

Knowledge Sharing through Face-To-Face Communication and Labour Productivity: Evidence from British Workplaces

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Abstract: We investigate whether the adoption by workplaces of human resources management (HRM) practices that enhance face-to-face communication (FTFC) among employees is associated with productivity gains. The analysis is based on a nationally representative sample of over 500 British trading establishments drawn from the linked 2004 Workplace Employment Relations Survey and Annual Business Inquiry, for which objective measures of labour productivity (value added per employee) are available. We find a positive association between productivity and FTFC in problem-solving groups, teams and meetings of senior or line managers and employees, provided that FTFC is adopted on a continuous basis. Our finding suggests that British workplaces could enhance their productivity by implementing HRM practices in such a way as to intensify knowledge sharing through employees' personal interactions.

Keywords: Human resources management, face-to-face communication, knowledge sharing and labour productivity

JEL Classification: J24, O15

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1. INTRODUCTION

Managing knowledge flows effectively is widely regarded as crucial for organisations that wish to achieve competitive advantage (Dierickx and Cool 1989; Collins and Clark 2003). The existing human resources management (HRM) literature acknowledges that this challenge can be best faced by adopting an HRM paradigm that enhances social networks made up of individuals with strong ties and reciprocal trust (Lepak and Snell 2007). The participation of employees in intra-organisational social networks is an essential requirement for the establishment of an environment conducive to knowledge sharing, which in turn enhances organisational performance. Employees possess in fact valuable knowledge of the production process and the management can elicit such knowledge by directly involving the workforce in the activity of the organisation through the implementation of 'high performance' HRM practices such as self-managed teams or off-line problem-solving groups (Appelbaum *et al.* 2000).

Empirical studies for Britain have explored the process of knowledge sharing within workplaces by focusing on 'direct voice' practices (Bryson *et al.* 2006; Marchington and Wilkinson 2000). These practices include HRM arrangements entailing two-way communication between employers and employees without the mediation of representatives. From a theoretical viewpoint, the impact of direct voice practices on organisational productivity is ambiguous. On the one hand, in the absence of countervailing forces such as those provided by unions, workers may be

discouraged to put forwards productivity-enhancing improvements, as a fair distribution of the fruits of their contribution to organisational performance may not be ensured (Freeman and Medoff 1984). On the other hand, voice through representatives may not be efficient as this can constitute a barrier between managers and employees (Pfeffer 1994; Storey 1992). Direct voice mechanisms may allow managers a better response to workforce's diverse needs and ideas, thus eliciting more cooperation and commitment from workers (Bryson *et al.* 2006). The empirical evidence on the association between direct voice practices and productivity is rare and not clear-cut. Fernie and Metcalf (1995) and Kersley *et al.* (2006) report a positive relationship, while Bryson *et al.* (2006) found no evidence at all. These studies rely on subjective measures of labour productivity.

This paper further explores the empirical association between direct voice practices and organisational performance. Rather than dealing with direct voice in general, we focus on direct voice through face-to-face communication (FTFC), as this means of knowledge sharing bears stronger implications for competitive advantage compared to other two-way communication mechanisms. FTFC arises when individuals physically close to each other engage in a mutual exchange of verbal information. It is widely argued that this type of interaction among employees is likely to result in the sharing of tacit knowledge (Rebernik and Širec 2007; Nonaka and Takeuchi 1995; Koskinen *et al.* 2003; Meherabian 1971). As the latter is deeply embedded in its bearers, who are often unaware of possessing it (Polanyi 1966), physical contact and verbal interaction are crucial requisites for its transfer among individuals. Tacit knowledge is highly idiosyncratic and thus very difficult to imitate (Nonaka 1991; Grant 1993; Spender 1993; Sobol and Lei 1994; Ambrosini and Bowman 2001), which makes it a unique source of competitive advantage. Other two-way communication mechanisms are expected instead to enhance the exchange of knowledge that can be easily codified throughout the organisation (i.e., explicit knowledge). This is the case, for example, of interactive networks based on the intranet or phone system, which are not characterised by employees' physical contact. Likewise, suggestion schemes or formal surveys of employees (which are two-way communication mechanisms only in the presence of feedback from the management) do not entail verbal interaction among individuals. While it is arguable that all social networks based on FTFC actually result in the sharing of tacit knowledge, the personalisation of knowledge flows characterising these networks suggest that this communication mechanism is to be regarded as qualitatively superior to other means of knowledge disclosure.

The above remarks suggest that workplaces that implement HRM practices in such a way as to facilitate FTFC among employees are expected to show a better economic performance compared to workplaces where such arrangements are absent. The main objective of this paper is indeed to investigate whether this expectation is supported by empirical evidence. To this end we use a nationally

representative sample of more than 500 British trading workplaces for which information on HRM practices enhancing FTFC (namely, problem-solving groups, teams, meetings between senior managers and employees, and meetings between line managers and employees) and account-based measures of labour productivity are available. Information on HRM practices comes from the Management Questionnaire of the 2004 Workplace Employment Relations Survey (WERS), while the measures of value added per employee are drawn from the linked WERS 2004 Financial Performance Questionnaire and Annual Business Inquiry, made available by the Office for National Statistics in London.

This paper contributes in several ways to the existing research on the link between HRM practices and organisational performance. First, by focusing on HRM practices enhancing FTFC it makes a first attempt to draw a distinction between the different direct voice regimes that can be adopted by organisations to manage their internal knowledge. Second, it is one of the few studies to use objective measures of labour productivity for British workplaces. With few exceptions (namely, Patterson *et al.* (1997) and Guest *et al.* (2003)), in fact, the existing HRM studies have relied on subjective measures of labour productivity (e.g. Bryson *et al.* 2005; Guest and Hoque 1994; Hoque 1999; Wood and de Menezes 1998). Finally, the paper seeks to give serious attention to the nature of the knowledge (i.e., tacit or explicit) disclosed through direct voice practices. Up-to-now, this issue has been completely neglected by HRM studies and remained in the exclusive domain of the knowledge management literature. It is our view that bridging these two literatures can provide useful insights into the identification of suitable workplace arrangements to achieve high productivity through employee involvement.

The remainder of the paper is organised as follows. Section 2 exposes the knowledge management literature on FTFC and intra-organisational knowledge sharing and provides a brief summary of the theoretical and empirical research on the association between HRM practices, direct voice practices in particular, and workplace productivity. Section 3 describes the data employed. Section 4 presents the empirical results. Finally, Section 5 concludes.

2. LITERATURE REVIEW

2.1 - Knowledge sharing through FTFC

The resource-based view of the firm (Barney 1991) suggests that an organisation can achieve market dominance by combining resources that are rare, valuable and difficult to imitate. Among the many possible resources that an organisation can use for this purpose, *knowledge stocks* (that is, the knowledge embedded in its workers) is an often cited one (Jackson *et al.* 2003). Nonetheless, it has been pointed out that

while knowledge stocks provide organisations with the foundation for competitive advantage, what really matters is the effective management of *knowledge flows* (Dierickx and Cool 1989; Collins and Clark 2003). This is achievable by workplaces through the establishment of social networks made up of individuals with strong ties and reciprocal trust (Lepak and Snell 2007). The increasing interest in knowledge sharing through social networks has shifted the research focus from human capital to social capital, the latter being defined as “the sum of the actual and potential resources embedded within, available in, and derived from the network of relationships possessed by an individual or social unit (Nahapiet and Ghoshal 1998: 243).” This idea is already present in Tsoukas (1996), who views the firm as a ‘distributed knowledge system,’ where knowledge is embedded in individuals, located in its different parts, and their social interactions.

It is important to note that the knowledge that can be shared within social networks can be explicit or tacit in its nature. Explicit knowledge is that type of knowledge that can be codified and thus communicated easily (Nonaka and Takeuchi 1995). Interactive networks based on the intranet or phone systems are an example of intra-organisational arrangements enhancing the transfer of explicit knowledge. One-way communication practices like suggestion schemes, formal surveys of employees and information disclosure from employees to managers or from managers to employees are also important means to diffuse explicit knowledge. Tacit knowledge is instead very difficult to formalise and therefore to transfer, since it is deeply embedded in its bearers (Nonaka 1991). The latter are often unaware of possessing it. As pointed out by Michael Polanyi, who first introduced the concept of tacit knowledge, “we can know more than we can tell (Polanyi 1966: 4).” Tacit knowledge is being increasingly regarded as *the* recipe for competitive advantage (Grant 1993; Spender 1993; Sobol and Lei 1994). Given its high level of personalisation, in fact, tacit knowledge can be considered unique, imperfectly mobile/imitable and non-substitutable (Ambrosini and Bowman 2001) and thus closer than explicit knowledge to the definition of ‘resource’ required by the resource-based view of the firm.

According to Nonaka (1991) and Sternberg (1994), tacit knowledge is practical (i.e., it describes a process) and context-specific (i.e., it is acquired in situations where it is used). Therefore, it can be better acquired through personal experience and learning by doing in practical situations entailing face-to-face interactions such as coaching, networking and the like (Rebernik and Širec 2007). According to Nonaka and Takeuchi (1995), personal contact enhances the tacit-to-tacit knowledge exchange. Koskinen *et al.* (2003) view face-to-face interaction as the richest medium to transfer knowledge, as “it allows immediate feedback so that understanding can be checked and interpretation corrected (Koskinen *et al.* 2003: 286).” This form of interaction is in fact less likely to result in misinterpretation of meanings compared to other forms of social relations, since the knowledge

conveyed by body language, facial expression and tone of voice goes beyond the spoken message (Meherabian 1971).

In conclusion, a large knowledge management literature supports the view that social networks based on employees' physical contact and dialogue are likely to result in the diffusion of tacit knowledge throughout the organisation. Therefore, we would expect that, other things being equal, workplaces facilitating FTFC among employees enjoy a substantial competitive advantage, in the form of higher productivity, compared to workplaces where this means of knowledge sharing is absent. This proposition is certainly very appealing from a theoretical point of view, but requires some empirical testing.

2.2 - HRM practices and labour productivity

A body of industry-specific and cross-industry empirical studies published by US researchers suggests a positive association exists between specific HRM practices, labelled 'high-performance' HRM practices, and organisational productivity in the USA (Appelbaum *et al.* 2000; Arthur 1994; Batt 1999; Cappelli and Newmark 2001; Huselid 1995; Ichniowski *et al.* 1997; MacDuffie 1995). These studies measure labour productivity as either the number of working hours required to produce a specific output (e.g. a ton of steel at a mini-mill or a vehicle at an assembly plant) or the value of sales per employee. The practices in question are those that allow organisations to elicit their employees' *discretionary effort* through the exploitation of the three conditions advocated by the AMO paradigm (Appelbaum *et al.* 2000): workers' ability (A) is ensured through the selection or initial training of employees with high skills or formal education and allows the deployment of a large stock of human capital; workers' motivation (M) is achieved through the provision of incentives such as investments in further training, employment security and trust-enhancing systems of performance management (e.g. performance-related pay and internal promotions); working arrangements like self-managed teams and off-line problem-solving groups can provide workers with the opportunity (O) to influence the decision-making process of the organisation and allow them to share their task-specific knowledge.

As yet, few company-level studies on the association between HRM practices and workplace productivity are available for Britain. Furthermore, most of these studies base their assessment on subjective measures of labour productivity and many of them employ purposive samples of companies or establishments with specific characteristics, which raises the issue of whether their findings can be generalised. Using data from the WERS 1998, which is a nationally representative dataset including 2,191 establishments from different sectors with 10 or more employees, Bryson *et al.* (2005) find a positive impact of bundles of 9 HRM practices on labour productivity for unionised workplaces. The self-assessed measures of labour

productivity reported in the Cross-Section Management Questionnaire of the WERS indicate whether managers perceive their establishment's labour productivity as much higher, higher, the same, lower or much lower than the average labour productivity of their industry. Wood and de Menezes (1998) use a sample of 899 workplaces in the private sector with 25 or more employees from the same dataset. The authors employ a latent class analysis of seven practices to retrieve four categories of 'high commitment' practices based on the extent of the adoption. They find that only workplaces in the third category, i.e. medium/high adoption, enjoy higher labour productivity. Guest and Hoque (1994) use a dataset of 122 greenfield non-unionised workplaces with 50 or more employees to explore the association between counts of 21 HRM practices and self-reported measures of labour productivity (compared to the best UK performers in the sector). They find that workplaces adopting a number of practices higher than the median enjoy higher productivity. Using a nationally representative sample of 209 hotels with 25 or more employees, Hoque (1999) also finds a positive association between the number of practices in place (among 21) and subjective measures of labour productivity.

Only few studies have explored the HRM-performance nexus in UK organisations relying on objective measures of productivity. Patterson *et al.* (1997) analyse the change in sales per employee for 67 single-site UK companies with 60 or more employees in the manufacturing sector using factor scores of HRM practices and find a positive association. Guest *et al.* (2003) use cross-section and panel data for 366 UK manufacturing and service companies with more than 50 employees. They find a positive relationship between an index of 48 HRM practices and subjective measures of labour productivity. However, this relationship disappears when objective productivity measures (sales per employee) are employed.

The extent to which subjective and objective measures of labour productivity converge is still an issue subject to debate (Forth and McNabb 2008; Machin and Stewart 1996; Wall *et al.* 2004). Nonetheless, the lack of availability of objective measures of productivity is generally regarded as a weak point of the UK-based empirical research on the HRM-productivity nexus.

2.3 – Knowledge sharing, FTFC and labour productivity

The term 'knowledge sharing' is often used loosely to indicate any process of knowledge transfer, thus including both one-way and two-way knowledge flows. Throughout this paper we use a narrower definition of knowledge sharing, whereby this term refers to only those knowledge exchanges at the workplace where each employee involved is at the same time knowledge sender and receiver. Knowledge sharing as defined above is therefore conceptually different from knowledge disclosure, which entails unidirectional knowledge flows instead (e.g. from

managers to employees or the other way around).

There exists a strand of empirical research exploring the process of knowledge sharing or disclosure in British workplaces. The research in question generally talks about ‘information’ rather than ‘knowledge.’ However, these two terms can be used interchangeably. Given our focus on two-way knowledge flows, we do not discuss studies concerned with information disclosure (e.g. Peccei *et al.* 2005, 2008) but refer exclusively to research focusing on ‘direct voice’ practices (Willman *et al.* 2006; Bryson *et al.* 2006, 2007). These arrangements, also labelled ‘employee involvement’ or ‘direct participation’ (Marchington and Wilkinson 2000; Marchington 2007), include HRM practices entailing two-way communication between employers and employees without the mediation of representatives. The ‘voice regime’ as a broad concept also includes indirect voice, whereby two-way communication between workers and the management can be mediated by trade unions and/or non-union representatives (e.g. those elected by the main body of the workforce to participate in consultative committees). Voice practices help reduce transaction and exit costs for both employer and employees and are therefore considered contractual governance mechanisms producing mutual benefits (Bryson *et al.* 2007).

From a theoretical viewpoint, the impact of direct voice practices on organisational productivity is ambiguous. On the one hand, the absence of countervailing forces such as those provided by unions may discourage workers to put forwards productivity-enhancing improvements, as a fair distribution of the fruits of their contribution to organisational performance may not be ensured (Freeman and Medoff 1984). In this case, employees’ disclosure of sensitive knowledge might even results in dismissals or redundancies (Bryson *et al.* 2006). On the other hand, voice through representatives may not be efficient as this can constitute a barrier between managers and employees (Pfeffer 1994; Storey 1992). Workforce’s diverse needs and ideas may not be well represented through collective representation, whereas direct voice mechanisms allow managers a better response to these diverse concerns, thus eliciting more cooperation and commitment from workers (Bryson *et al.* 2006). The empirical evidence on the nexus direct voice practices–organisational productivity is limited and inconclusive. Some authors find a positive relationship between direct voice and subjective measures of labour productivity (Fernie and Metcalf 1995; Kersley *et al.* 2006). Some others, again using self-assessed measures of productivity, found no evidence of a positive association (e.g. Bryson *et al.* 2006).

Peccei *et al.* (2005) highlight that existing studies “do not, by and large, make a clear distinction ... between the various communication mechanisms that are used in organisations and the actual content of the information that is disclosed to employees (Peccei *et al.* 2005: 13).” The authors address this concern by specifically focusing on downward communication, i.e. information disclosure from

managers to employees of information relating to internal investment plans, staffing plans and the financial position of the workplace. Nonetheless, their concern is a general one that can also be extended to the direct voice regime. Up to now, no distinction has been made between the different mechanisms in which employees' direct voice can be 'expressed' at the workplace. In Bryson *et al.* (2006), for example, the 'direct voice' category includes both HRM practices potentially enhancing FTFC, like meetings of managers and employees and problem-solving groups, and communication mechanisms such as formal surveys of employees' views/opinions and suggestion schemes. The latter arrangements, however, rely on written communication and therefore lack the personal dimension characterising FTFC. Furthermore, in the absence of any feedback from the management, surveys of employees' views and suggestion scheme reflect simple one-way knowledge flows. Finally, the definition of FTFC should also embrace team-working, provided that employees within this type of social network are physically close to each other and engage in verbal discussion. It is important to note that knowledge can be fruitfully shared among employees without any involvement from the part of managers. In the presence of autonomous teams, for example, any productivity-enhancing suggestion coming from employees can become operative directly without the need to be communicated to the management.

The existing research has explored the relationship between direct voice practices and productivity by using aggregate measures of direct voice (e.g. Bryson *et al.* 2006, 2007; Fernie and Metcalf 1995). While this approach has been mainly dictated by the consideration that "It is relatively rare for one of these three voice practices to be used in isolation" (Bryson *et al.* 2006: 445), it did not permit to distinguish between the diverse nature and content of the knowledge shared at the workplace through FTFC. HRM arrangements like problem-solving groups and teams, for example, enhance social networks within which workers can share both explicit and tacit knowledge. The assumption that the adoption of meetings of senior managers and employees results in tacit knowledge sharing, however, may not be very realistic, as the hierarchical distance between senior managers and workers may inhibit the personalisation of their human interactions. As for meetings of employees and line managers, the latter are defined by the WERS 2004 (the survey from which this paper draws its data) as non-managerial employees that have duties involving the supervision of other employees. The possibility that tacit knowledge is shared during meetings of line managers and employees is higher compared to meetings of senior managers and employees, since the working relationship established among peer workers is more likely to be characterised by a higher degree of personalisation. Therefore, to gain some insight into the different content/nature of the knowledge that can be shared throughout these HRM practices it may be opportune to include them separately in the regression analysis. This is the approach followed by this paper.

3. DATA AND METHOD

3.1 - Productivity measures

The dependent variable in our regression analysis is value added (in thousands of pounds) per employee. This measure of labour productivity is drawn from a dataset, provided by the Office for National Statistics in London, which results from the merging of the WERS 2004 Financial Performance Questionnaire and the Annual Business Inquiry. After the exclusion of outliers, value added per employee is available for 570 of the trading workplaces included in the WERS 2004 Cross-Section Survey of Managers (see Forth and McNabb 2007). The consideration of establishments for which account-based measures of labour productivity is available strongly reduces the size of the sample of trading workplaces. However, weights have been built at the Office for National Statistics, allowing us to generalise our result to the population of trading workplaces in Britain. The availability of objective measures of productivity also allows us to overcome the historical criticism attracted by the subjective assessment by managers of their workplace's labour productivity relative to other establishments in the same industry. The extent to which subjective measures of productivity reported in the WERS 2004 and objective measures obtained after linking the WERS' Financial Performance Questionnaire with the Annual Business Inquiry converge is explored by Forth and McNabb (2008).

3.2 - HRM practices capturing knowledge sharing through FTFC

Our independent variables are selected HRM practices with the potential to enhance FTFC. The source of data on these is the WERS 2004 Cross-Section Survey of Managers, a nationally representative survey which includes detailed information, provided by managers responsible for employment relations matters, on a large number of HRM practices for 2,295 private and public British workplaces with 5 or more employees. We limit our study to workplaces in the trading sector because data on objective measures of labour productivity are available only for a subset of trading workplaces, due to the interest in studying organisations with a profit-maximising behaviour. Our analysis focuses on the following HRM practices:

- *Teams*. The Survey of Managers reports the proportion (0, 1-19, 20-39, 40-59, 60-79, 80-99 or 100 per cent) of core employees working in formally-designated teams at each workplace. Core employees are employees belonging to the largest non-managerial occupational group among those listed in the *Standard of Occupational Classification (SOC) 2000*.
- *Problem-solving (PS) groups*. These are groups of non-managerial employees

that solve specific problems or discuss aspects of performance or quality. Managers provided the proportion (coded as for teams) of workplace employees involved in such groups over the past year.

- *Briefings*. These are meetings between line managers and employees.
- *Meetings*. These are meetings between senior managers and employees.

We attempt to distinguish between the actual presence of FTFC within the networks established through the four HRM practices in question (in which case we speak of *effective* FTFC practices) and instances where individuals within such networks do not engage in FTFC (in which case we refer to these as *merely formal* FTFC practices). The need to identify *effective* FTFC networks, as opposed to *merely formal* ones, arises from the awareness that some HRM practices represent a missed opportunity to enhance knowledge sharing within workplaces. For example, the members of a team may not exchange their knowledge in organisations dominated by the activity of the so-called ‘knowledge workers,’ who tend to develop their networks with external institutions rather than with co-workers within the firm (Swart 2007). In this case the team arrangement gives rise to a merely formal FTFC community, which limits productivity gains for the organisation. When we refer to any of the four HRM practices without specifying whether FTFC is actually present (the approach generally adopted by the HRM literature) we shall call them *potential* FTFC practices.

Table 1 shows the percentage of trading workplaces adopting each of these arrangements as either potential or effective FTFC practices. These percentages are obtained based on the sub-sample of trading workplaces for which objective measures of labour productivity are available, and for which observations on the HRM variables in question are non-missing. Nonetheless, figures are weighted in order to be made representative of the whole population of trading workplaces (see Forth and McNabb 2007). We consider teams and PS groups as adopted if they involve any percentage of employees at the workplace or, alternatively, if they involve at least 60 per cent of employees.

[Table 1 here]

Effective FTFC practices are those which identify employees’ networks actually relying on FTFC. We try to capture the presence of FTFC using specific pieces of information provided in the WERS 2004 Cross-Section Survey of Managers. Specifically, teams are defined as effective FTFC practices if their members jointly decide how the work is to be done. Meetings and briefings are supposed to entail FTFC if at least 25% of the time is available to employees to ask questions or offer their view. By their nature, PS groups are arrangements aimed at enhancing FTFC

among individuals and therefore they already identify effective FTFC practices. This explains why, in the table, these arrangements show exactly the same percentages for potential and effective FTFC practices. We can see that the percentage of workplaces actually relying on FTFC (second column) is largely (always more than one third) lower than the percentage of workplaces adopting the HRM practices regardless of FTFC (first column).

Table 2 reports the average value of our productivity measure across the four practices in question, again distinguishing between potential and effective FTFC practices. Additionally, mean values for workplaces which do not adopt these practices at all are reported. We notice that, with the only exception of PS groups involving any percentage of non-managerial employees, value-added per head is always higher for workplaces adopting any of the four arrangements (second column) compared to the case of non-adoption (first column). Considering the same practices in the presence of FTFC (third column), we can see that workplaces adopting teams (any percentage of core employees) with FTFC outperform workplaces adopting the same practice regardless of whether FTFC is present. However, when teams are considered which involve at least 60 per cent of core employees, the outcome is reverted. As we already explained, PS groups as supposed to be implemented as an effective FTFC practice, therefore a comparison with the correspondent potential FTFC practice is not possible. Workplaces adopting Meetings as an effective FTFC practice show a slightly lower productivity compared to workplace relying on Meetings as a potential FTFC practice. Finally, the use of Briefings as an effective FTFC practice seems to confer a productivity advantage to workplaces. The fact that labour productivity increases when FTFC is introduced in teams with any percentage of core employees but decreases when FTFC is considered in teams with at least 60 per cent of core employees suggests that FTFC-related benefits may depend on the relative size of the networks (i.e. the percentage of workplace employees involved). This issue will be explored later in our regression analysis.

[Table 2 here]

3.3 - Workplace, organisation and market controls

In our regressions we also control for the workplace characteristics of size (logarithm of the number of employees), age (dummy for workplaces more than 20 years old) and trade union recognition (dummy variable). The organisation characteristics of size (dummy for organisations with more than 1000 employees) and foreign ownership (dummy for workplaces belonging to an organisation which is at least 50 per cent foreign-owned) are also included. Finally, we control for the degree of competition in the market (represented by the management informant's

assessment on a 1-to-5 scale, where 1 is very low and 5 very high) and the industrial sector (11 dummies at the SIC 2003 section level).

3.4 - Other HRM controls

Finally, we control for the presence of the following HRM practices, which we group in two categories:

1) HRM practices enhancing the deployment and development of a skilled workforce:

- *Skilled workforce* (1 if 50 per cent or more of employees are professionals, associate professionals or technical employees and 0 otherwise).
- *Off-the-job training* (1 if at least 60 per cent of experienced core employees have been given time off their work in the last year to receive training and 0 otherwise).
- *Induction programme* (1 if an induction programme for new core employees exists and 0 otherwise).
- *Recruitment test* (1 if a personality or performance test is used for recruitment purposes and 0 otherwise).
- *Performance appraisal* (1 if it applies to at least 60 per cent of non-managerial employees and 0 otherwise).
- *Multi-skilling* (1 if at least 60 per cent of core employees are formally trained to do jobs other than their own and 0 otherwise).

2) HRM practices providing employees with trust and motivation:

- *Employment security* (100 minus the percentage of employees, among those in the payroll during the past year, who stopped working at the workplaces because dismissed).
- *Internal recruitment* (1 if, when filling vacancies, internal applicants are the only sources or, other things equal, they are preferred to external applicants and 0 otherwise).
- *Performance-related pay* (1 if employees are paid based on result/merit pay or receive profit-related payments or bonuses and 0 otherwise).
- *Core employees' autonomy* (scale composed of three items: discretion, control over the pace and involvement in decisions over their work; Cronbach's alpha is 0.72).

- *Information disclosure* (scale composed of three items: disclosure by managers to employees of information relative to internal investment plans, financial position of the workplace and financial position of the organisation; Cronbach's alpha is 0.71).

In the spirit of the AMO paradigm, the first set of HRM practices reflects the level of human capital (i.e., employees' ability) available to the organisation. The inclusion of these arrangements in our regression analysis allows us to control for differences among workplaces in the endowment of knowledge that can potentially be shared among employees within FTFC-based networks.¹ Motivating workers through organisational commitment in order for them to share their knowledge is also considered a key issue for the successful management of knowledge (Appelbaum *et al.* 2000; Hislop 2003). This motivates the inclusion of the second set of HRM practices.

Taking account of non-missing observations on the HRM practices reflecting FTFC, the productivity measures, the workplace, organisation and market characteristics, and the other HRM controls we end up with a dataset including a number of workplaces slightly higher than 500. The actual size varies according to what variables we are considering in any specific regression.

4. EMPIRICAL RESULTS

Our empirical analysis first assesses whether the adoption by workplaces of teams, problem-solving groups and meetings between line/senior managers and employees, i.e. HRM practices identifying *potential* FTFC communities is positively related to labour productivity. Subsequently, we explore whether there is a positive productivity differential between *effective* and *merely formal* FTFC communities. A finding in this sense would suggest that it is FTFC that matters for productivity enhancements rather than HRM practices *per se*, and that studies simply including potential FTFC practices in their regression analyses may have failed to capture the important contribution that knowledge shared through FTFC bears for workplace productivity. Finally, we investigate whether the association between FTFC and productivity changes according to the intensity of adoption of FTFC.

Table 3 presents the results of the productivity regressions obtained when FTFC practices are considered as implemented regardless of the length of time for which they are actually in place. In Regression 1.1 we report the coefficients and standard errors for the dummy variables capturing *potential* FTFC practices. Specifically, for teams and problem-solving (PS) groups, a dummy variable is included for each category representing the percentage of employees involved. The excluded category is workplaces with no teams (or PS groups) at all. The sign of the coefficients for PS

groups and teams varies according to the percentage of employees involved. The coefficient for briefings is positive, while that for meetings is negative. However, among all these only the (negative) coefficient for PS groups with 20 to 39 per cent of non-managerial employees is statistically significant (5% level).

[Table 3 here]

The absence of any significant coefficients might be attributable to the simple consideration of potential FTFC practices whereby no distinction is made between workplaces that actually implement FTFC and workplaces which do not. In Regression 1.2 we attempt to distinguish between *merely formal* and *effective* FTFC practices. Alongside with the coefficients and standard errors for each dummy variable identifying the potential FTFC practice, we report the coefficients and standard errors for another dummy variable identifying effective FTFC practices. As explained before, for PS groups and committees potential and effective FTFC coincide, so the same dummies used in Regression 1.1 are re-included. Basically, the coefficient on each of the additional dummies captures the productivity gain associated with FTFC within the network considered. The coefficients for the dummies on the potential FTFC practices in Regression 1.2 have a different meaning from those in Regression 1.1: here they capture the association of productivity with the same networks but in the absence of FTFC (i.e., *merely formal* FTFC practice).

We can see that the coefficients on ‘Teams (40-59%)’ and ‘Teams (40-59%) with FTFC’ are -0.200 and 0.454, respectively (both significant at the 5% level). This suggests that teams involving this percentage of employees where FTFC is absent make a negative contribution to workplace productivity, while FTFC strongly increases their productivity. Summing up the two coefficients we obtain the association between labour productivity and Teams (40-59%) adopted as an effective FTFC practice. The negative association between productivity and PS groups with 20 to 39 per cent of non-managerial employees is still negative and significant (5% level). Finally, the coefficients on the remaining variables are not significant.

We now assess whether the association between FTFC and productivity changes if the four practices are implemented on a continuous basis. PS groups are considered permanent if they are adopted ‘permanently’ as opposed to ‘for a fixed period of time’ or ‘a mixture of both.’ There is no direct information in WERS 2004 on the permanency of teams, meetings and briefings. We consider briefings and meetings as permanent if they are conducted at least once a fortnight (unfortunately, there is no such information for teams). Table 4 shows the results of the regressions analysis carried out on FTFC practices which we consider as adopted permanently based on this information. In Regression 2.1 we show the association between

potential FTFC practices and productivity. The coefficient on PS groups involving 20 to 39% of non-managerial employees presents a negative sign while that on briefings is positive (both coefficients are significant at the 1% level). All the other coefficients are not significant. Regression 2.2 shows instead the results obtained when we allow for FTFC to take place in the four networks in question. The coefficients on PS groups involving 20 to 39% of non-managerial employees, those including 60 to 79% of non-managerial employees and those including all non-managerial employees present a negative, positive and negative sign (significant at the 1%, 10% and 10% level, respectively). There is again a difference in sign between the coefficient on teams with 40 to 59% of core employees and the coefficient on the dummy variable capturing FTFC in the same teams. The absolute magnitude of the two coefficients is larger if compared to Table 1. The coefficient on 'Meetings with FTFC' is also positive and significant (5% level). Notably, the coefficient on briefings is now not significant, while the coefficient on 'Briefings with FTFC' is positive and significant (5% level).

[Table 4 here]

The results presented above show that the simple inclusion in the empirical analysis of *potential* FTFC practices (the approach often adopted by the HRM literature) may have confounding effects: it can either lead to a failure to detect an association between some HRM practices and labour productivity (see, for example, the case of Teams (40-59%)) or to a claim of unconditional positive association, when productivity gains are instead attributable to FTFC among members of the network (this is the case for permanent briefings). Also, the relative size of (i.e., the percentage of employees involved in) FTFC-based networks seems to matter for productivity advantage. Networks with too many or too few employees imply either no productivity gain (for teams) or a negative association with productivity (for PS groups). The simplest explanation for the non-linear size effect found for problem-solving groups is that an excessive number of individuals may congest FTFC networks whereby the huge, and perhaps too diverse, amount of knowledge cannot be managed efficiently. On the contrary, few employees may not provide FTFC networks with the amount or variety of knowledge needed to bring forward productivity enhancing suggestions.

Importantly, the tendency to adopt FTFC permanently is crucial to enhance organisational productivity. If adopted on a continuous basis, in fact, FTFC shows a positive and significant association with value added per worker within all the practices under study. Notably, compared to a situation where the temporal dimension in the implementation of the FTFC practices is not considered, additional and positive productivity gains show up for problem-solving groups with 60 to 79 per cent of non-managerial employees, meetings and briefings, and the FTFC-

related gain is higher for teams with 40 to 59 per cent of core employees. The simplest explanation of this result is that knowledge needs time to be shared, understood and processed in such a way as to produce observable gains to the organisation. An alternative explanation, drawn on the line of Bogenrieder and Nooteboom (2004), is that it may take time to build up trust and empathy between individuals, which is essential to an effective learning environment.

Interestingly, we found a strong and statistically significant negative association between trade unions and productivity and no evidence of any positive association of productivity with joint consultative committees (however, given the focus on direct voice, the coefficients for these two variables have not been reported here). These results suggest that voice through representatives may constitute a barrier between managers and employees, as argued by some authors (e.g. Pfeffer 1994; Storey 1992), and this interposition may inhibit the workforce to make significant contributions to workplace productivity.

Overall, the finding of a positive association between FTFC and labour productivity suggests that the development of social networks where employees engage in personal interactions is a practice that should be encouraged at the workplace. Since the number of trading workplaces in Britain where FTFC is not implemented is quite high (see Table 1), the introduction of FTFC practices could strongly enhance the productivity of the trading sector as a whole. However, whether productivity gains are directly attributable to FTFC is an issue that needs to be explored. FTFC, in fact, may impact productivity indirectly, by contributing to the creation of a more cooperative and committed workforce (Bryson *et al.* 2006), which is in turn stimulated to make productivity-enhancing suggestions.

5. CONCLUSIONS

This paper uses a nationally representative sample of more than 500 British trading establishments in order to investigate whether workplaces enjoy productivity gains from the adoption of HRM practices that enhance FTFC, i.e. two-way communication based on employees' physical proximity and verbal interaction. The underlying assumption is that an intense process of knowledge sharing is more likely to arise in workplaces whose employees engage in FTFC compared to workplaces where FTFC is absent, and this should be reflected in higher productivity levels observable empirically. Notably, our analysis is based on objective measures of labour productivity, exogenous to the report of workplace practices by managers. The extensive controls included in our regressions also reduce the risk of bias from human capital or motivational effects that are likely to be associated with FTFC.

We find a positive association between value added per worker and FTFC in

social networks established through problem-solving groups, teams, meetings of line managers and employees and meetings of senior managers and employees. Nonetheless, this finding holds only when FTFC is adopted on a continuous basis. The simplest explanation of this result is that knowledge needs time to be shared, understood and processed in such a way as to produce observable gains to the organisation. An alternative explanation is that it might take time to build up trust and empathy between individuals, which is essential to an effective learning environment.

We also find that the percentage of employees involved in FTFC-based networks is important to explain their association with labour productivity. FTFC within teams results in productivity gains only if such arrangements include 40 to 59 per cent of core employees. For problem-solving groups, we find evidence of a non-linear size effect. The involvement of 60 to 79 per cent of non-managerial employees has positive implications for productivity. On the contrary, when a higher or lower percentage of employees is involved, the adoption of problem-solving groups shows a negative association with productivity. While the reasons behind this finding need to be explored in more depth, the more obvious explanation for this non-linear size effect is that the presence of too many individuals may result in overcrowded FTFC networks where workers' knowledge cannot be managed efficiently. On the other hand, the engagement of too few employees in FTFC may not ensure an amount of knowledge flows sufficient for productivity enhancements to take place.

As for the nature of the knowledge shared through FTFC-based networks, it is quite difficult to understand what type is actually disclosed within them. We recognise that in practice explicit and implicit knowledge may be used in combination. For example, workplaces adopting problem-solving groups or teams are expected to enjoy productivity benefits from both knowledge types exchanged by employees involved in such arrangements. The consideration that tacit knowledge is very likely to be shared within social networks established through problem-solving groups, together with our finding that a moderate size for these networks is more suited to reap productivity gains from knowledge sharing, suggests that networks relying on tacit knowledge should be subject to a careful treatment by workplace management. It might indeed be critical to select workers for inclusion in these social networks. Employees with different skills and aptitudes but somewhat overlapping knowledge sets are likely to be good candidates, as they would provide a stimulating learning environment and at the same time an efficient working platform whereby people can engage in successful knowledge sharing.

In conclusion, our study suggests that the productivity of British workplaces in the trading sector could strongly be enhanced by adopting an HRM strategy aimed at facilitating knowledge sharing through FTFC. Employees' physical proximity and verbal interaction seem to be in fact crucial elements characterising social networks

that bring about successful productivity enhancements at the workplace. Since the number of trading establishments in Britain failing to adopt FTFC is relatively high, the introduction of FTFC practices could strongly enhance the productivity of the trading sector as a whole. However, whether productivity gains are directly attributable to FTFC is an issue worth exploring. FTFC in fact, may simply contribute to the creation of a more cooperative and committed workforce, which is in turn stimulated to make productivity-enhancing suggestions.

Note 1. A schooling variable and a skill indicator for core employees have been built with the purpose of controlling for differences among workplaces in their endowment of human capital. The “schooling attainment” variable was obtained by giving a score to each employee based on the highest academic qualifications reported in the Survey of Employees Questionnaire of the WERS 2004. After ranking the maximum academic attainments on a 6-point scale, we calculated the median for core employees in each workplace. The skills variable was obtained in a similar way based on the number of years that employees spent at the workplace, which the SEQ ranks from 1 to 5. However, these two indicators have not been used alongside with the additional HRM controls since their inclusion reduced the number of observations to only around 370 workplaces.

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Tables

TABLE 1
Descriptive statistics for the adoption of FTFC practices

	<i>Potential FTFC practices</i>	<i>Effective FTFC practices</i>
	<i>Mean (s.e.)</i>	<i>Mean (s.e.)</i>
Teams (any percentage of core employees)	56% (4.0%)	34% (3.6%)
Teams (at least 60% of core employees)	44% (3.8%)	28% (3.5%)
PS groups (any percentage of non-managerial employees)	13% (2.3%)	13% (2.3%)
PS groups (at least 60% of non-managerial employees)	6% (1.8%)	6% (1.8%)
Meetings	70% (3.7%)	41% (3.9%)
Briefings	58% (3.9%)	34% (3.7%)

Notes: Figures are weighted to make them representative of the population of trading workplaces with 5 or more employees. They are based on a number of observations which varies according to the practice in question (from a minimum of 552 for Briefings as an effective FTFC practice to 561 for Meetings and Briefings as potential FTFC practices). Standard errors (s.e.) in parentheses.

TABLE 2
Value-added per employee across FTFC practices

	<i>Potential FTFC practices</i>		<i>Effective FTFC practices</i>
	<i>No adoption</i>	<i>Adoption</i>	
	<i>Mean (s.e.)</i>	<i>Mean (s.e.)</i>	<i>Mean (s.e.)</i>
Teams (any percentage of core employees)	37.11 (3.79)	42.86 (4.76)	43.74 (7.16)
Teams (at least 60 % of core employees)	36.63 (3.26)	44.92 (5.80)	44.41 (8.36)
PS groups (any percentage of non-managerial employees)	40.87 (3.52)	36.78 (4.27)	36.78 (4.27)
PS groups (at least 60 % of non-managerial employees)	40.34 (3.30)	40.50 (6.17)	40.50 (6.17)
Meetings	33.94 (4.21)	42.91 (4.04)	42.85 (5.07)
Briefings	29.30 (2.63)	48.13 (4.75)	49.20 (6.77)

Notes: Figures are weighted to make them representative of the population of trading workplaces with 5 or more employees. They are based on a number of observations which varies according to the practice in question (from a minimum of 552 for Briefings as an effective FTFC practice to a maximum of 561 for Meetings and Briefings as potential FTFC practices). Standard errors (s.e.) in parentheses. Value-added expressed in thousands of pounds.

TABLE 3
The association between FTFC practices and labour productivity

Dependent variable (value-added per employee)	Regression 1.1 Coeff. (std. err.)	Regression 1.2 Coeff. (std. err.)
PS groups (1-19%)	-0.062 (0.070)	-0.082 (0.071)
PS groups (20-39%)	-0.117 (0.058)**	-0.118 (0.056)**
PS groups (40-59%)	-0.022 (0.073)	-0.008 (0.074)
PS groups (60-79%)	0.155 (0.143)	0.154 (0.131)
PS groups (80-99%)	0.028 (0.099)	0.036 (0.095)
PS groups (100%)	-0.108 (0.073)	-0.096 (0.077)
Teams (1-19%)	0.032 (0.069)	-0.015 (0.073)
Teams (20-39%)	-0.008 (0.062)	0.058 (0.105)
Teams (40-59%)	-0.033 (0.114)	-0.200 (0.090)**
Teams (60-79%)	0.004 (0.057)	-0.031 (0.129)
Teams (80-99%)	-0.028 (0.045)	0.022 (0.056)
Teams (100%)	0.050 (0.043)	-0.002 (0.061)
Teams (1-19%) with FTFC		0.122 (0.142)
Teams (20-39%) with FTFC		-0.119 (0.112)
Teams (40-59%) with FTFC		0.454 (0.194)**
Teams (60-79%) with FTFC		0.020 (0.134)
Teams (80-99%) with FTFC		-0.076 (0.070)
Teams (100%) with FTFC		0.060 (0.077)
Meetings	-0.046 (0.036)	-0.059 (0.045)
Meetings with FTFC		0.023 (0.043)
Briefings	0.040 (0.032)	0.010 (0.045)
Briefings with FTFC		0.021 (0.048)
R-squared	0.449	0.450
Number of observations	523	514

Notes: Standard errors (in parentheses) are adjusted to account for the complex survey design in the 2004 WERS. All the variables listed in Section 3 are controlled for. **: significant at the 5% level.

TABLE 4
The association between permanent FTFC practices and labour productivity

Dependent variable (value-added per employee)	Regression 2.1 Coeff. (std. err.)	Regression 2.2 Coeff. (std. err.)
PS groups (1-19%)	-0.003 (0.124)	-0.049 (0.140)
PS groups (20-39%)	-0.331 (0.093)***	-0.329 (0.087)***
PS groups (40-59%)	-0.023 (0.090)	-0.028 (0.084)
PS groups (60-79%)	0.123 (0.129)	0.274 (0.150)*
PS groups (80-99%)	-0.071 (0.124)	-0.102 (0.12)
PS groups (100%)	-0.136 (0.070)	-0.136 (0.076)*
Teams (1-19%)	0.045 (0.073)	0.014 (0.068)
Teams (20-39%)	0.002 (0.052)	0.116 (0.100)
Teams (40-59%)	-0.038 (0.110)	-0.242 (0.077)***
Teams (60-79%)	-0.024 (0.053)	-0.026 (0.109)
Teams (80-99%)	-0.014 (0.049)	0.003 (0.064)
Teams (100%)	0.055 (0.042)	0.007 (0.057)
Teams (1-19%) with FTFC		0.075 (0.147)
Teams (20-39%) with FTFC		-0.165 (0.103)
Teams (40-59%) with FTFC		0.513 (0.192)***
Teams (60-79%) with FTFC		-0.026 (0.114)
Teams (80-99%) with FTFC		-0.027 (0.075)
Teams (100%) with FTFC		0.065 (0.068)
Meetings	0.042 (0.050)	-0.042 (0.060)
Meetings with FTFC		0.185 (0.083)**
Briefings	0.114 (0.038)***	0.035 (0.047)
Briefings with FTFC		0.114 (0.057)**
R-squared	0.475	0.517
Number of observations	506	506

Notes: Standard errors (in parentheses) are adjusted to account for the complex survey design in the 2004 WERS. All the variables listed in Section 3 are controlled for. ***, **, *: significant at the 1, 5 and 10% level, respectively.