectation formation, differences may arise according to the existing social and economic environments. The interaction between socio-economic elements and psychological aspects may imply different wage expectations for individuals with identical attributes. In this sense, the analysis of the process of wage expectation formation probably include more complex questions than those usually considered.

[5] We are grateful to Robert Sugden for this suggestion.

Table 1: Descriptive statistics by geographic areas: millions of lire per year

	n	Min	1stQu	Median	Mean	3rdQu	Max
North-Center	243	1.6	13.0	16.3	17.3	20.3	60.0
South	441	1.0	11.1	14.1	15.3	18.7	81.0

3. THE DATA

Before introducing the description of the econometric methods used to estimate (20) a word of warning is necessary on the reliability of the expectation data that we use. There is a rather skeptical attitude towards expectational data based on the assumption that respondents to surveys may not answer the questions honestly. However, as pointed out by many authors (see Manski, 1990; Dominitz and Manski, 1994) there is not robust empirical evidence to condemn all expectations data and to prefer inference on expectations based on income realizations.[6]The data we use in this paper are taken from the Bank of Italy Survey on family budgets carried out in March 1996 and referring to 1995 (BIS95, hereafter). BIS95 reports information about many individual and family characteristics, including individual positions in the job market during 1995 as well as at the time the enquiry was carried out. The individuals selected in this study are those who have declared being unemployed or first job seekers in March 1996, independently of their position in 1995.[7] Here we focus on the individual expected wages over the next 12 months. Three pieces of information are available from BIS95:

1. the minimum expected wage, conditionally upon having found (and accepted) a job, w_m;
2. the maximum expected wage, w_M;
3. the subjective probability of getting less than $\bar{w} \equiv \frac{1}{2}(w_m + w_M)$, α.

We compute the individual expected wage as

$$\mathcal{W} = \frac{1}{2}\left(w_m + \bar{w}\right)\alpha + \frac{1}{2}\left(\bar{w} + w_M\right)\left(1 - \alpha\right). \tag{14}$$

Note that $\mathcal{W}$ is the *conditional* expected wage, being conditional on having found and accepted a job. The *unconditional* expected wage should be weighted by the probability of finding (and accepting) a job.

Some descriptive statistics of $\mathcal{W}$ are reported by geographical areas in table 1, while the estimated probability density (pdf) and cumulative distribution functions (cdf) are reported in figure 1. The different number of individuals selected in the North[8] ($n_N = 243$) and in the South ($n_S = 441$) reflects the different situation of the job market in the two areas of the country, the unemployment in the South being roughly double than in the North. The distribution of expected wages in the South seems to be shifted to the left with respect to the North. However, the highest expected values can be found in the South. These features mirror those of the distributions of the observed wages for the same areas (see *e.g.* Lupi and Ordine, 1998).[9]

Density estimation allows us to carry out a formal test of equality of distributions in the two areas. We compute the test in the form of a Cramér-von Mises test, as

$$CVM = \int \left[\hat{F}_N(\mathcal{W}) - \hat{F}_S(\mathcal{W})\right]^2 d\mathcal{W} \tag{15}$$

where $\hat{F}_N(\mathcal{W})$ and $\hat{F}_S(\mathcal{W})$ are the estimated cdf 's of $\mathcal{W}$ in the Northern and Southern regions, respectively. However, while the conventional CVM test is computed over an estimated cdf and a fixed reference cdf, we use two estimated cdf 's. Therefore, we utilize a bootstrap method to infer about the marginal significance of our test. Indicating by $\hat{f}_i$ ($i \in \{N, S\}$) the estimated pdf 's, $R \gg 1$ couples of independent samples (each constituted of n_N and n_S observations) are bootstrapped under the null of equal distributions from $\hat{f}_i$ with i determined on the basis of the highest number of observations.[10] Then the significance level of the test is computed

[6] Italian expectations data have already been used *e.g.* by Guiso *et al.* (1992).

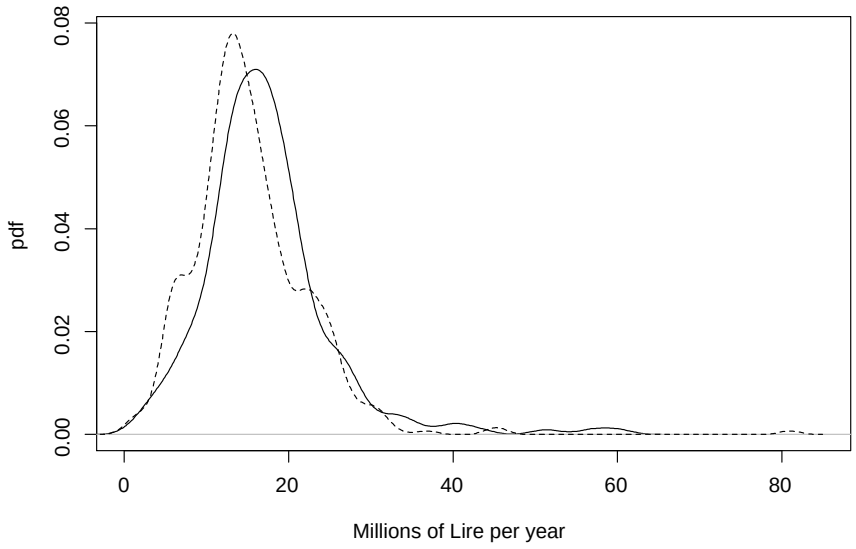
[7] Actually we can use only about a half of the entire BIS95 sample because the information related to the professional status at the time of the enquiry is available only for a subset of the interviewed.

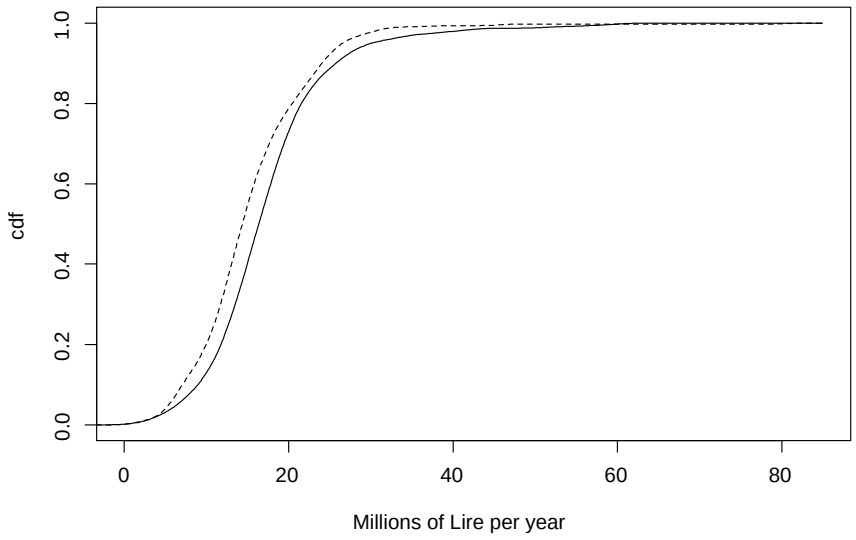
[8] For brevity we refer to the North-Center as "North" or "Northern regions".

[9] However, notice that in Lupi and Ordine (1998) the comparison is carried out over 4 geographical areas and using hourly (rather than annual) wages. Note also that, if a trimmed sample is used (excluding 2.5% of the distribution on both sides), the maximum value of $\mathcal{W}$ in the North is higher (34.0) than that observed in the South (30.0), while the minimum is equal (5.0) in the two areas. If trimming is carried out using a value of 0.5% for both sides of the distribution we still have that the highest value in the north is larger (51.4) than the corresponding value in the South (36.8). In this case Southern regions exhibit also a smaller minimum vale (1.7) than the Northern ones (3.2).

[10] In practice, since $n_S > n_N$, samples are botstrapped from $\hat{f}_S$. Details on how to bootstrap from estimated densities can be found in Silverman (1986) or Efron and Tibshirani (1993).

Figure 1: Estimated probability density functions (pdf) and cumulative distribution functions (cdf) of individual income expectations in the North-Center (solid lines) and in the South (dashed lines). Bandwidths selected by Sheather and Jones' (1991) method.





according to

$$ASL = R^{-1} \sum_{j=1}^{R} \mathbb{I}(CVM_j > CVM) \tag{16}$$

with CVM_j and CVM being the values of the CVM test on the j-th bootstrapped couple of samples and on the original samples, respectively, and with $\mathbb{I}(\cdot)$ being the indicator function. The test rejects the null of identical distributions for $ASL < \alpha_c$ (e.g., $ASL < 0.05$). This procedure applied to our data makes us to strongly reject the null of equal distributions, giving $CVM = 0.160$ and $ASL = 0.000$. (See appendix A for some results concerning the reliability of the bootstrap-based procedure.)

According to these results we conclude that it is not just the mean, but the whole distribution of expected wages that is significantly shifted to the left in the Southern regions with respect to the corresponding distribution in the North of the country. To the extent that wage expectations are reflected on the reservation wages, it seems that something else must be important in explaining Southern unemployment.[11] A different question is if the shift to the left is large enough to have any impact. However, we feel that an important issue is if the conditional (on individual characteristics) rather than the unconditional distributions are the relevant entities to look at. In the rest of the paper, we will try to investigate this aspect.

4. MODELLING WAGE EXPECTATIONS

Some of the variables included in our theoretical model cannot be empirically estimated as they concern psychological aspects. For this reason we simplify our hypothesis on individual wage expectation starting from the idea that each individual considers an aspiration wage which depends on his labor market attributes and on his subjective estimate of the probability of receiving a job offer $\widehat{\lambda}$, which in turn depends on personal characteristics and on local labor market conditions. Formally:

$$w^* = w(S_t, X_t, D_t, B_t, \widehat{\lambda}) \qquad i = 1, 2, ...N \tag{17}$$

with

$$\widehat{\lambda}_t = \lambda\left(S_t, X_t, D_t, B_t, u\right) \tag{18}$$

[11] See also Mazzotta (1998).

where w^* is the potential wage for individual i, S is education, X is experience, D are personal attributes like age, sex, marital status, etc., B are households characteristics, u is the local rate of unemployment and t is a time index.

Each period, conditional on his current information, the individual formulates wage expectations and chooses his labor market state. The information set at his disposal may be represented as:

$$I_t = (S_t, X_t, D_t, B_t, u, \widehat{\omega}_t) \tag{19}$$

where $\widehat{\omega}_t$ denotes the information on the wage distributions known to the individual at the beginning of time t.

Relying on this assumption the expected wage may be expressed as a function of the following variables:

$$E(w) = f\left(S_t, X_t, D_t, B_t, \widehat{\omega}_t, \widehat{\lambda}_t\right). \tag{20}$$

On the basis of the arguments and results exposed in the previous sections we think that wage expectation formation might be different in the north-central and southern regions. For this reason we model the two regions separately. With reference to our previous research (Lupi and Ordine, 1998 and 1999) it might well be that a finer regional disaggregation would be more appropriate, but we would loose too many degrees of freedom.

It might well be that linear models are too simple to approximate unemployed people's wage expectations behavior. Indeed, more complex relations than those postulated by a linear model could be important in determining expected wages. In order to explore different patterns without imposing special parametric alternatives, we use *additive models* which are a very general class of non parametric models defined as (see *e.g.* Hastie and Tibshirani, 1990)

$$y = \alpha + \sum_{i=1}^{N} f_i(x_i) + \varepsilon, \tag{21}$$

where the f_i's are nonparametric univariate functions of the x's (one for each x_i), the ε's are independent of the x_i's, and $\mathsf{E}(\varepsilon) = 0$, $\mathsf{V}(\varepsilon) = \varepsilon^2$. Given their generality, additive models are a powerful exploratory tool. Standard linear models are special cases of additive models. Since we want to investigate the effect of some variables after controlling for specific effects, the model that is most interesting to us is a semiparametric modification of (21), in which some control variables $\mathbf{z}$

enter the model linearly, that is

$$y = c + \mathbf{z}\boldsymbol{\beta} + \sum_{i=1}^{N} f_i(x_i) + \varepsilon. \tag{22}$$

Estimation of (22) is carried out using a sort of "double backfitting algorithm".[12] The algorithm can be easily explained as follows: Rewrite the model compactly as

$$Y = \mathbf{X}_p\boldsymbol{\alpha} + f(\mathbf{X}_n) + u$$

where $\mathbf{X}_p$ and $\mathbf{X}_n$ are two matrices of dimension $n \times k_p$ and $n \times k_n$, respectively, which represent the variables that enter the model parametrically (including the constant) and non parametrically. Estimation is carried out in an iterative way as follows:

1. Let $\widehat{f(\mathbf{X}_n)} = 0$
2. $Y - \widehat{f(\mathbf{X}_n)} = \mathbf{X}_p\boldsymbol{\alpha} + e_p$ from which $\widehat{\boldsymbol{\alpha}}$ is estimated
3. $Y - \mathbf{X}_p\widehat{\boldsymbol{\alpha}} = f(\mathbf{X}_n) + e_n$ from which $\widehat{f(\mathbf{X}_n)}$ is estimated by backfitting
4. Fitted residuals are

$$\begin{aligned} Y - \widehat{Y} &= Y - \left(\mathbf{X}_p\widehat{\boldsymbol{\alpha}} + \widehat{f(\mathbf{X}_n)}\right) \\ &= Y - (Y - \widehat{e}_p + \widehat{e}_p - \widehat{e}_n) \\ &= \widehat{e}_n \end{aligned}$$

   and $RSS = \widehat{e}_n'\widehat{e}_n$.
5. Iterate 2-4 until RSS does not change (or the change in RSS is smaller than a pre-specified tolerance level).

Given the risk of over-interpreting the model, we start from a general unrestricted model and restrict it stepwise in order to retain only significant factors, as suggested *e.g.* by Hastie and Tibshirani (1990). Even if the distributional result is only approximate, a check about the significance of each regressor (both in the parametric and in the nonparametric part of the model) is carried out using the

[12] In a first version of the paper, we estimated directly (21) on OLS residuals on the control variables. The procedure might be expected to be valid as far as convergence of the linear (OLS) model is more rapid than that of the nonparametric components, as is usually the case. The results we reached are very similar to those presented in this version of the paper.

pseudo-F (Hastie and Tibshirani, 1990; Bowman and Azzalini, 1997)

$$F = \frac{(RSS_0 - RSS)/(df_0 - df)}{RSS/df} \overset{\text{approx}}{\sim} F_{(df_0-df),df}$$

where the index "0" indicates the restricted model estimated excluding the regressor of which we want to test the significance.[13]

The variables included in the unrestricted models are reported in Table 2. Retained variables and their approximate significance levels are reported in Table 3. The estimated nonparametric factors for the North-Central regions and for the South are reported in figures 2 and 3, respectively.

Being a female reduces wage expectations both in the Northern and Southern regions, while being the head of a household increases wage expectations only in the South.

As far as nonparametric factors are concerned, we find in Northern regions significant effects of personal income in the previous year, age, and education. The effect of individual age on wage expectations is on average fairly flat, but shows two evident "humps" corresponding to about 26 and 45 years, respectively. The effect of education is increasing and broadly linear for all degrees but impose a penalty for those who do not possess any school degree. Expected wages are also increasing in personal income over the previous year, but those who did not earn any income during 1995 show on average higher wage expectations than those who realized low income levels.

In southern regions, low education levels do not appear to decrease wage expectations in the same measure as in the North. Overall, the estimated factor for education is relatively flat with a relative increase corresponding to university degrees. Per capita household real assets show a similar pattern, with higher level of wealth associated with higher expectations, being otherwise only slowly increasing.

From an economic point of view, it emerges that the mechanisms of wage expectations formation are rather different in the two areas. In particular, the additive model estimated on Norther regions data are able to "explain" a significantly larger fraction of the variance than in the South. The R^2 of the model estimated for the North is more than four times larger than that of the model estimated for the South.

[13] Significance has been computed for each variable using an approximate F-test based on the comparison of the fitted residual sum of squares obtained including and excluding the relevant variable (see *e.g.*, Hastie, 1992). Asymptotic inference for additive models is a field of current research (see Hastie and Tibsirani, 1990 and Schimek and Turlach, 1999).

Table 2: Variables used in the analysis.

Variable	Variable description	transform	
ly95	personal 1995 labour income	log	
ly95fnpc	average 1995 labour income of the other members of the family	log	
lprob	subjective probability of finding a job	log	
lastemp	last employment (if any)	none	
lage	age	log	
lexpe	number of past positions	log	
lycrf	per capita household financial income	log	
larf	per capita household real assets	log	
lpff	per capita household liabilities	log	
rentpc	per capita rent or imputed rent for the house where the family lives	log	
conspc	per capita consumption	log	
educat	level of education	none	
female	1 if female	none	✓
head	1 if head of household	none	✓
bhealth	1 if in bad health state	none	✓
smalcity	1 if lives in a small city	none	✓
fjs	1 if first job seeker	none	✓
ltun	1 if long term (more than one year) unemployed	none	✓
r3-r20	regional dummies	none	✓

Notes: "✓" in the last column denotes a control variable that enters the semiparametric model linearly. Lastemp is a categorical variable taking 10 values from low-qualified to high-qualified jobs. Educat is a categorical variable taking 7 values from 1 (no education) to 7 (university degree). r3-r20 are regional dummy variables intended to capture macroeconomic regional effects: r2 is absent due to lack of individuals in the small region Valle d'Aosta in our sample.

Table 3: Retained factors in semiparametric models

Factor	Significance	nonparametric
North-Central regions		
educat	0.0000	yes
female	0.0000	no
r5	0.0000	no
r9	0.0002	no
lage	0.0005	yes
ly95	0.0012	yes
r6	0.0092	no
r10	0.0189	no
$R^2 = 0.457$		
Southern regions		
female	0.0002	no
r15	0.0010	no
educat	0.0015	yes
headhouse	0.0229	no
larf	0.0670	yes
$R^2 = 0.104$		

Figure 2: North-Central regions: estimated nonparametric additive factors. Points are partial residuals. Dashed lines represent approximate ± 2 pointwise standard errors of estimated curves.

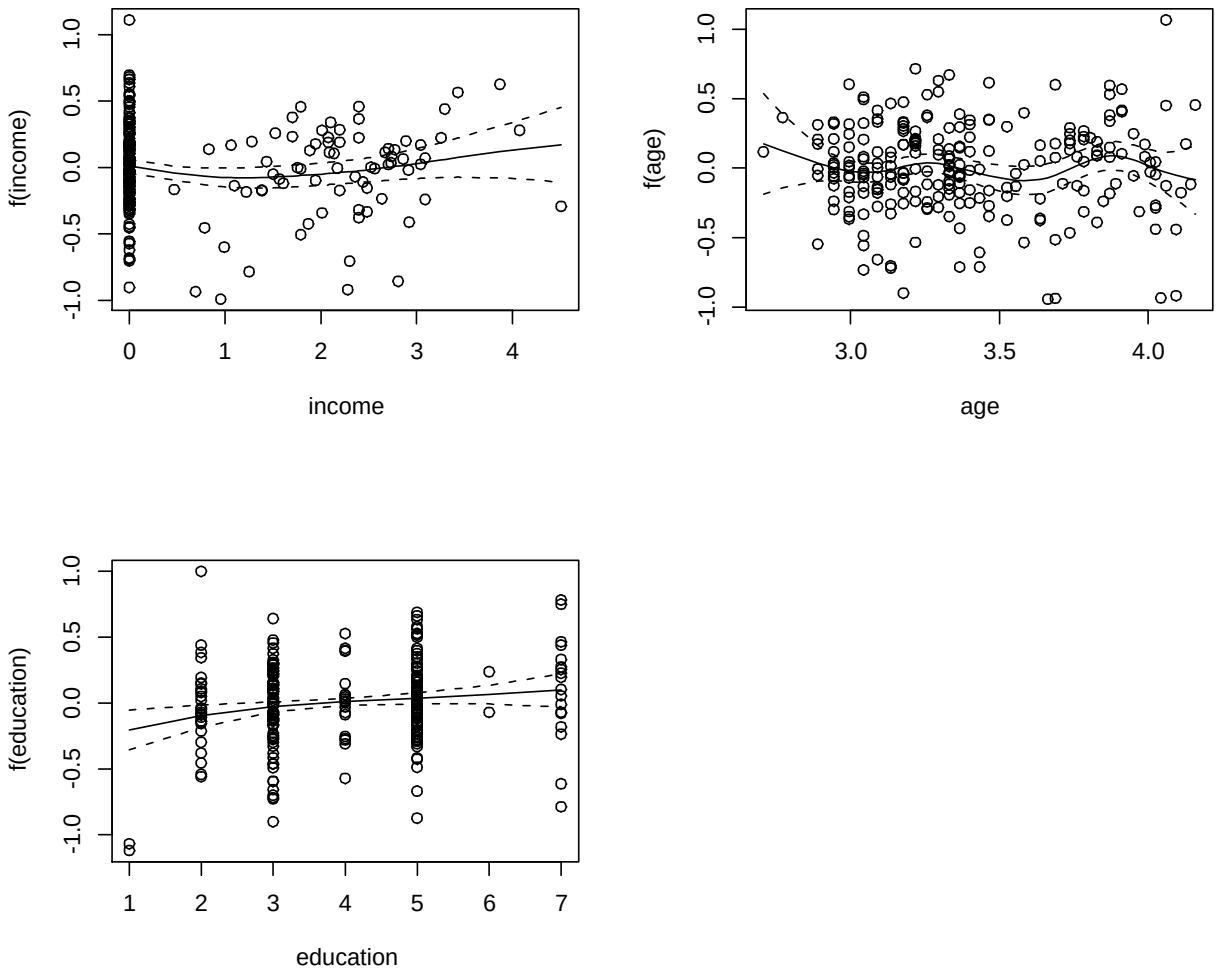
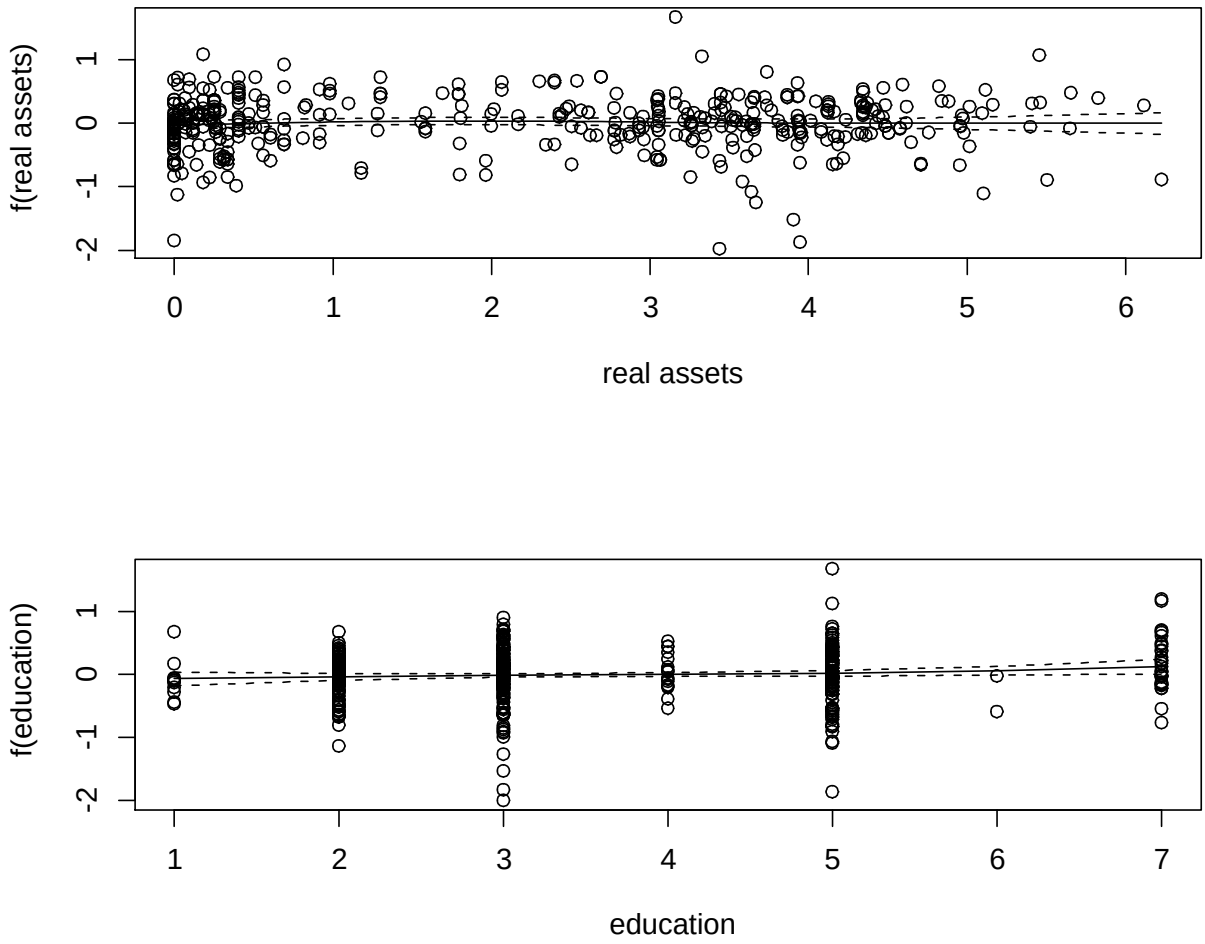


Figure 3: Southern regions: estimated nonparametric additive factors. Points are partial residuals. Dashed lines represent approximate ± 2 pointwise standard errors of estimated curves.



Indeed, wage expectations in the South seem to be nearly unpredictable using the dataset at hand. On the basis of the considerations expressed in the previous sections we argue that, since the information in the South is less diffuse and more ambiguous than in the North, the divergence between the econometric model and the wage expectation mechanism is larger. This in turn implies a more efficient use of available information on the hand of northern unemployed. As far as we may claim that southern unemployed do not use efficiently the available information set, the often cited argument that the reservation wages in southern regions do not reflect the local labor market conditions may be empirically justified. But why should people in the South make a worst use of available information compared to people living in the North? A possible answer can be found in the fact that, since the Southern labor market is poor of work experiences, the process of wage expectation formation is based on a restricted range of information compared to the North. This can induce a distortion in the aspiration adjustment process whenever none of the people already employed could have exactly the same characteristics of the considered subject. For example, for a newly graduated engineer it could be hard to find another subject already employed having his own personal and professional characteristics. Consequently, he can only refer to people that have found a job a long time before, or that have a different curriculum. This can induce an over-evaluation or under-evaluation of wage expectations. Moreover, on our view the scarcity and ambiguity of information permits the occurrence of some psychological phenomena, as cognitive dissonance, that induce people to formulate their wage expectations without taking into account all the available information. This means that if information is costly, the environment is particularly noisy or the individual ability to process the information is low the effect of cognitive dissonance on wage expectations becomes more likely.

The greater ambiguity in the information available in the South may depend on the divergence between paid wages and wages established by collective bargaining, due to the presence of a strong informal sector. Besides, wage differentials and employment opportunities between public and private sector may also be relevant. In the North and the South of Italy public wages are almost equal in nominal term although real wage differentials are undisputable. Moreover, opportunities in the private sector are better in the North and public employment is much more attractive in the South where job chances in the private sector are very poor. As argued by Alesina, Danninger and Rostagno (1999), this situation "implies that for private entrepreneurs it is expensive to offer jobs as attractive as those offered by the public sector". As support to this argument they bring some empirical evidence about the scarce job search activity of people employed in the public sector. Our paper shows that even if the number of expected public job offers is not great enough to

rationally justify a high wage expectation, the payment of public wages that are higher than private ones can generate distortions that bring people to not adjust their wage expectations in order to take into account private sector information. In this case, social variables and family experiences can be relevant in the attitude to adjust aspiration wages. In fact, avoidance or discounting of information related to the sector that pays low wages will be more likely if the individual is part of a social group whose members are almost all employed in the sector that pays high wages. In this case the direct information he receives tends to confirm his aspiration level. Then public sector in the South can lead to a vicious circle for some new reason that adds to the many already discussed by the previously quoted study.

The quality and quantity of information on the labor market could also explain why education in the South is not important in defining wage expectations until it does not reach a university degree. Indeed, in this geographic area wage opportunities for lower levels of education are very similar.

Similarly, in a market characterized by a high rate of unemployment and by a lack of correspondence between wages and qualifications it can easily happen that people who in the past had a low wage compared to their aspiration level do not include it in the information set relevant for their process of wage expectation formation. On the contrary, if the individual perceives the past wage as adequate to his own personal and professional characteristics it will be relevant in defining his wage expectations. Further, the occurrence of a high wage expectation for people that never had a job may arise when individuals do not have the opportunity to directly understand the evaluation that the local labor market gives to their own characteristics.

Moreover, as discussed in the previous sections cognitive dissonance could bring the unemployed to give importance to variables that generally are not relevant in wage expectations, as social status. The positive influence of real assets in the wage expectations of people living in the South may give support to this hypothesis. In any instances, the more cognitive dissonance or other similar effects are frequent, the more usual personal (and to some extent, household) characteristics are no longer representative of individuals' beliefs on future wages, so that it becomes particularly difficult to find any statistical model explaining the observed expectations.

On the basis of these considerations adjustment of wage aspiration to labor market conditions would depend on emotions that obviously cannot be enclosed in an econometric model. Only when information becomes pervasive this emotional

element tend to disappear. We think that this might highlight a partial, but plausible, description of wage expectations formation, especially in the South of the country.

5. CONCLUDING REMARKS

In this paper we analyze the process of wage expectations formation in different labor market environments. We argue that cognitive dissonance phenomena and psychological elements may be relevant in forming expectations and are more likely to occur when information is more ambiguous and scarce. We investigate empirically this issue by considering how the subjective perception of the potential wage distribution is influenced by "measurable" individual and household attributes in local labor markets characterized by different information availability. We refer to Italian northern and southern regions and apply semiparametric additive model techniques to individual data derived from the Bank of Italy Survey for the year 1995.

We find that the distribution of expected wages is significantly shifted to the left in the southern regions with respect to the corresponding distribution in the North-Center of the country. A significantly larger proportion of variance of individual expected wages can be "explained" by individual and household characteristics in the northern regions. We argue that the mechanisms underlying wage expectations formation are rather different in the two areas, with a more efficient use of available information on the hand of the northern unemployed. At the same time, we argue that wage expectations in the South might show the effect induced by cognitive dissonance that arises when the information gathered by the local labor market greatly diverges from the individual aspiration level. This psychological effect obviously may operate for unemployed living both in the South and in the North, but the ambiguity and scarcity of information that is peculiar to the southern labor market makes it more relevant in this area. This is not to say that individuals in less developed areas do not consider the information available in the local labor market, but that the underlying process might be more complex and slow. In this sense we highlight that the issue may be relevant in designing labor market policy due to the possible ineffectiveness of measures enhancing labor force participation since reservation wages may be stacked at levels that are inconsistent with the local labor market conditions. At the same time, the aim of adjusting aspiration wages to the real labor market environment may be addressed improving the availability and transmission of information.

Appendix A. CVM TEST: SOME RESULTS WITH KNOWN DISTRIBUTIONS

We have applied the test (15)-(16) with $R = 500$ over generated random samples $\{x_{1j}\}_1^{200} \sim \chi^2(\upsilon_1)$ and $\{x_{2j}\}_1^{400} \sim \chi^2(\upsilon_2)$. The ASL of the pairwise comparisons of the generated samples are reported in table 4. Since comparisons with $|\upsilon_1 - \upsilon_2| > 1$ are relatively uninteresting, the relative simulations have not been carried out. Notice that the exercise carried out in this appendix is not properly a Monte Carlo analysis, because this experiment should in this case be repeated over a large number of replications. The choice of the $\chi^2(\cdot)$ distributions is justified on the basis of their vague resemblance with the distribution of $\mathcal{W}$. The results reported in table 4 show that the test seem to give accurate answers. In only 5 out of 28 cases the test erroneously does not reject at the standard 5% confidence level; furthermore, it never rejects when the null is true. Note that for increasing υ_i's, the distributions become increasingly close each other. Therefore, it is not a case that the power of the test decreases with increasing υ_i's. Of course, a proper Monte Carlo analysis would be necessary to verify the power and size properties of the test accurately. In order to get some further insights in relation with the results of the empirical part of the paper, it is useful to remind that the ratio of the means of the empirical samples is about 1.13. In this sense the most relevant comparisons in table 4 are those for which $\upsilon_k \in \{7, \ldots 11\}$.

Table 4: Estimated ASL values for chi-squared distributed random samples (R=500).

$\upsilon_2 \setminus \upsilon_1$	2	3	4	5	6	7	8	9
2	0.356	0.000						
3	0.000	0.814	0.000					
4		0.000	0.454	0.000				
5			0.000	0.964	0.000			
6				0.000	0.510	0.006		
7					0.000	0.686	0.024	
8						0.000	0.964	0.000
9							0.028	0.874
$\upsilon_2 \setminus \upsilon_1$	9	10	11	12	13	14	15	16
9	0.874	0.570						
10	0.016	0.882	0.000					
11		0.072	0.568	0.016				
12			0.002	0.446	0.280			
13				0.002	0.260	0.116		
14					0.190	0.588	0.000	
15						0.028	0.302	0.166
16							0.000	0.398

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