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Abstract

Earlier studies of the impact of performance pay on individuals' behavior have primarily been concerned with the effects on their earnings and productivity. The productivity increases associated with the adoption of performance pay practices may, however, come at the expense of quality of life at or outside work. In this paper we study the effect on the employees' out-of-work activities, testing whether performance pay contracts lead to a "time squeeze" for non-work activities. In doing so, we distinguish between two effects, a substitution effect and a discretion effect. On the one hand, since the marginal payoff to work is higher under a performance pay contract, employees will work more and spend less time on private activities (substitution effect). On the other hand, to the extent that employees have some choice over their work hours, if employees are more productive they can do the same job in less time and have more spare time for private activities (discretion effect). We distinguish between those services that the employee can buy in the market (e.g., cleaning, cooking) and leisure activities (e.g., sports, cultural activities).

Keywords: Performance pay, Out-of-work activities, Time allocation, Work-family balance

JEL Codes: J22, J33, M52

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1 Introduction

Research on the impact of performance pay has mainly been concerned with its effects on earnings of individuals and performance of firms (Booth and Frank (1999); Lazear (2000) and Parent (1999); Freeman and Kleiner (2005); Shearer (2004)). Considerable less is known about other consequences of the introduction of performance pay, such as worker turnover, job satisfaction (Money and Graham (1999); Heywood and Wei (2006)) and competition between employees (Drago and Garvey (1998)). Increased use of incentive pay schemes is frequently accompanied by changes in the design of jobs and work organizations. In particular, paying for performance typically means increasing the discretion of employees with respect to choice of methods, order and rate of work (Ortega, 2006). There is a small economic literature (and a large number of works in psychology and sociology) on how increased demands of work life affect job satisfaction (see Greene (2006) for a discussion and analysis) or the work-family life balance (Berg, Kalleberg and Appelbaum (2003)) and related time stress (Hamermesh and Lee, forthcoming). Investigations of how changes in compensation schemes spill over to other parts of individuals' lives have, however, been thin on the ground.

Our intention in this paper is to fill one of these gaps. More precisely, we focus on how performance pay affect employees' private lives in terms of time available for housework (cooking, cleaning), taking care of children, elderly or disabled relatives, and sports, cultural and other leisure activities. In other words in our study we examine the extent to which performance related pay schemes contribute to the much discussed worsening of the "work/life balance" as it is called Europe ("time squeeze" is the term used in North America); see OECD (2004). Our empirical analysis is based on the European Working Conditions Survey from year 2000, which

provides us with a fairly rich data set on working conditions and individuals' activities outside work in 27 European countries.

The econometric study is guided by a stylized model of the Holmström-Milgrom's (1991) multi-task model variety. The model shows that the total effect of performance pay on private activities can be decomposed into a "substitution effect" (employees spend less time on private activities because better work performance leads to a higher bonus) and a "discretion effect" – with a performance pay contract employees are given more discretion over work hours and can choose to spend more or less time on private activities. In the empirical sections of the paper we first estimate the total effect of performance pay on private activities for male and female employees, and find that the effect is always positive or insignificant. Because this result is potentially subject to a selection bias, we use a differences approach which enables us to estimate the substitution effect. This alternative approach utilizes an interesting feature of the data – the information about employees' discretion over work schedules. We find that female employees with a performance pay contract reduce the amount of time spent on almost all private activities, whereas male employees reduce the amount of time for all except charitable and political activities.

The remainder of the paper is structured as follows. Next the theoretical model and the hypotheses to be tested are presented and derived. Section 3 contains the data description. In the next two sections we report results from analyses using two different estimation approaches. Section 6 concludes.

2 Theory

To guide the empirical analysis we use a stylized version of Holmström and Milgrom's (1991) multi-task agency model. A firm is assumed to employ one individual whose work effort is not observable and is denoted by e. In addition the employee makes several choices outside work, which are denoted by $A = h, L$. First of all, she chooses the amount of housework and family-related work that she wants to conduct. Such work is denoted by h and includes the amount of time that she spends cooking, taking care of her children or elderly relatives, and doing housework. Second, she can also hire housework services and thus spend less time on such activities. The amount of such services is denoted by x and their price is given by p. Finally, the employee chooses an amount of leisure, which is denoted by L and includes the amount of time spent on cultural activities, sports and other kinds of leisure. Her utility function has a constant absolute risk aversion coefficient equal to r:

$$U = -\exp\{-r[c + B(h + x) + F(L) - g(e, h)]\}, \quad (1)$$

where c is consumption, $B(.)$ are the private benefits derived from housework, $F(.)$ is the net utility of leisure, and $g(.,.)$ is the cost of effort. We assume that housework services are a perfect substitute for the employee's own housework effort: $B = B(h + x)$, with $B' > 0$ and $B'' < 0$. We also assume that $F' > 0$ and $F'' < 0$. As far as the cost function is concerned, all first and second partial derivatives are assumed to be positive, which in particular implies that e and h are substitutes in the utility function (complements in the cost function). The cost function is assumed to be quadratic:

$$g(e, h) = e^2/2 + \gamma h^2/2 + \kappa eh \quad (2)$$

where $\gamma, \kappa > 0$. The employee's budget constraint is given by $c + px = w$, where for simplicity the price of consumption has been normalized to one. In addition, we assume that time imposes a limit on the amount of work and out-of-work activities that the employee can carry out: specifically, $e + h + L = 1$. The firm is assumed to be risk neutral, with profits given by $(y - w)$, where y denotes value added and w employee compensation. Specifically, we assume that $y = e + \varepsilon$, where $\varepsilon \sim N(0, \sigma^2)$.

As in Lazear (1986), we consider two different contractual arrangements. In the first one, the employee is paid through a performance pay contract, $w = \beta + \alpha y$, and has discretion to choose the amount of effort (e) she wants to exert. Under the second arrangement she is paid a straight salary, i.e. $w = \beta$. Because in the latter case she would not have any incentive to work, the firm must supervise her in order to ensure that she works for a minimum amount of time or supplies a minimum level of work effort, which we denote by $\underline{e}$. Thus. $\underline{e}$ is positively related to the extent of monitoring, and negatively related to the employee's discretion.[1]

Under a performance pay contract the employee maximizes the certainty equivalent

$$\beta + \alpha e - px + B(h + x) + F(1 - e - h) - g(e, h) - (r/2)\,\alpha^2 \sigma^2, \qquad (3)$$

with respect to e, h and x, which gives the following first-order conditions:

$$\alpha - F'(1 - e - h) - g_1(e, h) = 0 \qquad (4)$$

[1] The more the employee is supervised, the higher $\underline{e}$ and the lower her discretion. In particular, if there is no supervision, $\underline{e} = 0$, which means that the employee is free to choose her preferred effort level.

$$B'(h + x) - F'(1 - e - h) - g_2(e, h) = 0 \quad (5)$$

$$-p + B'(h + x) = 0. \quad (6)$$

where g_1 and g_2 refer to the first partial derivatives of g with respect to the first and second arguments respectively. Combining these three conditions, we obtain

$$\alpha = F'(1 - e - h) + g_1(e, h) \quad (7)$$

$$p = F'(1 - e - h) + g_2(e, h). \quad (8)$$

Let e^{pp}, h^{pp}, L^{pp} and x^{pp} denote the optimal choices under this first contractual arrangement. Under the second contractual arrangement, the employee is paid a fixed salary (i.e., $\alpha = 0$), and will choose the minimum amount of work effort ($\underline{e}$). Therefore we will have

$$0 < F'(1 - \underline{e} - h) + g_1(\underline{e}, h) \quad (9)$$

$$p = F'(1 - \underline{e} - h) + g_2(\underline{e}, h). \quad (10)$$

We will use e^s, h^s, L^s and x^s to denote the optimal choices under this second contractual arrangement. Two other contractual arrangements are possible but will not be optimal: if there is a performance pay contract but the employee does not have discretion, i.e., she is closely monitored and must always choose the level of effort $\underline{e}$, she will be inefficiently exposed to risk. Given that she is being monitored, the contract could be improved by paying her a fixed salary. The other suboptimal contract is the one where the employee is paid a fixed salary and has discretion to choose effort, for in that case she will choose a level of effort equal to zero. We can

therefore concentrate on the two contracts (performance pay with discretion and salary pay without discretion) that can be optimal for some parameter values.

Comparative statics for those two contracts are summarized in the following proposition (see Appendix A for the proof):

Proposition:

(a) Under a salary system, housework (h^s) is decreasing with respect to $\underline{e}$. Moreover, leisure (L^s) is decreasing with respect to $\underline{e}$ if and only if $\kappa < \gamma$.

(b) Suppose the firm moves from a salary system to a performance pay system. If work effort increases ($e^{pp} > \underline{e}$), then housework will diminish ($h^{pp} < h^s$). Furthermore, leisure will diminish ($L^{pp} < L^s$) if and only if $\kappa < \gamma$.

Part (a) of the proposition characterizes the effect of increasing the extent of monitoring conditional on the employee being paid a straight salary, whereas part (b) characterizes the total effect of moving from a salary system (where the employee is forced to choose $\underline{e}$) to a performance pay system (where the employee has freedom to choose e).

Intuition for these results can be summarized as follows. Because of the multi-task nature of the problem, the marginal return of housework ($B' - g_2$) must in equilibrium be equal to the marginal return of leisure (F'). When moving from a salary system to a performance pay system (or when increasing the amount of supervision within a salary system), the employee increases work effort, which raises the marginal return of leisure. Hence, to go back to equilibrium, the marginal return of housework must increase and / or the marginal return of leisure must diminish.

A reduction in housework will always achieve both goals: it will reduce the marginal return of leisure, and it will of course increase the marginal return of housework. As far as leisure is concerned, it must be noted that, since $L = 1 - e - h$, the effect of performance pay will depend on the increase in work effort relative to the reduction of housework. This will in turn be determined by the degree of substitutability between work and housework: in the case where work and housework are weak substitutes ($\kappa < \gamma$), a small reduction of housework will suffice to increase the marginal return of housework back to an equilibrium level. In that case, since the reduction of housework is relatively small compared to the increase in work effort, leisure will diminish. In contrast, if work and housework are strong substitutes ($\kappa > \gamma$), a large reduction of housework will be needed to increase the marginal return of housework back to an equilibrium level. In that case leisure will actually increase, because the reduction in housework is relatively large compared to the increase in work effort.

Mathematically, note that the first-order conditions for housework imply

$$p = F'(1 - e^{pp} - h^{pp}) + \gamma h^{pp} + \kappa e^{pp} \qquad (11)$$

$$p = F'(1 - \underline{e} - h^{s}) + \gamma h^{s} + \kappa \underline{e} \qquad (12)$$

In the particular case where $\kappa = \gamma$ these two conditions imply that $h^s + \underline{e} = h^{pp} + e^{pp}$, and therefore $L^{pp} = L^s$, i.e. performance pay has no effect on leisure. If $\kappa > \gamma$ then the two conditions are satisfied if $h^s + \underline{e} > h^{pp} + e^{pp}$, and therefore $L^{pp} > L^s$, i.e. performance pay increases the amount of leisure. Conversely, for $\kappa < \gamma$ we must have $h^s + \underline{e} < h^{pp} + e^{pp}$, which means that performance pay will have a negative effect on leisure ($L^{pp} < L^s$).

The model also shows that moving from a salary system to a performance pay system generates two different effects, a substitution effect and a discretion effect. Letting $A = h$ or $A = L$, the total effect of performance pay can be decomposed as

$$A^{pp} - A^{s}(\underline{e}) = [\, A^{pp} - A^{s}(0) \,] + [\, A^{s}(0) - A^{s}(\underline{e}) \,], \qquad (13)$$

where $[\, A^{pp} - A^{s}(0) \,]$ is the substitution effect and $[\, A^{s}(0) - A^{s}(\underline{e}) \,]$ is the discretion effect.

The substitution effect means that if employees have discretion over their work hours (i.e. $\underline{e} = 0$), performance pay contracts will have a negative influence on the amount of time dedicated to housework. This is due to the fact that when a performance pay contract is introduced the marginal benefit of work effort increases, i.e., every additional hour of work raises expected performance, leading to a higher expected bonus. Provided that the employee has some choice over work hours, she will cut out-of-work activities in order to have more time available for work. In the model, if the employee has discretion and is paid a straight salary, her equilibrium choice is given by the value of A^s that corresponds to the particular case where $\underline{e} = 0$; whereas if she has discretion and a performance pay contract, her choice will be given by A^{pp}. Hence the proposition implies a negative substitution effect for housework ($A = h$) and a negative or positive substitution effect for leisure ($A = L$), depending on whether $\kappa < \gamma$ (negative effect) or $\kappa > \gamma$ (positive effect).

The discretion effect has to do with the fact that when performance contracts are introduced, employees are typically given wider discretion over the choice of work hours, i.e., greater explicit incentives usually come hand in hand with greater discretion. Thus, under a salary system we will

generally have $e^s = \underline{e} > 0$ since the firm will want to ensure a minimum level of effort. If the employee was free to choose the amount of time devoted to work and was being paid a fixed salary, we would have $e^s = \underline{e} = 0$ instead. Part (a) of the proposition implies that the discretion effect will always be positive for housework ($A = h$), and will be positive for leisure ($A = L$) if and only if $\kappa < \gamma$.

3 Data description

Data used here come from the third European Working Conditions Survey, which was carried out for the 15 old member states in 2000 and for the 12 candidate member states in 2001. The data are a cross-section of more than 24,000 employees representing all industries and occupational groups. The data set has information on performance pay, discretion and private activities. An individual is defined to receive performance pay if she receives any of the following payments: piece rate or productivity payments, payments based on the overall performance of the company she works in (profit sharing) and income from shares in the company she is working for. As can be seen from Table 1, piece rates and profit sharing are clearly the most prevalent performance pay schemes. All in all, 16.4 per cent of the employees receive at least one form of performance pay.

Table 1. Performance pay

Variable	Mean	Std. dev.	N
1. Piece rates	.105	.306	27,083
2. Group Performance Pay	.024	.154	27,083
3. Profit sharing	.056	.230	27,083
4. Stock ownership	.009	.094	27,083
Performance pay: (1)+(2)+(3)+(4)	.164	.402	27,083

As for outside work activities the questionnaire asks the respondents on a scale from 0 (never) to 5 (every day for at least one hour) about the *frequency* of their involvement in several different types of activities: voluntary or charitable activity, political/trade union activity, caring for and educating your children, cooking, housework, caring for elderly/disabled relatives, taking a training or education course, sporting activity, cultural activity and leisure activity. In our empirical analysis, reported below, we will not consider educational activities as for some respondents these may involve training for their jobs. As can be seen from Table 2, participation in political/trade union activities is rare as is involvement in charitable and taking care of disabled or elderly relatives, too. Not surprisingly, the most prevalent outside work activities are housework, child care, cooking and "other leisure", followed by sports and cultural activities.

Table 2. Outside work activities, by gender

Activity	**Men**				**Women**			
	Mean	**Std. dev.**	**Median**	**N**	**Mean**	**Std. dev.**	**Median**	**N**
1. Cooking	2.384	1.852	3	13,573	4.279	1.259	5	13,119
2. Housework	2.587	1.779	3	13,598	4.369	1.074	5	13,172
3. Children care	2.321	2.248	3	11,618	2.899	2.340	5	11,427
4. Disabled/elderly	.513	1.209	0	12,213	.815	1.509	0	11,724
5. Charity	.533	1.035	0	13,363	.537	.988	0	12,766
6. Political	.227	.711	0	13,306	.146	.550	0	12,723
7. Sport	1.607	1.619	2	13,445	1.350	1.589	0	12,795
8. Cultural	1.063	1.256	1	13,456	1.134	1.218	1	12,861
9. Leisure	2.590	1.565	3	13,543	2.394	1.577	3	12,932

Note.- For each out-of work activity there are six possible responses: "never" (0); "once or twice per year" (1); "once or twice per month" (2); "once or twice a week" (3); "every day or every second day for less than one hour" (4); "every day for at least one hour" (5).

Since theory suggests distinguishing between private activities for which the market provides a close substitute and those for which no market substitute really exists, we use the information available to construct four different indexes (see Table 3). The first one, "HouseIndex", is defined as the sum of the variables referring to cooking and housework. Both are activities for which the market can provide very close substitutes. The second index is called "FamilyCareIndex" and measures the frequency with which respondents spend time taking care of their children or elderly / disabled relatives. These are activities for which the market provides substitutes which however are not as close as the ones for cooking and housework. The third and fourth indexes capture non-work activities for which the market cannot provide a substitute: "CharipolIndex" includes charitable and political activities, and "LeisureIndex" includes sports, cultural and other leisure activities.[2] The reason for using two different indices for these activities is that in the former case it could be argued that some market substitution would be possible (i.e., donating money to charitable organizations or political associations), whereas in the latter case such substitution is simply impossible. Since the response options for the frequency of out-of-work activities do not increase linearly, we use a non-linear scale reflecting how many times per year the employee participates in each kind of activity to compute the indexes. Thus, in that scale the response "never" is quantified as zero; "once or twice per year" as 1.5; "once or twice per month" as 18 (i.e., 1.5*12); "once or twice a week" as 72 (i.e., 1.5*12*4); "every day or every second day for less than one hour" as 273.75 (i.e., 0.75*365); and "every day for at least one hour" as 730 (i.e., 2*365).

Table 3 shows summary statistics for the four indexes computed with that scale. Given that the two highest response options refer to the frequency and duration of the activity, whereas the other

[2] Since LeisureIndex includes three different variables, we normalize the sum to make sure that the range for this index is the same as for the other indexes, which include only two variables each.

ones refer only to the frequency, the values for the two highest options are arguably open to some discussion. In particular, the highest response option could take on a higher value, since the questionnaire does not specify any upper bound on duration.[3] Another possibility would be to collapse the highest two responses into one, so that the resulting measure would only convey information on frequency (i.e., no information on duration). We have carried out sensitivity checks by changing the scale in these ways. Results reported in the next two sections are robust to both types of changes.

Table 3. Indexes of outside work activities, by gender

Activity	Men			Women		
	Mean	Std. Dev.	N	Mean	Std. dev.	N
HouseIndex	382.172	493.644	13,512	1057.564	517.037	13,092
FamilyCareIndex	283.471	353.054	10,756	432.607	398.372	10,550
CharipolIndex	23.404	109.737	13,194	16.947	85.899	12,607
LeisureIndex	178.292	247.531	13,199	152.167	226.330	12,563

We will also make use of total hours worked (per week) as a dependent variable. This is constructed from answers in the questionnaire concerning the number of weekly hours usually worked in main job, plus for those who beside their main job have another regular job, the usual weekly hours in this secondary job. The Survey also has a number of questions concerning discretion, and the information we use emanates from a question whether the employee can influence her working hours or not. In addition, we use a number of control variables summarized

[3] Indeed, the highest response is actually the median response of females for cooking, housework, and children care (see Table 2), and it is not unreasonable to assume that such responses correspond to more than two hours of activity per day.

in Table 4 below, as well as industry, country and occupation dummies.[4] Not surprisingly, men work more hours and are more often employed on permanent contracts and the main income earner in the household. Furthermore, men have somewhat more discretion regarding work hours than women.

Table 4. Summary statistics of discretion, work hours, and main control variables

Variable	Men			Women		
	Mean	Std. dev.	N	Mean	Std. dev.	N
Discretion over work hours	.348	.476	13,666	.327	.469	13,089
Hours worked (per week)	41.105	10.252	13,671	35.823	11.849	13,132
Household size	2.111	1.343	13,824	2.078	1.297	13,255
Main income earner	.780	.414	13,728	.416	.493	13,133
Married	.593	.491	13,786	.562	.496	13,194
Part-time contract	.066	.248	13,826	.249	.432	13,257
Permanent contract	.823	.381	13,670	.797	.402	13,086
Age	38.447	11.249	13,826	38.060	10.930	13,257

4 Estimates of the determinants of private activities

In this section we report estimates from linear regressions[5] for the different private activities. We estimate the models for men and women separately, using systems of seemingly unrelated regression equations. The key explanatory variable of interest is the dummy for performance pay. In addition the models also include a set of control variables: the individual's age, marital status, whether she is the main income earner in the household, household size, whether she is employed

[4] Industries and occupations are defined at one-digit level.
[5] We have also run estimations of ordered probit models. However, since these cannot be estimated as a system of seemingly unrelated regression equations and because using them does not make use of real information about the time used on different activities, we prefer the linear specification.

on a permanent /fixed-term and on a full-time/part-time contract, and the individual's occupation, industrial affiliation and country of residence.

The estimation results are given in Tables 5 and 6 for men and women, respectively. (To save space, the occupation, industry and country dummy estimates are omitted). We can see that for men performance pay is associated with more charitable and political activities, and more leisure activities. There is no significant effect on "house-related" (cooking and housework) activities. As far as women are concerned, performance pay does not have a significant effect on any of the private activities.

Table 5. Seemingly unrelated regressions, male employees

	HouseIndex	**FamilyCareIndex**	**CharipolIndex**	**LeisureIndex**
Performance pay	-19.407* (11.793)	9.581 (8.079)	3.873 (2.823)	4.633 (6.292)
Household size	-54.111*** (3.919)	87.056*** (2.685)	2.334** (.938)	-7.486*** (2.091)
Main income	-.669 (12.125)	114.102*** (8.307)	2.834 (2.902)	-39.888*** (6.470)
Married	-92.197*** (11.597)	147.417*** (7.946)	-1.764 (2.776)	-24.718*** (6.188)
Part-time contract	28.759 (18.253)	-4.076 (12.505)	11.535*** (4.369)	26.323*** (9.739)
Permanent contract	-3.579 (12.302)	30.612*** (8.428)	-3.545 (2.944)	4.495 (6.564)
Age	1.495*** (.463)	-3.026*** (.317)	.389*** (.111)	-2.032*** (.247)
N	10,170	10,170	10,170	10,170
R-squared	.195	.267	.026	.088

Note. Standard errors are shown in parentheses. Levels of significance: (***) 1 percent; (**) 5 percent; (*) 10 percent. All regressions include 26 country dummies, 8 occupation dummies, 11 industry dummies, and a constant. All other variables are shown in the table.

Table 6. Seemingly unrelated regressions, female employees

	HouseIndex	**FamilyCareIndex**	**CharipolIndex**	**LeisureIndex**
Performance pay	-7.813 (14.886)	14.431 (11.208)	2.284 (2.835)	8.479 (7.007)
Household size	22.377*** (4.224)	132.372*** (3.180)	1.588** (.805)	-14.413*** (1.988)
Main income	50.881*** (11.062)	134.187*** (8.329)	2.359 (2.107)	-10.434** (5.207)
Married	242.845*** (11.468)	148.467*** (8.634)	-.582 (2.184)	-20.457*** (5.398)
Part-time contract	115.397*** (11.677)	55.191*** (8.792)	3.227 (2.224)	23.226*** (5.497)
Permanent contract	42.500*** (12.043)	34.871*** (9.067)	-4.650** (2.294)	-7.098 (5.669)
Age	7.294*** (.484)	-1.842*** (.365)	.316*** (.092)	-1.064*** (.228)
N	9,896	9,896	9,896	9,896
R-squared	.188	.259	.017	.101

Note. See Table 5.

Table 7 reports the same regression model with total number of hours worked as the dependent variable. This is estimated on samples for individuals with and without discretion and with and without performance pay, separately by gender. In the first case the key explanatory variable is performance pay, and in the other it is discretion (i.e., ability to choose work hours). The other explanatory variables entered are the same as in Tables 3 and 4, and are not reported in the table.

It can be seen that both men and women who have discretion with respect to their working hours work more when they receive performance pay. Women also work more if paid according to performance even though they cannot choose their working hours. This likely indicates that full-time jobs are more associated with performance related pay schemes than part-time jobs. When

Table 7. Regressions for total number of work hours; coefficients to "performance pay" (columns (1) and (2)) and "choose hours" ((3) and (4))

Gender	No discretion (1)	Has discretion (2)	Performance pay (3)	No performance pay (4)
Men	.423 (.277)	1.525*** (.376)	1.778*** (.429)	1.291*** (.206)
Women	.817** (.321)	.797* (.443)	-.087 (.559)	-.135 (.190)

Note. See Table 5.

the data is cut according to the nature of pay schemes, as in columns (3) and (4), it is found that men who can choose working hours work more irrespectively of whether they are paid for performance or not. For women, there is no difference in the impact of discretion between those who receive performance pay and those who do not.

One potential problem with the estimations shown in this section is due to unobserved ability differences. If more able employees are more likely to have performance pay contracts, as predicted by models that allow for sorting, (see e.g., Lazear (2000)), and if ability is correlated with private activities – an assumption which is not implausible – then our estimates will be biased. The next section addresses this issue.

5 Estimates from a differences approach

The Survey includes several questions on employee discretion and one in particular where individuals report whether they have freedom to choose their work hours (see Table 4). Thus we observe the amount of out-of-work activities performed by four different types of employees: those with a performance pay contract and discretion over work hours, those with a performance pay contract and no discretion over work hours, and those with a salary contract with or without discretion over work hours.

The estimation strategy we call the differences approach uses this information as follows. We cut the data into four different categories. The first category consists of all employees who have no discretion in their choice of work hours. The second category includes all employees with discretion, and categories three and four have all employees without and with performance pay contracts, respectively. Of the total sample 56 per cent had neither discretion nor performance pay. Another relatively large category is those with discretion but no performance pay; their share is 27.6 per cent. 10.3 per cent are on performance pay contracts but lack discretion with respect to work hours, and the remaining 6.1 per cent have discretion as well as performance pay.

We run four regressions, one for each of the above-mentioned categories of employees, as shown in Table 8: to keep the same notation as in Section 2, we use A to refer to the amount of private activities ($A = h, L$). The performance pay and discretion dummies are denoted by PP and D respectively, and control variables are denoted by X. Error terms are given by c and ε, where c_i is the part of the error term correlated with performance pay (for $i = 1, 2$) or discretion (for $i = 3, 4$), and ε_i is the part of the error term which is uncorrelated with performance pay (for $i = 1, 2$) or discretion (for $i = 3, 4$).

In principle there may be some selection bias in all four regressions. However, even in the presence of bias we expect private activities to be more sensitive to performance pay when the employee has more freedom to choose her work hours than when she lacks freedom, provided that the size of the biases is similar in the two cases. Thus the coefficient of performance pay must be higher (in absolute value) in regression 2 than in regression 1. Similar reasoning applies to the coefficient for discretion over work hours: private activities must be more sensitive to

Table 8. Regressions needed for the differences approach

	Regression equation	Criterion for sample selection	Coefficient of interest
1	$A_1 = \alpha_1 + \beta_1 * PP_1 + \theta_1 X_1 + c_1 + \varepsilon_1$	$D = 0$	$\beta_1 = A^{pp}(\underline{e}) - A^{s}(\underline{e})$
2	$A_2 = \alpha_2 + \beta_2 * PP_2 + \theta_2 X_2 + c_2 + \varepsilon_2$	$D = 1$	$\beta_2 = A^{pp}(0) - A^{s}(0)$
3	$A_3 = \alpha_3 + \beta_3 * D_3 + \theta_3 X_3 + c_3 + \varepsilon_3$	$PP = 0$	$\beta_3 = A^{s}(0) - A^{s}(\underline{e})$
4	$A_4 = \alpha_4 + \beta_4 * D_4 + \theta_4 X_4 + c_4 + \varepsilon_4$	$PP = 1$	$\beta_4 = A^{pp}(0) - A^{pp}(\underline{e})$

discretion when the employee is paid a fixed salary than in the case where she has a performance pay contract: in the latter case she will be less inclined to increase the amount of time spent on private activities, for the opportunity cost (the negative effect on her bonus) is higher. We can therefore use the differences $\beta_2 - \beta_1$ and $\beta_4 - \beta_3$ to obtain cleaner estimates of the effects on private activities. More precisely, if selection biases are similar in equations 1 and 2 and equations 3 and 4, this approach enables us to difference out the selection bias. It should of course be noted that, because of the differencing, some information is lost: specifically, the estimates obtained in this way measure the substitution effect, rather than the total effect (see Appendix B for details).

To obtain estimates of the differences $\beta_2 - \beta_1$ and $\beta_4 - \beta_3$, we estimate the following two equations:

$$A = \alpha_I + \beta_I * PP + \theta_I X + \gamma_I * D + \delta_I * D * PP + \lambda_I DX + c_I + \varepsilon_I \quad (14)$$

$$A = \alpha_{II} + \beta_{II} * D + \theta_{II} X + \gamma_{II} * PP + \delta_{II} * PP * D + \lambda_{II} DX + c_{II} + \varepsilon_{II} \quad (15)$$

where control variables (X) are the same as in previous regressions (household size, main income earner dummy, marital status dummy, part-time contract dummy, permanent-contract dummy, age, 26 country dummies, 8 occupation dummies, and 11 industry dummies). The parameters of interest, which measure the substitution effects, are δ_I and δ_{II} respectively, where $\delta_I = \beta_2 - \beta_1$ and $\delta_{II} = \beta_4 - \beta_3$. As in the previous section, we estimate separate regressions for male and female employees, using the seemingly unrelated regression equations approach. Estimates of the parameters of interest are given in Table 10. The first thing to be noted is that for both males and females the signs of the substitution effects are the same when the estimation relies on the performance pay coefficient and when it relies on the discretion coefficient (i.e., in general the estimates for δ_I and δ_{II} have the same sign). There are only two out of eight cases where the signs differ, and in those two cases the coefficients are not statistically different from zero anyway.

Table 10. Substitution effects, males and females

Activity	**Men**		**Women**	
	δ_I	δ_{II}	δ_I	δ_{II}
HouseIndex	-35.340 (24.217)	-27.733 (24.639)	-60.489* (31.631)	-20.869 (31.485)
FamilyCareIndex	14.471 (16.608)	7.562 (16.941)	-15.457 (23.807)	3.414 (23.725)
CharipolIndex	-8.932 (5.837)	-5.109 (5.937)	-15.820*** (6.016)	-9.209 (5.992)
LeisureIndex	-34.277*** (12.941)	-37.552*** (13.194)	5.839 (14.904)	-8.001 (14.859)

Note.- Estimation results for equations (14) and (15). Standard errors are shown in parentheses. Levels of significance: (***) 1 percent; (**) 5 percent; (*) 10 percent.

As far as male employees are concerned, we find a significant negative effect of performance pay on leisure, and no significant effect for the other activities. For female employees we find a negative effect on house-related activities as well as on charitable and political activities. Based on the theory, we expected the substitution effect to be always negative for those services that the employee could to some extent hire in the market. In our data, the housework index would fall in this category, and we find the results for both male and female employees to be in accordance with the theory, i.e., when significant the substitution effects are negative (see Table 10). Taking care of family members can also be considered a service that employees can hire in the market, but in that case we do not find significant effects for either male or female employees. This is consistent with the fact that for those activities the market provides more imperfect substitutes than for housework. We therefore should not expect strong substitution effects there. The two remaining indexes (charitable and political activities and leisure activities) can be classified as "leisure" (L in the model). In this case the theory is consistent with both positive and negative effects, and the data show that all significant effects are negative. The results also show important differences between male and female employees – significant effects for men and insignificant effects for women.

Thus, all in all, the propositions in our theoretical analysis are broadly supported by the estimation results. Moreover, the estimates imply that performance pay schemes seem to be associated with a cost in form of less time spent on cooking, housework, charity, sports, political activities and leisure.

6 Conclusions

Using a large cross section of European employees, we have studied the effect of performance pay contracts on the time that employees spend on private activities. Theory suggests a substitution effect whereby employees with a performance pay contract devote less time to private activities for which it is possible to hire services in the market (e.g. housework, children care). In addition, there is a discretion effect whereby, if employees have some choice over work hours, they can choose to do their work in less time and have more spare time for private activities.

We conduct two empirical analyses. First of all we estimate the total effect of performance pay (i.e. the sum of the substitution and discretion effects). We estimate separate regressions for male and female employees and find that the total effect is always positive or insignificant. The second empirical analysis exploits an interesting feature of the data – the information about discretion over work hours. We use a differences approach to control for selection bias and estimate the substitution effect in two different ways. We find evidence of a negative substitution effect for both male and female employees. Consequently, our results suggest that the increased adoption of performance pay schemes may contribute to a worsening of the time squeeze problem.

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Appendix A

Proof of Proposition

Part (a):

The first-order conditions under the salary system imply that

$$p = F'(1 - \underline{e} - h^s) + g_2(\underline{e} , h^s) \qquad \text{(A1)}$$

If $\underline{e}$ increases, then both $g_2(\underline{e} , h^s)$ and $F'(1 - \underline{e} - h^s)$ will increase. Therefore for (A1) to be satisfied we need h^s to diminish. Differentiating (A1) with respect to $\underline{e}$ we obtain:

$$\delta h^s / \delta \underline{e} = -[g_{21}(\underline{e} , h^s) - F''(1 - \underline{e} - h^s)] / [g_{22}(\underline{e} , h^s) - F''(1 - \underline{e} - h^s)]. \qquad \text{(A2)}$$

Furthermore, since $L^s = 1 - \underline{e} - h^s$, the amount of leisure L^s will diminish with $\underline{e}$ if and only if $| \delta h^s / \delta \underline{e} | < 1$. From (A2), this is satisfied when $g_{21}(\underline{e} , h^s) < g_{22}(\underline{e} , h^s)$, i.e. $\kappa < \gamma$.

Part (b):

The first-order conditions under the two contractual arrangements imply that

$$p = F'(1 - e^{pp} - h^{pp}) + g_2(e^{pp}, h^{pp}) \qquad \text{(A3)}$$

$$p = F'(1 - \underline{e} - h^s) + g_2(\underline{e} , h^s) \qquad \text{(A1)}$$

If $e^{pp} > \underline{e}$, then these two conditions require that $h^{pp} < h^s$.

Appendix B

Econometric Approach

Table A1 shows the four regression equations and the expected value of the estimator of interest, under the assumption that there is a selection bias in all four equations:

Table A1. The estimation equations

	Regression equation	Expected value of estimator
1	$A_1 = \alpha_1 + \beta_1 * PP_1 + \theta_1 X_1 + c_1 + \varepsilon_1$	$E(\beta_1) = A^{pp}(\underline{e}) - A^{s}(\underline{e}) + (PP_1'PP_1)^{-1} E(PP_1'c_1)$
2	$A_2 = \alpha_2 + \beta_2 * PP_2 + \theta_2 X_2 + c_2 + \varepsilon_2$	$E(\beta_2) = A^{pp}(0) - A^{s}(0) + (PP_2'PP_2)^{-1} E(PP_2'c_2)$
3	$A_3 = \alpha_3 + \beta_3 * D_3 + \theta_3 X_3 + c_3 + \varepsilon_3$	$E(\beta_3) = A^{s}(0) - A^{s}(\underline{e}) + (D_3'D_3)^{-1} E(D_3'c_3)$
4	$A_4 = \alpha_4 + \beta_4 * D_4 + \theta_4 X_4 + c_4 + \varepsilon_4$	$E(\beta_4) = A^{pp}(0) - A^{pp}(\underline{e}) + (D_4'D_4)^{-1} E(D_4'c_4)$

The differences approach relies on the assumption that the biases are equal in the first and second regressions and in the third and fourth regressions respectively, i.e.

$$(PP_1'PP_1)^{-1} E(PP_1'c_1) = (PP_2'PP_2)^{-1} E(PP_2'c_2) \quad \text{(A4)}$$

$$(D_3'D_3)^{-1} E(D_3'c_3) = (D_4'D_4)^{-1} E(D_4'c_4) \quad \text{(A5)}$$

This condition will be satisfied if the correlation between performance pay and the unobserved determinants of private activities (e.g., ability) is the same for employees with and without discretion; and similarly, if the correlation between discretion and any unobserved determinants of private activities is the same for employees with and without a performance pay contract. If

condition (A4) is satisfied, then using OLS the difference between the two performance pay coefficients will be an unbiased estimator of $\{ [A^{pp}(0) - A^{s}(0)] - [A^{pp}(\underline{e}) - A^{s}(\underline{e})] \}$. Since $A^{pp}(\underline{e}) = A^{s}(\underline{e})$, this expression is equal to the substitution effect, $A^{pp}(0) - A^{s}(0)$. Likewise, if condition (A5) is satisfied, so that selection biases are the same in regressions 3 and 4, using OLS the difference between the two discretion coefficients will be equal to $\{ [A^{s}(0) - A^{s}(\underline{e})] - [A^{pp}(0) - A^{pp}(\underline{e})] \}$ and since $A^{pp}(\underline{e}) = A^{s}(\underline{e})$, this will also be equal to the substitution effect, $A^{pp}(0) - A^{s}(0)$.

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