Do White Collar Employee Incentives Improve Firm Profitability?

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Abstract:

We use proprietary archival compensation panel data from Finnish white-collar employees (WCEs) over the period of 2002 to 2011 in order to examine the relationship between performance-based incentives for WCEs and the future profitability of the firm as well as determine whether this association is moderated by task complexity. While many studies examine the determinants and performance effects of CEO compensation, virtually no evidence has been presented to indicate that explicit financial incentives for WCEs improve the profitability of the firm. Our empirical results show that performance-based incentives for WCEs are significantly positively related to the future Return-on-Assets, Return-on-Equity and Profit Margin ratios of the firm. We also find that this effect comes from the performance-based incentives for low-level WCEs, corroborating the importance of implementing performance-based incentives also to low-task complexity jobs.

JEL Classification: M40

Keywords: White-collar employees, Performance-based incentives, Firm profitability, Task complexity

I. INTRODUCTION

This study examines the relationship between performance-based incentives for white-collar employees (WCEs) and the future profitability of the firm as well as whether this association might be moderated by task complexity. For this purpose, we use a large proprietary compensation panel data set including over 564,000 individual employee-year and 7,820 firm-year observations from Finnish manufacturing firms over the years 2002-2011.

Performance-based incentives have become a key, widespread component of management control systems at every organizational level (Banker et al., 2001; Merchant et al., 2011; Merriman and Deckop, 2007). Given mandatory disclosure of information concerning top-management compensation in listed companies (Prendergast, 1999), most of the academic and practitioner literature on variable pay has focused on incentives for chief executive officers (CEOs) or other top executives of listed firms (see reviews by Lambert and Larcker, 1987; Lambert, 2001; Tosi et al., 2000). Although these studies are important for understanding the performance effects of incentive systems, they may provide

little information about the relationship between incentives and profitability for the majority of workers, who have substantially less wealth and less influence on firm performance than CEOs.

Despite the dramatic increase in the proportion of WCEs in industrialized countries (Hopp et al., 2009), only a handful of studies have looked at the effects of incentive systems in this important employee population, which accounts for 60 to 75 percent of the workforce (Ramirez and Nembhard, 2004). Among the exceptions, Baik et al. (2012) analyze a compensation dataset of 1.2 million WCEs in technology-oriented U.S. firms and report an inverse association between the use of long-term equity-based incentives to retain employees and WCEs' firm-specific human capital and productivity. Yet, Baik et al. (2012) have overlooked the potential relationship between WCE compensation and firm performance.

Firms are operated by employees, holding different skills, knowledge and responsibilities at various hierarchical levels and with varying task complexities, but possessing comparable capacity to influence firm performance (Frow, Marginson and Ogden, 2005; Kujansivu and Oksanen, 2010; Stajkovic and Luthans, 2001). Heads of large divisions, for example, have more narrowly defined decision rights than CEOs, but bear direct responsibilities and risks for a subset of key outcomes in the firm (Aggarwal and Samwick, 2003). Therefore, the disproportionate research focusing on CEOs' pay-performance relationship overlooks critical organizational architecture issues related to asymmetric information, levels of discretion and contractual incompleteness, which are intrinsic to the tasks carried out by WCEs (Aghion et al., 2013; Friis et al., 2015). Because WCEs are neither blue-collar workers (BCEs), who exert substantial physical effort in their routine tasks, nor top management, possessing extensive decision rights, the performance effects of incentive systems for WCEs still remain an unexplored empirical topic (e.g.

Belfield and Marsden 2003; Kauhanen and Piekkola, 2006; O'Shaughnessy 1998). Given the central role of financial incentives in organizational functioning and for employees at lower hierarchical levels (Kihn, 2007; Du, Deloof and Jorissen, 2013), research is needed on the association between incentives at lower hierarchical levels and firm performance. Moreover, the diversity of tasks performed by WCEs offers an interesting setting to examine whether the performance effect of incentives is affected by job-related attributes, such as task complexity (Bonner and Sprinkle, 2002). These insights create the main motivation for our study.

Previous agency-based analytical studies show that task complexity decreases firms' use of financial incentives due to unobservable dimensions of individual performance (Holmstrom and Milgrom, 1991) and the noisiness of the performance measure (Prendergast, 1999). Complex tasks require task-specific strategies and knowledge for proper completion (Bailey and Fessler, 2011), resulting in a low sensitivity of firm performance to increases in effort (Bonner et al., 2000). On the other hand, complex tasks are more difficult to monitor, suggesting that the benefits of contracting on outputs could be high. The benefits of incentive compensation would therefore be greater for complex jobs, where there is an overall measure of performance (Prendergast, 2002; Raith, 2008). Such an overall measure is available for top management, where output measures such as firm profitability and stock returns are available as bases for incentive compensation, but for other employees with higher job complexity no complete performance measure of their job performance is available. Therefore, we argue, that for lower-complexity tasks, incentive compensations are more effective, even though their level would be lower, if compared to higher-complexity non-executive tasks. Accordingly, in our empirical analysis, we classify employees according to their organizational status, responsibilities

and task description (Elinkeinoelämän Keskusliitto, The Confederation of Finnish Industries, 2011), resulting in three WCE groups with different degrees of task complexity.

A further motivation for our study is recent calls in the literature to examine the performance effects of incentive systems across national contexts (Tsui, Nifadkar, and Ou, 2007), and more specifically in contexts different from the U.S., from which most of the previous pay-performance evidence has been derived (Tosi et al., 2000; Makri, Lane, and Gomez-Mejia, 2006; Merchant et al. 2011). We use data from Finland, where WCEs represent 40 percent of the labor force, and where labor unions have a very strong role in the centralized salary negotiation system (Alho and Pekkarinen, 2004). Interestingly, incentive compensation is not covered in these negotiations; instead, each company has the freedom to design its own incentive system, leaving room for divergence in the structure and level of incentive compensation. Thus, the Finnish context offers an interesting research setting to examine not only the effect of incentive compensation for WCEs on firm future performance but also whether task complexity might have any moderating role in this relationship.

Our empirical findings can be summarized as follows. First, we show that the majority of our sample firms (52.6 percent) have paid performance-based incentives to WCEs during the sample period at an average rate of 1.78 percent of the total pay, varying from 0 to 44.64 percent. In the subsample of firms that pay performance-based incentives to WCEs, the average rate is 4.16 percent. For non-executive managers, performance-based incentives constitute on average 6.81 percent of their total pay, for experts 4.17 percent and for WCEs in routine tasks 3.73 percent. Second, we document a significantly positive association between the proportion of the WCE's performance-based incentives and the future profitability of the firm over the next two years. More precisely, we find that a one percentage point increase in WCE performance-based incentive increases the future *ROA*

of the firm by about 0.21 percentage points. Finally, we predict and find that the relationship between performance-based incentives and the firms' future profitability differs across the WCEs' organizational status, being significant only for WCEs who perform less complex tasks. Our results suggests that a one percentage point increase in the performance-based incentive for WCEs at the low-level task-complexity increases future *ROA* by about 0.38 percentage points. Moreover, we find that for low-level WCEs, this relationship plays an important role only when performance-based incentive compensation is large enough, i.e. exceeding 5 percent of fixed salary.

Our results provide new insights into the moderating effect of employee's occupational characteristics on the association between performance-based incentive compensation and the firm's future profitability (Bonner and Sprinkle, 2002; Evans et al., 2006; and Bai, Coronado and Krishnan, 2010). As for managerial implications, our results suggest that firms have not recognized the benefits of paying performance-based incentives for low-level WCEs. More specifically, our findings suggest that performance-based incentives are extensively used for mid- and high-level WCEs, while they could be used more often and more extensively also for WCEs with less complex tasks. It is worth noting that our results remain essentially unchanged after controlling for key firm characteristics, industry- and year-fixed effects, as well as alternative measures of firm financial performance. Since performance-based incentives and firm future performance can be endogenously determined in a complex system, one can never entirely rule out endogeneity concerns, including correlated omitted variables and reverse causality. Our additional analyses, however, suggest that causality flows from the low-level WCEs' performance-based incentives to the firm's future performance.

Our findings contribute to the literature on management control systems and incentive systems in three main respects. First, to our knowledge, this is the first archival study with

both longitudinal and cross sectional data to explore the effect of performance-based incentives for WCEs on firm financial performance. Prior research has focused on the performance effects of incentives for top executives (e.g. Elsilä et al., 2012; Hanlon et al., 2003; Jensen and Murphy, 1990; Sun et al., 2009), or the performance effects of blue-collar worker incentives (e.g. Bhargava 1994; Conyon and Freeman, 2001; Fizroy and Kraft, 1986; Kraft and Ugarkovic, 2006; Zhuang and Xu, 1996). Moreover, the few prior studies on the performance effects of WCE incentives examine this issue within a single organization (Evans et al. 2006; Ederhof, 2011; Friis et al., 2015). Second, our study not only compares the performance effect of incentive compensation across firms but also across WCEs with different task complexities. Recent research suggests that the effectiveness of incentive compensation depends on job related attributes, specifically in terms of the breadth of tasks, discretion and specific knowledge (Raith, 2008; Hwang, Erkens and Evans, 2009; Ortega, 2009). Hence, our study empirically extends the implications of this prior research by exploring the intervening effect of WCEs' task complexity. Third, our study builds on the research framework proposed by Bonner and Sprinkle (2002), and extends the empirical evidence about WCE incentives documented by Evans et al. (2006) and Baik et al. (2012).

The remainder of this paper is organized as follows: Section 2 presents the theoretical background and develops our research hypothesis. Section 3 highlights the national context in which our study is conducted, namely Finland, and describes the sample, data sources, and variables. Section 4 presents the results of our analysis and Section 5 presents our conclusions.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Performance-based incentives for WCEs and future profitability of the firm

Management control systems, and more specific performance measurement systems, provide performance information to evaluate and reward employees, and play an important role in motivating individuals to achieve higher performance. Such information is primarily used to motivate individuals by linking compensation with employees' effort and performance. In this framework, incentives influence employee's choice of effort level, and effort affects performance (Baker, 1992; 2002; Raith 2008; Hwang, Erkens and Evans, 2009; Aghion et al., 2013).

Along this line of reasoning, the agency perspective justifies the use of performance-based incentives by the risk associated with the incompleteness of the employment contract, which may be minimized by aligning employees' financial interests to the organization's financial and non-financial goals (Eisenhardt, 1989; Indjejikian, 1999; Banker et al. 2000a,b). More specifically, the benefits of performance-based incentives on firm performance tend to be explained by two distinct forces. First, incentive compensation motivates employees to exert effort in a way that is consistent with the objectives of the firm. Second, these contracts can be structured in order to encourage more productive employees to self-select into the firm (Prendergast 1999, Bonner and Sprinkle 2002). Performance-based incentive is therefore considered to be a mechanism for aligning the interests of employees and employers, especially when the work output is either difficult to measure or difficult to assign to an individual (Baker, 1990; Kauhanen and Piekkola, 2006), which is the case of non-executive white-collar work (Drucker, 1999; Ramirez and Nembhard, 2004). Furthermore, aligning company and employee interests becomes increasingly essential with the increasing misuse of resources in today's organisations, the increasing decentralisation of decision rights and increasing use of capital-intensive production technology (Belfield and Marsden, 2003).

However, most studies investigating the use and the effects of performance-based incentives have focused on CEOs or a firm's entire workforce, combining white- and blue-collar employees (e.g. Jenkins Jr. et al., 1998; Bonner and Sprinkle, 2002; and Tosi et al., 2000). Yet, WCEs' jobs differ from those of both CEOs and BCEs. While the CEO is at the top of the corporate hierarchy and has responsibility for all areas of corporate performance (Aggarwal and Samwick, 2003), BCEs are manual workers who are often hourly salaried (Coates, 1986). WCEs, who are often positioned between these two groups, refers to those non-manual, salaried office workers (e.g. supervisors, clerks, professionals, and senior managers) who perform more-complex tasks and who use specific knowledge as a resource or as the output of their work process (Coates 1986; Drucker, 1999; Kujansivu and Oksanen, 2010).[1]

White-collar work is therefore characterized as non-routine, individual, and knowledge-based, which means that white-collar tasks are less precisely defined and therefore more difficult to monitor (Baker, 1990; Hopp et al., 2009; Baik et al., 2012). In addition, WCEs are assumed to have more autonomy (Drucker, 1999). Consequently, their choices are not restricted to increasing effort, but also include making correct and timely decisions (Indjejikian, 1999). It is also more difficult to measure the performance of WCEs than that of BCEs (e.g., Baker 2000, Belfield & Marsden 2003), as it usually entails multidimensional and subjective assessment (Remirez and Nembhard, 2004; Hopp et al. 2009, Baik et al. 2012; Ederhof 2011).

Theory also indicates that the pay-performance association depends on the relative importance of incentives (e.g. Rynes et al., 2004; McCausland et al., 2005) and the extent to which employees perceive these incentives as being explicitly tied to specific and

[1] Actually, white-collar work and knowledge work are related concepts. The term knowledge work was for some time known as white-collar work (Ramirez and Nembhard 2004). Drucker (1999), for instance, emphasizes that knowledge workers manage themselves and have some autonomy.

controllable outcome (e.g. Judge et al., 2001; Giraud et al., 2008; Bellavance et al., 2013). Accordingly, workers with weak incentive pay may actually perceive performance-based incentives as a distraction from the non-pecuniary aspects of work that provide intrinsic motivation (e.g., Frey and Jegen 2001). In contrast, workers receiving higher incentive pay tend to perceive performance-based incentives as a reflection of their competence, personal worth, and status in the organizational hierarchy (Malka and Chatman 2003; McCausland et al. 2005), and it is this feeling of being in a control of their pay that increases their motivation and performance (Eisenberger et al. 1999). Consistent with this literature, we expect that the WCEs' performance-based incentives are positively associated with the future profitability of the firm, as summarized in our first hypothesis:

Hypothesis 1: Performance-based compensation for WCEs is positively associated with the firm's future profitability.

2.2 Task complexity, performance-based incentive and future profitability

Agency theory-based models suggest that employees with more complex tasks may also have more private information and greater discretion about the optimal distribution of efforts across multiple tasks. Incentive compensation can therefore be regarded as a substitute for direct monitoring, given the difficulties in observing their performance outcomes (e.g., Banker et al., 2000; 2001; Eisenhardt, 1989; Prendergast 2002). Based on Holmstrom and Milgrom's (1991) agency-based model, the optimal contracting literatures suggests, that because complex jobs contain unobservable dimensions of performance, rewarding only on the basis of observable outcomes may have adverse effects. On the other hand, it has also been suggested that because complex tasks are difficult or costly to monitor, the benefits of contracting based on the works outputs can be particularly high in complex tasks (e.g., Prendergast, 2002; Raith, 2008; Bai, Coronado and Krishnan, 2010).

Also, since knowledge and procedures are not easily pre-specified in complex jobs, employees in these positions are typically given more discretion in their effort allocation and job scheduling (Ortega, 2009. Consequently, WCEs' pay-performance relationship can be influenced by factors other than the relative importance of performance-based incentives, such as task complexity (e.g. Bailey and Fessler, 2011; Bonner and Sprinkle, 2002; Evans et al., 2006).

Complex tasks involve a larger number of components, require greater coordinative activities, place higher information-processing demands, and are more dynamic than routine tasks (Wood, 1986; Henderson and Fredrickson, 1996). Complex tasks are also assumed to require task-specific strategies and knowledge for proper completion (Bailey and Fessler, 2011). As task complexity increases, the *"requirements for task-specific skills and knowledge increase, and performance outcomes become less sensitive to increases in effort and thus to performance-based incentives"* (Bonner et al., 2000: 22).[2] As Bonner and Sprinkle (2002: 321) suggests, the more complex the task, the less likely it is that piece-rate compensation will improve total performance when compared to the results of mere fixed salary (Bailey and Fessler, 2011). Accordingly, we contend that, as non-executive WCEs' task complexity increases, incentive compensation may not result in higher levels of firm performance.[3] In other words, the link between incentive pay and firm performance for complex tasks is likely to be weaker than for less complex tasks.

WCEs' work varies in terms of specific knowledge and task complexity (Hopp et al., 2009; Kauhanen and Napari, 2012; Kujansivu and Oksanen, 2010). Coates (1986) classifies WCEs' work into three categories: clerical, professional, and managerial. In contrast, Ray

[2] Bonner and Sprinkle (2002) provides experimental evidence that the more complex the task, the less likely it is that piece-rate compensation, a proxy for incentive pay, will improve total performance when compared to fixed-wage compensation.

[3] This incentive effect may not hold for those in top management positions, where outcomes such as stock price, sales growth, capital invested, or profitability, are easily observable and to a larger extent dependent on their decisions,.

and Sahu (1989) categorize WCEs' tasks into two types: routine (e.g., a supervisor's job controlling machines) and non-routine (e.g., an engineer's implementation of a job evaluation scheme). Recent literature corroborates these categorizations. Davenport et al. (2002) show that there are different task-specific skills, levels of responsibilities, and degree of task autonomy within WCEs. Building on this literature, we expect that the association between WCEs' performance-based incentives and a firm's future profitability varies according to the WCEs' task complexity. The specific knowledge and discretion that goes with WCEs' task complexity are likely to moderate the sensitivity of firm performance to an incremental effort by the WCE. More precisely, we expect that the pay-performance relationship tends to be weaker as the non-executive WCE's task complexity increases. This leads to our second research hypothesis:

Hypothesis 2: *The higher the WCE's task complexity, the weaker the positive association between the performance-based compensation for WCEs and the firm's future profitability.*

Figure 1 illustrates our second hypothesis on WCEs' task complexity and performance-based compensation and relates the hypothesis to the literature on BCEs' and CEOs' task complexity. The vertical axis of Figure 1 describes the level of task complexity. Specifically, BCEs have the lowest level of task complexity followed by WCEs in clerical, professional and managerial positions. Finally, CEOs have the highest level of task complexity. Prior research shows that increased task complexity leads to a greater need for incentive compensation (Prendergast, 2002; Raith, 2008; Bai, Coronado and Krishnan, 2010).

The horizontal axis of Figure 1 shows the complexity of the work output measures. The outcome measures of BCEs' work are typically simple, and consequently, it is easy to

construct comprehensive incentive compensation for them. Interestingly, output measures of CEOs' work are also simple including traditional financial performance measures, such as the profitability or stock return of the firm. For WCEs, the complexity of the work output measures varies significantly. In particular, WCEs in clerical positions have output measures that are very similar to those of BCEs, because simple output measures are adequate when the task complexity is low. However, the output of the work of WCEs in professional and managerial positions is complex, but there are no comprehensive output measures available. Thus, we argue, that due to lack of comprehensive output measure for professional and managerial WCEs, the effectiveness of their incentive compensation is low as suggested by Holmstrom and Milgrom (1991). Figure 2 summarizes the arguments that lead to our second hypothesis. Specifically, we expect to find a higher (lower) level of incentive compensation for WCEs in professional and managerial (clerical) positions, and that these incentives are ineffective (effective) in increasing the firm performance.

(Insert Figures 1 and 2 about here)

3. DATA ENVIRONMENT

3.1 The Finnish context

Finland provides an informative setting to investigate the effectiveness of performance-based incentives for WCEs for several reasons. In the early 1990s, Finland underwent a transition from a credit-based to a capital market-based financial system, which led to the liberalization of foreign investments. Furthermore, consequent to Finland's entry into the European Union (EU) in 1995, Finnish companies became more exposed to foreign competition (Piekkola, 2005), which in turn created a pressing need to adapt

management control systems to fit a more market-oriented economy (Jones et al., 2012; Kihn, 2007).

Finland is often classified as a corporatist political and economic system with centralised wage setting policies (D'Art and Turner, 2004; Asplund, 2007; Jones et al., 2012; Kauhanen and Napari, 2012). Labor unions have a strong presence in Finland with a union density of 85 percent in 2005 (Asplund, 2007). Each employee has the right to belong to a labor union with no say by employer. Centralized wage negotiations are usually held at an industry sector level with high coordination within each sector (Asplund, 2007). Fixed salaries have been the predominant form of compensation in these centralized wage negotiations. As a result, labor contracts are very homogenous across firms and industries, and focus on fixed salary increases in the form of index clauses, minimum tariff wages for each occupational category and job level, as well as a wage development guarantee system, i.e. the salary development should be equal in all sectors and for all wage earners (Asplund, 2007; Uusitalo and Vartiainen, 2009). Typically, the outcome of these negotiations has resulted to a significant increases in fixed salary, which has limited firms' opportunities to use incentive pay extensively. In addition, labor agreements have set legally enforceable minimum standards for all firms in a given industry sector. Therefore, labor agreements cover about 95 per cent of the total labor force (Asplund, 2007; Uusitalo and Vartiainen, 2009; Kauhanen and Napari, 2012).

Although Finnish firms implement labor agreements quite mechanically, there is increasing flexibility to agree on working hours and remuneration systems, including performance-based incentives at the firm level (Asplund, 2007). The ratio of performance-based incentives to fixed salary is relatively low among Finnish firms, but as pointed out by e.g. Jones et al. (2012), these incentives are extensively used in Finland, if compared to other developed countries. To illustrate, Jones et al. (2012) report that 66.9 percent of their

sample firms used performance-based incentives. Hence, Finnish firms provide incremental performance-based incentives also to their low-level employees who are lacking other compensation schemes such as equity ownership or stock options (Jones et al., 2012). Since performance-based incentives is by far the most important factor explaining differences in the pay structures across Finnish firms, the Finnish labor market offers a unique research setting for examining the role of WCEs' performance-based incentives in the future profitability of the firm.

3.2 Data sources

We obtain the data on each individual WCEs' pay structure from a survey questionnaire administrated by the Confederation of the Finnish Industries (EK)[4]. Although the survey covers the entire private sector, we have access only to data for manufacturing companies.[5] The questionnaire was systematically mailed to all Finnish-based member firms of EK in October of each year during our sample period, from 2002 to 2011. These companies represent over 70 percent of the Finnish GDP and employ about 950,000 people. Since EK conducts this survey regularly among its member firms as a basis for its official salary statistics, response rates are typically high. The survey package includes a cover letter explaining the purpose and details of the survey questionnaire and a link to the web site where respondents should complete the questionnaire. These respondents are representatives of the firms. In this study, we analyse manufacturing firms.

We use the ratio of performance-based pay to total pay for measuring WCEs' performance-based incentives. The performance-based pay in the data includes only cash

[4] The Confederation of Finnish Industries (http://ek.fi/en/) is the leading employers' business organisation in Finland. It represents the entire private sector, both industry and services, and companies of all sizes. In May 2011, EK had 16,000 member firms.

[5] We have access only to manufacturing companies, because the structure of the survey data bases does not allow merging data for service companies to that of manufacturing companies.

incentives and not equity incentives. The sample consists of private firms, where equity-based compensation is rare. For each firm *i* and year *t*, we first calculate the sum of performance-based pay[6] and the sum of total pay over all WCEs by using each individual WCE's pay data. All incentive compensation must be paid during year *t*, and the compensation could be paid either based on financial performance or another performance indicator of the previous year (i.e. *t-1*), or based on performance indicators of the first part (i.e. quarter or first six months) of the year. We then use these aggregated amounts to calculate the ratio of performance-based pay to total pay for each firm *i* in year *t*. We denote this variable as PBI_{it}.

Each WCE in the data is placed into one of five task complexity categories, which follow survey data regarding the WCEs' organizational status, responsibilities and task description according to the International Standard Classification of Occupations (ISCO) -classification. Level 1 WCEs are non-executive managers who have subordinates and comprehensive responsibility for managing a reporting unit, such as a division, a department, or a production line. WCEs at this level have a thorough knowledge of the managed operations and are responsible for and make decisions about the business strategy and the operations of the managed unit as a whole (e.g. the quality and quantity of production, budget, and recruitment of personnel). WCEs at Level 2 consist of senior specialists who work in demanding development and planning tasks and are accountable for the progress and results of their projects. Level 3 WCEs consist of technicians and professionals who work as specialists in planning and implementation positions. They are also responsible for the progress and performance of projects. Since WCEs at Levels 2 and 3 have rather similar tasks and responsibilities, we combine these levels in our analyses.

[6] Performance-based pay denotes cash payments related to the firms' profit-sharing or gain-sharing systems, i.e. the payments determined by the success of operations, which may be measured at a firm, team or individual level.

Finally, Level 4 consists of foremen with workers as direct subordinates, and Level 5 includes clerical support workers in departments such as customer service, bookkeeping, warehousing, sales, and production. Since WCEs at Levels 4 and 5 do more routine work than those at Levels 2 and 3, we combine these two groups into one for the purpose of our analysis (Elinkeinoelämän Keskusliitto, 2011).

This WCE-level survey data enables us to calculate PBI_{it} separately for these three subgroups of WCEs based on their task complexity (Coates, 1986; Hopp et al. 2009; Kujansivu and Oksanen, 2010). Accordingly, we calculate PBI_{it} separately for WCEs with high (non-executive managers, Level 1), middle (senior specialists and specialists, Levels 2 and 3) and low (foremen, office and customer service workers, back office staff, assistants, Level 4 and 5) levels of task complexity. We denote these variables as $PBI1_{it}$, $PBI2_{it}$, and $PBI3_{it}$, respectively.

The accounting data needed to calculate the profitability, size, and degree of financial leverage of each firm-year are obtained from a publicly available Voitto+ database maintained by the credit bureau Suomen Asiakastieto Ltd. This database contains the financial statement information of all Finnish firms. We match firm-year WCE data (the *PBI* variables) with the accounting data based on the firm-specific identification codes[7]. The resulting aggregated panel data set consists of 7,820 firm-year observations of 2,006 firms over the sample period from 2002 to 2011. Out of our panel data the great majority, 7,525 (96.2 percent) of the firm-year observations, are from non-listed firms. In addition, 74.9 percent of the firm-year observations are small and medium-sized enterprises as

[7] We obtained WCE-level data from the Confederation of Finnish Industries, who collects the data from their member firms. For firms larger than 30 employees it is compulsory to deliver the data annually. For smaller firms, the response rate is less than 50 percent. The original WCE-level data contains 1,106,804 person-year observations. After deleting erroneous observations with no salary or negative *PBI*, we end up with 1,106,740 person-year observations. We then aggregate these person-year data to firm-year data, which results in 14,279 firm-year observations. After combining these firm-year compensation data with the firm-level performance data, we have 8,887 firm-year observations. Finally, we truncate one percent on each side of the distributions of control variables as outliers.

defined by the European Commission. 53.49 percent (1,073) of the sample firms have paid performance-based pay to their WCE workers in at least one year in our sample. Similarly, 42.84 per cent (3,350) of the 7,820 firm-year observations includes performance-based pay paid to some WCE. Table 1 reports the breakdown of our sample by industry. We have also estimated all our models using the non-aggregated person-level panel data, that is, we have combined yearly accounting data with person-year pay data. Due to considerations of space, we report results using only the firm-year panel data and discuss the results based on the person-level data in Section 4.2 "Robustness Checks and Additional Analyses".

(Insert Table 1 about here)

Panel A in Table 2 reports the descriptive statistics of the sample firms. On average, there are 51 WCEs in one firm-year observation, of which 32 are males, thus representing 63 percent of the WCEs in our sample. Average salary is about 2,863 euros, which is equal to the average salary of 2,862 euros for the whole Finnish population[8], thereby indicating that these WCEs represent average paid workers. The WCEs' average age is 44 years and varies between 24 and 66 years. The results also show that sample firms are of varying size, with the average (median) total number of employees being 160 (72).

Panel B in Table 2 reports the summary statistics of the variables used in the analyses, i.e. all firms including those that used ($PBI_{it} > 0$) and did not use ($PBI_{it} = 0$) performance-based incentives for WCEs. The average proportion of WCE's performance-based incentives (PBI_{it}) is 1.78 percent of the total pay, with the median and maximum values being 0 and 44.64 percent, respectively. The descriptive statistics also show that the subgroups of highest-level ($PBI1_{it}$) and middle-level WCEs ($PBI2_{it}$) have the highest proportion of performance-based pay. We address this issue in more detail in the next

[8] See Elinkeinoelämän keskusliitto (2009).

section.

Finally, Panel C in Table 2 reports summary statistics for those firms that use performance-based incentives (i.e. $PBI_{it} > 0$). These results show that PBI_{it} is on average 4.16 percent of the total pay: for non-executive managers 6.81 percent of total pay, for experts 4.17 percent, and for WCEs in routine tasks 3.73 percent.

(Insert Table 2 about here)

3.3. Research methods and preliminary data analysis

We test our hypotheses by estimating the following pooled OLS regressions from our panel data:

$$ROA_{it+1} = \beta_0 + \beta_1 PBI_{it} + \beta_2 ROA_{it} + \beta_3 LNSALES_{it} + \beta_4 EQRATIO_{it} + \sum_{s=2003}^{2011} \alpha_s YEAR_s + \sum_{k=1}^{17} \alpha_k INDUSTRY_k + \varepsilon_{it}, \quad (1)$$

$$ROA_{it+1} = \beta_0 + \beta_1 PBI1_{it} + \beta_2 PBI2_{it} + \beta_3 PBI3_{it} + \beta_4 ROA_{it} + \beta_5 LNSALES_{it} + \beta_6 EQRATIO_{it} + \sum_{s=2003}^{2011} \alpha_s YEAR_s + \sum_{k=1}^{17} \alpha_i INDUSTRY_k + \varepsilon_{it}, \quad (2)$$

where ROA_{it+1} is the Return-on-Assets ratio[9] for firm *i* in year *t+1*, PBI_{it} is the ratio of performance-based pay to total pay for WCEs for firm *i* paid in year *t*, and $PBI1_{it}$ - $PBI3_{it}$ are WCE performance-based pay for either high-, middle-, or low-level WCEs divided by total pay in the respective WCE category (high-, middle-, or low-level) for firm *i* in year *t*. We include in Models (1) and (2) several control variables to account for the effect of other

[9] *ROA* is calculated as the ratio of Net Earnings and Financial Costs to Total Assets. Total Assets are calculated as the average of the beginning and ending balance sheets.

factors potentially affecting the profitability of the firm. First, we include the current profitability (ROA_{it}) to control for the autocorrelation in profitability. Second, firm size is likely to affect profitability, as smaller firms should be more profitable due to their greater risk. We therefore include in our models the natural logarithm of sales ($LNSALES_{it}$). Third, we include in the model the equity-to-debt ratio, as profitability should increase with the degree of financial leverage due to the increased riskiness of the firm ($EQRATIO_{it}$). Finally, we include indicator variables for each industry ($INDUSTRY_i$) and year ($YEAR_s$) to control for the effect of any omitted industry-level variable and temporal variation in the profitability of the firm. We estimate Models (1) and (2) using clustered standard errors as in Petersen (2009).

Table 3 reports the correlations between the variables. Consistent with our *Hypothesis 1,* the performance-based compensation (PBI_{it}) is significantly positively correlated with future profitability (ROA_{it+1}).The performance-based compensation for middle-level WCEs ($PBI2_{it}$) and low-level WCEs ($PBI3_{it}$) are significant and positively correlated with the future profitability at a 1 percent level, while that of the high-level WCEs ($PBI1_{it}$) is only at 10 percent level, as we use Spearman correlation, which is in line with our *Hypothesis 2*. The univariate analysis also shows that current and future profitability are highly correlated, thus confirming that firm profitability is highly auto-correlated and lagged profitability is hence needed in Models (1) and (2).

(Insert Table 3 about here)

4. RESULTS

4.1. White Collar Employee Performance-based Incentives and the Firm's Future Profitability

We first analyze whether the future profitability of the firm increases with the WCEs' performance-based incentives. We begin our empirical analysis by examining the univariate analyses, as shown in Table 4. We first separate firm-year observations for those firms that actually used WCE performance-based incentives in a given year (i.e. $PBI_{it}>0$) from those of firms that did not use WCE performance-based incentives (i.e. $PBI_{it}=0$). We then divide firm-year observations for firms that used WCE performance-based incentives into quartile portfolios of equal size based on the level of PBI_{it}. Table 4 also reports the average values for current and future profitability, firm size, and the degree of financial leverage for these categories of firm-year observations.

The results in Table 4 show that the future Return-on-Assets ratio (ROA_{it+1}) increases as we move from a quartile portfolio with the lowest level of non-zero PBI_{it} (category "Low") to a quartile portfolio with the highest level of PBI_{it} (category "High"). It is worth noting that ROA_{it+1} is relatively high among those firms that do not use WCE performance-based incentives at all (category "Zero"). The difference in ROA_{it+1} between the "High" and "Zero" PBI_{it} categories is highly significant. These results have two implications. First, some firms might decide to not implement WCE performance-based incentive systems – most likely because these firms do not expect gains from such systems due to their characteristics. In particular, these firms are smaller, implying that they are easier to monitor, and they use more debt-financing, indicating that they have a greater extent of external monitoring by debt holders compared to other firms in our sample. Their decision not to use WCE performance-based incentives appears to be the right managerial decision, as the profitability of these firms is comparable to that of the firms that use WCE performance-based incentive systems only to a limited extent (quartiles "Low" and "2"). This result is also consistent with the findings by Piekkola (2005), Brown et al. (2003), and Gneezy and Rustichini (2000), suggesting that the relationship between monetary

incentives and firm performance is not linear, but that the monetary incentive should be large enough to have desirable effects. Second, Table 4 corroborates empirical evidence provided by Rynes et al. (2004), McCausland et al. (2005), and Chong and Eggleton (2007) suggesting that the performance effects of incentive-based compensation increase with the relative importance of the rewards.

Regarding the other variables, the results reported in Table 4 show significant differences in all variables across the portfolios constructed by the variable PBI_{it}. In particular, the use of performance-based incentive systems for WCEs increases with firm size ($LNSALES_{it}$), which indicates that larger firms have a greater need to establish formal incentive systems and accountability mechanisms for their employees (Frye 1994; Frow et al., 2005). The use of WCE performance-based incentive systems also increases with the proportion of equity in the total capital of the firm ($EQRATIO_{it}$). This finding is consistent with CEO compensation literature reporting a negative relationship between the firm's leverage and pay-for-performance sensitivity (e.g. John and John, 1993). Moreover, similar results have also been reported for equity-based compensation for nonexecutive employees (Frye 1994) and financial participation in Finnish manufacturing companies (Kauhanen and Piekkola, 2006).

(Insert Table 4 about here)

Next, we estimate Models (1) and (2) to explore the effect of WCE performance-based incentives on the future profitability of the firm. Our results reported in column (1) of Table 5 show that the coefficient on PBI_{it}, the proportion of WCE performance-based incentives to total pay, is significantly positive at the 0.01 level. The magnitude of the regression slope for the variable *PBI* indicates that a one percentage point increase in WCE performance-based incentive increases the future *ROA* of the firm by about 0.21 percentage

points. These results are consistent with our *Hypothesis 1*, i.e. the use of performance-based incentives for WCEs improves the future profitability of the firm. Our results confirm the importance of considering mechanisms to increase accountability and foster WCEs' productivity (Frow et al., 2005) when firms have shifted revenue generating activities from manual work to knowledge work (Ramirez and Nembhard, 2004).

Regarding the control variables, as expected, the contemporaneous ROA_{it} has a significantly positive slope, indicating a strong positive auto-correlation in the profitability of the firm. Consistent with Aggarwal and Samwick (2003), the slope of the variable $EQRATIO_{it}$ has a predicted negative sign, whereas that of the variable $LNSALES_{it}$ is positive, which is unexpected (Frye 1994; Frow et al., 2005).

Our second hypothesis predicts that the effect of WCE performance-based incentives on a firm's future profitability is moderated by the WCEs' task complexity. More precisely, we expect this relationship to be stronger for WCEs with lower task complexity because the multidimensional and long-term performance perspective, implicit in more complex, non-routine tasks, lessens the link between the WCE's performance-based incentive and the firm's future profitability. Hence, we next test how WCE performance-based incentives at different levels of task complexities increase the future profitability of the firm by estimating Model (2). The results, reported in columns (2-5) in Table 5, show that the slope of the variable $PBI3_{it}$ is significantly positive, while that of the variables $PBI1_{it}$ and $PBI2_{it}$ are insignificant. In other words, the performance-based incentives aimed at the low-level WCEs significantly increase the future profitability of the firm, as predicted by our *Hypothesis 2.* The regression slope of the variable $PBI3_{it}$ indicates that a one percentage point increase in the performance-based incentive for WCEs at the low-level task-complexity increases future *ROA* by about 0.38 percentage points. We have also analyzed the threshold level of incentive compensation for low-level WCEs that triggers the positive

effect on the future performance of the firm. Our un-tabulated results show, that when the level of an incentive compensation exceeds 5 percent of the total pay, there is a significantly positive effect of $PBI3_{it}$ on the future profitability of the firm. We do not find such an effect when $PBI3_{it}$ is less than 5 percent.

These results support the notion that task complexity interacts with the level of rewards in promoting productivity (Bailey and Fessler, 2011). More specifically, in our sample of WCEs, the performance effect of incentive compensation decreases as task complexity increases, which is consistent with the experimental evidence presented by Bonner and Sprinkle (2002) and Bonner et al. (2000). This implies that performance-based incentives for WCEs are more effective, or at least more directly associated with firm future profitability, when the WCE task is less complex. This might be explained by the fact that the multidimensional and long-term performance perspective, implicit in more complex, non-routine tasks, may lessen the link between WCEs' performance-based incentive and the firm's future profitability. Our evidence is also in line with the findings of Evans et al. (2006), since we show that as task complexity increases, indicating greater information asymmetry and uncertainty assumed by the agents, the sensitivity of incentive compensation to performance decreases.

The result that only low-level WCEs' performance-based incentives improve firm performance is interesting, given the fact that the results reported in Table 2 showed the performance-based incentives to be significantly lower for low-level WCEs' than for mid- or high-level WCEs. In other words, performance-based incentives for low-level WCEs while small in magnitude, are still efficient in improving firm performance. Taken together, these results suggest that firms have not recognized the importance of paying performance-based incentives to low-level WCEs to the same extent as the other two WCE levels.

(Insert Table 5 about here)

4.2. Robustness Checks and Additional Analyses

Endogeneity issues such as correlated omitted variables and reverse causality are always potential problems in performance regressions. In our main analyses, we included in our models the current performance of the firm (ROA_{it}) to control for the fact that better performing firms are likely to pay greater levels of performance-based incentives. Next, we conduct several additional analyses to confirm the robustness of our results.

Other Profitability Measures as Dependent Variables

We re-estimated Models (1) and (2) with a two-years-ahead profitability (ROA_{it+2}) as the dependent variable to explore whether the incentive effect of *PBI* lasts longer than one year. The un-tabulated results were similar to those reported in Table 5. In other words, PBI_{it} is positively associated with a firm's two-years-ahead profitability (ROA_{it+2}), and when including PBI_{it} separately by subgroups of WCEs, the slope for the low-level task complexity subgroup ($PBI3_{it}$) is significantly positive, while that of middle- and high-level task complexity ($PBI1_{it}$ and $PBI2_{it}$) are insignificant. These findings provide additional support for our hypotheses, i.e. performance-based incentives for WCEs with low task-complexity have long-lasting positive influences on firm performance.

In order to verify that our results are not driven by the definition of our measure of firm performance (our dependent variable), we also estimate our models by using alternative performance measures — return-on-equity (ROE_{it+1}) and profit margin ($PROFMAR_{it+1}$) ratios.. The results of these estimations reported in Tables 6 and 7 remain materially similar as in Table 5. It is worth noting that we have also included in our models a measure of the firm's earnings management, i.e. total accruals, as an additional control variable. After the inclusion of total accruals, our results remain unchanged.

(Insert Table 6 and 7 about here)

Controlling for the level of salary paid to WCEs

We included in Models (1) and (2) the natural logarithm of the average salary paid to WCEs in the firm to control for the potential effect of the over-all level of the WCE compensation on firm performance. Specifically, we control for the average salary paid to all WCEs in the firm and the average salaries paid in each of the WCE levels. The un-tabulated results from these regressions were similar to those reported in Table 5.

Using salary as an alternative proxy for job complexity

We have used the level of the salary paid to WCEs as an alternative measure of job complexity. Specifically, we have classified WCEs into three groups of equal size based on the level of their salary. We have then estimated our models for these three groups. Although the level of the salary is a rough measure of job complexity, we include it in our models as a robustness check. The un-tabulated results from these regressions were similar to those reported in this paper.

Variability of the PBI variables

It is possible that paying incentive compensation to WCEs with lower task complexity ($PBI3_{it}$), who are assumed to have less decision rights and thereby limited effect on firm financial performance, is an indication of profit-sharing rather than productive incentive effects (Prendergast, 1999). Unfortunately, our data base does not provide information on the specific type of incentive compensation used for the different employee levels. However, we contend that WCEs in our sample are receiving productive incentives for the following reasons. First, if our results were more consistent with profit-sharing than with the productive incentives, we would expect to observe very similar levels of incentive compensation (as a percentage of salary) for employees of a given firm. Second, profit sharing would also be a more important element of incentive compensation (as a percentage of salary) for lower level employees, whereas for higher-level employees, incentive

compensation would contain more nuanced elements. Third, the level of incentive compensation would be very similar among the low-level employees, i.e. there would be less variation in the variable *PBI3*, compared to the variables *PBI1* and *PBI2* within the same firm-year observations. In order to investigate and support our argument, we analyze the variability of the three *PBI* variables for each WCE category (employee level) by calculating the coefficient of variation for each of the *PBI* variables for each firm-year observation. The un-tabulated results show that both the average and median coefficients of variation are of very similar magnitude in all WCE categories. Therefore, we contend that profit sharing is not the dominating force for incentive compensation in our data.

Determinants of the PBI variable

We shed more light on the determinants of performance-based incentives by estimating a model with the current *PBI* as the dependent variable as well as both the current and future *ROA* and the current *LNSALES* and *EQRATIO* as independent variables. We also include in the model the ratio of the number of low-level WCEs (Level 3) in the firm to the total number of WCEs (*WCE3RATIO*) to explore whether the firms consider task complexity when deciding the extent of their incentive system. The results of these analyses reported in Table 8 show that the future *ROA* is not significantly associated with the current *PBI*. More importantly, the proportion of the low-level WCEs to all WCEs in the firm is not related to the size of PBI for all employees. This evidence would suggest that firms do not take into account any firm-specific job complexity level. As we relate *WCE3RATIO* with *PBI* for each employee level, we find a positive significant relationship in each employee group. This relationship is strongest for Level 3 employees (the coefficient of $WCE3RATIO_{it}$ is 0.76 with $PBI3_{it}$, 0.15 with $PBI2_{it}$ and 0.35 with $PBI1_{it}$). Thus, firms with a higher proportion of Level 3 employees use much more variable compensation, especially for Level 3 employees. We interpret this result as evidence that firms which have mostly

low complexity jobs pay more variable compensation for those jobs. For those firms, this kind of compensation system makes sense, as it leads to better future performance.

(Insert Table 8 about here)

Changes in sample restrictions

As discussed in Section 3.2, we used firm level data in our analysis, where we aggregated the original person-level pay data. Hence, as a robustness test we also estimated Models (1) and (2) using the original person-level data. The dataset is obviously very large containing 564,389 individual observations. We estimated our models by using the entire person-level data and in a second step by randomly selecting one individual employee per firm. The results of both analyses were materially similar to those reported in our tables.

Some firms may not pay performance-based incentives because their current weak performance does not allow it. We control this effect by including in our models the current profitability (ROA_{it}). However, we have also addressed this issue by estimating our models excluding firm-year observations for firms that do not pay PBI in that particular year but which have paid PBI in some year during our study period. In other words, this dataset does not include firms that have adopted PBIs for their WCE, but do not pay PBI in a given year due to weak performance. Results from these regressions were essentially similar to those reported in the tables. Accordingly, while we cannot rule out endogeneity concerns such as reverse causality, the results of our additional analyses suggest that causality flows from incentives to the firm's future performance.

Within firm variation in task complexity

We have also addressed the endogeneity concerns by exploring within the firm variation in task complexity. Specifically, we first identify those WCEs who changed from

one task complexity level to another within the firm. We include in this subsample all firm-year observations with at least five WCEs changing their task level. The subsample contains 2,091 firm-year observations. The results based on this subsample are essentially similar to those reported so far. Specifically, PBI_{it} is statistically significant with the estimated coefficient of 0.27 (t-value 1.71), and in separate regressions, $PBI2_{it}$ and $PBI3_{it}$ are statistically significant with the estimated coefficients of 0.29 (t-value 1.75) and 0.32 (t-value 1.69), while $PBI1_{it}$ remains insignificant. All the control variables remain significant with the same signs as in Table 5.

5. CONCLUSIONS

In this study, we analyze a proprietary archival panel data set of Finnish firms to examine the effects of performance-based incentives for white-collar employees (WCE) on the future profitability of the firm. We also investigate the moderating role of task complexity in this association. Our data set for the sample period extending from 2002 to 2011 contains individual WCE pay structure data for firms representing more than 70 percent of the Finnish GDP and employing about 950,000 employees. To the best of our knowledge, this is the first archival study to examine the pay-performance relationship for WCEs. In Finland, with the presence of centralized wage negotiations and strong labor unions, labor contracts are homogenous across industries and firms, with fixed salaries being emphasized over incentive compensation (D'Art and Turner, 2004; Jones et al., 2012; Kauhanen and Napari, 2012), thus leaving variable compensation as a key differentiating element across firms. These characteristics offer an interesting setting to examine our research question.

Our results, based on 7,820 firm-year observations, show that performance-based incentives paid to WCEs improve future profitability of firms. Specifically, we find that a

one percentage point increase in WCE performance-based incentive increases the future *ROA* of the firm by about 0.21 percentage points. Our findings suggest that although implicit rewards play an important role for WCEs whose performance is difficult to measure (e.g. Baik et al., 2012), explicit financial incentives provide positive incentive effects (Chong and Eggleton, 2007). Moreover, our evidence suggests that performance-based incentives seem to be effective only for WCEs with less complex tasks, whereas for the groups of WCEs with managerial responsibilities and a high level of expertise (middle- and high-level of task complexity) a pay-performance relationship was not found. Specifically, a one percentage point increase in the performance-based incentive for low-level task-complexity employees increases future *ROA* of the firm by about 0.38 percentage points. Thus, for less complex WCE work, the commonly used theoretical perspectives supporting the benefits of incentive compensation seem to apply, whereas for more-complex WCE tasks, the incentive compensation does not lead to improved performance, as measured by firm profitability. This result corroborates the experimental evidence documented by Bonner and Sprinkle (2002).

Our results also suggest that the use of performance-based pay for WCEs has a positive relationship with future profitability, even in a country with a strong presence of labor unions. This is especially true for low-level WCEs, where fixed salaries dominate the pay structure. We also find that the performance effect lasts at least two years. These results remain essentially unchanged after using alternative measures of the firm's profitability and controlling for firm characteristics, such as earnings management, industry- and year-fixed effects. More importantly, our results are robust even after accounting for the potential endogenous relationship between performance-based incentives and firm profitability. Overall, our results extend the work by Merchant et al. (2011) on a cross-national comparison of managerial incentive compensation practices, as well as that of Bailey and

Fessler (2011) and Friis et al. (2015) concerning the elements explaining the effectiveness of incentive systems.

As with any empirical investigation, our study has some limitations. First, although our data set has several strengths (e.g., detailed WCE pay structures for a large sample of manufacturing firms over a lengthy period), our analysis would have been strengthened by more detailed data on whether WCE incentives are based on team or individual performance (e.g., profit sharing versus individual bonus). Second, whereas we examine management practices in an understudied context outside of North America (Merchant et al. 2011; Tsui et al., 2007), we were unable to control for firm-specific factors such as growth opportunities and the degree of a firm's decentralization, which might potentially influence the use, the risk, and the informativeness of performance metrics linked to incentive compensation (Evans et al., 2006; Bonner et al. 2000). Future studies could address these issues and more deeply explore the complementarities between other forms of incentive and control mechanisms in order to further examine the effects of compensation systems on WCE productivity and firm performance. This would require more detailed information about the characteristics of such reward systems and the companies in general. Examining interactions between different monitoring mechanisms and human resource practices, such as goal setting, employee participation, commitment, and formality in performance appraisal, would also constitute promising avenues for future research. Finally, there always remains the question of endogeneity between compensation and firm performance. Although our tests suggest that in our data set, causality mostly flows from incentives to firm performance, we cannot fully rule out endogeneity concerns, such as reverse causality. This issue remains an opportunity for further examination.

Our results have several managerial implications. First, introducing performance-based incentives for WCEs as an element in management control systems (a control

subsystem) seems to pay off at lower levels of task complexity, whereas for complex tasks the sensitivity of performance-based incentives and the firm's future profitability is less apparent. For these more complex skill-specific tasks, other mechanisms for monitoring and rewarding seem more fundamental than explicit incentive compensation (Giraud et al., 2008; Merchant et al., 2011). Second, the incentive effect seems to last not only one year but at least two years. Therefore, a direct short-term analysis concerning the benefits of performance-based incentives may underrate their influence on the profitability of companies. Third, because our findings suggest that the effect of incentive compensation is moderated by occupational characteristics of the employee, such as task complexity (e.g. Bailey and Fessler, 2011; Bonner and Sprinkle, 2002; Evans et al., 2006), our results are meaningful for all kinds of organizations considering the adoption of or changes in their compensation systems. Finally, adding to previous empirical evidence on the pay-performance relationship of WCEs (Aghion et al., 2013; Baik et al. 2012) and its sensitivity to task complexity (Bonner et al., 2000), our study draws managers' attention to the need for tailored rewarding strategies depending on the type of work carried out by WCEs.

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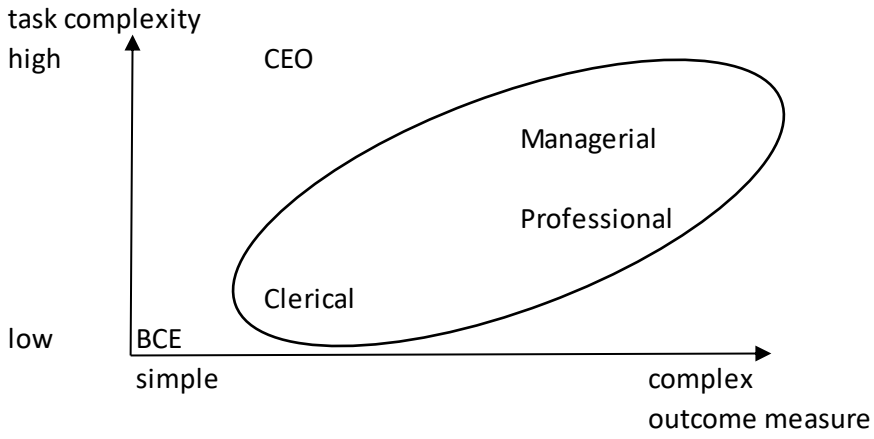
Appendix. Definition of the variables

PBI_{it}	The ratio of annual performance-based pay to total pay for WCEs in firm *i* in year *t* (in percentage terms).
PBI_{it+1}	The ratio of annual performance-based pay to total pay for WCEs in firm *i* in year *t+1* (in percentage terms).
$PBI1_{it}$	The ratio of annual performance-based pay to total pay for high-level WCEs (non-executive managers) in firm *i* in year *t* (in percentage terms).
$PBI1_{it+1}$	The ratio of annual performance-based pay to total pay for high-level WCEs (non-executive managers) in firm *i* in year *t+1* (in percentage terms).
$PBI2_{it}$	The ratio of annual performance-based pay to total pay for middle-level WCEs (specialists) in firm *i* in year *t* (in percentage terms).
$PBI2_{it+1}$	The ratio of annual performance-based pay to total pay for middle-level WCEs (specialists) in firm *i* in year *t+1* (in percentage terms).
$PBI3_{it}$	The ratio of annual performance-based pay to total pay for lower level WCEs (back office staff, assistants) in firm *i* in year *t* (in percentage terms).
$PBI3_{it+1}$	The ratio of annual performance-based pay to total pay for lower level WCEs (back office staff, assistants) in firm *i* in year *t+1* (in percentage terms).
ROA_{it}	Return-on-Assets ratio for firm *i* in year *t* (in percentage terms).
ROA_{it+1}	Return-on-Assets ratio for firm *i* in year *t+1* (in percentage terms).
$LNSALES_{it}$	The natural logarithm of sales for firm *i* in year *t.*
$EQRATIO_{it}$	The equity-to-total assets ratio for firm *i* in year *t.*
ROE_{it}	The ratio of net income to equity for firm *i* in year *t.*
ROE_{it+1}	The ratio of net income to equity for firm *i* in year *t+1*.
$PROFMAR_{it}$	The profit margin for firm *i* in year *t*.
$PROFMAR_{it+1}$	The profit margin for firm *i* in year *t+1*.
$WCE3RATIO_{it}$	The ratio of the number of lower level WCEs (back office staff, assistants) to total number of WCEs in firm *i* and year *t*.

Figure 1.

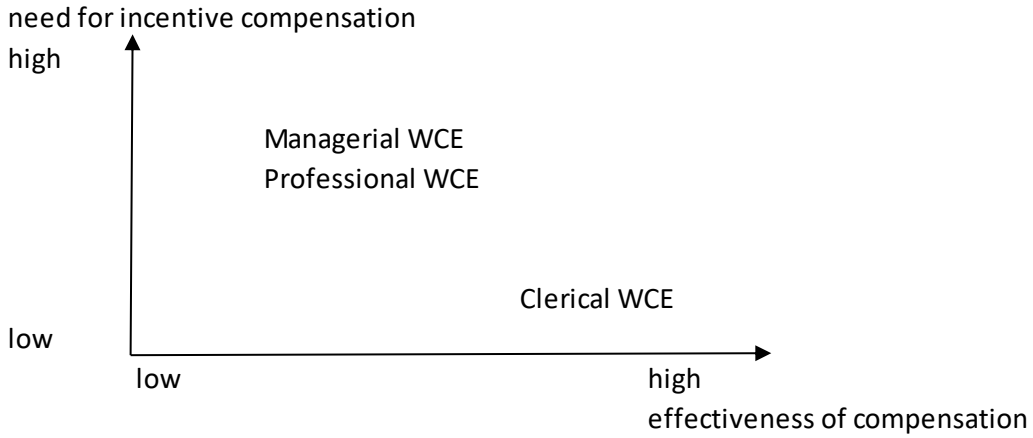
Complexity of WCE's (circled), BCE's and CEO's tasks and outcome measures*



*Note:
The figure shows the relationship between task complexity (vertical axis) and the complexity of outcome measures (horizontal axis) for blue-collar employees (BCE), for clerical (low-level), professional (middle-level) and managerial (high-level) white-collar employees (WCEs), and for CEOs.

Figure 2.

Need and effectiveness of incentive compensation for WCE groups*



*Note:
The figure shows the relationship between the need for incentive compensation due to task complexity (vertical axis) and the effectiveness of compensation due to complexity of outcome measure (horizontal axis) for clerical (i.e. low-level), professional (i.e. middle-level) and managerial (i.e. high-level) white-collar employees (WCEs).

Table 1

Distribution of Firm-Year Observations by Industries*

	Number of observations	Percent
Manufacture of food products and beverages	665	8.50
Manufacture of textiles	156	1.99
Manufacture of wearing apparel	88	1.13
Manufacture of leather and related products	86	1.10
Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	200	2.56
Manufacture of paper and paper products	290	3.71
Printing and reproduction of recorded media	839	10.73
Manufacture of coke and refined petroleum products	26	0.33
Manufacture of chemicals and chemical products	184	2.35
Manufacture of rubber and plastic products	531	6.79
Manufacture of other non-metallic mineral products	392	5.01
Manufacture of basic metals	1940	24.81
Manufacture of furniture	184	2.35
Other manufacturing	49	0.63
Electricity, gas, steam, and air conditioning supply	618	7.90
Construction of buildings	841	10.75
Civil engineering	203	2.60
Specialized construction activities	528	6.75
Total	7,820	100.00

*Note: The distribution is based on the Standard Industrial Classification published by Statistics Finland.

Table 2

Descriptive Statistics*

Panel A: Characteristics of sample firms

	Mean	Median	Std.	Min	Max
# of WCEs	51	20	85.39	1	847
Men	32	11	58.68	0	723
Women	19	7	33.58	0	463
Average salary	2,863.15	2,832.89	498.92	1,731.50	4,496.00
Average salary for high-level WCEs (*PBI1*)	4,579.41	4,463.00	1,141.23	1,804.00	12,647.00
Average salary for middle- level WCEs (*PBI2*)	2,944.12	2,917.33	519.58	1,565.00	5,398.28
Average salary for low-level WCEs (*PBI3*)	2,165.79	2,123.00	369.35	1,100.00	4,792.75
Average age (years)	44.00	44.13	4.30	24.00	66.00
Annual sales	44,727.06	14,656.05	89,316.76	558.90	1,017,719.50
Total # of employees	160	72	244.80	4	2,681

Panel B: Summary statistics of the variables

	Mean	Lower quartile	Median	Upper quartile	Std.	Min	Max
PBI_{it}	1.78	0.00	0.00	2.69	3.22	0.00	44.64
$PBI1_{it}$	1.71	0.00	0.00	0.17	4.01	0.00	50.00
$PBI2_{it}$	1.71	0.00	0.00	2.50	3.24	0.00	44.28
$PBI3_{it}$	1.07	0.00	0.00	0.74	2.41	0.00	28.14
ROA_{it+1}	16.03	2.70	11.60	25.40	25.02	-69.40	162.70
ROA_{it}	18.20	3.90	12.80	27.30	24.95	-48.90	190.40
$LNSALES_{it}$	9.67	8.64	9.60	10.69	1.44	6.33	13.83
$EQRATIO_{it}$	46.99	29.50	47.50	64.40	22.35	1.80	92.60

Panel C: Summary Statistics of *PBI*, when *PBI* > 0

	N	% of firm years	Mean	Median	Std.	Min	Max
PBI	3350	43%	4.16	3.31	3.79	0.00	44.64
$PBI1_{it}$	1970	25%	6.81	5.75	5.39	0.00	50.00
$PBI2_{it}$	3209	41%	4.17	3.27	3.93	0.00	44.28
$PBI3_{it}$	2234	29%	3.73	3.03	3.24	0.00	28.14

*Notes:

1. The table provides descriptive statistics on our data. The full sample includes 7,820 firm-year observations of Finnish manufacturing firms during the period 2002-2011. Average salary and Annual sales are in Euros.
2. See Appendix for variable definitions.

Table 3
Correlations between the Variables*

		1	2	3	4	5	6	7	8
1	PBI_{it}		0.62***	0.96***	0.72***	0.09***	0.08***	0.23***	0.06***
2	$PBI1_{it}$	0.71***		0.55***	0.44***	0.05***	0.04***	0.29***	0.00
3	$PBI2_{it}$	0.97***	0.66***		0.70***	0.09***	0.09***	0.22***	0.06***
4	$PBI3_{it}$	0.76***	0.60***	0.76***		0.08***	0.06***	0.26***	0.06***
5	ROA_{it+1}	0.08***	0.02*	0.08***	0.05***		0.59***	0.04***	0.00
6	ROA_{it}	0.05***	0.00	0.06***	0.02**	0.60***		0.04***	0.05***
7	$LNSALES_{it}$	0.35***	0.37***	0.36***	0.37***	0.03***	0.03**		-0.05***
8	$EQRATIO_{it}$	0.05***	0.01	0.04***	0.04***	0.08***	0.15***	-0.04***	

*Notes:

1. The table presents pair-wise Pearson (above diagonal) and Spearman (below diagonal) correlations for selected variables.
2. ***, ** and * denote significance levels at the 0.01, 0.05 and 0.10 levels, respectively.
3. See Appendix for variable definitions.

Table 4
Firm Characteristics by Level of Performance-Based Compensation*

	Zero	Low	2	3	High	High – Zero	
# of firms	**4,470**	**837**	**837**	**838**	**838**	**t-test (Wilcoxon-test)**	**P-value**
PBI$_{it}$	0.00 (0.00)	0.70 (0.67)	2.39 (2.40)	4.45 (4.37)	9.08 (7.87)		
ROA$_{it+1}$	15.14 (11.20)	12.60 (9.90)	15.58 (11.30)	19.07 (12.85)	21.59 (16.30)	**-6.74** **(7.63)**	**<.0001** **(<.0001)**
ROA$_{it}$	18.17 (12.80)	13.02 (9.40)	16.08 (10.90)	19.24 (13.25)	24.65 (18.30)	**-6.75** **(8.32)**	**<.0001** **(<.0001)**
LNSALES$_{it}$	9.23 (9.13)	10.07 (10.03)	10.23 (10.25)	10.34 (10.40)	10.34 (10.42)	**-20.24** **(19.47)**	**<.0001** **(<.0001)**
EQRATIO$_{it}$	46.25 (46.90)	43.31 (47.80)	47.99 (48.00)	47.50 (47.70)	50.14 (48.30)	**-4.59** **(4.31)**	**0.0001** **(0.0004)**

*Notes:

1. The table presents mean (median) values of the variables for portfolios sorted according to the level (relative amount) of group-based compensation (PBI_{it}). The table also reports the *t*-test and Wilcoxon-test with their corresponding *p*-values for the differences in means and medians between the two extreme portfolios.
2. See Appendix for variable definitions.

Table 5
The Association between Performance-Based Compensation (*PBI*) and Future Profitability (*ROA*)*

	Exp. Sign	(1) (t-stat)	(2) (t-stat)	(3) (t-stat)	(4) (t-stat)	(5) (t-stat)
Intercept		4.25 (1.22)	3.72 (1.55)	4.18 (1.77)	**4.79** **(1.91)***	4.56 (1.78)
PBI_{it}	+	**0.21** **(2.80)*****				
$PBI1_{it}$	+		0.04 (0.54)			-0.07 (-1.03)
$PBI2_{it}$	+			0.20 (1.61)		0.05 (0.35)
$PBI3_{it}$	+				**0.38** **(2.76)*****	**0.38** **(2.68)*****
ROA_{it}	+	**0.58** **(28.05)*****	**0.58** **(11.07)*****	**0.58** **(11.12)*****	**0.58** **(11.05)*****	**0.58** **(11.09)*****
$LNSALES_{it}$	–	**0.58** **(2.94)*****	**0.65** **(2.99)*****	**0.59** **(2.66)*****	**0.53** **(2.30)****	**0.56** **(2.53)*****
$EQRATIO_{it}$	–	**-0.04** **(-3.08)*****	**-0.03** **(-2.77)*****	**-0.04** **(-2.95)*****	**-0.04** **(-3.01)*****	**-0.04** **(-3.06)*****
Year fixed-effects		YES	YES	YES	YES	YES
Industry fixed-effects		YES	YES	YES	YES	YES
Adjusted R^2		0.36	0.37	0.37	0.37	0.37
Observations		7,820	7,820	7,820	7,820	7,820

*Notes:

1. Column (1) provides the results of estimating Model (1):

$$ROA_{it+1} = \beta_0 + \beta_1 PBI_{it} + \beta_2 ROA_{it} + \beta_3 LNSALES_{it} + \beta_4 EQRATIO_{it} + \sum_{s=2003}^{2011} \alpha_s YEAR_s + \sum_{k=1}^{17} \alpha_i INDUSTRY_k + \varepsilon_{it}.$$

Columns (2-5) provide the results of estimating Model (2):

$$ROA_{it+1} = \beta_0 + \beta_1 PBI1_{it} + \beta_2 PBI2_{it} + \beta_3 PBI3_{it} + \beta_4 ROA_{it} + \beta_5 LNSALES_{it} + \beta_6 EQRATIO_{it} + \sum_{s=2003}^{2011} \alpha_s YEAR_s + \sum_{k=1}^{17} \alpha_i INDUSTRY_k + \varepsilon_{it},$$

2. See Appendix for variable definitions.

*******, ** and * denote significance levels at the 0.01, 0.05 and 0.10.

Table 6
The Association between Profitability and Performance-Based Compensation at Different WCE levels: ROE as the Dependent Variable*

	Exp. Sign	(1) (t-stat)	(2) (t-stat)	(3) (t-stat)	(4) (t-stat)	(5) (t-stat)
Intercept		3.41 (0.47)	3.19 (0.44)	3.32 (0.46)	4.02 (0.53)	4.08 (0.55)
PBI$_{it}$	+	**0.22 (1.65)***				
PBI1$_{it}$	+		0.11 (1.18)			0.01 (0.14)
PBI2$_{it}$	+			0.21 (1.61)		0.00 (0.06)
PBI3$_{it}$	+				**0.41 (3.38)*****	**0.39 (3.19)*****
ROE$_{it}$	+	**0.32 (12.07)*****	**0.32 (11.84)*****	**0.32 (12.06)*****	**0.32 (11.93)*****	**0.32 (12.12)*****
LNSALES$_{it}$	-	**-0.58 (-2.03)****	**-0.54 (-1.75)***	**-0.57 (-2.00)****	**-0.63 (-1.97)****	**-0.64 (-2.07)****
EQRATIO$_{it}$	-	-0.04 (-1.39)	-0.03 (-1.31)	-0.04 (-1.40)	-0.04 (-1.43)	-0.04 (-1.43)
Year fixed-effects		YES	YES	YES	YES	YES
Industry fixed-effects		YES	YES	YES	YES	YES
Adjusted R^2		0.13	0.13	0.13	0.13	0.13
Observations		6,057	6,057	6,057	6,057	6,057

*Notes:

1. Table provides the results of estimating Model:

$$ROE_{it+1} = \beta_0 + \beta_1 PBI_{it} + \beta_2 PBI1_{it} + \beta_3 PBI2_{it} + \beta_4 PBI3_{it} + \beta_5 ROE_{it} + \beta_6 LNSALES_{it} + \beta_7 EQRATIO_{it} + \sum_{s=2009}^{2002} \alpha_s YEAR_s + \sum_{k=1}^{18} \alpha_i INDUSTRY_k + \varepsilon_{it},$$

2. See Appendix for variable definitions.
3. ***, ** and * denote significance levels at the 0.01, 0.05 and 0.10 levels respectively.

Table 7
The Association between Profitability and Performance-Based Compensation at different WCE levels: Profit Margin as the Dependent Variable*

	Exp. Sign	(1) (t-stat)	(2) (t-stat)	(3) (t-stat)	(4) (t-stat)	(5) (t-stat)
Intercept		1.43 (1.08)	1.47 (1.11)	1.40 (1.06)	1.53 (1.17)	1.59 (1.20)
PBI$_{it}$	+	0.04 (0.93)				
PBI1$_{it}$	+		0.03 (1.01)			0.02 (0.86)
PBI2$_{it}$	+			0.03 (0.70)		-0.01 (-0.33)
PBI3$_{it}$	+				**0.07** **(1.71)***	**0.07** **(2.06)****
PROFMAR$_{it}$	+	**0.69** **(21.50)*****	**0.69** **(21.58)*****	**0.69** **(21.50)*****	**0.69** **(21.52)*****	**0.69** **(21.54)*****
LNSALES$_{it}$	+	0.12 (1.63)	0.12 (1.58)	**0.13** **(1.70)***	0.12 (1.47)	0.11 (1.36)
EQRATIO$_{it}$	+	**0.01** **(2.38)****	**0.01** **(2.43)****	**0.01** **(2.38)****	**0.01** **(2.36)****	**0.01** **(2.35)*****
Year fixed-effects		YES	YES	YES	YES	YES
Industry fixed-effects		YES	YES	YES	YES	YES
Adjusted R^2		0.45	0.45	0.45	0.45	0.45
Observations		7,870	7,870	7,870	7,870	7,870

*Notes:

1. Table provides the results of estimating Model:

$$\text{PROFMAR}_{it+1} = \beta_0 + \beta_1 PBI_{it} + \beta_2 PBI1_{it} + \beta_3 PBI2_{it} + \beta_4 PBI3_{it} + \beta_5 \text{PROFMAR}_{it} + \beta_6 LNSALES_{it} + \beta_7 EQRATIO_{it} + \sum_{s=2009}^{2002} \alpha_s YEAR_s + \sum_{k=1}^{18} \alpha_i INDUSTRY_k + \varepsilon_{it},$$

2. See Appendix for variable definitions.
3. ***, ** and * denote significance levels at the 0.01, 0.05 and 0.10 levels respectively.

Table 8
Determinants of Performance-Based Compensation (*PBI*)*

	Exp. Sign	(1) (t-stat)	(2) (t-stat)	(3) (t-stat)	(4) (t-stat)
Intercept		**-2.04 (-7.69)*** **	**-6.55 (-10.86)*** **	**-2.10 (-4.97)*** **	**-3.22 (-8.14)*** **
***PBI1*$_{it+1}$**			**1.94 (10.58)*** **		
***PBI2*$_{it+1}$**				**0.78 (17.40)*** **	
***PBI3*$_{it+1}$**					**2.03 (12.61)*** **
***PBI*$_{it+1}$**		**0.64 (21.50)*** **			
***ROA*$_{it}$**	+	**0.00 (1.98)*** **	0.00 (0.03)	**0.00 (2.33)*** **	**0.00 (1.72)***
***ROA*$_{it+1}$**	+	0.00 (0.01)	0.00 (0.63)	-0.00 (-0.19**)**	**0.00 (1.70)***
***LNSALES*$_{it}$**	–	**0.19 (4.72)*** **	**0.65 (7.62)*** **	**0.20 (4.24)*** **	**0.26 (6.33)*** **
***EQRATIO*$_{it}$**	–	**0.00 (3.42)*** **	-0.00 (-0.03)	**0.00 (5.09)*** **	**0.00 (2.93)*** **
***WCE3RATIO*$_{it}$**		-0.09 (-0.97)	**0.35 (2.78)*** **	**0.15 (1.67)***	**0.76 (6.88)*** **
Year fixed-effects		YES	YES	YES	YES
Industry fixed-effects		YES	YES	YES	YES
Adjusted R^2		0.46	0.28	0.42	0.34
Observations		6,069	6,069	6,069	6,069

*Notes:

1. Columns (1) provides the results of estimating Model (3):

$$PBI_{it} = \beta_0 + \beta_1 PBI_{it+1} + \beta_2 ROA_{it} + \beta_3 ROA_{it+1} + \beta_4 LNSALES_{it} + \beta_5 EQRATIO_{it} + \beta_6 WCE3RATIO_{it} + \sum_{s=2003}^{2011} \alpha_s YEAR_s + \sum_{k=1}^{17} \alpha_i INDUSTRY_k + \varepsilon_{it}.$$

2. Columns (2-4) provide the results of estimating Model (4):

$$PBIX_{it} = \beta_0 + \beta_1 PBIX_{it+1} + \beta_2 ROA_{it} + \beta_3 ROA_{it+1} + \beta_4 LNSALES_{it} + \beta_5 EQRATIO_{it} + \beta_6 WCE3RATIO_{it} + \sum_{s=2003}^{2011} \alpha_s YEAR_s + \sum_{k=1}^{17} \alpha_i INDUSTRY_k + \varepsilon_{it}.$$

3. See Appendix for variable definitions.

4. *******, ** and * denote significance levels at the 0.01, 0.05 and 0.10 levels respectively.