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EFFORT-BASED CAREER OPPORTUNITIES AND WORKING TIME

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Abstract

The authors evaluate the economic effects of the hypothesis of *effort-based career opportunities*, described as a situation in which a firm creates incentives for employees to work longer hours than bargained (or desired), by making career prospects depend on relative working hours. Firms' personnel management policies may tend to increase working time (or workers' effort) in order to maximize profits. *Effort-based career opportunities* raise working time, production and output per worker, and reduce workers' utility. The authors make a first attempt to empirically estimate the relationship between hours worked and the expected opportunities of promotion using the British Household Panel Survey data set. Their analysis shows that the perceived probability of promotion increases with working time, and that this result is robust to various econometric specifications.

JEL Class.: J22, J23, J50, M12
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1 Introduction

In a recent paper Bell and Freeman (2001) explain the differences in hours worked in the US and Germany by the different levels of earnings inequality of the two countries. The authors find a positive correlation between earnings inequality at the occupational level and hours worked using cross-section data, and that hours worked raise both future wages and actual (US) or perceived (Germany) promotion prospects using longitudinal data. As Bell and Freeman (2001) notice there may be several competing explanations for the work hours-future earnings relationship found at the empirical level: 1) human capital theory, according to which hours worked are an investment in future earnings; 2) tournament/incentive models (see for instance Lazear and Rosen, 1981, Nalebuff and Stiglitz, 1983, and Landers, Rebitzer and Taylor, 1996) which the authors support; 3) some underlying 'third' factor, such as individual ability or effort, which simultaneously affects both working hours and future earnings. The authors also maintain that the positive relationship between working hours and the probability of promotion is not necessarily a prediction of human capital models and is more in line with tournament/incentive models, even though it might still be subject to the third explanation above.

In the present paper, we build on the hypothesis advanced by Bell and Freeman (2001), in the following way:

1. we present a simple theoretical model that provides a possible reason why firms might prefer longer working hours than those bargained or

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desired by workers and use effort-based promotion schemes to incentivate workers to work longer hours. In such schemes the probability of promotion is directly linked to the number of hours worked;

2. we use longitudinal UK data to empirically investigate the relationship between hours worked and the probability of promotion as perceived by employees. With respect to Bell and Freeman (2001), who analyzed Germany and the US, we focus on UK data and use panel data estimators.

2 The model

We assume that workers live for two periods.[1] In the first period they are hired by a firm in a low skilled position, whereas in the second period they may be promoted to a high skilled position or remain in the same position.[2]

We make the following hypotheses:

1. unions and firms bargain over hourly wages (and working hours) both for unskilled and skilled workers;

2. workers cannot change the workplace without incurring costs because of specific human capital, mobility costs, absence of a continuum of jobs;[3]

3. because of a perfect complementarity between low and high skilled jobs, only a fixed proportion $\overline{p}$ of low skilled workers is promoted to the high level position;

[1] Considering an infinite time horizon we obtain qualitatively the same results, but with more complex algebra.

[2] In what follows, we shall often refer to jobs and positions interchangeably. We shall also refer to skilled workers and unskilled workers, referring to workers filling skilled and unskilled positions, respectively.

[3] We make this hypothesis since here we are mainly interested in internal labor markets. As observed by Naylor (2002), a firm can force workers off their labor supply curve thanks to its degree of monopsonistic power, which in turn can originate from the absence of a continuum of jobs, the presence of search and mobility costs, or firm-specific skills. In this regard, Stewart and Swaffield (1997), using BHPS data, find that age-specific regional unemployment (a proxy for labor market tightness and absence of a continuum of jobs) has a significant positive effect on working hours. In the present paper we add a further source of firm monopsonistic power: the use of effort-based promotion schemes. As in Naylor (2002), also in our model unions act as a countervailing power 'enabling workers to resist to employer's attempt to push them to lower outcomes along the contract curve.' (p.4).

4. high skilled workers' productivity is higher than low skilled workers' productivity;

5. workers' utility function is additively separable into labor income and working time.

In what follows we analyze the conditions that make a firm *rationed* with respect to working hours.

2.1 Bargaining

We assume a utility function of the type: $U_j = R(w_j h_j) - g(h_j)$, where w_j is hourly wage and h_j are working hours, $R(w_j h_j)$ the utility of labor income and $g(h_j)$ the disutility of work. The index j is used to indicate the two positions that a worker can fill: the unskilled job ($j = U$) and the skilled one ($j = S$). For the moment we exclude any form of heterogeneity across workers in the parameters of the utility or profit functions and accordingly drop the subscript for individuals. However, workers' heterogeneity will be reintroduced in the empirical model.

Firms' profits are given by: $\pi_j = z_j y(h_j) - w_j h_j$, where $z_j y(h_j)$ is the total revenue function[4]. We obtain immediately the hours demand function $w = zy'_h$ and the hours supply function $wR' = g'_h$. The intersection between the two functions gives the competitive market equilibrium ($zy'_h = \frac{g'_h}{R'}$).

Bargaining may give rise to different outcomes, whose 'extreme' cases are those in which one of the social parts (firms or workers) acts as a Stackelberg leader, incorporating the reaction function of the other.

If firms act as leaders, they maximize profits under the constraint of the labor supply function. In the case of risk neutral workers (i.e. the hours supply function is simply $w = g'_h$) firms will choose the working time satisfying the following condition: $zy'_h = g'_h + g''_h h$. For $g''_h > 0$, the marginal productivity of working time is higher than the hourly wage, therefore profit maximizing firms would prefer longer working hours than the ones supplied by workers.

If workers act as leaders, wages and hours will be chosen along the hours demand function. By definition, in this case the wage equates the marginal productivity of work.

In order to reach more meaningful results, in the next section we analyze a bargaining process between social parts considering two different hypotheses on bargaining: the efficient bargaining model, where firms and workers bargain over both wages and hours worked, and the 'right to manage' model,

[4]Thereafter we shall not indicate the index j unless necessary.

where they bargain over wages whereas the working time is freely chosen by workers.

2.1.1 Efficient bargaining

Hourly wage and working hours are chosen following Nash bargaining. Hence, firms and workers maximize the following expression:

$$\underset{w,h}{max}\ [zy(h) - wh]^{1-\mu}[R(wh) - g(h)]^{\mu} \tag{1}$$

where μ is the contractual strength of workers.

Let us assume that individuals are risk neutral, so that $R' = 1$ and define $0 < \alpha = \varepsilon_{y,h} < 1$ and $\gamma = \varepsilon_{g,h} > 1$, where ε denotes the elasticity. Hence[5], after some algebraic steps, the first order conditions may be written as follows:

$$zy'_h = g'_h \tag{2}$$

$$w^* = \left(\frac{1-\mu}{\gamma} + \frac{\mu}{\alpha}\right) zy'_h \tag{3}$$

where equation 2 represents the contract curve[6] and equation 3 represents a translation of the labor demand curve (given by $w = zy'_h$), which we label *wage curve*. Therefore, the equilibrium is situated below the labor demand if $\left(\frac{1-\mu}{\gamma} + \frac{\mu}{\alpha}\right) < 1$, i.e. if:

$$\mu < \frac{\alpha(\gamma - 1)}{\gamma - \alpha} < 1. \tag{4}$$

In this case, firms prefer a higher working time than the bargained one. This is the case in which firms may use effort-based promotion schemes in order to induce workers to work longer hours than the bargained ones.

2.1.2 Right to manage

Workers choose working time along their labor supply function, obtained by maximizing their utility at a given wage:

$$g'_h = w. \tag{5}$$

[5]In what follows, we assume that both the production function ($y(h)$) and the work disutility function ($g(h)$) show constant elasticities, for instance $y(h) = h^{\alpha}$ and $g(h) = h^{\gamma}$.

[6]Which is not dependent on wages for risk neutral workers.

The bargaining problem becomes:

$$\max_{w} [zy(h(w)) - wh(w)]^{1-\mu}[R(wh(w)) - g(h(w))]^{\mu}$$

Solving the first order condition, we obtain precisely the same relationship between wage and marginal productivity of labor as defined in equation 3. Thus, equation 5 and equation 3 define the equilibrium in the right to manage model.

If condition 4 is met (not met), so that the equilibrium is below (above) the labor demand, i.e. $w^* < zy'_h$, employees work a lower (higher) number of hours with respect to the case of efficient bargaining.[7] Given that equation 3 represents an inverse relationship between wages and working hours, this implies a higher (lower) wage and a higher (lower) utility. Hence, workers prefer the right to manage model, deciding unilaterally working hours, unless they are 'strong enough' in bargaining (i.e. condition 4 is not met).

Even in the right to manage case, the same conclusion concerning the willingness of firms to increase working hours above the bargained ones holds if condition 4 is met.[8]

Remark 1 *If the workers' bargaining power is below a given level, firms prefer longer working hours than the bargained ones both in the case of efficient bargaining and in the case of working time decided unilaterally by workers.*

2.1.3 A synthesis

In figure 1 we present a case where the condition 4 is met, so that firms would prefer longer working hours at the given hourly wage. Therefore, the *wage curve* (equation 3) is below the labor demand curve. We show graphically the outcome of bargaining in the two cases outlined above. The intersection between the *wage curve* and the labor supply gives the (not Pareto efficient) equilibrium in the right to manage case, whereas the intersection between the *wage curve* and the contract curve gives the (Pareto efficient) equilibrium in the case of efficient bargaining.

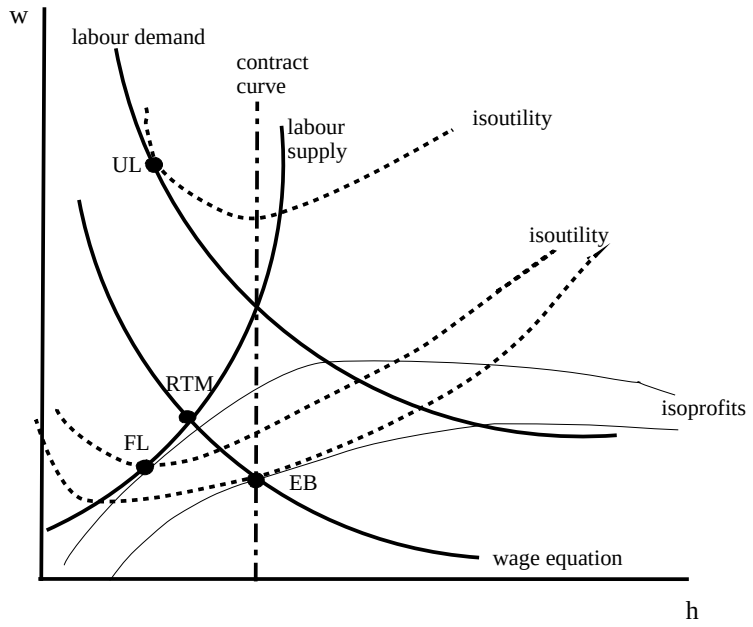
Note that, as Naylor (2002) pointed out, in the latter case employees work longer hours than the desired ones at the current wage, i.e the efficient bargaining equilibrium is on the right of the labor supply curve; it is also on the left of the labor demand curve, so that firms would prefer more hours

[7] With efficient bargaining, $g'_h = zy'_h$ whereas in this case $g'_h < zy'_h$. The reduction in work disutility implies a reduction in working time.

[8] Note that for $\mu = 0$, the right to manage model collapses to the case of leadership by firms.

of work than the bargained ones. If firms were able to persuade workers to work longer hours at the given hourly wage level they would increase their profits at the expenses of workers' utility.

Figure 1: Bargaining



Legend: EB Efficient bargaining equilibrium; RTM right to manage equilibrium; UL Union leader Stackelberg equilibrium; FL Firm leader Stackelberg equilibrium

Finally consider that, in the efficient bargaining case[9] workers indirect utility may be written as:

$$V(\alpha, \gamma, \mu, z) = z^{\frac{\gamma}{\gamma-\alpha}} \mu \left(\frac{\alpha}{\gamma}\right)^{\frac{\alpha}{\gamma-\alpha}} \left(\frac{\gamma-\alpha}{\gamma}\right) \tag{6}$$

that, for $\gamma > \alpha$ is increasing in z. Since we assumed that $z_S > z_U$ (hypotesis

[9]Optimal values in the efficient bargaining model are: $h^* = \left(\frac{\alpha z}{\gamma}\right)^{\frac{1}{\gamma-\alpha}}$ and $w^* = \alpha z \left(\frac{1-\mu}{\gamma} + \frac{\mu}{\alpha}\right) h^{*(\alpha-1)}$, whereas results for the right to manage are $h^* = z \left(\frac{\alpha(1-\mu)+\gamma\mu}{\gamma^2}\right)^{\frac{1}{\gamma-\alpha}}$ and $w^* = \gamma \left(\frac{1}{h^*}\right)^{1-\gamma}$.

4 in section 2) high skilled jobs offer a higher expected utility to workers.[10] Therefore, workers prefer to be promoted to the high skilled position.

2.2 The effects of effort-based career opportunities

Let us now introduce the hypothesis that firms, once the work contract has been signed, prefer longer working hours than the bargained ones (condition 4 is met) and use effort-based promotion schemes as a device to incentivate workers.

In particular, we assume that because of firms adopt effort-based promotion schemes the relative probability to be promoted for a worker depends on her working hours. In particular, we simply assume that the scheme is such that a worker's expected probability of promotion p_i is a positive function of the ratio between her working time (h_i)and the average one within the firm (H): $p_i = p\left(\frac{h_i}{H(h_i)}\right)$).[11] Average working hours may be a function of h_i because each worker considers the reaction of other workers to her behaviour in terms of hours worked, i.e. $H = H(h_i)$. If $H = \overline{H}$ each worker makes her decision considering the hours worked by the others as given, as in the Cournot model.

In fact, our hypothesis is that, in a first stage, bargaining between trade unions and firms define the wage rate and the standard hours, whereas, in a second stage, each worker may freely choose her overtime hours.

In what follows, we assume that $0 \leq \varepsilon_{H(h_i),h_i} < 1$,[12] and that when all workers choose the same working hours promotion is random.

Workers are always hired in the unskilled position in the first period (suffix U), and they may get promoted to the skilled position in the second period (suffix S). V_U and V_S indicate the second period expected utility of workers in unskilled and skilled jobs, respectively.

With *career opportunities based on working time*, the life-time expected utility of a unskilled worker is:

$$U_U = R(w_U^* h_U) - g(h_U) + \beta \left[p\left(\frac{h_U}{H(h_U)}\right) V_S + \left(1 - p\left(\frac{h_U}{H(h_U)}\right)\right) V_U \right]$$

[10] A similar result is obtained in the right to manage model. In that case, $V(\alpha, \gamma, \mu, z) = z^{\frac{\gamma}{\gamma-\alpha}} \left(\frac{(1-\mu)\alpha+\mu\gamma}{\gamma^2}\right)^{\frac{\gamma}{\gamma-\alpha}} (\gamma - 1)$.

[11] We leave here the effort-based promotion scheme in implicit form since our main interest is not to analyze the most efficient scheme for the employer.

[12] i.e. workers working longer hours expect *ceteris paribus* a higher probability of promotion. In what follow, we drop the index i unless necessary.

where w_U^* is the wage emerging from bargaining whereas h_U is the choice variable for unskilled workers and β the discount factor.

Defining $\Delta V = V_S - V_U$, we can write[13]

$$U_U = w_U^* h_U - g(h_U) + \beta \left[p\left(\frac{h_U}{H(h_U)} \right) \Delta V \right].$$

Maximizing the expected utility with respect to working hours (h_U) we obtain:

$$g'_{h_U} = w_U^* + \beta \Delta V p'_{h_U} \left[\frac{1 - \varepsilon_{H,h_U}}{H(h_U)} \right], \tag{7}$$

which defines h_U^*, the working time that is chosen if effort-based promotion schemes are used by firms. For $\varepsilon_{H,h_1} < 1$ the disutility of work is higher than the one of equation 2 (if condition 4 is met) and is also higher than the one of equation 5. Hence working time must be higher. Furthermore, the right-hand side of the previous equation is increasing in p'_{h_U} and ΔV, which is a positive function of the difference between skilled and unskilled workers' productivity, and therefore of wage inequality (see footnote 9).

Remark 2 *With* career prospects based on working time *and a* low *workers' bargaining power, employees work longer hours than the bargained ones (in the case of efficient bargaining), or the ones that they would have chosen alongside the hours supply function (in the case of right to manage). This behaviour reduces workers' utility and increases firms' profits. Moreover, working hours depend positively on the responsiveness of the probability of promotion to relative working time (p'_{h_U}) and the increase in utility if promoted (ΔV), which is in turn a positive function of wage inequality.*

Given that all workers are assumed to be equal, each of them decides her working hours in the way described by equation 7. In the symmetrical equilibrium $h_U^* = \overline{H}$, i.e. all employees work the same amount of hours. Hence, the probability to be promoted is for every worker at its 'natural' level ($p(1) = \overline{p}$), but employees work longer hours than the ones each of them would have chosen in the absence of effort-based incentives.

Nevertheless, none of them can reduce her working hours below the one described by equation 7 without incurring in a reduction of the promotion probability.

[13] Given that in the second period workers have no longer the incentive to work longer hours, since promotion is not possible any more, they will work the number of hours bargained (or preferred). Then, ΔV can be easily obtained from equation 6, does not depend on h_U and turns out to be a positive function of the difference between z_S and z_U.

Table 1: Worker's expected utility

		Worker a cooperate	non cooperate
Worker b	cooperate	EV_a^+, EV_b^+	EV_a^{++} , EV_b^-
	non cooperate	EV_a^-, EV_b^{++}	EV_a^*, EV_b^*

with $EV^{++} > EV^+ > EV* > EV-$

In terms of game theory, the equilibrium described by equation 7 is a not Pareto-efficient Nash-equilibrium.

We know that the expected utility of a worker is maximized with $h_U = h^*$ given by equation 2 (or 5). Let us call this utility with EV^+.

With effort-based career incentives, in a symmetrical equilibrium, for the same probability to be promoted, the working time is higher than the optimal level, hence the expected utility is lower; we call it EV^*.

Let us consider two workers. When one of them chooses the optimal working time without considering the incentives, i.e. she behaves according to equation 2 (or 5), and the other chooses the working time according to equation 7, the utility of the former is lower (we define it as EV^-) and that of the latter is bigger (EV^{++}), because of the different career opportunities.

A worker may choose to cooperate (choosing the optimal working time without considering effort-based career prospects) or not to cooperate, choosing the working time in order to gain the promotion to the high skilled position.

Table 1 illustrates the outcome of the effort-based promotion hypothesis, representing the payoff matrix. The strategy to cooperate (i.e, to decide together with the other workers the working time in a binding commitment) is dominated by the strategy not to cooperate. However, we have assumed in section 2 that individuals live for two periods and promotion can take place in the second period only, i.e. that the game is a one-shot game. Nevertheless, if the decision concerning working hours is taken by workers an indefinite number of times, as it is well known from game theory, the *cooperative equilibrium* may emerge.

Remark 3 *Unless workers cooperate, when firms use effort-based incentives, each worker works longer hours than the ones she would have chosen, and has the same probability to be promoted. Workers utility is reduced; people work longer hours, enjoying less leisure, consuming more.*

Thus, as in Naylor (2001), unions could act as a countervailing power, by increasing the cohesion and cooperation among workers.

3 The BHPS data

In the empirical analysis we use data from the British Household Panel Survey (BHPS), a British representative survey gathering a wealth of information on households', individuals' and job characteristics.[14] We use data from the first 10 waves of this survey, which refer to the years 1991-2000. The relevant question for our aim is the following: "In the current job do you have opportunities for promotion?", whose possible answers are yes or no. We label this dummy variable as CAREER. We use this variable as a proxy for the value of the expected promotion probability ($p(.)$) in the theoretical model. Using information on the *no. of hours normally worked per week (excluding overtime)* and on *no. of overtime hours in normal week* we obtain the total hours normally worked per week. The ratio between the *the usual net pay per month in the current job*, available from the survey and the total hours normally worked per week (times 4.34) gives the hourly net wage that we use for the empirical estimates.[15]

From the first 10 waves of the BHPS we select a sample of individuals who worked 20 or more hours per week.[16] So do we since we want to focus only on people for whom working in the marketplace is the main activity and whose working time is more likely to be responsive to career prospects (compared to 'marginal' or less career motivated workers).[17] We drop from the original sample (N=111,206) also people in non-civilian occupations, self-employed workers and observations with missing data for at least one of the variables included in the econometric model. Since we plan to use fixed and random effects logit models, we further exclude individuals appearing in the sample only once. With these sample selection criteria the final sample size reduces to 31,853 individuals, 16,856 males and 14,994 females. It is interesting to notice that also in UK data it is possible to observe the 'hours surplus' reported in US and German data by Bell and Freeman (2001). For the pooled sample (males and females) only 6.47% of individuals stated to prefer longer

[14] See Taylor (2001) for an introduction to the BHPS.

[15] As observed by Bell and Freeman (2001) wages computed in this way may be affected by a considerable measurement error.

[16] We exclude individuals with more than 90 working hours per week.

[17] A similar sample selection criterion has been applied in the recent literature by Bell and Freeman (2001) and Booth et al. (2003). In particular, Bell and Freeman (2001) observe that including also part-timers in the analysis strongly weakens the inequality-hours relationship.

hours than worked, while 35.81% stated to prefer less working hours. In order to have a first look at the relationship between hours worked and career opportunities we reported in Tables 2 and 3 the average working hours, the fraction of individuals having promotion opportunities in the current job, and the preferred working hours by quintile for men and women, respectively. It is immediate to note that there seems to exist a positive relationship between hours worked and the expected opportunities of career advancement in the current job. This relationship appears to be stronger and monotonic for women. Moreover, individuals working longer hours are more likely to prefer less work hours, suggesting that employers can force employees to work longer hours than the latter prefer.[18] These are only raw summary statistics of course and the positive correlation between working hours and promotion opportunities may be spurious and driven by the different characteristics of workers in the different quintiles of the hours distribution. For this reason, in our empirical analysis we shall take into account workers' observed and unobserved heterogeneity..

Table 2: Quintiles of the work hours distribution, opportunity of career and preferred hours (BHPS data) - Men

Quintiles of weekly hours worked	Avg normal working hours	Promotion opportunities		Preferred working hours		
		no	yes	less	more	equal
1	35.06	47.32	52.68	21.94	10.86	67.21
2	39.83	48.21	51.79	27.30	7.81	64.89
3	43.57	42.37	57.63	34.12	7.19	58.69
4	48.50	42.06	57.94	43.16	5.34	51.49
5	59.83	44.15	55.85	55.18	3.84	40.98

4 Empirical analysis

The simple theoretical model outlined in section 2 posits that in the presence of effort-based promotion schemes the expected probability of promotion is a positive function of working time. In particular, in our framework workers with longer working hours will expect *ceteris paribus* a higher probability of promotion. The ideal data to test this implication would be employers-employees matched data, where it would be possible to control for the relative working time of workers in the same firm. Unfortunately, such data are not

[18] In this regard see Stewart and Swaffield (1997).

Table 3: Quintiles of the work hours distribution, opportunity of career and preferred hours (BHPS data) - Women

Quintiles of weekly hours worked	Avg normal working hours	Promotion opportunities		Preferred working hours		
		no	yes	less	more	equal
1	24.57	62.38	37.62	16.65	12.30	71.05
2	35.63	51.75	48.25	34.50	4.95	60.55
3	38.52	48.59	51.41	38.40	3.63	57.97
4	40.99	45.19	54.81	40.02	3.11	56.87
5	50.06	37.91	62.09	55.67	2.45	41.88

readily available and we use longitudinal micro-data, instead. In particular, we include among the explanatory variables some controls for employer's characteristics (such as sector of activity, number of employees, presence of unions in the workplace), which will be considered as proxies for the average working time of workers in certain types of jobs. Moreover, we also control for observed workers' characteristics since there might be differences in the utility of work ($g(.)$ in the theoretical model), the utility of income ($R(.)$), the productivity of workers (z) which can affect both working hours and promotion opportunities. However, as observed by Bell and Freeman (2001), the correlation between hours worked and the expected probability of promotion may be only spurious and determined by some unobservable 'third factor' simultaneously determining working time and the likelihood of promotion. In order to mitigate the problem of *simultaneity bias* we use panel data methods. In particular, the unobserved heterogeneity across individuals may be accounted for by directly modeling it as random or fixed effects.

In what follows, we estimate a panel data logit model of the expected probability of promotion of the following type:

$$P_i = a_0 + a_1 h_i + a_2 X_{1i} + a_3 X_{2i} + u_i + \epsilon_{it} \tag{8}$$

where i and t are subscripts for individuals and time, respectively. P_i is an indicator variable which equals one if individual i expects to be promoted in the current job and zero otherwise. u_i is, depending on the type of panel model chosen, an individual fixed or random effect. h_i are working hours, X_{1i} a vector of personal characteristics, X_{2i} a vector of employer's characteristics and ϵ_{it} an error term. Our coefficient of interest is a_1, i.e. the effect of working time on the expected probability of promotion. We interpret a statistically significant positive coefficient (a_1) as evidence supporting that firms are using

effort-based promotion schemes.[19]

We include in the empirical specifications several controls for personal and job characteristics. The full list of control variables with some descriptive statistics is reported in the Appendix.

We start the analysis with a simple logit model on the pooled sample. With such a model the observations are considered independent (as in a cross-section), i.e. we do not exploit the fact that some observations refer to the same person to take into account individuals' unobserved attributes in the estimation method.[20] We estimate the working hours-promotion opportunities relationship separately by gender. This is motivated by the differences shown by the raw data in Tables 2 and 3 and by the fact that some covariates might have a different effect on working hours or expected promotion for men and women (e.g., the number of children). In tables 4 and 5 for each model we report the results of two specifications, one including among the explanatory variables the total number of hours worked only (1), and the other including the full set of controls (2). In the pooled logit models, including the control variables changes the magnitude of the effect of hours worked on the expected promotion probability. This confirms that individuals with different expected probabilities of promotion may differ with respect to observable attributes and that the latter may partly account for the positive correlation between hours worked and expected promotion. However, the coefficient of work hours remains highly statistically significant (at least at the 1% level) in all specifications including controls for individual and workplace characteristics.

From the pooled sample logit model, the estimated effect of increasing by one hour the weekly working hours on the probability of promotion is 0.29% for males and 0.45% for females, in the models with control variables.

In a second step we exploit the longitudinal structure of our sample and use panel data estimators. We estimate two models, a fixed effects (FE) conditional logit model (see Chamberlain 1980) and a random effects (RE) logit model. When using the FE conditional logit model it is necessary to use only the observations for which the value of the CAREER dummy changes over time ('movers'). This implies that we are working with a potentially selected sample, with the possibility of introducing in the analysis a *sample selection bias*. In particular, we are likely to exclude all variation in career opportunities between those individuals who never had opportunities of ca-

[19]We exclude the possibility that workers are irrational, i.e. that they expect a positive effect of working hours on the probability of promotion even if firms do not use effort-based promotion schemes.

[20]However, standard errors shown in Tables 4 and 5 are robust to the fact that observations for the same individual are correlated.

Table 4: Working hours-promotion opportunities estimates - Men

no. of weekly hours worked	Pooled logit (full sample)		RE logit (full sample)		FE logit ('movers')		RE logit ('movers')		Pooled logit ('movers')	
	1	2	1	2	1	2	1	2	1	2
coefficient	0.008	0.014	0.009	0.015	0.014	0.007	0.015	0.008	0.008	0.008
(std.err.)	0.002	0.003	0.002	0.003	0.003	0.004	0.003	0.003	0.002	0.003
marginal effect (%)	0.20	0.29	0.21	0.22	(c)	(c)	0.21	0.18	0.19	0.18
Other controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
N. obs.	16859		16859		9694		9694		9694	
N. groups	3811		3811		1889		1889		1889	
Overall significance[(a)]	11 (0.00)	1340 (0.00)	13 (0.00)	1470 (0.00)	16 (0.00)	726 (0.00)	25 (0.00)	750 (0.00)	9 (0.00)	677 (0.00)
Log-likelihood	-11585	-9986	-6664	-8943	-3822	-3466	-9853	-6223	-6708	-6244
FE vs RE[(b)]	-	-	-	-	4.18 (0.04)	94.18 (0.00)	-	-	-	-

Note. [(a)] Test for the exclusion of all covariates but the constant (Wald test in the pooled logit model and the RE logit models, Likelihood Ratio test in the FE logit model); [(b)] Hausman test (see Hausman 1978); [(c)] It is not possible to report the predicted probabilities since the software do not estimate the individual fixed effects. The complete estimates are available upon request from the authors.

Table 5: Working hours-promotion opportunities estimates - Women

no. of weekly hours worked	Pooled logit (full sample)		RE logit (full sample)		FE logit ('movers')		RE logit ('movers')		Pooled logit ('movers')	
	1	2	1	2	1	2	1	2	1	2
coefficient	0.036	0.021	0.044	0.029	0.026	0.023	0.023	0.017	0.021	0.016
(std.err.)	0.003	0.003	0.003	0.004	0.004	0.005	0.003	0.003	0.003	0.003
marginal effect	0.88	0.45	0.74	0.44	(c)	(c)	0.54	0.37	0.53	0.36
Other controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
N. obs.	14994		14994		8621		8621		8621	
N. groups	3531		3531		1719		1719		1719	
Overall significance[(a)]	160 (0.00)	1157 (0.00)	182 (0.00)	1215 (0.00)	45 (0.00)	511 (0.00)	69 (0.00)	557 (0.00)	55 (0.00)	539 (0.00)
Log-likelihood	-10195	-9093	-8825	-8173	-3374	-3142	-5906	-5623	-5937	-5640
FE vs RE[(b)]	-	-	-	-	31.07 (0.00)	98.65 (0.00)	-	-	-	-

Note. [(a)] Test for the exclusion of all covariates but the constant (Wald test in the pooled logit model and the RE logit models, Likelihood Ratio test in the FE logit model); [(b)] Hausman test (see Hausman 1978); [(c)] It is not possible to report the predicted probabilities since the software do not estimate the individual fixed effects. The complete estimates are available upon request from the authors.

reer advancement and those who always had it, giving a special emphasis to the within-individuals variation. We firstly estimate FE and RE logit models on the sample of 'movers' and comment here on the results of the models with full controls. With respect to the pooled sample logit model in the case of FE and RE the (marginal) effect of work hours is reduced in the latter models. The FE and RE logit estimates are very robust to the inclusion of control variables for males, while for females including the latter decrease the effect of work hours. From Table 4, it appears that the estimated marginal effects for males are rather similar to those found by Bell and Freeman (2001) on German data for the specification including educational controls.[21] The effects are also slightly higher than that found by Booth et al. (2001) in their analysis on the effect on actual promotions of overtime work in the UK (0.1%).[22] Increasing by one the number of hours worked raises the expected probability of promotion for males (females) by 0.18, (0.37) percent points in the RE logit model (in the sample of 'movers' and including all controls). Therefore the effect of working hours of the expected probability of promotion appears to be stronger for women.

In order to assess the effect on the estimates of the sample selection which might potentially affect the 'movers' sample, we re-estimated the pooled logit model on the 'movers' sample and the RE logit model on the full sample (see Tables 4 and 5). For males it is clear that the estimated effect of working hours on the expected probability of promotion is of smaller magnitude when considering the 'movers' sample. This suggests that considering the 'movers' sample may introduce some bias in our estimates. The estimated effects do not appear however very different. The marginal effects are 0.22 percent points in the RE logit models estimated on the the full sample and 0.18 percent points for the pooled logit estimated on the 'movers' only. Also for women there is some evidence that the marginal effects estimated on the 'movers' sample are lower than those computed from the full sample, although the difference is not remarkable. The estimated marginal effects are 0.44 percent points in the RE logit models estimated on the the full sample and 0.36 percent points for the pooled logit estimated on the 'movers' only. For both males and females the different models (pooled logit, RE logit) yield very similar marginal effects when estimated on the same sample ('movers'

[21] Using the marginal effect of the hours measured in logarithms from table 7, column (2'), in their article, and dividing it by the average number of hours in the period 1985-95 reported in table 1, we obtain a marginal effect on the expected probability of promotion of increasing by one the hours worked of 0.24%.

[22] This is what our model predicts if workers expect a 'reaction' of their colleagues, in terms of increasing hours worked, weaker than the actual one (e.g., in the case of 'naive' expectations that the other workers do not react, i.e. the 'Cournot case').

or full sample).

5 Concluding remarks

In this paper we build on the empirical findings of Bell and Freeman (2001), of a positive relationship between working hours and expected and actual probabilities of promotion, to show why firms may be interested in using effort-based promotion schemes to increase working hours supplied by employees.

With a simple theoretical model we describe a situation in which a firm may incentivate employees to work longer hours than the ones bargained by making career advancement depend on relative working hours. This kind of personnel policies may tend to increase working time in order to maximize profits. Under the hypothesis that the elasticity of work disutility is higher than the elasticity of product to hours worked, firms would prefer higher working hours if their bargaining power is higher than a given level, which depends on preferences and technology. In fact, in that case firms pay a hourly wage at a level that makes the marginal productivity of work hours higher than the wage rate.

With the adoption of *career opportunities based on working time* on the part of firms, each worker will work more in order to increase her probability of career advancement, but, in a symmetrical equilibrium, all employees will work longer hours and have the same probability of a career advancement. Only if workers cooperate, they can resist the opportunistic behavior of working more than their colleagues.

Career opportunities based on working time raise working time, production, profits and per-capita GDP, at the cost of a reduction in workers' utility. Our theoretical model is coherent with some stilyzed facts observed in the UK labor market such as the inverted-U shaped age profile in actual work hours (Stewart and Swaffield 1995), since only relatively young workers (less than 35) are more likely to experience career advancements. Our model is also able to explain a number of phenomena such as gender differences in career advancements or the comparative advantage in terms of career opportunities of women choosing traditionally female dominated sectors or jobs. The first may stem from the lower number of hours worked by married or cohabiting women who also have home responsibilities, the second from the fact that women choosing traditionally female dominated sectors are more likely to compete with women (who work relatively less hours) for career advancements.

We seek some empirical evidence for the UK supporting our claim that

the 'hours surplus' puzzle discussed in Bell and Freeman (2001), i.e. the fact that most employees would prefer to work less hours, may originate from firms using effort-based promotion schemes Our analysis shows that there is indeed a highly statistically significant positive relationship between hours worked and workers' expected probability of promotion. Use of panel data estimators confirms that this result is robust to the potential presence of unobserved heterogeneity.

In summary, the use of effort-based promotion schemes seems to be in place in the UK, Germany and the US (see Bell and Freeman, 2001). As we have shown in the first part of the analysis these practices may have interesting implications in terms of reducing workers' welfare. Our theoretical analysis suggests that setting upper limits to working time, through collective agreements or by law may increase workers' utility, at the cost of a reduction in per capita GDP: if our model hypotheses are correct, workers would like to substitute higher leisure to lower income.

For future research, it would be interesting to apply the analysis to data sets relating to other countries and to employers-employees matched data to assess how spread these practices are across countries, and to quantify the precise effect of hours worked on workers' expected or actual promotions at the firm level.

Appendix

Table 6: Control variables used in the empirical estimates of tables 4 and 5 (BHPS data)

variable	**description**
whreal	real hourly wage
year	year
individual characteristics	
woman	sex (M/F)
nch02	number of children in the household aged 0-2
nch34	number of children in the household aged 3-4
nch511	number of children in the household aged 5-11
nch1215	number of children in the household aged 12-15
age	age at date of interview
age2	age squared at date of interview
nchild	number of own children in the household
unionmem	member of trade union (Y/N)
property	house property (4)
jbttwt	minutes spent travelling to work
spjb	whether spouse/partner employed now (Y/N/No spouse)
socclas	parents social class (7)
educa	highest academic qualification (7)
workplace characteristics	
temporary	temporary job (Y/N)
sect	sector (9)
skillseg	socio economic group (12)
size	firm size (5)
public	private sector (Y/N)
tenure	tenure
tenure2	tenure squared
unionjob	union at worplace (Y/N)

Note. In brackets are reported the number of categories for categorical variables.

Table 7: Sample summary statistics

Variable	'Full' sample		'Movers' sample	
	Mean	Std. Dev.	Mean	Std. Dev.
career	0.53	0.50	0.51	0.50
htot	41.27	10.18	41.39	9.98
whreal	5.68	3.17	5.61	2.85
woman	0.47	0.50	0.47	0.50
nch02	0.08	0.28	0.08	0.28
nch34	0.07	0.27	0.08	0.27
nch511	0.27	0.61	0.26	0.60
nch1215	0.17	0.45	0.17	0.45
age	36.71	11.46	36.24	11.09
age2	1479.34	891.34	1436.04	845.28
nchild	0.58	0.92	0.58	0.92
unionjob	0.50	0.50	0.50	0.50
unionmem	0.33	0.47	0.32	0.47
temporary	0.03	0.18	0.04	0.19
jbttwt	23.93	20.76	24.29	21.37
public	0.30	0.46	0.29	0.45
tenure	8.41	6.05	8.12	5.64
tenure2	107.25	180.18	97.74	160.77
Spouse's work				
no spouse	0.29	0.45	0.29	0.45
spouse does not work	0.11	0.32	0.11	0.31
spouse work	0.60	0.49	0.60	0.49
Industry dummy				
Agriculture, Hunting, Forestry, Fishing	0.03	0.16	0.03	0.17
Mining and Quarrying	0.04	0.19	0.04	0.20
Manufacturing	0.10	0.30	0.11	0.31
Electricity, Gas and Water	0.10	0.30	0.10	0.30
Construction	0.03	0.18	0.03	0.18
Wholesale and Retail Trade, Restaurants	0.18	0.38	0.18	0.38
Transport, Storage and Communications	0.07	0.25	0.06	0.24
Finance, Insurance, Business Services	0.14	0.35	0.14	0.34
Community, Social and Personal Services	0.32	0.47	0.32	0.46
Socio-Economic Group				
employers,large	0.00	0.00	0.00	0.00
managers,large	0.12	0.33	0.12	0.33
employers,small	0.00	0.00	0.00	0.00
managers,small	0.07	0.25	0.07	0.25
professional self-employed	0.00	0.00	0.00	0.00
professional employees	0.05	0.23	0.06	0.23
int. non-manual,workers	0.14	0.35	0.14	0.35
int. non-man,foreman	0.05	0.22	0.05	0.22
junior non-manual	0.21	0.40	0.21	0.41
personal service wkrs	0.05	0.22	0.04	0.20

cont'd

Variable	'Full' sample		'Movers' sample	
	Mean	Std. Dev.	Mean	Std. Dev.
foreman manual	0.05	0.23	0.06	0.23
skilled manual wkrs	0.11	0.32	0.12	0.32
semi-skilled manual wkrs	0.11	0.31	0.11	0.31
unskilled manual wkrs	0.03	0.16	0.02	0.15
own account wkrs	0.00	0.00	0.00	0.00
farmers - employers,managers	0.01	0.08	0.01	0.08
farmers - own account	0.00	0.00	0.00	0.00
Education				
higher degree	0.03	0.16	0.03	0.17
1st degree	0.12	0.33	0.12	0.32
hnd,hnc,teaching	0.08	0.28	0.08	0.28
a level	0.22	0.42	0.23	0.42
o level	0.30	0.46	0.30	0.46
cse	0.06	0.25	0.07	0.25
none of these	0.18	0.38	0.17	0.37
Firm size				
1-9	0.15	0.36	0.14	0.35
10-49	0.29	0.45	0.28	0.45
50 - 99	0.12	0.32	0.12	0.33
100 - 499	0.25	0.43	0.26	0.44
500 or more	0.19	0.39	0.19	0.40
Parents' social class				
professional	0.05	0.23	0.06	0.24
managerial and technical	0.24	0.43	0.25	0.43
skilled non-manual	0.16	0.37	0.16	0.37
skilled manual	0.27	0.44	0.27	0.45
partly skilled	0.10	0.30	0.10	0.30
unskilled	0.03	0.16	0.02	0.16
Inapplicable	0.15	0.36	0.14	0.35
Year				
1991	0.09	0.29	0.10	0.29
1992	0.03	0.17	0.03	0.18
1993	0.03	0.18	0.04	0.19
1994	0.04	0.19	0.04	0.20
1995	0.11	0.31	0.12	0.32
1996	0.12	0.32	0.12	0.33
1997	0.12	0.33	0.13	0.33
1998	0.13	0.34	0.14	0.34
1999	0.17	0.37	0.15	0.35
2000	0.16	0.37	0.14	0.35

Note. This table shows some summary statistics for the 'full' (31,853 individuals) and the 'movers' (18,315 individuals) samples pooled by gender.

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