

DISCUSSION PAPER SERIES

IZA DP No. 18059

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Promotion and Productivity**

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## ABSTRACT

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# Management Practices, Workplace Health Promotion and Productivity

Since the emergence of personnel economics, economists have been increasingly aware that the management practices used by firms are an important determinant of productivity. However, it is an open question of whether the impact of management practices on the productivity of firms depends on workplace health promotion activities (alternatively called workplace wellness programs). Using a widely recognized management index developed by Bloom and Van Reenen (2007), this study provides evidence that workplace health promotion moderates the link between management practices and productivity. Our panel data estimates show that the positive impact of management practices on productivity is stronger if a firm engages in workplace health promotion. This finding fits the notion that workplace health promotion mitigates adverse side effects of management practices on employees' health. However, our estimates also provide evidence of a negative direct influence of workplace promotion on productivity. The positive moderating influence of workplace health promotion only dominates the negative direct influence if a firm uses Bloom and Van Reenen's management practices (targets, monitoring and incentives) at a high intensity.

**JEL Classification:** I10, J24, J28, J81, M50

**Keywords:** targets, monitoring, incentives, employee health, workplace wellness programs, firm performance

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## 1. Introduction

For a long time economists have shown considerable interest in the factors driving productivity differences between firms within and across countries (Blackwood et al. 2021, Goldin et al. 2024, Syverson 2011). Since the emergence of personnel economics, it has been increasingly recognized that these differences are not simply due to technological factors, but also crucially depend on the management practices used by firms (Hoffman and Stanton 2025, Lazear 2000a, Lazear and Oyer 2012, Lazear and Shaw 2007). However, only relatively recently, economists have begun to pay attention to the fact that management practices can have adverse side effects on the health of employees (Bender and Skatun 2022). Poor employee health not only affects employees' well-being. It also harms firm performance through increased sickness absenteeism, lower quality of employee job performance and a slower speed of work (Corbeanu et al. 2023, Goetzel et al. 2004, Grinza and Rycx 2020). Against this background, our econometric study is the first to address the question of whether the impact of management practices on productivity can be strengthened by measures mitigating the adverse consequences for employee health.

Our study considers an index of management practices developed by Bloom and Van Reenen (2007). This index captures three broad areas: (1) *Monitoring* (2) *Targets* (3) *Incentives*. The index has been used in a series of important follow-up studies covering several tens of thousands of organizations across more than twenty countries (Bender et al. 2018, Bloom and Van Reenen 2010, Bloom et al. 2011, Bloom et al. 2012, Bloom et al. 2013, Bloom et al. 2014, Bloom et al. 2019, Bloom et al. 2021, Broszeit et al. 2019, Cornwell et al. 2021, Jirjahn et al. 2024). While Bloom and Van Reenen initially focused on the manufacturing sector, recent studies have expanded the focus to analyze

management practices, among others, also in schools and hospitals (Bloom et al. 2015a, Bloom et al. 2015b). Bloom and Van Reenen's management index has received considerable attention in the literature and studies using the index are widely cited.<sup>1</sup>

The management index aims at identifying best practices that generally improve firm performance regardless of contextual factors (Bloom and Van Reenen 2007, 2010, Bloom et al. 2012, Scur et al. 2021). However, it is an open question of whether the effects of the management practices are indeed not contingent on moderating factors. From a theoretical viewpoint, workplace health promotion (WHP) has the potential to play a role in the functioning of management practices. The practices identified by Bloom and Van Reenen not only involve productive, but also dysfunctional effects. As we will make clear, excessive monitoring, overflowing targets, and high pressure to perform can produce a climate where employees overwork themselves, face increased workplace bullying and perceive employer-employee relationships as hostile and threatening. This can lead to increased workplace accidents, burnout, stress and anxiety entailing a deterioration of employees' physical and mental health. The adverse side effects on employee health can have negative repercussions on economic performance dampening the productivity-enhancing influence of the management practices. At issue is whether WHP mitigates the negative side effects and, hence, strengthens the positive impact of the management practices on productivity.

Our empirical analysis uses panel data from the German Management and Organizational Practices Survey (GMOP). This is one of the firm-level datasets initiated by Bloom and Van Reenen. Our productivity estimates show that WHP indeed plays a moderating role in the functioning of management practices. We find a positive interaction

effect of WHP and management practices supporting the view that the impact of management practices on productivity is stronger when a firm engages in WHP. However, the estimates also provide evidence of a negative direct influence of WHP on productivity working in the opposite direction as the moderating influence. The negative direct influence fits the notion that WHP consumes time and productive resources. Our estimates show that the positive moderating influence of WHP dominates the negative direct influence only if a firm uses the management practices at a high intensity. This suggests that WHP only contributes to a higher productivity of firms where an intense use of management practices entails severe negative side effects on employee health.

All in all, our study yields two key insights. First, the study shows that the influence of management practices on productivity is not independent of contextual factors. The strength of the influence depends on WHP. This finding conforms to the notion that the management practices have negative side effects on employee health. Mitigating these side effects through WHP leads to a stronger impact of the practices on productivity. On a broader scale, our finding provides an important lesson for research in personnel economics. Studies in personnel economics examining the economic consequences of management practices have neglected health issues so far. Our study makes it clear that an adequate assessment of the economic consequences of management practices cannot be obtained without considering health aspects.

Second, our study shows the role of WHP in the economic performance of firms in a more differentiated light. There is an ongoing discussion on the costs and benefits of WHP (Croft et al. 2024). While firms undertake substantial investments in WHP, the effectiveness of WHP often appears to be limited. Our estimates suggest that the economic

outcome of WHP depends on the extent of work-related health problems within a firm and, hence, on the need to tackle health issues. The overall influence of WHP on productivity is positive – i.e., the positive moderating influence dominates the negative direct one – if a firm makes intense use of management practices. The intense use of management practices entails more severe health problems for the workforce so the gain from measures promoting employee health at the workplace is high. By contrast, the overall influence of WHP on productivity is negative – i.e., the direct effect dominates the moderating one – if the firm uses the management practices at a low intensity. A less intense use of management practices is associated with less severe health problems so there is a rather small gain from investing in WHP. In that case, WHP primarily consumes time and resources that could be used for more productive purposes from the firm's perspective.

## **2. Background Discussion**

### *2.1 Management Practices, Workers' Health and Firm Performance*

In their initial study, Bloom and Van Reenen (2007) collected data from manufacturing firms in Britain, France, Germany, and the United States to identify three dimensions of best management practices: (1) *Monitoring* – how well does the firm track the performance of employees, review performance (e.g., through regular appraisals) and use this for continuous improvement? (2) *Targets* – does the firm set appropriate targets, track closely aligned outcomes and take appropriate action if the two are inconsistent? (3) *Incentives* – does the firm fix or fire low performers and does it reward high performers with performance pay and promotions? Bloom and Van Reenen developed a combined index of the various practices to show that firms scoring high on the index are characterized by higher productivity. Subsequent studies confirmed a positive link between management

practices and firm performance for a broader set of sectors and countries (Bloom and Van Reenen 2010, Bloom et al. 2014).

The practices captured by the management index match quite well with classical incentive theories in personnel economics. Efficiency wage theory assumes that monitoring employees and firing low performers is a measure to sort out low-ability individuals who are not well suited for their jobs and to induce employees to put in the required level of effort (Kwon 2005, Shapiro and Stiglitz 1984). Tournament theory suggests that putting employees in a contest and promoting those with outstanding performance to well-paid positions provides incentives to exert high effort (Lazear and Rosen 1981). Finally, principal-agent theory shows that employers can provide effort incentives and attract high-ability applicants by tying employees' pay to their output (Holmstrom and Milgrom 1987, Lazear 2000b). Of course, employees may only engage in those activities that are rewarded (Holmstrom and Milgrom 1991). Therefore, a broad set of targets and a correspondingly comprehensive monitoring of the various performance dimensions are required (Griffith and Neely 2009, Jirjahn and Poutsma 2013, Prendergast 1999).

However, management practices can also have a series of dysfunctional side effects. In particular, they may harm the health of employees. A large bulk of studies have shown that work intensification is associated with increased stress among employees (Franke 2015, Cottini and Lucifora 2013, Mauno et al. 2023). Most salient to our topic, adverse health consequences have been specifically identified for performance pay, promotions, monitoring, threat of dismissal, and targets – the various components that enter the management index.

Performance pay entails careless work behavior and induces employees to overwork themselves. It increases the risk of workplace accidents (Artz and Heywood 2015, Bender et al. 2012) and deteriorates employees' physical and mental health (Allan et al. 2021, Andelic et al. 2024, 2025, Baktash et al. 2022a, Bender and Theodossiou 2014, Cadsby et al. 2016, DeVaro and Heywood 2017).<sup>2</sup> In order to cope with the increased stress and fatigue entailed by performance pay, employees are more likely to drink alcohol and use drugs (Artz et al. 2021, Baktash et al. 2022b, Dahl and Pierce 2020).

The competitive workplace climate induced by promotion tournaments provides incentives for sabotage activities among employees (Chowdhury and Gürtler 2015, Lazear 1989). Sabotage activities take many forms such as refusing help and cooperation, spreading rumors about opponents, purposefully delaying execution, and transmitting false information. Being the victim of such workplace bullying has been widely recognized as a source of stress, mental health problems and impaired self-worth (Carnero et al. 2012, Suggala et al. 2021, Verkuli et al. 2015).

Furthermore, as emphasized by behavioral economists, excessive monitoring creates a climate of distrust and insecurity as it tends to be perceived by employees as an expression of coercion and hostility (Fehr and Falk 2002, Heinz et al. 2020). In a similar vein, psychologists argue that invasive monitoring negatively affects employees' sense of autonomy and privacy and, hence, can be an assault on personal dignity. Psychological research shows that monitoring is associated with increased stress and lower employee well-being (Ravid et al. 2023, Siegel et al. 2021).

The threat of dismissal and the entailed fear of job loss negatively affect sleep (Chadi 2023) and lead to symptoms of major depression (Magnusson Hanson et al. 2014),

burnout and even increased suicidal ideation (Probst and Lavaysse 2017). Finally, there is evidence that leaders who create excessive target pressure without providing supporting resources to their subordinates contribute to employee burnout (Sijbom et al. 2019).

The adverse health consequences entailed by management practices can affect firm performance in various ways. One immediate consequence of the workplace accidents induced by incentive pay is that they lead to interruptions of production and business activities (Agrilés-Bosch et al. 2014). Moreover, the physical and mental health problems entailed by incentives, monitoring and targets dampen a firm's productivity through increased sickness absenteeism (Benhenda 2022, Grinza and Rycx 2020). If production is characterized by interdependent worker productivity, the output lost by a single employee's absence is not only their own increment. The employee's absence also harms the productivity of other employees within the firm (Heywood and Jirjahn 2004, Heywood et al. 2008). Finally, even if employees with physical or mental health problems are present, there are on-the-job productivity losses due to lower quality of job performance, slower pace and more mistakes (Corbeanu et al. 2023, Goetzel et al. 2004, Hennekam et al. 2020). Again, under conditions of interdependent worker productivity, this also affects the productivity of co-workers.

## *2.2 The Moderating Role of Workplace Health Promotion*

In summary, from a theoretical viewpoint, the management practices identified by Bloom and Van Reenen not only involve productive incentive and sorting effects, but also have counterproductive side effects through impaired employee health. This makes the total effect on firm performance unclear. While a positive link between the management practices and productivity has been shown by a series of studies (Scur et al. 2021), the

strength of this link is likely to depend on the extent to which the negative health consequences affect employees' performance. A positive impact of the management practices on productivity should be more pronounced if the employer implements measures to mitigate the adverse health consequences entailed by the practices. This brings to the role of WHP.

WHP is intended to reduce work-related health problems by encouraging preventive care and discouraging unhealthy behaviors. This includes measures such as health checks, health-related training, healthy menus at work, or provision of sports facilities. While the costs and effectiveness of WHP are usually a topic within medical and psychological research (Baid et al. 2021, Fleming 2024, Franklin 2023, Goetzel et al. 2014, Lutz et al. 2019, Pelletier 2011, Robroek et al. 2020, Robroek et al. 2021), a small number of econometric studies have also analyzed the impact on employee or firm performance (Buhai et al. 2017, Huber et al. 2015, Jones et al. 2019, Pedersen and Arendt 2014). All in all, the literature provides very mixed results on the effects and economic consequences of WHP ranging from negative influences to having no significant or a positive impact. Mixed results in empirical research often indicate that influences are heterogeneous. This also applies to the consequences of WHP. WHP should play a lesser role if a workplace is characterized by relatively healthy working conditions. WHP may even harm firm performance if it just consumes valuable time and resources without yielding a discernible benefit. However, WHP can play an important role in improving firm performance when employees face unhealthy and stressful work environments.

A series of reasons suggest that WHP has the potential to mitigate the detrimental health effects that are associated with management practices. Training managers how to

recognize health issues, provide support to employees and create a respectful work climate is one possible transmission channel. Health-oriented leadership appears to be an important moderating factor in the link between work intensification and employees' physical and mental exhaustion (Huettermann and Bruch 2019, Huo et al. 2022, Sijbom et al. 2019). If superiors provide support to employees and assist them in coping with job demands, they can counteract the health risks posed by management practices.

Furthermore, health checks provide feedback to employees about their health status. This fosters health consciousness and can make employees more cautious to overwork themselves. In a similar vein, health-related training and advice, healthy menus at work, or the provision of sports facilities help employees develop healthy behaviors making them more resilient to stress. Employees may learn how to avoid maladaptive coping strategies such as substance abuse (Hennekam et al. 2020). Instead they learn how to use productive coping strategies such mindfulness, taking time off when needed, or communicating openly about health conditions.

On a broader scale, WHP helps frame the organizational climate in a more positive way. Under conditions of asymmetric information, employer signaling plays a crucial role in how employees perceive their work situation (Backes-Gellner and Tuor 2010). While management practices such as monitoring, threat of dismissal, and setting tight performance targets tend to create a climate of distrust, insecurity and hostility (Fehr and Falk 2002), WHP is a positive signal that the employer cares about employees' well-being and is willing to provide support (Huettermann and Bruch 2019). This signal partially offsets the negative impact of the management practices on organizational climate. It positively influences the stress mindset of employees as they perceive management

practices to a lesser degree as coercion and expression of hostility. Combining management practices with WPH signals optimism that job demands can be successfully approached.

Finally, Jones et al. (2019) provide evidence of a self-sorting of employees with healthier behaviors and lower medical expenditures into WPH programs. This suggests that WPH acts as a sorting device allowing the employer to recruit and retain employees who are already initially healthier and in a better shape to cope with job demands. Thus, while management practices such as performance pay attract employees with a high ability to perform (Lazear 2000b), WPH may attract employees who are more resilient to stress and, hence, are less affected by the practices.

Altogether, our theoretical considerations suggest that we should observe a stronger positive link between management practices and productivity if the practices are coupled with WHP. WHP mitigates the adverse health consequences of management practices. Thus, the productive incentive and sorting effects of the management practices come to light more strongly.

### **3. Data, Variables and Methodology**

#### *3.1 Dataset*

Our empirical analysis uses panel data from the GMOP (Broszeit et al. 2017). The GMOP survey design as well as the questionnaire are closely related to the Management and Organizational Practice Survey (MOPS) carried out by the US Census Bureau (Bloom et al. 2019). The MOPS is a follow-up study for manufacturing firms in the US that leans on Bloom and Van Reenen's (2007) initial World Management Survey (WMS).

The GMOP survey was carried out from November 2014 to May 2015 by the Kiel Institute for the World Economy (IfW) and the Institute for Employment Research (IAB).

The Institute for Applied Social Sciences (infas), a professional survey and opinion institute, conducted the interviews. Financial support was provided by the Leibniz Association.

The target population of the survey consisted of manufacturing firms with at least 25 employees in Germany. The sample was drawn from administrative data of the Employment History Panel (BHP). 1,927 firms participated in the survey. Broszeit and Laible (2017) show that firms in the survey and firms of the entire target population in the administrative data are very similar with respect to firm size, employment development, wages, gender composition of the workforce, and employees' qualification and age. They conclude that the survey data can be considered as representative.

The data were collected on the basis of a questionnaire in paper-pencil or online interviews with top managers. Most of the questions were asked for the years 2008 and 2013. Thus, a two-wave panel can be constructed. Information on some firm characteristics which usually do not change within a few years were only asked for the year 2013. These variables can be used with suitable caution as time-invariant variables.

### *3.2 Key Variables*

Table 1 provides the definitions of our key variables. Information on the key variables is available for the years 2008 and 2013. The dependent variable is the natural logarithm of productivity with productivity being defined as value added per employee.

Building from Bloom and Van Reenen (2007) and Bloom et al. (2019), the index of management practices is based on 16 questions capturing three areas: monitoring, targets and incentives (see Appendix Table A1 for details). The monitoring questions ask interviewees about the collection of information to monitor and improve the production

process. For example, the survey asks, “How frequently were performance indicators tracked at the firm?” The response options range from “never” to “hourly or more frequently.” The targets questions ask about the design, integration, and realism of production targets. For example, the survey asks, “What was the time frame of production targets?” The answers range from “no production targets” to “combination of short-term and long-term production targets.” The incentives questions cover managerial and non-managerial bonuses, promotions, and reassignment/dismissal practices. For example, the survey asks, “What is the share of non-managerial employees receiving a performance bonus?” Interviewees respond on a Likert scale ranging from “0%” to “100%.”

The results from the 16 questions are aggregated into a single score of management practices. The aggregated management score is the unweighted average of the scores for each of the questions, where the responses to each item are first scored to be on a 0–1 scale. Thus, the aggregated index ranges from 0 (management practices are barely structured around monitoring, targets, and incentives) to 1 (management practices have a highly structured focus on monitoring, targets, and incentives).

The survey also provides dummy variables on the use of a series of WPH measures: (1) Health awareness seminars for employees (2) Health checks (3) Provision of training for supervisors to increase health-oriented leadership competence (4) Provision of relaxation opportunities and sports facilities (5) Programs to promote healthy diet (6) Ergonomic workplace design. Our WHP index is the unweighted average of the WHP measures. The index ranges from 0 to 1. Our theoretical considerations suggest there should be a positive interaction effect of the WHP index and the management index on productivity.

Of course, other measures may also play a moderating role in the influence of management practices on productivity. Work intensification has been shown to affect the family and private life of employees (Baktash 2024, Baktash et al. 2025, Hur et al. 2021). This may have repercussions on employees' performance at work. Measures promoting a better integration of work and family may help mitigate these negative side effects and, hence, increase the productivity effects of management practices. Thus, we also account for family friendly practices. Our dataset provides five dummy variables: (1) Support with childcare (2) Reduced work schedules (3) Flexible working hours (4) Support of reintegration into work after maternity leave (5) Support with finding care facilities for children or relatives needing care. Our index of a family-friendly policy is the unweighted average of the various family friendly practices. Bloom et al. (2011) found that the management score is correlated with an index of family-friendly practices. At issue is whether a family friendly policy moderates the productivity effects of the management practices.

### *3.3 Control Variables*

The data allows controlling for a rich set of firm characteristics. Definitions and descriptive statistics of the control variables are shown in Table A2. In all regressions, we include time-varying control variables for firm size, capital intensity, innovativeness, export activities, subsidiaries abroad, intensity of product market competition, qualification of managerial and non-managerial employees, and the year of observation.

Our time-invariant control variables capture foreign ownership, family ownership, location, industry, collective bargaining coverage, and works councils. These variables are

included in our random effects (RE) regressions. They are not included in our fixed effects (FE) regressions as the FE model does not allow including time-invariant variables.

#### **4. Empirical Results**

Table 2 provides the results on our key variables. Control variables are included in the regressions, but are suppressed to save space.<sup>3</sup> The determinants of the log of productivity are estimated using the RE and the FE approach. The RE and the FE model both decompose the error term of the regression into two parts, a time-varying component and a firm-specific time-invariant component. The two models differ in their distributional assumptions. The RE model requires that the firm-specific component is uncorrelated with the explanatory variables. By contrast, the FE model allows for any correlations between the firm-specific component and the explanatory variables. Thus, it accounts for possible endogeneity that is due to unobserved time-invariant factors. However, the FE model only uses the within variation contained in the data whereas the RE model uses both the within and between variation in the variables.

The RE and FE estimations show a very similar pattern of results. In the initial regressions (1) and (2), we do not include interaction variables. While the regressions confirm a significantly positive association between the management index and productivity, they do not provide evidence of a significant role of WHP or family friendly practices. However, the full pattern of influences may remain obscured until interaction effects are taken into account.

Thus, in the next step, we include interaction variables in the regressions. Columns (3) and (4) show the estimates. The management index retains a significantly positive coefficient. The interaction of the management index with the index of family friendly

practices does not take a significant coefficient. Hence, we find no evidence that family friendly policies moderate the productivity impact of the management practices. By contrast, the interaction of the management index and the WHP index takes a significantly positive coefficients. This conforms to our theoretical expectations. WHP mitigates the counterproductive side effects of management practices on the health of employees. As a consequence, the positive impact of management practices on productivity is stronger if these practices are coupled with WHP. To illustrate the magnitudes of the estimated influences, let us consider an increase in the management score by 0.2 points. This is roughly a one standard deviation of the score. Taking regression (4) into account, the 0.2 increase in the management score implies a roughly 5% higher productivity if the firm does not engage in WHP activities.<sup>4</sup> The increase in the management score is associated with an almost 8% percent higher productivity if the WHP score is equal to its mean of 0.3.<sup>5</sup>

The variable for WHP emerges with a significantly negative coefficient when the interaction terms are included. This implies that there is a direct influence of WHP on productivity working in the opposite direction as the positive moderating influence. Considering our theoretical background discussion, the negative direct influence may reflect that WHP consumes time and resources negatively affecting firm performance. As illustrated by Figure 1, the total influence of WHP on productivity depends on the management score. If the management score is equal to 0.623 (a value somewhat higher than the mean score in our data), the direct and the moderating influence offset each other so WHP does not change the firm's productivity. If the management score is smaller than 0.623, the direct influence dominates the moderating influence so WHP is associated with lower productivity. By contrast, if the management score is greater than 0.623, the

moderating influence is stronger than the direct influence implying that WHP leads to higher productivity.

In summary, our empirical analysis shows that the influence of management practices on productivity is moderated by WHP. The positive influence of management practices on productivity is stronger if the practices are coupled with WHP. However, that does not mean that it always pays off for a firm to invest in measures promoting workplace health. WHP has a negative direct influence on productivity counteracting the positive moderating influence. Only if a firm uses incentives, monitoring and targets at a high intensity, the moderating influence of WHP is sufficiently strong to dominate the direct influence. From a theoretical point of view, this suggests that WHP particularly contributes to increased productivity when there are severe adverse consequences of management practices for the health of employees. An intense use of management practices entails such severe adverse consequences. WHP mitigates these severe consequences and the negative repercussions on firm performance so it increases the productivity of a firm with an intense use of management practices.

## **5. Conclusions**

The determinants of productivity are a key topic in economic research. However, there are different strands of literature emphasizing different determinants. The literature emphasizing the role of health (Weil 2007, 2014) and the literature focusing on management practices (Hofman and Stanton 2025) have been largely unconnected so far. Our study crosses the bridge between these two strands of literature. Using Bloom and Van Reenen's (2007) widely recognized management index, we show that WHP plays a positive moderating role in the link between management practices and the productivity of

firms. Our panel data estimates show that the impact of management practices on firm productivity is stronger if the practices are coupled with WHP. The finding conforms to the notion that management practices have adverse side effects on employee health which can be mitigated by measures promoting workplace health. However, our estimates also suggest that it not always pays off for a firm to engage in WHP. We find evidence of a negative direct influence of WHP on productivity. The positive moderating influence of WHP only dominates the negative direct influence if a firm uses the practices captured by management index – targets, monitoring and incentives – at a high intensity.

We recognize that WPH can have positive externalities that go beyond the economic performance of firms. Mitigating work-related health problems improves employee well-being and reduces health care expenditures borne by the social health insurance system. Employers ignoring these externalities underinvest in WHP. From the viewpoint of social welfare, it can desirable that even firms with a lower score of the management index engage in WHP. This suggests that some policy intervention may be required to encourage employers to undertake investments in WHP.

The other way round, adverse side effects of management practices on employee health are likely to entail negative externalities implying that firms use the practices too excessively from the viewpoint of social welfare. Thus, some intervention or regulation may be required to limit the intense use of management practices. Examining the welfare implications of WFH and management practices stands as important future research.

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**Table 1:** Variable Definitions and Descriptive Statistics of Key Variables

| <i>Variable</i>            | <i>Definition</i>                                                                                                                                                                                                                                                                                                                                                                                                                         | <i>Mean<br/>(Std. dev.)</i> |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Ln(productivity)           | Natural logarithm of value added (in Euro) per employee.                                                                                                                                                                                                                                                                                                                                                                                  | 11.181<br>(0.769)           |
| Management practices       | Score of sixteen management practices (monitoring, targets, and incentives). The score ranges from 0 to 1. See Table A1 for details.                                                                                                                                                                                                                                                                                                      | 0.561<br>(0.159)            |
| Workplace health promotion | Score based on six dummies capturing various WHP measures: (1) Health awareness seminars for employees (2) Health checks (3) Provision of training for supervisors to increase health-oriented leadership competence (4) Provision of relaxation opportunities and sports facilities (5) Programs to promote healthy diet (6) Ergonomic workplace design. The score is the unweighted average of the WHP measures. It ranges from 0 to 1. | 0.302<br>(0.259)            |
| Family friendly practices  | Score based on five dummies capturing various family friendly practices: (1) Support with childcare (2) Reduced work schedules (3) Flexible working hours (4) Support of reintegration into work after maternity leave (5) Support with finding care facilities for children or relatives needing care. The score is the unweighted average of the family friendly practices. It ranges from 0 to 1.                                      | 0.371<br>(0.246)            |

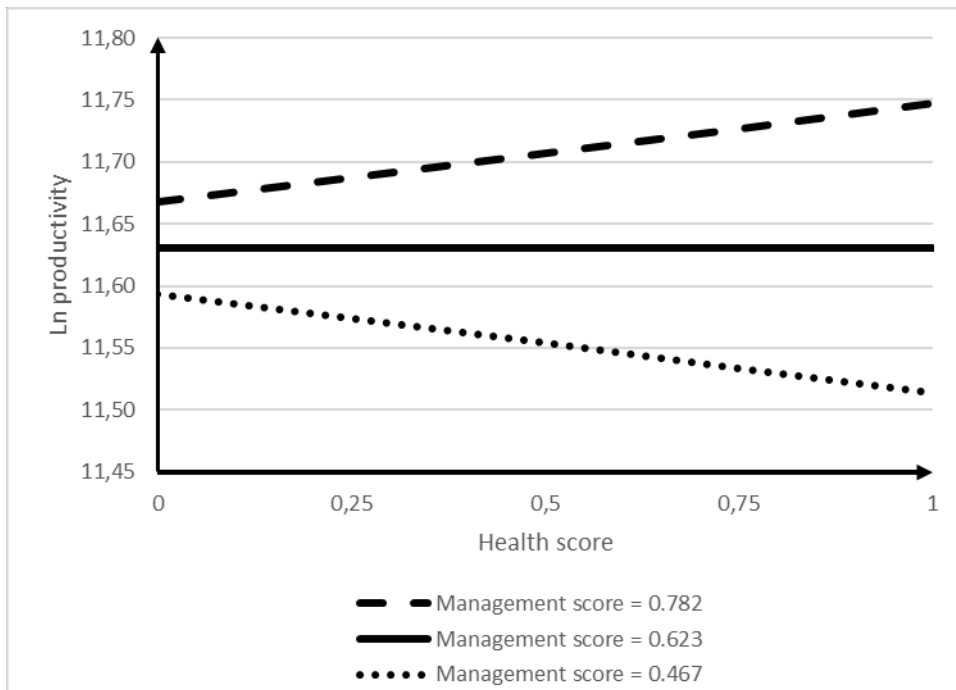
N = 1356

**Table 2: Productivity Regressions**

|                                                      | (1)<br><i>RE</i>   | (2)<br><i>FE</i>  | (3)<br><i>RE</i>   | (4)<br><i>FE</i>   |
|------------------------------------------------------|--------------------|-------------------|--------------------|--------------------|
| Management practices                                 | 0.311<br>(3.09)*** | 0.282<br>(2.37)** | 0.290<br>(2.22)**  | 0.232<br>(1.69)*   |
| Workplace health promotion                           | 0.028<br>(0.59)    | 0.005<br>(0.10)   | -0.304<br>(2.14)** | -0.312<br>(2.05)** |
| Family friendly practices                            | -0.069<br>(1.26)   | -0.076<br>(1.32)  | 0.086<br>(0.52)    | -0.003<br>(0.02)   |
| Management practices x<br>workplace health promotion | ---                | ---               | 0.533<br>(2.45)**  | 0.501<br>(2.18)**  |
| Management practices x<br>family friendly practices  | ---                | ---               | -0.273<br>(1.03)   | -0.132<br>(0.48)   |
| $R^2$                                                | 0.067              | 0.075             | 0.068              | 0.080              |
| Number of establishments                             | 678                | 678               | 678                | 678                |
| Number of observations                               | 1356               | 1356              | 1356               | 1356               |

Dependent variable: Ln(productivity). The table shows the estimated coefficients. Z-statistics are in parentheses. Standard errors are clustered at the establishment level. Control variables are included, but are suppressed to save space. \*\*\* Statistically significant at the 1% level; \*\* at the 5% level.

**Figure 1:** The Influence of WHP on Productivity



Note: The figure is based on regression (4) of Table 2.

## Appendix

**Table A1:** Items of the Management Score

| Question                                                                                                                                                                                                           | Answer categories                                                                                                                                           | Score |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Monitoring</b>                                                                                                                                                                                                  |                                                                                                                                                             |       |
| What happened at this firm when a problem in the production process arose?                                                                                                                                         | No action was taken.                                                                                                                                        | 0     |
|                                                                                                                                                                                                                    | We fixed it, but did not take further action.                                                                                                               | 1/3   |
|                                                                                                                                                                                                                    | We fixed it and took action to make sure that it will not happen again.                                                                                     | 2/3   |
|                                                                                                                                                                                                                    | We fixed it, took action to make sure that it will not happen again, and had a continuous improvement process to anticipate problems like these in advance. | 1     |
| How many key performance indicators were used at this firm? <i>Examples for key performance indicators are: metrics on production, cost, output, quality, inventory, energy, absenteeism and delivery on time.</i> | No performance indicators                                                                                                                                   | 0     |
|                                                                                                                                                                                                                    | 1-2                                                                                                                                                         | 1/4   |
|                                                                                                                                                                                                                    | 3-9                                                                                                                                                         | 2/4   |
|                                                                                                                                                                                                                    | 10-49                                                                                                                                                       | 3/4   |
|                                                                                                                                                                                                                    | 50 or more                                                                                                                                                  | 1     |
| How frequently did <u>managers</u> take performance indicators into account when making decisions? <i>A manager is someone with a supervisory function.</i>                                                        | Never                                                                                                                                                       | 0     |
|                                                                                                                                                                                                                    | Yearly                                                                                                                                                      | 1/6   |
|                                                                                                                                                                                                                    | Quarterly                                                                                                                                                   | 2/6   |
|                                                                                                                                                                                                                    | Monthly                                                                                                                                                     | 3/6   |
|                                                                                                                                                                                                                    | Weekly                                                                                                                                                      | 4/6   |
|                                                                                                                                                                                                                    | Daily                                                                                                                                                       | 5/6   |
|                                                                                                                                                                                                                    | Hourly or more frequently                                                                                                                                   | 1     |
| How frequently did <u>non-managers</u> take performance indicators into account when making decisions? <i>A non-manager is an employee without supervisory function.</i>                                           | Never                                                                                                                                                       | 0     |
|                                                                                                                                                                                                                    | Yearly                                                                                                                                                      | 1/6   |
|                                                                                                                                                                                                                    | Quarterly                                                                                                                                                   | 2/6   |
|                                                                                                                                                                                                                    | Monthly                                                                                                                                                     | 3/6   |
|                                                                                                                                                                                                                    | Weekly                                                                                                                                                      | 4/6   |
|                                                                                                                                                                                                                    | Daily                                                                                                                                                       | 5/6   |
|                                                                                                                                                                                                                    | Hourly or more frequently                                                                                                                                   | 1     |
| Did this firm have production display boards and where were they located?                                                                                                                                          | We did not have any display boards.                                                                                                                         | 0     |
|                                                                                                                                                                                                                    | All display boards were located in one place (e. g. at the end of the production line).                                                                     | 1/2   |
|                                                                                                                                                                                                                    | Display boards were located in multiple places (e.g. at multiple stages of the production line).                                                            | 1     |
| <b>Targets</b>                                                                                                                                                                                                     |                                                                                                                                                             |       |
| What was the time frame of production targets at this firm? <i>Examples for production targets are: production, quality, efficiency, output, delivery on time.</i>                                                 | No production targets                                                                                                                                       | 0     |
|                                                                                                                                                                                                                    | Main focus was on short-term (less than one year) production targets                                                                                        | 1/3   |
|                                                                                                                                                                                                                    | Main focus was on long-term (more than one year) production targets                                                                                         | 2/3   |
|                                                                                                                                                                                                                    | Combination of short-term and long-term production targets                                                                                                  | 1     |
| Who was aware of the production targets at this firm?                                                                                                                                                              | Does not apply; no production targets                                                                                                                       | 0     |
|                                                                                                                                                                                                                    | Only managers                                                                                                                                               | 1/4   |
|                                                                                                                                                                                                                    | Most managers and some non-managers                                                                                                                         | 2/4   |
|                                                                                                                                                                                                                    | Most managers and most non-managers                                                                                                                         | 3/4   |
|                                                                                                                                                                                                                    | All managers and most non-managers                                                                                                                          | 1     |
| How easy or difficult was it for this firm to achieve its production targets?                                                                                                                                      | Firm did not have any production targets.                                                                                                                   | 0     |
|                                                                                                                                                                                                                    | Firm did not achieve production targets.                                                                                                                    | 0     |
|                                                                                                                                                                                                                    | Firm achieved production targets without much effort.                                                                                                       | 1/3   |
|                                                                                                                                                                                                                    | Firm achieved production targets with some effort.                                                                                                          | 2/3   |
|                                                                                                                                                                                                                    | Firm achieved production targets with normal amount of effort.                                                                                              | 1     |
|                                                                                                                                                                                                                    | Firm achieved production targets with more than normal effort.                                                                                              | 2/3   |
|                                                                                                                                                                                                                    | Firm achieved production targets with a lot of effort.                                                                                                      | 1/3   |

| Incentives                                                                                                                 |                                                                                                                                 |     |
|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----|
| What were <u>managers</u> ' performance bonuses usually based on?                                                          | No performance bonuses                                                                                                          | 0   |
|                                                                                                                            | Company's performance                                                                                                           | 1/4 |
|                                                                                                                            | Establishment's performance                                                                                                     | 2/4 |
|                                                                                                                            | Team performance                                                                                                                | 3/4 |
|                                                                                                                            | Own performance                                                                                                                 | 1   |
| What percent of the <u>managers</u> at this firm received performance bonuses if the necessary requirements were met?      | No performance bonuses                                                                                                          | 0   |
|                                                                                                                            | No one met the requirements.                                                                                                    | 0   |
|                                                                                                                            | 1 to 33%                                                                                                                        | 1/4 |
|                                                                                                                            | 34 to 66%                                                                                                                       | 2/4 |
|                                                                                                                            | 67 to 99%                                                                                                                       | 3/4 |
|                                                                                                                            | 100%                                                                                                                            | 1   |
| What were <u>non-managers</u> ' performance bonuses usually based on?                                                      | No performance bonuses                                                                                                          | 0   |
|                                                                                                                            | Company's performance                                                                                                           | 1/4 |
|                                                                                                                            | Establishment's performance                                                                                                     | 2/4 |
|                                                                                                                            | Team performance                                                                                                                | 3/4 |
|                                                                                                                            | Own performance                                                                                                                 | 1   |
| What percent of the <u>non-managers</u> at this firm received performance bonuses, if the necessary requirements were met? | No performance bonuses                                                                                                          | 0   |
|                                                                                                                            | No one met the requirements.                                                                                                    | 0   |
|                                                                                                                            | 1 to 33%                                                                                                                        | 1/4 |
|                                                                                                                            | 34 to 66%                                                                                                                       | 2/4 |
|                                                                                                                            | 67 to 99%                                                                                                                       | 3/4 |
|                                                                                                                            | 100%                                                                                                                            | 1   |
| What was the primary way <u>managers</u> were promoted at this establishment?                                              | There were no promotions.                                                                                                       | 0   |
|                                                                                                                            | Promotions were based mainly on factors such as tenure, family connections or age.                                              | 0   |
|                                                                                                                            | Promotions were based partly on performance and ability, and partly on other factors such as tenure, family connections or age. | 1/2 |
|                                                                                                                            | Promotions were based solely on performance and ability.                                                                        | 1   |
| What was the primary way <u>non-managers</u> were promoted at this establishment?                                          | There were no promotions.                                                                                                       | 0   |
|                                                                                                                            | Promotions were based mainly on factors such as tenure, family connections or age.                                              | 0   |
|                                                                                                                            | Promotions were based partly on performance and ability, and partly on other factors such as tenure, family connections or age. | 1/2 |
|                                                                                                                            | Promotions were based solely on performance and ability.                                                                        | 1   |
| How long did it usually take to reassign or dismiss under-performing <u>managers</u> ?                                     | Never reassigned or dismissed low performers                                                                                    | 0   |
|                                                                                                                            | More than 6 months                                                                                                              | 1/2 |
|                                                                                                                            | Less than 6 months                                                                                                              | 1   |
| How long did it usually take to reassign or dismiss under-performing <u>non-managers</u> ?                                 | Never reassigned or dismissed low performers                                                                                    | 0   |
|                                                                                                                            | More than 6 months                                                                                                              | 1/2 |
|                                                                                                                            | Less than 6 months                                                                                                              | 1   |

The aggregated management score is the unweighted average of the scores of the 16 items.

**Table A2:** Definitions and Descriptive Statistics of the Control Variables

| <i>Variable</i>                    | <i>Definition</i>                                                                                                                                  | <i>Mean<br/>(Std. dev.)</i> |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Ln(size)                           | Log of number of employees.                                                                                                                        | 4.375<br>(0.976)            |
| Ln(capital intensity)              | Log of capital intensity. The average capital intensity by region and industry has been calculated by using data from the IAB Establishment Panel. | 12.305<br>(1.377)           |
| University graduates, non-managers | Dummy equals 1 if more than 10% of the non-managerial employees have a university degree.                                                          | 0.223<br>(0.416)            |
| University graduates, managers     | Share of managerial employee who have a university degree.                                                                                         | 0.373<br>(0.304)            |
| High competition                   | Dummy equals 1 if the firm faces very strong competition.                                                                                          | 0.418<br>(0.493)            |
| Exporter                           | Dummy equals 1 if the firm exports its products or services.                                                                                       | 0.708<br>(0.455)            |
| Subsidiaries abroad                | Dummy equals 1 if the firm has one or more subsidiaries abroad.                                                                                    | 0.211<br>(0.408)            |
| Product innovation                 | Dummy variable equal 1 if the firm launched a new product or service (0.613; 0.487)                                                                | 0.613<br>(0.487)            |
| Foreign owner                      | Dummy equals 1 if a foreign owner is the majority owner of the firm.                                                                               | 0.120<br>(0.325)            |
| Family firm                        | Dummy equals 1 if a family is the majority owner of the firm (0.631; 0.483).                                                                       | 0.632<br>(0.482)            |
| Collective agreement               | Dummy equals 1 if the firm is covered by a collective bargaining agreement.                                                                        | 0.393<br>(0.489)            |
| Works council                      | Dummy equals 1 if the firm has a works council.                                                                                                    | 0.436<br>(0.496)            |
| Year dummy 2013                    | Dummy equals 1 if the observation is from the year 2013.                                                                                           | 0.500<br>(0.500)            |
| Urbanization dummies               | Three dummies for the urbanization of the region the firm is located in.                                                                           | ---                         |
| Industry dummies                   | Four dummies for industries within manufacturing.                                                                                                  | ---                         |

N = 1356

**Table A3: Full Results**

|                                                      | (1)<br><i>RE</i>     | (2)<br><i>FE</i>     | (3)<br><i>RE</i>     | (4)<br><i>FE</i>     |
|------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
| Management practices                                 | 0.311<br>(3.09)***   | 0.282<br>(2.37)**    | 0.290<br>(2.22)**    | 0.232<br>(1.69)*     |
| Workplace health promotion                           | 0.028<br>(0.59)      | 0.005<br>(0.10)      | -0.304<br>(2.14)**   | -0.312<br>(2.05)**   |
| Family friendly practices                            | -0.069<br>(1.26)     | -0.076<br>(1.32)     | 0.086<br>(0.52)      | -0.003<br>(0.02)     |
| Management practices x<br>workplace health promotion | ---                  | ---                  | 0.533<br>(2.45)**    | 0.501<br>(2.18)**    |
| Management practices x<br>family friendly practices  | ---                  | ---                  | -0.273<br>(1.03)     | -0.132<br>(0.48)     |
| Ln(size)                                             | -0.178<br>(3.97)***  | -0.251<br>(4.04)***  | -0.181<br>(4.02)***  | -0.255<br>(4.08)***  |
| Ln(capital intensity)                                | 0.058<br>(1.58)      | 0.063<br>(1.67)*     | 0.059<br>(1.61)      | 0.064<br>(1.72)*     |
| University graduates, non-<br>managers               | -0.011<br>(0.26)     | -0.057<br>(1.38)     | -0.010<br>(0.24)     | -0.058<br>(1.32)     |
| University graduates,<br>managers                    | 0.183<br>(1.67)*     | 0.080<br>(0.40)      | 0.178<br>(1.62)      | 0.063<br>(0.31)      |
| High competition                                     | -0.033<br>(1.34)     | -0.035<br>(1.37)     | -0.034<br>(1.39)     | -0.037<br>(1.45)     |
| Exporter                                             | 0.048<br>(1.09)      | 0.009<br>(0.21)      | 0.046<br>(0.97)      | -0.006<br>(0.15)     |
| Subsidiaries abroad                                  | 0.089<br>(1.98)**    | 0.022<br>(0.45)      | 0.089<br>(2.00)**    | 0.022<br>(0.46)      |
| Product innovation                                   | 0.019<br>(0.59)      | 0.000<br>(0.01)      | 0.020<br>(0.63)      | 0.002<br>(0.05)      |
| Foreign owner                                        | 0.141<br>(1.59)      | ---                  | 0.141<br>(1.59)      | ---                  |
| Family firm                                          | 0.026<br>(0.41)      | ---                  | 0.024<br>(0.38)      | ---                  |
| Collective agreement                                 | 0.005<br>(0.08)      | ---                  | 0.007<br>(0.10)      | ---                  |
| Works council                                        | 0.344<br>(5.00)***   | ---                  | 0.344<br>(5.00)***   | ---                  |
| Year 2013                                            | 0.004<br>(0.24)      | 0.030<br>(1.64)      | 0.006<br>(0.32)      | 0.032<br>(1.72)*     |
| Constant                                             | 10.929<br>(26.11)*** | 11.454<br>(23.50)*** | 10.950<br>(26.05)*** | 11.486<br>(23.41)*** |
| Urbanization dummies                                 | Included             | Included             | Included             | Included             |
| Industry dummies                                     | Included             | Included             | Included             | Included             |
| $R^2$                                                | 0.067                | 0.075                | 0.068                | 0.080                |
| Number of establishments                             | 678                  | 678                  | 678                  | 678                  |
| Number of observations                               | 1356                 | 1356                 | 1356                 | 1356                 |

Dependent variable: Ln(productivity). The table shows the estimated coefficients. Z-statistics are in parentheses. Standard errors are clustered at the establishment level. \*\*\* Statistically significant at the 1% level; \*\* at the 5% level; \* at the 10% level.

## Endnotes

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<sup>1</sup> According to Google Scholar, Bloom and Van Reenen's initial study has received more than 4,700 cites (as assessed on 21 July 2025).

<sup>2</sup> Already Adam Smith (1776) recognized that performance pay creates incentives for workers to ruin their health by overworking themselves.

<sup>3</sup> See Table A3 for the full results.

<sup>4</sup> This is calculated as  $100 \times (\exp(0.232 \times 0.2 + 0.501 \times 0.2 \times 0) - 1) = 4.75\%$ .

<sup>5</sup> This is calculated as  $100 \times (\exp(0.232 \times 0.2 + 0.501 \times 0.2 \times 0.3) - 1) = 7.96\%$ .