

Why has work effort become more intense? Effort-biased technical change and other stories

by Francis Green

*Department of Economics, University of Kent

Support for this paper was provided by the Leverhulme Trust. The author thanks Duncan Gallie for making available data from the Employment In Britain survey, and Peter Skott for very helpful comments on an earlier version of this paper, and acknowledges the Department of Trade and Industry, the Economic and Social Research Council, the Advisory, conciliation and Arbitration Service and the Policy Studies Institute as the originators of the 1998 Workplace Employee Relations Survey data.

JEL Classification J22

Key words: Labor supply, work effort, work intensity, wages, technical change, work organization, unions, high commitment policies, incentives.

Correspondence Address: Department of Economics, University of Kent at Canterbury, Canterbury CT2 7NP, U.K. Tel: +44 1227 827305; Fax: +44 1227 827784; email: gfg@ukc.ac.uk.

WHY HAS WORK EFFORT BECOME MORE INTENSE? EFFORT-BIASED TECHNICAL CHANGE AND OTHER STORIES

1. Introduction

There is a widespread impression, evident from popular reports and casual empiricism, of an increasing ‘tension’ and ‘strain’ across many workplaces in recent decades.¹ In part, the impression of increasing work strain may have come from changing work hours. Although in most industrialised countries average weekly hours of work have come down or, at worst, remained steady since the early 1980s, those hours have been concentrated in fewer households (Gregg and Wadsworth, 1996; Green, 2001). At the same time the proportion of United Kingdom workers putting in over 48 hours has risen. A similar trend towards increasing variation of hours is observed in the United States (Cappelli et al, 1997). However, just as relevant to the sense of rising strain, there is also now an array of evidence substantiating work intensification in thirteen European Union countries, that is, an increase in the proportion of effective labor performed for each hour of work (European Foundation, 1997; Green, 2001; Green and McIntosh, 2000).

In this paper, I investigate explanations for this work intensification. Despite the difficulties of measurement, work effort occupies an important place in both economic and psychological models of the labor contract. Work intensification is likely to have substantive welfare effects (not necessarily negative) on employees. Moreover, changing work intensity figures prominently in critical accounts of productivity change. At the organization level, for example, downsizing has been seen sometimes as just a “quick fix” for a firm’s efficiency shortcomings leading only to temporary improvements as surviving employees work harder but become demoralised (deVries and Balazs, 1997). Thus the verdict on downsizing as a managerial strategy is mixed. At the economy level, work intensification is shown to be an ingredient of the 1980s productivity boom in U.K. manufacturing, and critics have questioned the sustainability of this mode of growth in both the US and the UK (Roach, 1996; Evans *et al*, 1992; O’Mahoney, 1994).

¹ Typical examples are ACTU (1998) in Australia, Sherwen (1999) in the U.K.

In view of these wider implications, an improved understanding of the sources of work intensification is called for. There is only a little extant research on this issue, not because it is unimportant but because of the scarcity of usable measures of work effort over time. It happens that the basic facts about work intensification are clearest in the context of Britain. That the period from the early 1980s until 1997 was one of work intensification has been established using several methodologies:

- i. Overviews of bargaining agreements in several sectors in which workplace concessions, including productivity deals, are prominent (Andrews and Simmons, 1995; Elger, 1990; Tomaney, 1990);
- ii. Case studies of particular organizations (Burchell *et al*, 1999; Edwards and Whitston, 1991);
- iii. Subjective perceptions of recent effort change among survey respondents, either in broadly representative surveys or in specialist surveys of employees in selected organizations or occupations (Edwards *et al*, 1998; Edwards and Whitston, 1991; Burchell *et al*, 1999; Batstone and Gourlay, 1986; IRS, 1996);²
- iv. Substantive increases in directly reported subjective effort levels between successive comparable representative surveys during the 1990s (Green, 2001; Green and McIntosh, 2000);
- v. Large increases from 1986, through 1992 to 1997 in the number of perceived factors pressurising employees to work hard, as revealed in successive comparable surveys (Green, 2001).

By way of illustration, one may quote just one of the results using methodology (i.v). Respondents to successive national surveys in 1992 and 1997, drawn randomly from a target population of 20 to 60 year olds in employment, were asked: “‘My job requires that I work very hard’. Do you strongly agree, agree, disagree, or strongly disagree with this statement?”³ A key finding was that the proportions strongly agreeing rose from 32 percent in 1992 to 40 percent in 1997. Findings from

² Such responses display substantive content validity, but may nevertheless reflect respondent biases. Comparison of effort levels in successive representative surveys is a preferable methodology, as in (iv) and (v).

³ The surveys are the Employment In Britain survey of 1992 (EIB) and the Skills Survey of 1997. Details can be found, respectively, in Gallie *et al* (1998) and Ashton *et al* (1999). The years 1992 and

comparisons of other questions within the same surveys, and from using other data sets, show a broadly consistent picture of change across a range of effort indicators. Work intensification has taken place quite broadly across occupations and sectors. However, the increase in effort has been somewhat greater than average for women, for those aged over 40, for service sector and for public sector workers. For men, the change in discretionary effort is not significantly different from zero. Consistent with previous studies in the United States and in Britain, the level of perceived work effort is greater for women than for men (Bielby and Bielby, 1988; McIntosh, 1997).

Why has work effort become more intense? Recent studies have attributed work intensification either to increased competitive pressure being passed on to workers (Burchell *et al*, 1999) or to the rising power of bosses relative to declining unions (Green and McIntosh, 2000). An alternative, appealing, explanation is that the transformation of work processes alongside technical change has been effort-biased. I shall argue below that there are good reasons to believe that the productivity of high effort workers may have risen relative to that of low effort workers. It is likely that effort-biased technical change is complementary, in many environments, with skill-biased technical change.⁴ The introduction of human resource policies designed to encourage greater worker involvement and commitment, including incentives that link effort with pay, could also be driving some of the increased effort. Effort intensification might also come from exogenous changes on the labor supply side, including a shift in workers' preferences over effort and income. Structural changes including the enhanced facility of employers to measure, motivate and discipline effort might also be important. Relatedly, work intensification could be linked to increased job insecurity.

All these types of explanations are, at least superficially, potentially valid. The multiplicity of plausible explanations leads me to eschew any encompassing formal labor market model, because these explanations operate in a range of contexts (including perfect competition, bilateral bargaining and efficiency wage models). Rather, I first delineate the explanations using a variety of standard labor market frameworks (Section 2). These suggest a number of hypotheses about work

1997 are not ideally placed at similar points of the economic cycle. However, the effects of the cycle on work effort are theoretically ambiguous.

intensification that are, to varying degrees, amenable to testing through a reduced form specification. I then present evidence based on a high-quality large survey of establishments in Britain, the Workplace Employee Relations Survey of 1998. I describe the data and specification in Section 3, and the findings in Section 4.

My justification for this approach is, simply, that a partial understanding of this phenomenon is superior to none. There is insufficient data to allot prime causation to any of these hypotheses with complete confidence, using a full structural model, but it is possible to provide empirical support for certain explanations, while at the same time casting much doubt upon others, using British data. To anticipate, I find considerable support for the presence of effort-biased technical change. There are also findings in support of the structural change argument, suggesting that the decline of union influence has been a factor, and consistent with posited associations between company human resource policies and worker effort. There is, however, not much support for the assertion that increased job insecurity is causing workers to work harder.

I conclude with a more speculative discussion of supply-side factors. The changing nature of jobs, or consumerism and the desire for money, could be driving people to supply greater effort, though there is no direct evidence in support, and the circumstantial evidence is not favourable. Unfortunately, the data do not permit a conclusive analysis of the balance of supply-side and demand-side factors.

2. Hypotheses About Work Intensification, and Some Previous Evidence.

My conjecture is that an important explanation for the intensification of work lies in developments on the demand side of the labor market. On one hand the innovation of new information technologies has revolutionised the control of work flows. On the other there have been pervasive developments in managerial strategies affecting the way work is organised. In this section I argue that such changes would tend to raise work effort, and refer to the somewhat limited evidence there currently exists. I also review theories which suggest that an additional factor raising work effort may have been increases in labor market flexibility, as reflected in declining

⁴ There is now a considerable body of evidence that technical change in the current era has been skill-biased (e.g. Machin and Van Reenen, 1998).

union power and greater deployment of non-permanent labor. Finally, I consider how changes in human resource policies may have added to the impact of organizational and technical change.

2.1. Effort-Biased Technological Change

While technological changes are widely seen as efficiency-improving, there are good reasons to expect that they are on balance effort-biased, that is to say, they increase the productivity of high effort workers, relative to that of low effort workers. I refer to this process as “effort-biased technological change” (EBTC). In a standard competitive model of effort determination, exogenous EBTC would induce firms to demand more high effort workers, which would in turn bid up the wages of high effort workers.

“Amber Lights” Technology

Recent decades have seen the diffusion of a range of new techniques that generate both new products and more efficient production processes. “Just-In-Time” (JIT) production methods have been followed by “Total Quality Management” (TQM) and other associated work organization methods, most notably teamworking. Each of these practices had been adopted by at least 7 in 10 UK manufacturing sites by 1996 (Waterson *et al*, 1996). Such techniques have been diffused and adapted through many countries, and across sectors to embrace services as well as manufacturing, and the public as well as the private economy. These techniques have normally been complementary to the expansion of the new information technologies.

A central aspect of JIT and TQM production methods is the achievement of more efficient control of flows of materials and of work. JIT is premised upon the minimisation of inventories, and therefore requires close control of work flows as a direct consequence. TQM’s efficiency gains are said to come (in part) through the principle of involving the workforce in delivering continuous quality improvements. An important ingredient of these efficiency improvements is a closer matching of available labor to the required workflow.

The consequence is that it becomes possible to make better productive use of workers who supply high effort. The principle of the systematic removal of buffers is extended to the reduction of idle work time. Whereas, before the innovation of JIT and TQM, there were many gaps in the flow of work, this porosity in the working day starts to be reduced with the new managerial techniques. The productivity of those workers who choose to supply low effort is raised much less, or not at all.

Expanding information and communication technologies (ICT) are an indispensable adjunct to the new techniques.⁵ Not only have they delivered the technical means for improved co-ordination of materials flows and associated work schedules, they have afforded management an immensely enhanced capacity for the efficient allocation of work. This development is epitomised in the rise of the call centre, the so-called “20th century sweatshop” (Wazir, 1999).⁶ Though attention is often given to the ability of call centre managers to monitor and measure employees’ outputs with great accuracy, just as important is the automated supply of work tasks – each call following its predecessor with no gaps.

In addition to aiding the filling up of gaps during normal work time, ICT also raises the productivity potential of work done outside those hours. It thereby raises the productivity of high effort workers who take their work away with them. Put another way, ICT raises the opportunity cost of not working during time away from the usual workplace. The facilities of laptop computers, mobile phones and globally accessible Internet connections have opened the door to more intensive work on trains, planes and at home. This phenomenon has prompted some management writers to comment on the irony of labor-saving technology failing to liberate those who labor (e.g. Roach, 1996) - something that Ricardo and Marx discovered in the 19th century. The resolution, again, appears to be that the productivity of workers who choose to supply relatively low effort is enhanced to a significantly less extent than that of those who are prepared to work with the more effort-intensive technologies.

EBTC might appropriately be called the “amber lights” approach to raising productivity, after a certain Japanese factory which installed a system of lights at

⁵ Complementarities between technical change and certain work reorganizations have been examined both theoretically and empirically (Milgrom and Roberts, 1990; Bresnahan *et al*, 1999; Caroli and Van Reenen (1999).

workstations on a work flow line (Delbridge *et al*, 1992). While green meant there was time to spare and red stopped the line, amber indicated the worker was bordering on full capacity. The lights were the means for the optimal adjustment of workflow, amber being the line managers' preferred colour. Critics suggest that, whatever the ostensive purpose behind TQM or JIT, their effect is to extract greater work effort, through a process of 'management by stress' (Oliver, 1991; Sewell and Wilkinson, 1992; Delbridge *et al*, 1992). Although this perspective sees TQM/JIT as an improvement in monitoring technology, it would be a mistake to pigeonhole the effect as a switch to lower shirking in an efficiency-wage framework. Rather, it is evident from the accounts that the chief effect of the improved monitoring is to permit managers to deliver work more efficiently to workers – reducing or eliminating the gaps between episodes of effective work. Yet, work intensification need not be regarded negatively by workers whose time is being more effectively utilised. An alternative view sees TQM as bearing a mix of efficiency gains and work intensification (Edwards *et al*, 1998), and finds that work intensification is not necessarily disliked by workers if it is accompanied by other changes, such as greater employee involvement, that lend greater job satisfaction (Ichniowski *et al*, 1996; Wilkinson *et al*, 1997).

By way of illustration, Figure 1 shows a highly stylised model of the impact of EBTC. Initially, **OPQ** represents the production function. Workers trade off disutility of effort against the utility of wages and, assuming a competitive labor market, are paid their marginal product. Suppose there are two types of workers, who differ in their distaste for effort. The points **A** and **B** are the respective optimal points for low-effort and high-effort workers. EBTC is illustrated by an improvement in the management of workflows that leads to a new production function **OPQ'**, where the marginal and average product are both raised beyond the point **P**. The consequence is that the high-effort workers move to a new equilibrium at **B'** with higher effort, wages and productivity. In this simplified model the low-effort workers experience no change.

From the above discussion, I deduce a first hypothesis:

⁶ However, electronic control of work flows predates call centres by some two decades (Barker and Downing, 1980).

H1: Since prevalent forms of technical change are effort-biased, work is more likely to have been intensified at workplaces which experienced technical and/or organizational changes than at workplaces where no changes have occurred.

As yet, there is to my knowledge no existing empirical evidence on this hypothesis.

Task Flexibility

The ability of management to induce greater productivity from high effort is further enhanced by the discovery and diffusion of multi-skilling. The discovery has involved an unlearning of the principles of scientific management, coupled with a progressive dismantling of the settlement that accompanied Taylorism, in which trade unions traded acceptance of management's prerogatives in rigidly defined task management in return for rising wages and a measure of job security. It is also likely that the movement towards multi-skilling was enabled by increases in education levels of the work force. Whatever the ultimate source, the development of workers' abilities to perform a range of jobs (sometimes through job rotation or perhaps through training) enables workers to be redeployed as necessary. Workers who can perform repair and maintenance tasks do not need to await the arrival of specialists when their workplace machines go down, and they can perform routine maintenance at slack times. They can also be redirected to other parts of the workplace when demand switches cause bottlenecks elsewhere.

Thus we have a second hypothesis:

H2: Multi-skilling and improved task flexibility has contributed to work intensification.

2.2. Labor Market Flexibility

Declining Union Power

In contrast to the above emphasis on the transformation of the labor process as an important source of effort intensification, it is changes in labor market structures that have hitherto received the widest attention in this respect – primarily, the intensification of product market competition, the declining power of unions, and associated power shifts in principal-agent relationships at work. The main story, in this framework, is that firms have found themselves under increased pressure to reduce costs and/or raise quality and, with the state’s aid in reducing unions’ legal powers, have forwarded that pressure onto their workforces (Burchell et al, 1999). Firms are obliged both to streamline their production processes and to pare their price/cost margins, while shock tactics such as downsizing are deployed to break down traditional effort norms and to reduce payroll costs.⁷ In short, it has become the era of “lean and mean” production.

The pattern of work intensification across the public and private sectors is at least consistent with this story. Over 1992 to 1997 public sector workers in Britain encountered greater work intensification in the 1990s than private sector workers (Table 1). (This pattern is independently confirmed with the establishment data used in this paper, see below). Over the same period the ratio of public to private sector workers’ average pay declined by around six percentage points. Thus, in *relative* terms wages and effort are moving in opposite directions, consistent with the view that the market and institutional pressure on workers was increasing especially hard in the public sector.

The main testable hypothesis to emerge from the “lean and mean” characterisation of modern industry is:

H3: Falling union power contributes to an explanation of the intensification of effort.

The existing evidence on this issue is mixed. Previous studies of effort in a variety of contexts do not show any substantial direct link between union power and worker effort. Nevertheless, there is evidence of an indirect link, in that union power reduces the impact of the external economic environment on effort (Green and McIntosh, 1998), and there is evidence of a link at the level of the national economy, in that economies where union power has decreased are found to have experienced higher rates of effort intensification (Green and McIntosh, 2000).

Monitoring and Job Insecurity

Another part of the intensification story concerns the changes that have occurred in the capacity of employers to monitor conformity with employment contracts. Such changes often constitute additional consequences of the new production and management methods. Thus, the computerisation of workflows, symbolised in the call centre, not only efficiently allocates work tasks, it also monitors their execution and measures work rate with great precision. Similarly, a feature of TQM and JIT is that they raise the “visibility” of work (Sewell and Wilkinson, 1992). Deficiencies in work quality can be more easily traced to individual workstations, with the dual aim of raising efficiency by rooting out poor practices and detecting low effort by individual workers. Improvements in appraisal methods also raise management’s ability to monitor performances over a medium-term horizon.

In an efficiency wage model, improved monitoring technology would be predicted to lead to diminished shirking (i.e. greater effort), reduced supervision, lower wages and lower unemployment, or some combination of these (Bowles, 1985; Shapiro and Stiglitz, 1984). In so far as IT is an integral part of improvements in monitoring technology, this argument is further support for *HI*.

Similar predictions arise in efficiency wage models from an exogenous increase in the cost of job loss, brought on by a declining benefit/wage replacement

⁷ Studies of downsizing are consistent in assuming that it raises the workload for remaining workers; but they suggest a mixed impact on financial performance, which may be constrained by low morale and impaired efficiency (e.g. Mishra *et al*, 1998; deVries and Balazs, 1997).

ratio. Many countries, Britain included, have experienced declining replacement ratios over the last two decades. In addition there is evidence that the wage loss on returning to work is substantial in both Britain and the United States and has been increasing in Britain (Nickell *et al*, 1999; Jacobsen *et al*, 1993). The supply of effort would be predicted to have increased as a result.

However, even if effort is fully observed, the effect of market uncertainty can be to generate job insecurity. If workers perceive a finite risk of job loss they might devote above-the-norm effort levels, either to help support their employers' business or to move themselves towards the back of the redundancy queue. Workers with temporary job contracts, which by their nature are especially insecure, might devote extra effort if their wish is to be re-employed in subsequent periods. Even though the opposite reaction is also plausible (that insecurity creates demoralisation and hence less commitment), a positive link between insecurity and work effort is frequently asserted in popular, informal, explanations of work intensification (e.g. London Hazards Centre, 1994). I thus frame the further hypothesis:

H4: Increasing job insecurity has contributed to the intensification of work effort.

Existing evidence does not, however provide much support for this hypothesis, because it is by no means clear that insecurity has increased. The aggregate unemployment rate fell by the late 1990s to barely more than half what it was in the mid 1980s, and there has been no major change since 1986 in workers' expectations of job loss (Green, Felstead and Burchell, 2000). For the last two decades there has only been a small fall in average job tenure, mainly for men (Gregg and Wadsworth, 1995).

However, one component of insecurity – the temporary work contract – has increased somewhat in Britain. Whereas in 1992 only 5.0 percent were on temporary contracts, by 1999 this had risen to 6.2 percent. If temporary contracts, the epitome of labor market flexibility, are linked to greater work effort, their rise could be contributing in a small way to work intensification. Similarly, other forms of non-standard work might be thought of as less secure than traditional full-time jobs, and contributing to work intensification.

2.3 High Commitment Policies

Human Resource Management and Work Effort

The gradual growth of human resource management practices may also be having direct and complementary effects on work intensity. Recent decades have seen the development of techniques aimed at engendering greater identification of employees with company objectives. The new techniques include human resource methods such as empowerment, mentoring and employee involvement through consultation meetings and other means of intra-firm communication, as well as paternalistic fringe benefits and training geared to engender commitment (Green, 2000). It is either explicit or implicit in these policies that increased commitment is manifested in increased levels of work effort. Thus, a fifth hypothesis can simply be stated as:

H5: Work intensification is also partly associated with the spread of new HRM techniques designed to engender greater worker involvement.

Effort Incentives

In addition to the enhanced ability to measure effort for monitoring purposes, firms that deploy TQM and computerised control methods may also benefit by being better able to link effort with pay and retention. By offering appropriate rewards (for example, through Performance Related Pay or effort-related promotion or bonus schemes) employers can expect employees to select themselves according to their willingness to supply higher effort levels. Improved measurability thus permits hitherto infeasible contracts for greater effort in return for more pay.^{8,9} This argument provides further support for *H1*. An additional attraction of this argument is that it

⁸ Ironically, this sequence in which high effort workers are identified and idealised through the prize of high pay is reminiscent of the early days of introducing Taylorism.

⁹ Incomplete effort contracts can also lead to “overworking”, as distinct from a trend towards higher effort (Rebitzer and Taylor, 1995).

also predicts both an intensification of effort and a rise in wages, since selecting out some low effort/low wage workers will raise both averages.

Thus my final hypothesis for testing is:

H6: Increased use of effort incentives has contributed to work intensification.

Research evidence about the efficacy of high commitment policies is mixed and ongoing (for an overview, see Wood, 1999). For the most part, the evidence concerns impacts on productivity, costs or profit, rather than work effort. It is likely that the effects are contingent on HRM fitting with the organization. Often, attempts to involve workers more come at a time of substantial changes in work organization and are met with cynicism (Heyes, 1996). Nevertheless, commitment to firms is widely manifest in Britain (Gallie *et al*, 1998). Green and McIntosh (1998) give evidence that some types of HRM policy, particularly incentive pay and upward communication channels in the form of employee opinion surveys and active use of suggestion schemes, are associated with high effort levels, while downward communication channels had no association with effort.

The above six hypotheses are, of course, not independent. Thus it is likely that developments in ICT and in work organization (H1) have, by changing the monitoring technology, raised the ability to measure workplace performance and hence to deploy effort incentives (H6). And the decline in union power may, in addition to its direct effect (H3), have had an indirect effect through permitting the introduction of effort-biased technical and organizational change (H1). Part of the organizational change may involve the expansion of multi-skilling of workers (H2), something which may have been restricted by previous union enforcement of job demarcation.

3. Data and Specification

The Survey

To test these six hypotheses, I use data drawn from the cross-section component of the 1998 Workplace Employee Relations Survey (WERS98)¹⁰. This survey is the latest in a series of high quality representative industrial relations surveys in Britain that have been used extensively in previous research. Earlier surveys took place in 1980, 1984, and 1990.

The cross-section component of WERS98 consisted of three elements: face-to-face interviews with the senior manager with responsibility for employee relations and personnel matters; face-to-face interviews with a worker representative (where present); and a self-completion questionnaire from a sample of employees in each establishment. Here I utilise just the first two elements. The survey was drawn as a random sample of establishments in Britain with at least 10 workers. In total, 2,191 management interviews were successfully carried out, and this gave a response rate of 80%; the worker representative sample was 947 with a response rate of 82%. These response rates represent a comparatively high quality data sample. Full details are given in Cully et al (1999) and at <http://www.niesr.ac.uk/niesr/wers98/>.

Specification

To investigate the sources of effort change, I estimate equations in the form:

$$\Delta E = \alpha \Delta TC + \beta \Delta TFLEX + \gamma \Delta LMF + \delta \Delta HCP + u \quad (1)$$

where ΔE is effort change (if positive, work intensification). ΔTC is a vector representing changes in production technology, including changes in technology and changes in work organization. $\Delta TFLEX$ is the change in task flexibility. ΔLMF is the change in labor market flexibility, including both the use of various ‘non-standard’ workers (H4), and indicators of the decline in union power (H3). ΔHCP is the change in the use of high-commitment-inducing policies, including both human resource policies designed to raise worker involvement (H5) and increased use of effort incentives (H6). Finally, u is a random error term.

¹⁰ See Department of Trade and Industry (1999).

This formulation is preferable to estimating an effort-levels equation since, in a cross-section, it is typically hard to be confident that there are no important omitted RHS variables. By estimating in first differences one can eliminate the fixed effects associated with the perceived effort level in each establishment, and thereby avoid bias in the estimates arising from this unobserved establishment-level heterogeneity. Nevertheless, the possibility remains that unobserved variables are correlated with both effort change and one or more of the explanatory variables.

Measurement of Effort Change and Other Variable Definitions

Effort change is measured in WERS98 by a direct question to management respondents: “has there been any change in this workplace compared with five years ago in how hard people work here?”, to which a 5-point scale of responses was permitted (gone up a lot/ gone up a little/ stayed the same/ gone down a little/ gone down a lot). Usable responses were obtained for 1934 establishments. Accordingly, equation (1) is estimated with this variable, using a conventional ordered probit specification, which assumes that the error term u is normally distributed.

An identical question was independently asked of the workplace representatives. However, in many establishments there were no workplace representatives interviewed, and a porportion of the representatives did not answer the question. Because usable responses were obtained in only 821 cases, I prefer to use managers’ responses as the dependent variable in the estimations. Both sets of responses are summarised in Table 1a. In each case there is a very substantial balance of respondents reporting an increase in work effort. Perhaps unsurprisingly, workers’ representatives report the stronger balance in favour of work intensification with 61 percent saying work effort had gone up a lot and only 5 percent reporting a decrease in effort. Amongst managers, 40 percent reported that work effort had gone up a lot, while another 37 percent reported that it had gone up a little. The summary of managers’ responses was not substantively changed when the sample was restricted to the establishments with a worker representative present.

As with other data sets (Green and McIntosh, 2000), effort intensification in Britain is reported at higher levels in the public sector than in the private sector, by both sets of representatives. The fact that both in terms of the overall balance, and in

terms of sectors, there is a congruence with independent estimates provides a first check on the reliability of the management effort change data.

To obtain other checks I examine the internal consistency of the WERS98 data, as follows. That there is a difference between managers' and worker representatives' perceptions is unsurprising, given their contrasting viewpoints. Nevertheless, confidence in the reliability of the managers' responses is likely to be the greater if their ranking of establishments is positively correlated with worker representatives' ranking, in those cases where both variables are present. In fact the Spearman rank correlation coefficient between the two variables is positive and significant at 0.101 ($p=0.00$). As a further check on the validity of the data, one would expect that estimates of labor productivity change would be positively correlated with estimates of work effort change. Managers were asked (at a different point in the interview) to judge the extent to which labor productivity at the establishment had changed, and replied against the same 5-point scale as used for the effort scale. The Spearman rank correlation coefficient between the managers' perceptions of effort change and of productivity change is 0.405 ($p=0.00$).¹¹ With the usual caveats, therefore, about subjective data, I assume that the managements' reports of effort change contain positive, if noisy, information about the true extent of effort change.

All of the RHS change variables are measured from questions that ask respondents to report on change over the previous five years. As with effort change, they are, therefore, liable to potential recall error, which could create unknown biases in the estimates.

For *ATC* I capture changes in technology or in work organization via 0/1 dummy variables derived from three questions with a common stem as follows: "Over the past five years, has management introduced: 'new technology', 'changes in work organization', 'changes in work techniques or procedures'. For consistency with my theoretical argument, these questions are not perfect because they do not specify the form of new technology, and in particular do not specify whether ICT is somehow involved. Nevertheless, answers to similar questions in WIRS90 confirm that for roughly two-thirds of non-manual employees and for virtually all non-manual

¹¹ The managers' estimate of productivity change is also positively correlated with the workers' perception of effort change, with a Spearman correlation coefficient of 0.125 ($p=0.00$).

employees the new technology included the introduction of microelectronics technology.

I capture $\Delta TFLEX$ directly from the question “Has there been any change in this workplace compared with five years ago in your flexibility to move employees from one task to another?”. Respondents could again answer whether their flexibility had changed against a five-point scale, and I coded establishments as 1 if the reply was either “gone up a lot” or “gone up a little”, 0 otherwise. Descriptive statistics for all RHS variables are shown in Table 1b. It is seen that each of the elements of ΔTC and $\Delta TFLEX$ are present in a majority of establishments.

I capture labor market flexibility by a series of questions about the deployment of labor and the power of unions. Respondents were asked: “compared with five years ago, has the use of workers on fixed term contracts gone up, gone down, or remained about the same?” Identical questions were asked also about temporary agency employees, contractors and part-time employees. I coded 4 dummy variables equal to 1 each for increases in the use of each category, zero otherwise. As Table 1b shows, each element of increasing labor flexibility had been experienced in a substantial minority of establishments, more frequently in the public sector.

To capture the extent of decline over 5 years in the power of unions I used two questions. The first gets at union derecognition. Respondents were asked if the numbers of unions recognised at the establishment had fallen, and if so why. Where union de-recognition was given I took this as an indication of substantively reduced union power. The second question picked up changes in the importance of union bargaining: “has the importance of collective bargaining in determining pay (for the largest occupational group in the establishment) increased, stayed the same, or decreased, compared with five years ago?”. Although this question referred to pay rather than effort, it is likely that this question also gave information about the unions’ role in effort bargaining, and accordingly coded a dummy equal to 1 if the importance had decreased, 0 otherwise. Neither of these elements of declining union power were widespread (Table 1b). This might seem surprising but it should be remembered that British unions’ power had already been very substantially eroded by 1993.

Increased use of high commitment policies is measured using two questions. Managers were asked “Over the past five years, has management introduced

initiatives to involve employees?”, with just a Yes/No response scale. They were also asked: “Has there been any change in this workplace compared with five years ago in the proportion of pay for non-managerial employees which is related to measures of performance?”, with a 5-point response scale. I coded a dummy variable equal to 1 if the response was “gone up a lot” or “gone up a little”, 0 otherwise. As Table 1b shows, an employee involvement policy had been introduced in about a half of establishments, effort incentives in just under a third. But whereas employee involvement policies were most prominent in the public sector, effort incentives were predominantly a private-sector phenomenon.

4. Results

a) Main Findings

All the main findings are shown in Table 2. Column (1) presents estimates for the whole sample, including a full set of industry dummy variables.¹² Because employee relations and other factors linked to work intensification might be expected to have different effects across the public and private sectors, columns (2) through (7) show estimations separately for each of these sectors. A further rationale for this separate treatment was the substantively different wage and effort changes over the 1990s.¹³

The first three rows show that, regardless of sector, changes in technology and in work organization have significant effects on work effort. Strongly confirming H1, it appears that the introduction of new technology or of new forms of work organization, or of new techniques and procedures, are each associated with work intensification. Columns (3) and (6) also show a strong link between increases in task flexibility and work intensification, as hypothesised in H2. However, the introduction of the task flexibility measure reduces the magnitude and significance levels of the coefficients on the other change variables. This reduction reflects a high degree of

¹² While some industry dummies are significant their inclusion or exclusion does not affect the pattern of results.

¹³ A likelihood ratio test, with $\chi^2=20.3$, confirmed that it would be incorrect to force the coefficients to be the same across sectors; hence columns 2 through 7 are preferable from the statistical angle to column 1.

correlation between task flexibility and the other change variables, so that there is considerable multicollinearity in the estimates.¹⁴

Turning to labor market flexibility, I find that increased use of temporary agency employees, contractors or part-time employees are each associated with work intensification but the impact is only significant in the private sector (columns (2) to (4)). The increased use of fixed term workers is not correlated with intensification in either sector. These findings thus provide weak support for a link between insecurity and hard work (H4). The support is weak in part because, within the private sector, only about 1 per cent of workers are on temporary contracts.¹⁵ It is also weak because, while contractors might be expected to feel insecure, there is no necessary connection between part-time working and insecurity in either sector. Nevertheless there does appear to be an association between the decision to deploy more non-standard workers and the intensification of work. The link acquires importance because of the importance of part-time workers, who comprise nationwide about one in four workers in the private sector, and because nearly one in three managers in the WERS98 sample report increased usage of part-time workers (see Table 1b).

The decline in union power has the expected association with work intensification (H3), but the impact is sector-specific. In the public sector, both union derecognition and a decline in the importance of collective pay bargaining carry significant positive coefficients, but neither are significant in the private sector. Since unionisation is much stronger in Britain's public sector, this difference is perhaps unsurprising.

The introduction of high commitment policies has the predicted effects, consistent with hypotheses H5 and H6, as shown in column (1). However, the two types of policy – worker involvement policies and use of effort incentives – are each effective in different sectors. Relating pay to performance is only significantly effective for raising effort in the private sector. One possible explanation is that performance in industries with non-marketed outputs is harder to evaluate and hence effort incentives are less effective than in the marketed sector. Another possibility is

¹⁴ The Spearman correlation coefficient between increases in task flexibility and the introduction of new work organization is 0.26.

¹⁵ In fact the public sector is the main user of temporary workers in Britain. Private sector employers have comparatively few restrictions to obtaining flexibility from standard workers.

that public sector employers normally work to fixed budgets that are not changed by exceptional performance, and hence variable pay based on effort is less easy to put into practice. Either argument is consistent with the observation that effort incentives rose much less in the public sector than in the private sector. By contrast, employee involvement policies are both more prevalent, and more effective at raising effort, in the public sector. The rationale for this difference could be the flip side of the previous argument in relation to pay incentives. Thus, employers wishing to induce high commitment have to use non-price mechanisms where financial incentives cannot so easily be used. A further possibility is that it may be easier to get employees to identify with the public sector product (for example a health service). These arguments, however, are no more than plausible conjectures, and are not verified in this paper.

Finally, as column (1) shows, work intensification is strongest in the public sector, consistent with the raw data results shown in Table 1a and with other studies. I also included as a control whether a private-sector establishment had been in the public sector five years previously. As expected a privatised establishment had substantially higher levels of work intensification. Note, however, that less than a half per cent of establishments fell into this category.

Various alterations to the specifications used in Table 2 were tried. First, other changes of ownership (such as result from merger or take-over) could have been a possible source of intensification, if the new owners were to press for higher effort levels. However, there was no evidence for any such effect in the data. Second, I investigated whether there was any complementarity between the deployment of human resource techniques and changes in technology and work organization. It might be argued that EBTC would have a greater impact on effort and on productivity if management were successful in inducing employees to devote higher work effort. Accordingly, I interacted the high commitment variables with the new technology and new work organization variables. But the interaction effects were small and insignificant. Third, I included a dummy variable indicating whether there had been job reductions in the previous 12 months. Job reductions might be thought of as one route towards job intensification. As expected, this variable carried a positive and significant coefficient in the case of the whole sample (though it was not significant in

the private sector sample), thus showing a positive association between intensification and downsizing. However, this variable is not included in the table of main findings, since it is arguably inappropriate to include on the RHS a variable which could be seen as a proxy for the intensification measure on the right side. A second reason for not including downsizing is that the measure applies to a shorter period than does the intensification measure. Nevertheless, it is reassuring that all the main findings are robust to these possible alterations to the specification, in that the other coefficients are not sensitive to the inclusion of ownership variables, interaction terms or the downsizing variable.

b) Within-Sample Predictions

Although the above analysis has shown that each hypothesis can be confirmed to some extent by the evidence, we are also interested in the relative importance of each change. For example, new technology has been shown to be a significant determinant of effort intensification. It is also prevalent in three-quarters of establishments, and so is likely to be an important part of the change in average work intensity. By contrast, although where it happens union derecognition has a large effect, it is rare.

Table 3 quantifies the importance of the various hypotheses in explaining overall intensification, by using within-sample predictions, as follows. Row (1) gives the average predicted probability across the sample of falling into the category of effort having “gone up a lot”. The second row gives the same predicted probability, on the assumption that there were no introductions of new technology, or changes in work organization or changes in work techniques or procedures. For this purpose, the other variables were left unaltered. As can be seen there would be less work intensification in both sectors. The predicted probabilities would fall from 38 percent to 25 percent in the private sector, and from 52 percent to 30 percent in the public sector.

Subsequent rows carry out the same exercise for the other sets of factors affecting intensification. Thus, the increased use of non-standard workers had some effect in the private sector but none in the public sector (row (3)). The decline in union power made no difference in the private sector and, even though the variables

were significant, only a small difference in the public sector (row (4)). Thus, this evidence suggests that, at the establishment level, there is much more to the intensification of effort than the decline of union power.

Row (5) shows a moderate effect in both sectors from high commitment policies. If establishments had, hypothetically, neither increased their use of performance-related pay nor introduced employee involvement policies, the predicted probability of effort having “gone up a lot” would fall from 38 percent to 32 percent in the private sector, and from 52 percent to 47 percent in the public sector.

Row (6) shows, as expected, only a minute impact from privatisation. Finally, row (7) shows for good measure the impact of all these factors on intensification by supposing that none of them took place: it suggests that only 15 percent of private sector establishments and 22 percent of public sector establishments would register that hard work had gone up a lot.

The overall conclusion from this exercise is that, while all hypothetical sets of factors contribute to the intensification of work, changes in technology and in work organization (including changes in techniques or procedures) are the most important observable factors that can be identified.

c) Respondents' Views

It is informative to compare the statistical findings reported above with the opinions of the survey respondents about some of the same issues. In particular it is possible to examine respondents' own views about the impact of workplace changes. Where managers and worker representatives had named more than one form of change in the previous five years, they were asked to state which had had “the greatest impact on employees” working at that workplace. Table 4 summarises their responses.

It can be seen that, for both types of respondent, the introduction of new technology in their workplace is seen as the main source of change in the greatest proportion of cases. Changes in work organization, and in work techniques and procedures, are ranked second and third respectively. These views are consistent with the findings from the statistical analysis in Tables 2 and 3.

d) The robustness of the findings could also be examined using the alternative measure of effort change for the dependent variable, that which is reported by workplace representatives. This measure is available in a minority of establishments. For independent variables I also substituted the worker representatives' reports of changes in production for the managers' reports. As noted above, the worker representatives' and the managers' perceptions of the dependent variable are positively correlated, though the correlation is not very high. The result of this exercise (for brevity not shown, but available on request) confirms strongly the impact of the introduction of new work organization, the impact of increases in performance related pay on work intensification, and the greater intensification experienced in the public sector. There is, however, no statistically significant link between worker representatives' perceptions of new technology introduction and their perceptions of work intensification.

5. Discussion

If it is accepted that this has been an era of work intensification, it is surely not the first such time in history. The introduction of scientific management in the time following Taylor, for example, is noted for a similar trend (Braverman, 1974). However, in view of the evidence of deskilling associated with the decline of 19th century craft traditions, it is likely that explanations for work intensification relevant for that time will differ from those relevant to the current period.¹⁶

In this paper, I have put forward the view that an important modern trend is effort-biased technical change. I incorporate in that phrase both the introduction of new technology – and it is likely that information and communications technology is a major factor here – and changes in work organization and in work processes. The essential idea is that these changes generate larger productivity increases for those workers who are able and willing to provide high levels of work effort. A congruent development is that technology and expanding modern human resource policies are permitting effort to be linked more effectively with pay, and hence driving an expansion of the use of incentive pay, with consequent effects on effort.

¹⁶ Going further back, the need to accustom people to the discipline of factory labor was a key task for capitalists in the initial stages of the industrial revolution.

Several complementary explanations have been confirmed, on the basis of a high quality British establishment-based data set, the WERS98. First, effort is indeed intensified more in workplaces that introduce new technology, new forms of work organization, and new techniques or procedures. In most cases, new forms of work organization encompass increases in task flexibility, which itself contributes to work intensification. The impact of these factors is non-trivial, in that within-sample predictions of what would hypothetically happen, if such changes did not occur, imply that work intensification would have been at a substantially lower level. The findings suggest that, if changing technology and work organization continue to be biased in favour of high-effort workers, rising work pressure (with attendant welfare implications) will continue to be an issue for some time in many sectors of the economy. A second explanation to receive confirmation is that the increased use of high-commitment policies has had a substantive impact on effort. There has been an increasing use of effort-related financial incentives and these appear to be effective. Also, policies to increase worker involvement with their organizations appear to have been successful (on average) in engendering greater effort.

Third, the decline of union power is found to raise effort within this sample, consistent with findings comparing countries across the European Union (Green and McIntosh, 2000), but the magnitude of the effect is not great for the period under investigation here (1993 to 1998). Fourth, there is also some impact from increased usage of “non-standard” workers, particularly part-timers. However, one cannot interpret this effect as evidence of an insecurity effect. Finally, the ongoing relative fall in public sector employment is consistent with both the relatively high levels of work intensification coupled with falls in relative public sector pay.

Other factors may also be involved which have not been empirically evaluated here. It is possible that exogenous shifts on the supply side might have prompted an intensification of work effort. If jobs have become more fulfilling, and less arduous, workers’ aversion to high effort jobs is reduced, and so they choose higher pay and higher effort jobs than before.¹⁷ In a competitive labor market, firms would respond by offering jobs that require more effort because, at least in the short run, the relative

¹⁷ This result follows formally from a standard effort model such as Barzel (1973), except effort here is work intensity rather than the length of the working day.

cost of high effort workers is reduced by the excess supply.¹⁸ Some weak, circumstantial, support for such an explanation is available. For example, the increase of non-manual jobs, traditionally thought to embody better working conditions, might be a factor. Gallie *et al* (1998) report an increase in “employment commitment”, loosely interpreted as a preference for work. Many of those who work extremely long hours report that they are addicted to their jobs. Nevertheless, evidence against such a supply-shock explanation is that there are no indications of a general increase in job satisfaction, which in view of simultaneously increasing real wages might be predicted by such a shift.¹⁹

An alternative supply-side explanation for work intensification derives from an economy-wide perspective, in which consumerism, as driven by the imperatives of large corporations, creates an increasing need for consumer goods and services. The craving for more, fuelled by relative income effects, and by the advertising and marketing apparatus, is translated into a need for more wages. This argument, made in respect of work intensity, is similar to Juliet Schor’s argument in respect of work hours. Schor (1991) explains the long-term increase in average work hours of Americans, who, she argues, are caught on a “work and spend” treadmill. Workers choose to supply more hours, but their choice is not exogenous. It is constrained and shifted by the increasing wants of the materialist society.

Assessment of such an explanation is not easy, whether in respect of work hours or of work intensity. Whether workers work more to get more income and therefore are able to spend more is hard to distinguish empirically from the opposite chain of causation suggested by Schor, where the pressure to raise spending drives the requirement for more wages. A more complex story is also available in which workers gain rises in income and thence spend more, but after each income rise get locked into the higher spending levels by their changed habits or their long-term debts; in this story, effort levels are ratcheted up along with the materialist wants. There is ample support for the relative income theory in the savings literature.

¹⁸ A related possibility is that employers have discovered a way to make work appear more attractive through the redesign of jobs and good human resource practice – such is the view of Ichniowski *et al* (1996). But such an explanation places the source of the shock on the demand side, along with the EBTC explanation.

¹⁹ The proportions of British workers reporting that they are very satisfied or completely satisfied with their job was 39.6 percent in 1989 and 35.5 percent in 1997 (source: International Social Survey Programme, author’s calculations).

However, there is no obvious reason why consumerism should have taken a greater hold of British workers in recent decades than in earlier times. No such tendency is revealed in consumers' spending decisions – for example, the average propensity to save was approximately 10 percent in both 1979 and 1997. Thus, though “work and spend” could explain recent work intensification, it remains an *ad hoc* explanation without an additional tale that could rationalise the timing. In this respect, the demand-side explanations discussed above are superior.

A more general empirical assessment of the importance of supply shifts relative to demand shifts might be gleaned from knowledge about the returns to high effort. However, compounding the difficulty for researchers arising from the comparative scarcity of data on effort, much of the return to current effort will be in the form of future pay rises, and promotions, or beneficial job transitions. Such future returns cannot be properly estimated from individual earnings functions linked to contemporary effort; hence any assessment awaits new data that can allow an investigation of the link, if there is one, between wages and past effort. Nevertheless, recent assessments in respect of the effect of long work hours are informative. There is longitudinal evidence from the British Household Panel Study that working more overtime hours raises the probability of being promoted (Booth and Francesconi, 1997). Bell and Freeman (2000) show that long-hours working is a significant determinant of pay several years later, in both the United States and Germany. These findings suggest that a promising avenue for future research could be to explore the life-cycle determinants of work intensification. This approach would see work intensification as a consequence of and contributing to an increasingly unequal pay distribution.

References

- ACTU (1998). *A Report on the 1997 ACTU National Survey on Stress at Work*. ACTU Occupational Health and Safety Unit.
- Andrews, M. and R. Simmons (1995). "Are Effort Bargaining Models Consistent with the Facts? An Assessment of the Early 1980s." *Economica* 62(August): 313-334.
- Ashton, D., B. Davies, A. Felstead and F. Green (1999). *Work Skills In Britain*. Oxford, Centre for Skills, Knowledge and Organizational Performance, Oxford and Warwick Universities.
- Barker, J. and H. Downing (1980) "Word processing and the transformation of the patriarchal relations of control in the office", *Capital and Class*, 10, 64-99.
- Barzel, Y. (1973) "The determination of daily hours and wages". *Quarterly Journal of Economics*, 88, 220-238.
- Batstone, E. and S. Gourlay (1986). *Unions, Unemployment and Innovation*. Oxford, Blackwell.
- Bell, L. and R. Freeman (2000). *Working Hard and Working Easy: Hours Worked and Earnings Dispersion in the U.S. and Germany*. Joint Annual Conference of the European Association of Labor Economists and the Society of Labor Economists, Milan.
- Bielby, D.D. and W.T. Bielby (1988). "She Works Hard for the Money: Household Responsibilities and the Allocation of Work Effort", *American Journal of Sociology*, 93 (5): 1031-59.
- Booth, A. and M. Francesconi (1997). "Career Mobility in Britain", Discussion Paper 97/16, Institute for Labor Research, University of Essex.
- Bowles, S. (1985). "The production process in a competitive economy - Walrasian, Neo-Hobbesian, and Marxian models." *American Economic Review*, 75(1): 16-36.
- Bresnahan, T.F., E. Brynjolfsson, *et al.* (1999). *Information Technology, Workplace Organization and the Demand for Skilled Labor: Firm-Level Evidence*, National Bureau of Economic Research, Working Paper 7136.
- Burchell, B.J., D. Day, M. Hudson, D. Ladipo, R. Mankelow, J. Nolan, H. Reed, I. Wichert and F. Wilkinson (1999). *Job Insecurity and work intensification; flexibility and the changing boundaries of work*. Joseph Rowntree Foundation report.
- Cappelli, P., L. Bassi, H. Katz, D. Knoke, P. Osterman and M. Useem (1997). *Change at Work*. Oxford & New York, Oxford University Press.
- Cully, M., S. Woodland, A. O'Reilly and G. Dix (1999). *Britain At Work*. London, Routledge.

- Caroli, E. and J. Van Reenen (1999). "Skills and Organizational Change: Evidence from British and French establishments in the 1980s and 1990s", Institute for Fiscal Studies, Working Paper W99/33.
- Delbridge, R., P. Turnbull and B. Wilkinson (1992). "Pushing back the frontiers: Management control and work intensification under JIT/TQM factory regimes." *New Technology, Work and Employment* 7 (2): 97-106.
- Department of Trade and Industry (1999). *Workplace Employee Relations Survey: Cross Section, 1998* [computer file]. 4th ed. Colchester: The Data Archive [distributor], 22 December 1999. SN: 3955.
- deVries, M. F. R. K. and K. Balazs (1997). "The downside of downsizing." *Human Relations* 50(1): 11-50.
- Edwards, P. K. and C. Whitston (1991). "Workers are working harder - effort and shop-floor relations in the 1980s." *British Journal of Industrial Relations* 29(4): 593-601.
- Edwards, P., M. Collinson and C. Rees (1998). "The determinants of employee responses to total quality management: Six case studies." *Organization Studies* 19(3): 449-475.
- Elger, T. (1990). "Technical innovation and work reorganization in British manufacturing in the 1980s: continuity, intensification or transformation?" *Work, Employment and Society* 4 (Special Issue, May): 67-102.
- European Foundation for the Improvement of Living and Working Conditions (1997). *Working Conditions in the European Union*. Luxembourg, Office for Official Publications of the European Communities.
- Evans, S., K. Ewing and P. Nolan (1992). "Industrial-Relations and the British Economy in the 1990s-Thatcher Legacy." *Journal of Management Studies* 29 (5): 571-589.
- Gallie, D., M. White, Y. Cheng and M. Tomlinson (1998). *Restructuring The Employment Relationship*. Oxford, Clarendon Press.
- George, D. (1997). "Working longer hours: Pressure from the boss or pressure from the marketers?" *Review of Social Economy* 55(1): 33-65.
- Green, F. (2001). "It's Been A Hard Day's Night: The Concentration And Intensification Of Work In Late 20th Century Britain", *British Journal of Industrial Relations*, March, forthcoming.
- Green, F. (2000). "The impact of company human resource policies on social skills: implications for training sponsorship, quit rates and efficiency wages." *Scottish Journal of Political Economy*, 47 (3): 251-272.
- Green, F. and S. McIntosh (1998). "Union Power, Cost of Job Loss, and Workers' Effort." *Industrial & Labor Relations Review* 51(3): 363-383.
- Green, F. and S. McIntosh (2000). "Working on a Chain Gang? The Intensification of Work in Europe", Discussion Paper, Centre for Economic Performance, London School of Economics.

- Green, F. Felstead, A. and Burchell, B. (2000). "Job Insecurity And The Difficulty Of Regaining Employment: An Empirical Study Of Unemployment Expectations", *Oxford Bulletin of Economics and Statistics*, 62, Special Issue: 857-885.
- Gregg, P. and J. Wadsworth (1995). "A Short History of Labor Turnover, Job Tenure, and Job Security, 1975-93." *Oxford Review of Economic Policy* 11 (1): 73-90.
- Gregg, P. and J. Wadsworth (1996), "It Takes Two: Employment Polarisation in the OECD", London School of Economics, Centre for Economic Performance, Discussion Paper 304.
- Heyes, J. (1996). "A Formula for Success? Training, Reward and Commitment in a Chemicals Plant." *British Journal of Industrial Relations* (September): 351-370.
- Ichniowski, C., T. A. Kochan, D. Levine, C. Olson and G. Strauss (1996). "What Works At Work: Overview and Assessment." *Industrial Relations* 35(3): 299-333.
- IRS (1996). "Working harder, working longer: managers' attitudes to work revisited", *IRS Employment Review*, 600, January.
- Jacobsen, L., R. Lalonde and D. Sullivan (1993). "Earnings Losses of Displaced Workers." *American Economic Review* (September): 685-709.
- London Hazards Centre (1994) *Hard Labor*, London: London Hazards Centre Trust Ltd.
- Macduffie, J.P. (1995). "Human resource bundles and manufacturing performance: organizational logic and flexible production systems in the world auto industry." *Industrial and Labor Relations Review* 48 (2): 197-221.
- Machin, S. and J. Van Reenen (1998). "Technology and Changes in Skill Structure: Evidence From Seven OECD Countries." *Quarterly Journal of Economics* 113 (4): 1215-1244.
- Mcintosh, S. (1997) "The Determinants of Workers' Effort: Theory and Evidence" PhD Thesis, London School of Economics.
- Milgrom, P. and J. Roberts (1990). "The economics of modern manufacturing: technology, strategy and organization." *American Economic Review* 80 (6): 511-528.
- Nickell, S., T. Jones and G. Quintini (1999). "A Picture of the Job Insecurity Facing British Men", London School of Economics, Centre for Economic Performance, mimeo.
- O'Mahony, M. (1994). "Can Britain Bridge The Productivity Gap?" *Long Range Planning* 27(2): 85-94.
- Oliver, N. (1991). "The dynamics of just-in-time." *New Technology, Work and Employment* 6(1): 19-42.
- Rebitzer, J.B. and L.J. Taylor (1995). "Do labor-markets provide enough short-hour jobs - an analysis of work hours and work incentives." *Economic Inquiry* 33(2): 257-273.
- Roach, S.S. (1996). "The hollow ring of the productivity revival". *Harvard Business Review* 74 (6): 81-86.

- Schor, J. (1991). *The Overworked American*, Basic Books.
- Sewell, G. and B. Wilkinson (1992). "Someone to watch over me: Surveillance, discipline and the just-in-time labor process." *Sociology* 26: 271-289.
- Shapiro, C. and J.E. Stiglitz (1984). "Equilibrium unemployment as a worker discipline device." *American Economic Review* 74(3): 433-444.
- Sherwen, P. "Working to live or living to work", *The Guardian*, 11 September, 1999.
- Tomaney, J. (1990) "The reality of workplace flexibility", *Capital and Class*, 40(Spring): 29-60.
- Waterson, P., C.W. Clegg, R. Bolden, K. Pepper, P.B. Warr and T.D. Wall (1999). "The use and effectiveness of modern manufacturing processes: A survey of UK industry." *International Journal of Production Research* 37: 2271-2292.
- Wazir, B. (1999) "Life at the end of the line" in *The Observer*, 21/11/1999.
- Wilkinson, A., G. Godfrey and M. Marchington (1997). "Bouquets, brickbats and blinkers: total quality management and employee involvement in practice." *Organization Studies* 18(5): 799-820.
- Wood, S. (1999). "Human resource management and performance." *International Journal of Management Reviews* 1 (4): 367-413.

Table 1 Descriptive Statistics for 1998: Work Intensification and Other Changes Over Previous Five Years.

a) Dependent Variable: Change Over Previous Five Years In How Hard People Work

	According to Managers (% of establishments)			According to Workplace Representatives (% of establishments)		
	All	Private	Public	All	Private	Public
Gone up a lot	39.7	36.3	49.0	60.9	50.8	66.6
Gone up a little	37.4	37.4	37.2	19.9	34.7	11.5
Stayed the same	21.0	23.7	13.4	14.0	10.3	16.2
Gone down a little	1.6	2.1	0.4	4.1	1.9	5.4
Gone down a lot	0.4	0.5	0	1.0	2.3	0.3

b) Independent Variables: Changes Within Previous Five Years

	All (% of establishments)	Private Sector (% of establishments)	Public Sector (% of establishments)
<u>Changes in Production Technology & Flexibility</u>			
New technology	75.7	72.9	83.6
New work organization	64.4	60.4	75.4
New techniques or procedures	66.2	64.3	71.7
Increase in task flexibility of workers	57.1	58.4	53.5
<u>Labor Market Flexibility</u>			
<u>Increases in use of:</u>			
Fixed-term workers	17.4	12.1	32.3
Temporary workers	12.9	11.6	16.7
Contractors	22.2	21.7	23.8
Part-time workers	33.3	31.9	37.1
<u>Union decline</u>			
Union(s) de-recognised	0.7	0.5	1.4
Reduction in collective bargaining	5.0	4.2	7.2
<u>Commitment</u>			
Introduction of initiatives to involve employees	52.3	47.6	65.6
Increases in proportion of performance related pay for non-managerial workers	31.4	38.3	11.9
<u>Ownership</u>			
Privatised firm	0.4	0.5	n.a.
Public Sector	24.8	0	100

Note: cases are weighted to take account of stratified random sampling using varying sampling proportions, thereby providing unbiased population estimates.

Table 2 Determinants of Work Intensification, 1993-98

	All	Private Sector			Public Sector		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Changes in Production Technology & Flexibility</i>							
New technology	0.22 (0.07)**	0.17 (0.08)**	0.17 (0.08)**	0.18 (0.09)**	0.36 (0.15)**	0.30 (0.15)**	0.39 (0.16)**
New work organization	0.20 (0.07)**	0.18 (0.08)**	0.11 (0.08)	0.18 (0.08)**	0.23 (0.13)*	0.16 (0.13)	0.21 (0.13)*
New techniques or procedures	0.17 (0.07)**	0.14 (0.08)*	0.08 (0.08)	0.15 (0.08)*	0.14 (0.12)	0.11 (0.12)	0.25 (0.12)*
Increase in task flexibility of workers	-	-	0.46 (0.08)**	-	-	0.31 (0.11)**	-
<i>Labor Market Flexibility</i>							
<i>Increases in use of:</i>							
Fixed-term workers	-0.01 (0.07)	0.00 (0.09)	0.02 (0.09)	-0.01 (0.09)	0.04 (0.11)	0.04 (0.11)	0.03 (0.11)
Temporary workers	0.17 (0.07)**	0.23 (0.08)**	0.24 (0.08)**	0.21 (0.09)**	0.08 (0.13)	0.06 (0.13)	0.11 (0.13)
Contractors	0.17 (0.06)**	0.24 (0.08)**	0.22 (0.08)**	0.24 (0.08)**	0.06 (0.11)	0.05 (0.11)	0.01 (0.11)
Part-time workers	0.08 (0.06)	0.15 (0.07)**	0.15 (0.07)**	0.12 (0.07)*	-0.01 (0.10)	-0.04 (0.10)	0.00 (0.11)
<i>Union decline</i>							
Union(s) de-recognised	-0.04 (0.17)	-0.25 (0.17)	-0.30 (0.18)	-0.24 (0.22)	1.08 (0.53)**	1.05 (0.56)*	0.91 (0.59)
Reduction in collective bargaining	0.20 (0.09)**	0.15 (0.10)	0.12 (0.10)	0.14 (0.11)	0.42 (0.19)**	0.42 (0.19)**	0.31 (0.20)
<i>Commitment. Increases in:</i>							
Worker involvement	0.11 (0.06)*	0.11 (0.07)	0.08 (0.07)	0.10 (0.07)	0.19 (0.11)*	0.20 (0.11)*	0.19 (0.11)*
Performance Related Pay	0.21 (0.06)**	0.25 (0.07)**	0.19 (0.07)**	0.21 (0.07)**	0.06 (0.13)	0.04 (0.13)	0.20 (0.13)
<i>Ownership</i>							
Privatised firm	0.71 (0.45)**	0.87 (0.43)**	0.90 (0.41)**	0.76 (0.36)**	n.a.	n.a.	n.a.
Public Sector	0.24 (0.09)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Industry dummies	Yes	No	No	Yes	No	No	Yes
Pseudo R ²	0.057	0.044	0.058	0.058	0.036	0.044	0.070
n	1809	1250	1250	1250	559	558	559

The dependent variable is the manager's estimate in 1998 of the change over previous five years in how hard people work at the establishment. With the exception of the public sector and industry dummies, all independent variables also refer to changes over five years. Estimation is by ordinal probit; robust standard errors are in parentheses.

Table 3 Illustrative Predictions of Work Intensification*

		Private Sector (%)	Public Sector (%)
(1)	Within Sample	37.7	51.9
	<i>Effect of alternative scenarios: †</i>		
(2)	No change in production	24.9	29.8
(3)	No increase in use of non-standard workers	31.2	50.2
(4)	No fall in union power	37.3	49.9
(5)	No increase in commitment policies	31.4	46.8
(6)	Not a privatised firm	37.3	-
(7)	All of the above	14.6	22.0

*Average predictions of the probability that how hard people work has “Gone up a lot”.

† For each scenario, in the cases where the relevant RHS variable(s) equalled one, these variables were recoded to zero, i.e. indicating no change. All other variables were not altered. Then the average prediction was re-calculated.

Table 4 Main Source of Changes on Employees: Respondents' Opinions

<i>Changes in:</i>	According to Managers (% of establishments)	According to Workplace Representatives (% of establishments)
Payment systems	4.5	5.4
New technology	33.5	26.3
Working time arrangements	7.8	17.2
Organization of work	18.6	23.6
Work techniques or procedures	14.2	18.5
Introduction of initiatives to involve employees	11.2	4.1
Introduction of new product or service	10.3	4.8

Note: cases are weighted to take account of stratified random sampling using varying sampling proportions, thereby providing unbiased population estimates.

Figure 1

