The Use and Effects of Accountability and Job Autonomy when Results Controls are Infeasible: Substitutes or Complements?

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Abstract

While prior work in management accounting has mainly focused on results controls, this study investigates the joint use and effects of accountability as an action control and job autonomy in a setting in which results control are largely infeasible. We analyze how accountability and the level of job autonomy are complementarily or substitutively used by supervisors and how their (joint) use affects employees' loyalty to their departments (as proxied by employees' intention to stay and their overtime provided). We investigate our research question by collecting survey data among nurses from Swiss public hospitals. We predict and find that when task requirements are high (i.e., intensive care units (ICUs) in our hospital setting), job autonomy and accountability are used as substitutes by the supervisor. When task requirements are low (i.e., non-ICUs in our hospital setting), job autonomy and accountability are also used as substitutes but significantly less so compared to departments with high task requirements. Additionally, consistent with supervisor choices, job autonomy and accountability have substitutive effects on employees' likelihood to stay in the department and their overtime when task requirements are high. When task requirements are low, job autonomy and accountability are complementarily related with regard to employees' likelihood to stay in the department and substitutively with respect to overtime. Our study enhances the understanding of the use and effects of action controls in settings in which results controls are infeasible and contributes to a better understanding of job autonomy as a control practice.

I Introduction

Prior work in the field of management control systems has mainly focused on results controls and the incentives attached to them (e.g., Bonner and Sprinkle 2002, Sprinkle and Williamson 2007). However, in many jobs and situations, results controls cannot be used because they are either infeasible to implement or lead to severe dysfunctional incentive effects (e.g., Baker, Gibbons and Murphy 1994, Ginsberg 1984). For example, in healthcare, using results controls based on patients' wellbeing could lead physicians and nurses to treat mainly those patients who are most likely to do well again but not those who might need care the most. From a more general standpoint, there can be situations in which the time lag between employees' actions and their effects on results is too long or results controls are infeasible for other reasons (Baker, Jensen and Murphy 1988, Merchant and Van der Stede 2017). In these cases, action controls are often used to control employees' behavior. However, very little is known about how action controls are used, how they vary across different organizational settings and what their effects are (Malmi and Brown 2008).

In this study, we investigate how job autonomy and accountability are complementarily or substitutively used and how their (joint) use affects employees' loyalty towards their organization when results controls are infeasible. Accountability refers to the expectation that an employee has to justify his or her actions to the supervisor (Tetlock 1992, Lerner and Tetlock 1999) and represents an important form of action control (e.g., Merchant and Van der Stede 2017). Job autonomy represents the degree to which employees can self-determine the way they execute tasks (Hackman and Oldham 1980, Spreitzer 1995).

So far, it is an open question how action controls like, e.g., accountability, and job autonomy are linked. Intuitively, and as argued in prior work, one might assume that job autonomy and accountability are complements in practice when results controls are infeasible (e.g., Hall et al. 2006, Finn 2001). That means, the higher the level of an employee's job autonomy, the more often the employee would have to justify his actions to the supervisor

(Blegen et al. 1993, Wade 1999).[1] However, we argue that economic and behavioral costs associated with accountability can lead supervisors to use accountability and job autonomy as substitutes. Specifically, because a higher level of job autonomy increases the set of potential actions for employees, higher levels of accountability can lead to increasing economic and behavioral costs to both supervisors and employees, the higher the level of job autonomy. Particularly when tasks have high requirements—i.e., when they are non-standard, have a high degree of uncertainty and several potential solutions—justifying why an employee has taken or has not taken a specific action can induce substantial costs in terms of time and resources for both employee and supervisor. The reason is that a whole set of alternative actions would have to be analyzed, justified and evaluated by employees and their supervisors. Additionally, the need to justify actions may lead employees to choose the action that is easiest to justify but not the one that is most needed (Adelberg and Batson 1978), thereby entailing costs for the firm. Finally, granting employees autonomy about how to execute a task while simultaneously requiring them to justify their actions may be seen as a signal of distrust, potentially destroying employees' intrinsic motivation (e.g., Falk and Kosfeld 2006, Christ 2013). Thus, we predict that accountability and job autonomy are used as substitutes when task requirements are high.

In contrast, when task requirements are low, an employee's set of potential actions is more limited and the "best" action is easier to determine. Thus, justification and control costs are likely lower. Additionally, when tasks are more standard and the environment is less uncertain, high intrinsic motivations may add less value compared to a formal control system, thereby decreasing the costs of control. Consequently, we predict that the extent to which accountability and job autonomy are used as substitutes is lower when task requirements are low than when they are high.

[1] In the following, we will use male pronouns for employees and female pronouns for supervisors.

Additionally, we develop hypotheses about how accountability and the level of job autonomy affect employees' loyalty to their department. As employee loyalty is highly relevant to organizations (e.g., Olson-Buchanan and Boswell 2002, Whiting, Podsakoff and Pierce 2008) such reactions would have to be considered by supervisors when deciding about the control system design. We predict that when task requirements are high, job autonomy and accountability likely act as substitutes with respect to employees' loyalty to their department. When task requirements are high, a specific problem an employee faces may have several alternative solutions. Therefore, when the supervisor grants little job autonomy to the employee, accountability is likely seen as positive as a higher level of accountability conveys that the supervisor knows how a specific task should be carried out and which of many potential solutions should be chosen. Additionally, when the level of job autonomy is low, the costs of justification for the employee are rather low. However, the higher the level of autonomy in an environment of high task requirements, the higher are an employee's costs in justifying the specific action when the level of accountability increases. Likewise, the higher the level of job autonomy, the more accountability could be seen as a signal of distrust, decreasing intrinsic motivation. Consequently, we predict that when task requirements are high, accountability and job autonomy act as substitutes in influencing employees' loyalty to their department.

Again, we also predict that these substitutive effects are likely weaker when task requirements are low than when they are high for several reasons. When task requirements are low and the level of job autonomy is low as well, increasing levels of accountability could potentially lead to "overcontrol" or "micromanagement" (Eldenburg and Krishnan 2006, Cleary, Hungerford, Lopez and Cutcliffe 2015). The higher the level of job autonomy in such an environment, the less increasing accountability is likely seen as micromanagement. Increasing accountability could even signal higher task significance to employees in this case (Dose and Klimoski 1995). Simultaneously, when task requirements are low, justification

costs do not increase as strongly when accountability increases. Finally, as explained above, intrinsic motivations may be less strongly affected when task requirements are rather low (Frey and Osterloh 2002).

We investigate our hypotheses in a hospital setting by analyzing nurses' control mechanisms and the effects on their loyalty to the department as proxied by their intention to stay in their department and the overtime they provide. We collect data using an online survey among nurses from different departments in twelve Swiss public hospitals. Nurses as the unit of analysis are particularly suitable for studying the interrelation between accountability and job autonomy for several reasons. First, results controls are largely infeasible for nurses because holding nurses accountable for the *result* of patients' physical conditions can set incentives for them to refuse treating those patients who need care the most as these patients may be the most likely to not improve in their physical conditions. Therefore, accountability, not results controls, is one of the most relevant control mechanisms for nurses (e.g., Krautscheid 2014, Rowe 2000). Second, different departments in a hospital have substantially different levels of task requirements. Specifically, based on the level of task requirements, departments can be generally separated into Intensive Care Units (ICUs) and non-ICUs (Tummers, van Merode and Landeweerd 2002, 2006, Verhaeghe et al. 2008). In ICUs, tasks requirements are generally higher and characterized by, e.g., higher uncertainty, multiple solutions to problems, higher stress levels and more required knowledge about machine handling (Tummers et al. 2002, Landeweerd and Boumans 1994). Thus, we can study settings with high and low task requirements through ICU and non-ICU units. Third, nurses are often intrinsically motivated by their job but motivation can vary substantially across individuals (Janssen, de Jonge and Bakker 1999, Toode, Routasalo and Suominen 2011). This allows us to separate our sample into subsamples to provide additional tests of our theory. Finally, supervisors have flexibility in tailoring control mechanisms to the individual nurse, granting him more or less job autonomy and requiring him to justify his actions more often (McCallin and Frankson 2010,

Mueller and Vogelsmeier 2013). Thus, individual nurse data represents a valid data source to investigate control system design in situations in which results controls are not feasible.

Our results support our predictions by and large. First, using the demand-function approach (Grabner and Moers 2013), we regress accountability and job autonomy on their joint determinants. Estimating the conditional correlation between accountability and job autonomy, we find that both control mechanisms are significantly negatively correlated in ICUs, implying that supervisors use various levels of job autonomy and accountability as substitutive control choices for nurses. Second, in non-ICUs, job autonomy and accountability are also used as substitutes but significantly less so compared to ICUs. Third, examining the effects of control design choices on nurses, we use nurses' likelihood to stay in the department and the overtime they provide as proxies for their loyalty towards their department. We find that in ICUs, job autonomy and accountability negatively interact in their effect on both nurses' likelihood to stay in the department and their overtime. Fourth, consistent with our prediction, the substitutive effects of job autonomy and accountability on nurses' likelihood to stay in their department are lower in non-IUCs than in ICUs. In fact, in non-ICUs, the two control choices even act as complements. Regarding nurses' overtime, the substitutive effect is weaker in non-ICUs than in ICUs but not significantly so. These findings are consistent with supervisors' anticipation of control design choices' effects on nurses and their (more or less) substitutive use in ICUs and non-ICUs. Finally, we provide several supplemental analyses and robustness checks supporting our theory and main results.

Our findings have important implications for both research and practice. First, our study enhances the understanding of the use and effects of action controls in settings in which results controls are infeasible—as is often the case in practice. Specifically, we show that the use and effects of action controls might depend on other organizational design choices—the level of job autonomy granted to the individual nurse in our case. Additionally, we provide evidence that even if the level of job autonomy is low, accountability can have either positive

or negative effects on employees' loyalty to their department, depending on high or low task requirements. These findings may help to explain the mixed evidence on the effects of accountability in prior work (e.g., Dose and Klimovski 1995, Lerner and Tetlock 1999).

Second, prior work in accounting has mainly concentrated on the question how more delegated decision rights affect the design of incentives (e.g., Narayanan and Davila 1998, Moers 2006). Our findings foster our understanding of the question when organizations choose to grant more autonomy to their employees. We provide evidence that, contrary to intuition, a higher level of autonomy does *not* lead to more accountability for employees but that both design choices are used as substitutes. Thus, a higher level of job autonomy and, thus, more self-determination of tasks might not only substitute for more centralized control mechanisms when results controls are available (Nagar 2002, Abernethy, Bouwens and van Lent 2004) but also when they are *not* available, implying that accountability can entail costs of justification that organizations may not want to incur.

Finally, our study has practical implications as it informs practice about the effects of job autonomy and accountability on nurses' overtime and their likelihood to stay in their current department. Particularly the latter is of high relevance in the nursing sector. As we provide evidence that accountability can have positive or negative effects on employees' likelihood to stay, contingent on whether they work in a high or low task requirement environment, our results may help practitioners better design their control systems.

II Hypotheses Development

Background

Accountability refers to the implicit or explicit expectation that an employee has to justify his actions to others, particularly his supervisor (Scott and Lyman 1968, Tetlock 1992). It represents an important form of action control because employees who are unable to provide sufficient justifications of their actions usually suffer negative consequences (e.g., Merchant and Van der Stede 2017). While there is extensive research on the effects of

accountability on individual decision making (Lerner and Tetlock 1999, Frink and Klimoski 2004), the question how the need to justify one's actions interacts with other organizational control choices is largely unexplored. However, investigating such questions is important as prior work on accountability provides evidence that its effects are ambiguous and that accountability can attenuate but also exacerbate biases in individual decision making (e.g., Kruglansky and Freund 1983, Curley, Yates and Abrams 1986). Importantly, while it is sometimes *assumed* that all types of formal control mechanisms have similar effects and that, as a consequence, accountability would affect behavior similarly as other control mechanisms (Pelham and Neter 1995), accountability effects often *differ* from the effects of other motivational sources (Lerner and Tetlock 1999). In our study, we investigate the substitutive or complementary use and effects of accountability and job autonomy as important organizational control choices in a setting in which results controls are not feasible.

Prior work in accounting has mainly investigated the question how higher levels of delegated decision rights affect the design of incentives in settings with results controls and, in general, finds that the level of delegated decision rights and the use of incentives are positively related (Nagar 2002, Abernethy et al. 2004, Moers 2006). In contrast, our study focuses on the relation between accountability as an action control and job autonomy in a hospital setting in which results controls are infeasible. More closely related to our study, Widener, Shackell and Demmers (2008) examine the interplay between (vertical and horizontal) social surveillance as an action control, results controls and delegated decision rights. They provide evidence that, in a setting *with* results controls, firms delegate less decision rights when they have higher levels of vertical monitoring. Additionally, the higher the level of delegated decision rights, the higher the level of incentives to compensate the corresponding loss in control. While vertical monitoring represents a type of action control based on direct observation, we study the justification of actions that are not directly observable, its joint use with employees' job autonomy, and their combined effects on nurses.

Additionally, whereas the level of incentive compensation is at least indirectly (via the degree of delegated decision rights) associated with vertical surveillance, we study a setting where the use of results controls as alternatives to action controls is infeasible.

Related to our hospital setting in which we study our research question, accountability is one of the most relevant control mechanisms for nurses (e.g., Krautscheid 2014, Rowe 2000). While many professional standards attempt to define accountability (e.g., American Association of Colleges of Nursing 2008, International Council of Nurses 2000), the need to justify oneself is generally of high relevance in these definitions (e.g., Bovens 2004, Wade 1999). Importantly, the need to justify one's behavior not only refers to what employees do but also to what they *not* do (Milton 2008, Dohmann 2009). As a consequence, accountability can induce large justification costs for employees as well as their supervisors, particularly when the set of potential actions is large.

Prior work in the field of nursing has extensively studied job autonomy (e.g., Hansten and Washburn 1996, Grohar-Murray and DiCroce 1997, Walczak and Absolon 2001). However, to our best knowledge, only one study has investigated the connection between autonomy and accountability. Hall et al. (2006) analyze the relation between perceived accountability and job autonomy and find that autonomy can contribute to mitigate the negative effects of increased accountability on job tension and job satisfaction. In contrast, our study focuses on supervisors' (joint) use of job autonomy and accountability as well as their effects on employees' loyalty to their department as an important organizational outcome. Importantly, we investigate differences in the use and effects of these two organizational control system design choices contingent on whether employees work in an environment of high or low task requirements.

Hypotheses Development

Use of Accountability and Job Autonomy

Intuitively and as argued in prior work, one might think that job autonomy and accountability are used as complements in practice when results controls are infeasible (Hall et al. 2006, Finn 2001). That means, the higher the level of an employee's job autonomy, the more often the employee would have to justify his actions (and non-actions) to the supervisor (Blegen et al. 1993, Wade 1999). However, we will argue in the following that a higher level of job autonomy increases the set of potential actions for employees. As a consequence, justifying the specific action chosen from this set can entail significant economic and behavioral costs for supervisors and employees, leading supervisors to use job autonomy and accountability as substitutes. In the following, we first develop a hypothesis that this is case in environments with high task requirements.

When task requirements are high, tasks are usually characterized by high uncertainty, multiple solutions to a given problem, and high stress levels (Tummers et al. 2002, Landeweerd and Boumans 1994). In such a situation, the costs of making employees justify their action can be relatively *low* when the level of job autonomy is low, i.e., when employees have little room to decide how to carry out a task in a specific situation. Justification costs are rather low in such a situation because the course of action is quite clear. In contrast, when task requirements are high and job autonomy increases, the costs of justification to both supervisor and employee likely increase as well (Hill and Pacces 2018). The underlying reason is that when job autonomy increases, the employee would have to invest a considerable amount of time to explain and justify to the supervisor why he took a certain action and not another. The supervisor would have to invest considerable time and resources to examine and evaluate the whole set of the employee's potential actions.

Additionally, the need to justify the action can lead individuals to choose the action that is easiest to justify and not the action that is most appropriate (Adelberg and Batson 1978). For example, justification increases individuals' aversion towards ambiguous situations and makes them choose less ambiguous alternatives as they seem easier to justify

(Curley, Yates and Abrams 1986, Taylor 1996). In healthcare, for example, the need for justification in such situations might also lead to overinvestment in treatments, thereby either increasing costs too much or neglecting other patients that might need treatments more (Sanger-Katz 2018, Kachalia and Mello 2013, Pontes and Pontes 2004).

Finally, when the level of job autonomy is low, accountability is likely to be perceived as a part of a more centralized control system and likely increases the structure for employees. However, the higher the level of job autonomy, the more requiring employees to justify their actions can be perceived as a signal of distrust as it is unclear why autonomy was granted in the first place. Signaling distrust can destroy employees' intrinsic motivation (e.g., Falk and Kosfeld 2006, Christ 2013), thereby again creating justification costs. Intrinsic motivations are particularly important in situations with multiple tasks or tasks without clear, quantifiable standards and when tacit knowledge is important (Frey and Osterloh 2002). This is the case when task requirements are high.

Vice versa, increasing levels of job autonomy can increase employee motivation (e.g., Weisman, Alexander and Chase 1981) and decrease supervisor's work load. However, the positive effect of increased job autonomy likely decreases, the higher the level of accountability. The reason is that owing to increasing costs of justification for both supervisor and employee, the supervisor's workload decreases less and the positive effect on employee motivation increases less in job autonomy, the higher the level of accountability.

Taken together, as accountability can lead to substantial economic and behavioral costs for employees and supervisors in environments with high task requirements, we state the following hypothesis:

***H1a**: Ceteris paribus, accountability and job autonomy are substitutes when task requirements are high.*

While all types of economic and behavioral costs are likely large in environments with high task requirements, they likely decrease in environments with low task requirements. In

such environments, the set of potential actions for a given problem is more limited. As a consequence, the costs of justification are likely lower for both employees and supervisors. Employees likely require less time to justify their actions when the set of potential actions is limited and supervisors require less time and resources to analyze and evaluate these actions. Because tasks are relatively easy, the effect of accountability in signaling the significance of a task is likely higher than when task requirements are high, this may further attenuate the effects of increased accountability on employees.

Additionally, when task requirements are low, the best action likely differs less from the best justifiable action. This decreases the costs of choosing the best justifiable vs. most appropriate action. Finally, even though intrinsic motivations are likely important as well when task requirements are low, they are likely less important than when task requirements are high. As explained above, standards are likely clearer and tasks are less diverse when task requirements are low. Thus, high intrinsic motivations may add less value compared to a formal control system when task requirements are low than when they are high, thereby decreasing the costs of control. For all reasons, accountability and job autonomy are likely used as substitutes to a lower extent when task requirements are low than when they are high which we formally state in H1b:

***H1b**: Ceteris paribus, accountability and job autonomy are weaker substitutes when task requirements are low than when they are high.*

Effects of Accountability and Job Autonomy on Employees' Loyalty to their Department

Owing to its potentially positive effects for an organization (Wartzman 2017, Whiting et al. 2008), managing employee loyalty is one of the most relevant control issues for modern organizations in general (e.g., Bolino and Turnley 2003, Wright and Bonett 2002) and hospitals in particular (Hayes et al. 2006, Jones 2004). Our next set of hypotheses thus investigates how varying levels of accountability and job autonomy interact to affect employees' loyalty to their departments. Even though employees' loyalty to their department may be partly

influenced by their satisfaction with their pay (Hayes et al. 2006, Lum et al. 1998), it is by far not the only or decisive driver (Blegen 1993, Fisher, Hinson and Deets 1994, Shields and Ward 2001). We argue in the following that when task requirements are high, accountability and job autonomy as control mechanisms can positively influence employees' loyalty towards their departments, thereby, however, acting as substitutes to each other.

As explained above, accountability likely has several countervailing effects on employees. On the positive side, accountability can increase the significance of a task for employees by signaling that their task is important (Dose and Klimoski 1995). It can also make the standard of tasks more salient, thereby adding structure for employees (Mero, Motowidlo and Anna 2003). On the negative side, however, accountability creates justification costs when employees have to justify to their supervisor why (or why not) they took a specific action. Additionally, increasing accountability can be perceived as mistrust by employees, thereby destroying intrinsic motivation. Contingent on the level of job autonomy and task requirements, these effects can play out differently.

When task requirements are high, the task environment is highly uncertain and a specific task problem may have several alternative solutions. This implies that, when the degree of job autonomy is low in such an environment, increasing accountability likely conveys the signal, despite low job autonomy, that the task is important and that the supervisor knows how a specific task should be carried out and which of many potential solutions should be chosen. Simultaneously, when the level of job autonomy is low, employees' justification costs are rather low. Thus, when job autonomy is low, increased accountability likely has a positive effect on employees' loyalty to their departments.

The higher the level of job autonomy, the higher is employees' freedom in self-determining the appropriate action in a given situation. In an environment with high task requirements, this implies that employees' justification costs increase relatively strongly. The reason is that it would not only have to be made clear to the supervisor which actions were

available but also why the specific action chosen is superior to a large set of alternative actions.[2] Simultaneously, the higher the level of job autonomy, the lower is likely the positive effect of accountability in signaling task significance as, in an environment with high task requirements and freedom to self-determine their activities, it is likely clear for employees that their task is significant. Thus, any positive effect of accountability on employees' loyalty to their department that we described above, may be attenuated, the higher the level of job autonomy is. Finally, increasing accountability can increasingly be perceived as a "misfit" of control systems, the higher the level of job autonomy is (Milgrom and Roberts 1995, Friis, Hansen and Vamosi 2015). That is, an employee might question why he has to extensively justify his actions when he was granted the autonomy to decide about the specific action in the first place. This implies that, the higher the level of job autonomy, the more accountability could be interpreted as a signal that the employee is not trusted in choosing the appropriate action, thereby decreasing intrinsic motivation (Falk and Kosfeld 2006, Christ 2013).

Vice versa, while increasing levels of job autonomy are likely seen as positive and may contribute to employees' loyalty to their department (e.g., Weisman et al. 1981), the positive effect likely decreases in environments of high task requirements, the higher the level of job accountability. The reason is, as described above, higher job autonomy induces higher justification costs to employees when accountability increases, thereby attenuating its positive effect. Additionally, the potential distrust implied by high accountability likely reduces the positive effect of increased job autonomy on employees' intrinsic motivation and loyalty to their department (Hackman and Lawler 1971, Hackman and Oldham 1976). As a consequence, we state the following hypothesis:

H2a: *Ceteris paribus, when task requirements are high, accountability and job autonomy act as substitutes with respect to employees' loyalty to their department.*

[2] In some cases, it might even be that when the level of job autonomy increases, employees' actions more likely fall into a gray area in which responsibilities of different employees or supervisors are unclear. This can increase frustration when employees are also held accountable for such actions (Snowdon and Rajacich 1993).

When task requirements are low, in contrast, the substitutive effect of accountability and job autonomy on employees' loyalty to their department is likely attenuated. The main reason for this is that in an environment of low task requirements, increasing accountability is likely to be perceived differently by employees.

Specifically, when task requirements are low and the level of job autonomy is low as well, increasing accountability is likely to be perceived as less positive or might even be perceived as negative by employees (Dose and Klimoski 1995). The reason is that in an environment of low task requirements, tasks are relatively standard and clearly defined. If employees have little freedom to self-determine how they carry out such standard tasks, increasing accountability may have only small effects in signaling task significance or providing structure. In fact, increasing accountability in such a case may even lead to perceptions of "overcontrol" or "micromanagement" (Eldenburg and Krishnan 2006) which can reduce employee motivation and their loyalty to the department (Cleary et al. 2015).

However, the higher the level of job autonomy in an environment of low task requirements, the less increasing accountability is likely seen as micromanagement. Simultaneously, owing to the more limited set of action choices and lower uncertainty when task requirements are low, justification costs do not increase strongly when accountability increases. Additionally, the effect of increasing accountability signaling the significance of a task for employees (Dose and Klimoski 1995) is likely stronger when task requirements are low. The reason is in such an environment, it is not clear per se that the tasks that employees have autonomy about are important. Increasing accountability could then signal to employees that the tasks for which autonomy was granted and the careful selection of appropriate actions is important, which can increase motivation (e.g., Hackman and Lawler 1971, Hackman and Oldham 1976). Eventually, this can increase employees' loyalty to the department (e.g., Richer, Blanchard and Vallerand 2002).

Together, the substitutive effect of accountability and job autonomy is likely smaller when task requirements are low than when they are high. In fact, if the potentially positive effects of mitigating the micromanagement problem and signaling task significance dominate, job autonomy and accountability might even have complementary effects on employees' loyalty to the department when task requirements are low, i.e., increasing accountability might even have increasingly positive effects the higher the job autonomy is.

Vice versa, increasing job autonomy likely has generally positive effects on employees' loyalty to their department in an environment with low task requirements. The higher the level of accountability, the less positive might be the effects of increasing job autonomy owing to employees' increasing justification costs. However, again, the substitute effect is likely smaller when task requirements are low than when they are high because of lower justification costs. Likewise, increasing job autonomy could also have positive effects, the higher the level of accountability because the job for which autonomy increases may be perceived as more significant, the higher the level of accountability.

These arguments imply that our theory does not allow us to predict whether accountability and job autonomy act as complements or substitutes when task requirements are low, owing to the countervailing effects of increased significance and increased justification costs and potentially perceived distrust. However, we can predict that the substitutive effects of accountability and job autonomy are likely lower when task requirements are low rather than high. This is formally stated in H2b.

H2b: *Ceteris paribus, accountability and job autonomy act as weaker substitutes with respect to employees' loyalty to their department when task requirements are low than when they are high.*

III Methodology

Empirical Setting and Sample Description

To test our hypotheses, we collected survey data in 2019 using an online survey

among nurses from public Swiss hospitals. Our unit of analysis is the individual nurse employed in a hospital department. Prior to developing our survey instrument, we conducted several interviews to gain a better understanding of nurses' work environment, the control practices employed by their supervisors and sources of nurses' motivation.

Using publicly available data supplied by the Federal Office of Public Health, we identified 60 suitable Swiss public hospitals. We then contacted heads of HR/nursing administration to explain the research project and to encourage participation. As an incentive for the hospital, we promised each participating hospital an executive summary of the findings and a benchmarking report when the study was completed. Overall, we solicited participation from twelve public hospitals.

To encourage participation among nurses, either the head of HR or the head of nursing care of every hospital contacted the nurses directly via e-mail. The e-mail included both a letter of endorsement of the study and a web link to access the online survey instrument. As an incentive, nurses could participate in a raffle drawing with several prizes in-kind. Two and four weeks after the initial invitation, the participating hospitals sent reminder e-mails to all nurses. This process resulted in a total of 1,693 responses. The overall response rate across the twelve participating hospitals is 17%, which is in line with other studies using the survey method in nursing (e.g., Li et al. 2007, Purpora et al. 2012) and accounting (Bedford, Bisbe and Sweeney 2019, Widener 2007). Due to incomplete data, the sample size reported in our statistical analyses deviates slightly. Descriptive information and the response rates at the hospital level are reported in Table 1.

---- Insert Table 1 about here ----

To address the issue of non-response bias, early and late responding nurses (i.e., first and last thirds of responding nurses) were compared in terms of mean differences on the items used in this study (Armstrong and Overton 1977). Results of this analysis did not yield any significant differences for the main constructs used in our analyses. Thus, non-response bias

is unlikely to represent a threat to the validity of our findings.

To minimize the risk of common method bias (CMB hereafter) (Podsakoff, MacKenzie, Lee and Podsakoff 2003) we rely on both procedural and statistical remedies (Podsakoff, MacKenzie and Podsakoff 2012). In terms of procedural measures, we conducted a pre-test of the survey instrument to reduce ambiguity in the items used (Futterer, Schmidt, and Heidenreich 2018). Additionally, we guaranteed complete anonymity of the respondents and pointed out that there are no right or wrong answers to the survey questions (Chang, van Witteloostuijn and Eden 2010). To prevent hypothesis guessing and reduce the salience of the linkage between independent and dependent variables, we framed the study as an investigation of nurses' work environment in Swiss hospitals (Podsakoff et al. 2012).

Additionally, we applied two statistical tests to gauge the impact of CMB on our findings. First, we conducted a Harman's single-factor test. The un-rotated solution produced nine factors with Eigenvalues exceeding 1. The first factor explains 14.48% of the total variance, which is far below the suggested threshold level of 50% (Saebi, Lien and Foss 2017). Second, we followed the recommendations of Podsakoff et al. (2012) and additionally applied the unmeasured latent method factor technique (Gao et al. 2017). To assess the potential effects of CMB, we added an additional latent method factor to the structural model and allowed all the manifest variables to load on both their theoretical constructs as well as on the latent method factor. The results show that model fit was improved through including the latent method factor, but the variance explained by the newly added latent variable amounts to only 0.07. This is clearly below the recommended cutoff value of 0.50 (Hair et al. 1998).

As H2a and H2b predict interaction effects, the statistical tests are of low susceptibility to common method bias because interaction effects are unlikely to be part of respondents' cognitive maps (Siemsen, Roth and Oliveira 2010). However, to further alleviate concerns of CMB we used different measurement scales for our dependent and independent variables. While the measurement of the predictor variables is based on survey items that were

measured on a 7-point Likert scale (from 1 "does not apply" to 7 "fully applies"), the dependent variables in our study are operationalized based on ratio scales.

Together, our procedural remedies and statistical tests suggest that a significant CMB is unlikely to drive any of the findings.

Variable Measurement

The descriptive statistics reported in Table 2 show that all variables comprise a broad range with a minimum and maximum close to or at the scale anchors. Table 3 reports bivariate correlations and Cronbach's alphas for the variables used in our analyses. It provides further support for the discriminant validity of the survey constructs as Cronbach's alphas exceed inter-construct correlations in all cases.

---- Insert Table 2 about here ----

---- Insert Table 3 about here ----

Dependent Variable 1 – Probability to stay within Department (PD5)

Our first proxy for employee loyalty is nurses' indicated likelihood that they will still be working in their current department in five years ranging from 100% "I will definitely stay" to 0% "I will definitely leave my department". In light of the fact that turnover decisions in nursing are complex and unfold over an extended period of time (Hayes et al. 2012), we use a five-year time horizon. To assess the validity of our dependent variable, we correlate *PD5* with a 2-item construct reflecting the respondents' intention to leave (Liang, Tang, Wang, Lin and Yu 2016, Viator 2001). The negative and significant correlation ($\rho = -0.49$, $p < .01$) provides support for the construct validity of our measure.[3]

Dependent Variable 2 – Overtime (OT)

Our second proxy for employee loyalty to their department is the overtime nurses provided in the previous year. Overtime captures employee loyalty as it is largely voluntary

[3] We also collected information on the likelihood to stay using a two-year time horizon *(PD2)*. In untabulated robustness checks our results remain robust when using *PD2* as dependent variable instead of *PD5*.

and, thus, reflects how strongly nurses are attached to their department (Peltier, Nill and Schibrowsky 2004). We measure overtime as the difference between average working hours/week and contractually agreed working hours (Caballero and Lyons 1992).

Control Practices

Accountability (ACC)

We measure accountability with a single item capturing the extent to which nurses have to justify their doing to their supervisor (van Dierendonck and Nuijten 2011). We use this single item as our theory is mainly based on the consequences of employees' justification of their actions and non-actions to their supervisor. Prior work suggests that using a single-item measure is appropriate when participants evaluate a concrete construct they confront in their everyday work (Bergkvist and Rossiter 2007).

However, as some authors suggest that accountability also includes responsibility (e.g., Dose and Klimovski 1995), we also measure nurses' perceived responsibility towards their supervisor. We use the 2-item operationalization of accountability for robustness checks to exclude that our findings are driven by the random-error component in our single-item measure (Bedford and Spekle 2018).

Job Autonomy (JA)

To measure job autonomy we rely on a three-item construct used by Mahlendorf, Kleinschmit and Perego (2014) capturing the extent to which (1) nurses have significant autonomy in determining how to do their job, (2) can decide on their own how to do their work, and (3) supervisors grant nurses significant leeway in making decisions.

System-Specific Contextual Variable

High Task Requirements (HTR) vs. Low Task Requirements (LTR)

We capture high and low task requirements by distinguishing between ICU

(*TR_DUMMY* equal to 1) and non-ICU (*TR_DUMMY* equal to 0) departments.[4] Previous nursing research demonstrates that in ICUs, nursing tasks are less standard, have a higher degree of uncertainty and more potential solutions than in non-ICUs. Thus, ICUs reflect a high level of task requirements compared to non-ICUs (Tummers et al. 2002, 2006, Verhaeghe et al. 2008). To assess the validity of our ICU/non-ICU classification we analyze the characteristics of these units in our dataset. We find that nurses in ICUs face a significantly higher level of environmental uncertainty ($p < .01$), experience stressful situations significantly more often ($p < .01$), and face a greater variety of nursing tasks ($p < .01$). These findings support the validity of our operationalization.

Determinants of Accountability and Job Autonomy

Department and Individual Goals

Because performance measures and corresponding goals may exist at an aggregated department level and the existence of such performance measures can influence other control choices (e.g., Moers 2006, Widener et al. 2008), we collected data on the use of performance measures in the department (*PM*). *PM* is measured with two items describing the extent to which key performance measures (1) are regularly communicated to provide information about the performance of the department, and (2) play an essential role in order to ensure a good information flow within the department. Measuring *PM* at the department level is in line with prior work in nursing. We also capture whether nurses have personal goals (*GOAL_DUMMY* = 1 if goals are present and 0 otherwise). Our measure *GOAL_DUMMY* indicates that 78.50% of the respondents have explicitly defined personal goals.[5]

Additionally, we measure whether nurses have the opportunity to earn a bonus

[4] Consistent with previous literature, we classify intensive care units and emergency care units as ICU departments. Non-ICU departments include the following: ophthalmic departments, dermatological departments, neonatology, gynecology, and obstetrics, internal medicine, cardiology, pediatrics, neurology and neurosurgery, oncology, orthopedics, palliative care, urology, and others.

[5] If personal goals are defined for nurses, we also asked the respondents to name the two most important goals. Consistent with our reasoning that results controls are infeasible in the nurse setting, the overwhelming majority of nurse targets are of soft and developmental character (e.g., increase knowledge, control emotions, enhancement of leadership skills, etc.) and do not include hard and quantifiable performance measures.

(*BONUS*). This is the case for only about 20% of the nurses in our sample and the potential bonus amount is quite low (65% of these nurses report a maximum bonus of 5% based on fixed compensation), consistent with the low importance of any outcome-related control.

Task Interdependence (TI)

Because task interdependence can strongly determine the effectiveness of control mechanisms (Arnold and Tafkov 2019, Wageman and Baker 1997), we include task interdependence as a determinant. Because employees performing interdependent tasks depend on the skills, effort and information of their coworkers (Loughry and Tosi 2008), peer control is also more likely to emerge when task interdependence increases (Stewart, Courtright and Barrick 2012). Thus, we use peer control to proxy for task interdependence. Our construct is based on Loughry and Tosi (2008) and captures the extent to which coworkers in nurses' departments (1) pay attention to how coworkers in the department perform their work, (2) observe how coworkers do their job, (3) correct coworkers when they make mistakes, (4) let other coworkers know if they are doing something wrong, and (5) tell supervisors if other coworkers are doing something wrong.

Perceived Environmental Uncertainty (PEU)

To measure perceived environmental uncertainty, we use an established five-item survey instrument (Tummers et al. 2006). The five items capture the extent to which (1) the unit is daily confronted with emergencies, (2) patients' care is diverse with regard to the nursing activities to be performed, (3) the intensity of the patients' care is unpredictable, (4) changes in the demand of care are unexpected, and (5) nursing work often consists of unpredictable activities in addition to the ordinary nursing activities.

Importance of Innovation (INNOV)

To proxy for the operating environment of nurses, we also control for the importance innovation (Nagar 2002). As a proxy we rely on a purpose-developed construct measuring how frequently nurses (1) hear of new developments in nursing practice in their work, (2) are

informed by the supervisor about new developments in nursing practice, (3) are encouraged in their work to implement new developments in nursing practice, and (4) implement new developments in nursing practice in their work.

Task Programmability (TP)

Because the extent to which tasks are programmable could influence control design choices, we measure task programmability with a two-item construct outlining the clarity of nurses' tasks.

Effort Observability (EO)

As justification costs could be lower, the better supervisors can observe employees' actions, we also measure the extent to which the supervisor has regularly the opportunity to observe the nurses' work performance.

Job Content (NURSE_TASKS)

As job content might explain variation in control system design (Ouchi and Maguire 1975), we include control variables for the following six typical nursing tasks (Greenslade and Jimmieson 2007): (1) operation of technical devices (e.g., dialysis machine, respirator), (2) supporting patients in activities of daily life (e.g., personal care, etc.), (3) providing information to patients and relatives, (4) coordination of patient care with colleagues, (5) administrative tasks (e.g., documentation of the nursing care process, ordering of materials and medicines, etc.), and (6) management tasks (e.g., work scheduling, managing staff, etc.).

In the determinants regressions for accountability and job autonomy, we additionally control for the department size (*SIZE*) through the number of employees working in the department, nurses' experience through their tenure (*TENURE*), their education level (*EDUC* equal to 1 when nurses have a university degree and 0 otherwise) and whether nurses have leadership responsibilities or not (*LEADERSHIP_DUMMY* equal to 1 when nurses have a leadership position and 0 otherwise). Finally, we control for the effects of hospital affiliation *(HOSPITAL_DUMMIES)* and department affiliation *(DEPARTMENT_DUMMIES)*.

Control Variables for PD5 and OT

In our regression models for *PD5*, we control for pay satisfaction *(PS)* (de Gieter, de Cooman, Pepermans, and Jegers 2010) and task interdependence *(TI)*. We measure *PS* with a five-item construct based on Peltier, Pointer and Schibrowsky (2006). Additionally, in the regression models for both *PD5* and *OT*, we also control for nurses' tenure (*TENURE*), department size (*SIZE*), whether nurses work in stationary or ambulant care *(STATIONARY_CARE)* (Hayes et al. 2012), hospital affiliation *(HOSPITAL_DUMMIES)*, gender *(GENDER_MALE, GENDER_OTHER)*, and the respondent's age *(AGE)*.

IV Data Analysis and Results

Empirical Strategy

In line with Grabner and Moers (2013), we use two alternative strategies to test for the interrelation between accountability and job autonomy. First, we use the demand-function approach to test whether the two control practices, on average, are adopted as a system rather than in isolation. Second, we use the payoff-function approach to directly test whether the effect of one control practice on our outcome variables *PD5* and *OT* decreases in the use of the other practice and vice versa.

Regarding the demand-function approach to test H1a and H1b, we estimate conditional correlations between the respective control practices. The joint determinants of accountability and job autonomy are based on the relevant literature (Abernethy et al. 2004, Abernethy, Bouwens and van Lent 2010, Jaworski 1988, Moers 2006, Nagar 2002). In particular, we correlate the residuals of the following regressions:

$$ACC = \beta_0 + \beta_1 PEU + \beta_2 SIZE + \beta_3 TENURE + \beta_4 PM + \beta_5 GOAL\_DUMMY + \beta_6 BONUS + \beta_7 EO + \beta_8 INNOV + \beta_9 TP + \beta_{10} TI + \beta_{11} LEADERSHIP\_DUMMY + \beta_{12} EDUC + \beta_{13\text{-}18} NURSE\_TASKS + \beta_{19\text{-}29} HOSPITAL\_DUMMIES + \beta_{30\text{-}42} DEPARTMENT\_DUMMIES + \varepsilon_{ACC}$$

$$JA = \beta_0 + \beta_1 PEU + \beta_2 SIZE + \beta_3 TENURE + \beta_4 PM + \beta_5 GOAL\_DUMMY + \beta_6 BONUS + \beta_7 EO + \beta_8 INNOV + \beta_9 TP + \beta_{10} TI + \beta_{11} LEADERSHIP\_DUMMY + \beta_{12} EDUC + \beta_{13\text{-}18} NURSE\_TASKS + \beta_{19\text{-}29} HOSPITAL\_DUMMIES + \beta_{30\text{-}42} DEPARTMENT\_DUMMIES + \varepsilon_{JA}$$

Regarding the payoff-function approach to test H2a and H2b, we use both *PD5* and *OT* as outcome variables. We estimate the following models:

$$PD5 = \beta_0 + \beta_1 PS + \beta_2 ACC + \beta_3 JA + \beta_4 TR\_DUMMY + \beta_5 ACC*JA + \beta_6 ACC*TR\_DUMMY + \beta_7 JA*TR\_DUMMY + \beta_8 ACC*JA*TR\_DUMMY + \beta_9 TENURE + \beta_{10} SIZE + \beta_{11} GENDER\_MALE + \beta_{12} GENDER\_OTHER + \beta_{13} STATIONARY\_CARE + \beta_{14} TI + \beta_{15} AGE + \beta_{16\text{-}26} HOSPITAL\_DUMMIES + \varepsilon_{PD5}$$

$$OT = \beta_0 + \beta_1 AGREED\_WORKING\_TIME + \beta_2 ACC + \beta_3 JA + \beta_4 TR\_DUMMY + \beta_5 ACC*JA + \beta_6 ACC*TR\_DUMMY + \beta_7 JA*TR\_DUMMY + \beta_8 ACC*JA*TR\_DUMMY + \beta_9 TENURE + \beta_{10} SIZE + \beta_{11} GENDER\_MALE + \beta_{12} GENDER\_OTHER + \beta_{13} STATIONARY\_CARE + \beta_{14} AGE + \beta_{15\text{-}25} HOSPITAL\_DUMMIES + \varepsilon_{OT}$$

Hypotheses Tests

H1a/H1b

Panel A of Table 4 reports the results of the determinants regression for the control choices. Consistent with prior work, Model 1 shows that the level of job autonomy granted to a nurse is the higher, the lower the level of task interdependence (Abernethy et al. 2004), the higher the importance of innovation (Nagar 2002) and the more performance measures are used at the department level (Abernethy et al. 2004). Additionally, we find that the level of job autonomy increases when nurses have a leadership role and when they have a higher education level as well as the lower the level of perceived environmental uncertainty and the more programmable tasks are. Finally, job autonomy is the higher, the better supervisors can observe nurses' actions and the larger the department.

As reported in Model 2, accountability is the higher, the higher the level of task interdependence, the lower the task programmability, the smaller the department and the more department-level performance measures are used. Additionally, accountability increases when nurses have a non-university education level, when they are not eligible for a bonus and the higher their tenure. As prior work on the determinants of accountability is scarce in accounting, we thus cannot compare our findings to previous work.

---- Insert Table 4 about here ----

Substitution Effects between Accountability and Job Autonomy

To test H1a and H1b, we calculate the conditional correlations by correlating the residuals of job autonomy and accountability that we obtained from regressing the two control practices on their joint determinants (Grabner and Moers 2013). If the residuals are negatively correlated, this indicates a substitution effect between job autonomy and accountability.

Panel B of Table 4 reports the conditional correlation between the two control practices for the high-task-requirement (HTR) and low-task-requirement (LTR) subsamples separately. In line with H1a, the conditional correlation between the two control practices is negative and significant in our HTR-sample ($\rho = -0.31$, $p < .01$).[6] Thus, supervisors, on average, treat these two control practices as substitutes in their control system design.

To test H1b predicting a weaker substitutive relation between job autonomy and accountability when task requirements are low than when they are high, we compare the conditional correlation between the two control practices across the HTR and LTR samples. We test for equality of the two correlation coefficients using the Fisher transformation. We find that the substitution effect between accountability and job autonomy is significantly stronger ($p < .01$) in the HTR sample ($\rho = -0.31$, $p < .01$) than in the LTR sample ($\rho = -0.12$, $p < .01$). This result supports H1b. Additionally, it lends credibility to our theory underlying H1a and H1b that justification costs vary as a function of task requirements and determine the substitutive use of the control design choices.

To address the issue that unobserved variables might drive our results from the conditional-correlation test, we conduct a follow-up analysis based on nurses' patient orientation.[7] Our underlying theory for H1a and H1b suggests that a substitutive relationship

[6] P-values are reported one-tailed for directional expectations and two-tailed otherwise.

[7] We measure patient orientation with three items describing the degree to which (1) it is particularly important to nurses to ensure that patients receive the best possible care, (2) nurses would also work overtime if it helped a patient, and (3) nurses take as much time as possible to meet the needs of their patients (Susskind, Kacmar and Borchgrevink 2003).

between accountability and job autonomy can be driven by the costs of destroying intrinsic motivation and that this effect is more relevant in high vs. low task requirement environments. To test this argument, we split the two samples based on the median of nurses' patient orientation as our measure of nurses' intrinsic motivation. We then compare the two correlation coefficients of the two subsamples. Consistent with our underlying theory, we find that in the HTR sample, the substitution effect is larger for high patient orientation ($\rho = -0.37$, $p < .01$) than for low patient orientation ($\rho = -0.16$, $p < .01$). This difference is significant (p-value = 0.05). In the LTR sample, the substitution effect is also stronger for high ($\rho = -0.14$, $p < .01$) than for low patient orientation ($\rho = -0.11$, $p < .01$), but insignificantly so (p-value = 0.58). These findings support our theory about the specific relevance of intrinsic motivations in the HTR sample and its reduced relevance in the LTR sample.

H2a/H2b

To test the (joint) outcome effects of accountability and job autonomy hypothesized in H2a and H2b, we rely on the payoff-function approach using *PD5* and *OT* as the alternative outcome variables. Owing to the censored nature of *PD5*, we rely on a Tobit specification (Moers 2005, Amemiya 1984). The results of the Tobit regressions testing H2a and H2b are reported in Model 1 (HTR sample), Model 2 (LTR sample) and Model 3 (overall sample) in Table 5.

---- Insert Table 5 about here ----

H2a predicts that in the HTR sample, accountability and job autonomy act as substitutes with respect to nurses' loyalty to their department. Model 1 of Table 5 shows that accountability is positively associated with *PD5* when job autonomy is low ($\beta = 19.14$, $p < .05$). Likewise, when the level of accountability is low, job autonomy is positively associated with *PD5* ($\beta = 18.41$, $p < .05$). However, consistent with H2a, we find a negative and significant interaction between accountability and job autonomy ($\beta = -2.77$, $p < .05$), supporting the substitutive effect of both control choices on nurses' likelihood to stay.

H2b predicts that the substitution effect between accountability and job autonomy with respect to employees' department loyalty is lower in the LTR sample than in the HTR sample. We use two approaches to test this prediction. First, we run our Tobit regression for the LTR sample (Model 2). We find that in this sample, accountability is *negatively* associated with *PD5* when job autonomy is low ($\beta = -7.32$, $p < .05$). Thus, in the LTR sample, increasing levels of accountability seem to be perceived as micromanagement when job autonomy is low. Additionally, we find that the interaction between accountability and job autonomy is positive and significant ($\beta = 1.24$, $p < .10$), suggesting that job autonomy and accountability act as complements in the LTR sample. We then test whether the coefficients of the interaction terms in Model 1 and Model 2 are statistically different from one another and find that this is the case (p-value = 0.01). This supports H2b. As an alternative test for H2b, we specify a Tobit regression including all two-way interaction terms and the three-way interaction (*ACC * JA * TR_DUMMY*). We run this regression on the entire sample (Model 3). Again supporting H2b, we find that the three-way interaction term is negatively and significantly associated with *PD5* (Model 3: $\beta = -3.45$, $p < .05$) which implies that the interaction term in the HTR sample is significantly more negative than in the LTR sample.

As an alternative proxy for employee loyalty, we use the variable *OT* as the dependent variable of our regressions. Owing to the censored nature of *OT*, we again rely on a Tobit specification (Moers 2005, Amemiya 1984). In our hypotheses tests, we follow the same steps as for *PD5*. The results of our regression models are reported in Table 6 (Model 1).

---- Insert Table 6 about here ----

Model 1 again supports H2a as the interaction between accountability and job autonomy is negative and significant (Model 1: $\beta = -0.28$, $p < .10$). In line with H2b, Model 2 shows that in the LTR sample, the interaction coefficient is smaller in magnitude than in the HTR sample (Model 2: $\beta = -0.12$, $p < .05$). However, the difference between the two interaction term coefficients is not statistically significant (p-value = 0.24). In our second test for H2b, we run

our Tobit specification for the overall sample (Model 3). In line with H2b, the coefficient of the three-way interaction is negative. However, it is not significant (Model 3: $\beta = -0.09$, $p > .10$). Thus, when we use *OT* as dependent variable, we only find directional support for H2b.

Supplemental Analyses

As we argued in our theory development that intrinsic motivations may be affected by the interrelation between accountability and job autonomy, we investigate to what extent the interaction effect between accountability and job autonomy with regard to *OT* is sensitive to the level of patient orientation. Therefore, we split both the HTR sample and the LTR sample based on their respective median values of patient orientation and re-run the Tobit regressions separately for the four subsamples. The results are reported in Table 7.

---- Insert Table 7 about here ----

In line with our theory, we find that the substitution effect between accountability and job autonomy is strongest in the context of the HTR subsample with high patient orientation (Model 1: $\beta = -0.51$, $p < .05$). However, while this interaction coefficient is substantially larger than for the HTR subsample with low patient orientation (Model 2: $\beta = -0.07$, $p > .10$), the difference between the two subsamples is not significant (p-value = 0.18). The difference between high vs. low patient orientation is smaller in the LTR sample (Model 3: $\beta = -0.09$, $p > .10$ vs. Model 4: $\beta = -0.04$, $p > .10$) but again not significant (p-value = 0.35) reflecting that intrinsic motivation may be less important when task requirements are low. Additionally, when intrinsic motivation is high, the substitution effect is significantly larger when task requirements are high than when they are low (Model 1 vs. Model 3: p-value = 0.07). In line with our theory, keeping up intrinsic motivation seems most relevant for supervisors when task requirements are high.

Additionally, we run several robustness checks to assess the robustness of our findings. First, the conditional-correlation analysis for H1b assumes that the effect of the observed exogenous variables on accountability and job autonomy is the same in both subsamples

(Grabner 2014). Relaxing this assumption, we run the determinants regressions for the subsamples separately and then correlate the residuals in both subsamples. Again, we find that the conditional correlations between accountability and job autonomy are significant and negative in both the HTR sample ($\rho = -0.32$, $p < .01$) and the LTR sample ($\rho = -0.12$, $p < .01$). The difference is highly significant ($p < .01$). Our results for H1b are thus robust in this regard.

Second, as some authors suggest that accountability also includes responsibility (e.g., Dose and Klimovski 1995), we rerun all our analyses with the 2-item operationalization of accountability, including an item for responsibility. All findings and inferences regarding our hypotheses remain identical. Thus, the use of our single-item construct for accountability does not pose a threat to the validity of our results.

Third, we use conventional standard errors in our Tobit specifications and do not cluster standard errors in our main tests because we only have twelve participating hospitals (Angrist and Pischke 2009). Nevertheless, to account for potential intraclass correlation at the hospital level, we rerun all payoff-function specifications using robust standard errors clustered by hospitals (Rogers 1994). All of our findings remain statistically the same when we use clustered robust standard errors. We can hence rule out that our findings are an artefact of unaccounted intraclass correlation within hospitals.

Fourth, recent papers on the interrelation between control practices suggest using a modified payoff function that is more robust with regard to testing interrelationships between control practices (Masschelein and Moers 2018, Bedford, Malmi and Sandelin 2016). This modified payoff equation adds context-control-practice interactions to the payoff function. In our case, we add the main effect for *PEU*, the interaction for *PEU* and *ACC* as well as *PEU* and *JA* to the payoff functions. All our inferences remain unchanged with this alternative specification.

Finally, as an alternative to our dependent variable *PD5* that measures a 5-year time horizon, we repeat our analyses using the same measure based on a 2-year time horizon

(PD2). Our findings remain inferentially and statistically unchanged compared to using *PD5* as dependent variable, indicating that they are not driven by a specific time horizon.

V Discussion and Conclusion

Despite their prevalence in practice, little is known about the use and effects of action controls. In this paper, we investigate how accountability and job autonomy are complementarily or substitutively used and how their (joint) use affects employees' loyalty to their department in a setting in which results controls are infeasible. We suggest that justifying actions triggered by accountability can entail significant economic and behavioral costs for both supervisors and employees, leading supervisors to use job autonomy and accountability as substitutes. Specifically, we predict and find that accountability and job autonomy are used as substitutes in environments where task requirements are high and that this substitution effect is weaker when task requirements are low.

Additionally, we shed light on how accountability and job autonomy interact to affect employee loyalty to their departments as proxied by their propensity to stay within the department and their overtime. By and large, our results again highlight the substitutive role of accountability and job autonomy in environments with high task requirements and a weaker substitutive effect when task requirements are low. These results are in line with supervisors taking the effects of control mechanisms into account when making control choices.

Our paper adds to the literature in several ways. First, our study enhances the understanding of the use and effects of action controls in settings in which results controls are infeasible—as is often the case in practice. By studying their interrelation, our paper also contributes to the rapidly growing literature on complementarities among control practices (Grabner and Moers 2013). Additionally, we provide evidence that accountability can have either positive or negative effects on employees' loyalty to their department, depending on the high or low task requirements. These findings may help to explain the mixed evidence of the

effects of accountability in prior work (e.g., Dose and Klimovski 1995, Lerner and Tetlock 1999). Second, our findings foster our understanding of job autonomy as an organizational design choice as we provide evidence that job autonomy and accountability are used as substitutes. Thus, job autonomy might not only substitute for more centralized control mechanisms when results controls are available (Nagar 2002, Abernethy at el. 2004) but also when they are not available. Finally, our study informs practice about the effects of job autonomy and accountability on nurses' overtime and their likelihood to stay in their current department, contingent on the level of task requirements (i.e., whether nurses work in ICUs or non-ICUs). This may help practitioners better design their control systems.

The findings of this study should be interpreted in the light of their limitations. The obvious drawback of cross-sectional surveys is that they do not allow for the claim of causality. Any statements of causality in this paper are hence purely based on theoretical positions. Second, we use the same informant to collect both dependent and independent variables. Despite careful development of our survey instrument, extensive pre-testing, and good statistical validity and reliability, our data may contain noise. Despite these limitations, we are convinced that our study makes an important contribution to the analysis of action controls.

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TABLE 1
Description of sample

Hospitals	#Beds	#Employees	#Nurses	#Responses	Response Rate
Hospital 1	467	3,475	1,075	261	0.24
Hospital 2	70	174	100	42	0.42
Hospital 3	86	387	153	24	0.16
Hospital 4	189	1,100	320	84	0.26
Hospital 5	500	2,461	717	33	0.05
Hospital 6	140	800	337	88	0.26
Hospital 7	119	469	248	127	0.51
Hospital 8	96	209	123	19	0.15
Hospital 9	285	1,350	290	97	0.33
Hospital 10	63	500	135	13	0.10
Hospital 11	1,890	11,730	6,568	855	0.13
Hospital 12	120	450	170	50	0.29
Overall			**10,236**	**1,693**	**0.17**

TABLE 2
Descriptive statistics for survey constructs

Construct	Min	Mean	Median	Max	Std. dev.
Probability to stay within department (PD5)	0.00	53.70	50.00	100.00	38.02
Overtime (OT)	0.00	3.74	2.00	20.00	5.58
Accountability (ACC)	1.00	4.03	4.00	7.00	1.91
Job autonomy (JA)	1.00	4.81	5.00	7.00	1.40
Perceived environmental uncertainty (PEU)	1.00	4.64	4.80	7.00	1.30
Task programmability (TP)	1.50	6.23	6.50	7.00	0.84
Performance measures (PM)	1.00	4.33	4.50	7.00	1.75
Effort observability (EO)	1.00	4.52	5.00	7.00	1.97
Importance of innovation (INNOV)	1.00	4.32	4.50	7.00	1.46
Task interdependence (TI)	1.00	4.59	4.60	7.00	1.12
Pay satisfaction (PS)	1.00	3.93	4.00	7.00	1.42
Patient orientation (PO)	3.00	6.36	6.67	7.00	0.77
Size (Size)	1.00	45.84	30.00	1000.00	59.29
Tenure (Tenure)	0.00	7.96	5.00	40.00	7.68

TABLE 3
Correlation matrix [a]

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 PD5	**n/a**													
2 Overtime	-0.072***	**n/a**												
3 ACC	-0.009	0.0950***	**n/a**											
4 JA	0.186***	-0.0214	-0.127***	**0.89**										
5 PEU	-0.057**	0.200***	0.051**	-0.062**	**0.76**									
6 TP	0.121***	-0.062**	0.041	0.202***	0.014	**0.75**								
7 PM	0.094***	0.071***	0.162***	0.139***	0.052**	0.073***	**0.90**							
8 EO	0.135***	-0.054**	0.087***	0.104***	-0.050**	0.076***	0.195***	**n/a**						
9 INNOV	0.160***	-0.011	0.098***	0.259***	0.063**	0.122***	0.345***	0.244***	**0.72**					
10 TI	-0.067**	0.082***	0.251***	-0.086***	0.153***	0.073***	0.190***	0.120***	0.120***	**0.83**				
11 PS	0.130***	-0.136***	0.054**	0.171***	-0.102***	0.115***	0.083***	0.110***	0.226***	0.030	**0.84**			
12 PO	0.083***	0.038	0.071***	0.149***	0.088***	0.185***	0.100***	0.052**	0.122***	0.154***	-0.015	**0.57**		
13 Size	-0.002	0.050**	-0.024	0.003	0.205***	0.012*	0.012	-0.105***	0.004	0.075***	0.083***	-0.053**	**n/a**	
14 Tenure	0.179***	-0.033	0.033	0.051**	0.120***	0.120***	0.059**	-0.046*	0.086***	-0.083***	0.048*	0.043*	0.108***	**n/a**

*, **, *** Indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, two-tailed test.
Please refer to the appendix for a description of the multi-item constructs.
[a] The diagonal of the matrix shows the Cronbach's alpha for each variable. The other cells of the table report bivariate correlation coefficients. We do not calculate Cronbach's alpha for the single-item constructs (as indicated by n/a).

TABLE 4
Demand-function approach

Panel A: Regression analysis

	Model 1	**Model 2**
	JA	**ACC**
Intercept	2.103***	1.428***
	(0.341)	(0.489)
PEU	-0.057**	0.032
	(0.029)	(0.041)
SIZE	0.001**	-0.003***
	(0.001)	(0.001)
TENURE	-0.001	0.012**
	(0.004)	(0.006)
PM	0.041**	0.103***
	(0.020)	(0.029)
GOAL_DUMMY	-0.022	0.170
	(0.082)	(0.117)
BONUS	-0.011	-0.200*
	(0.081)	(0.116)
EO	0.030*	0.021
	(0.017)	(0.025)
INNOV	0.221***	0.043
	(0.025)	(0.036)
TP	0.345***	-0.103*
	(0.040)	(0.058)
TI	-0.173***	0.383***
	(0.031)	(0.044)
LEADERSHIP_DUMMY	0.422***	-0.245
	(0.107)	(0.154)
EDUC	0.321***	-0.432***
	(0.103)	(0.148)
NURSE_TASKS	Yes	Yes
HOSPITAL_DUMMIES	Yes	Yes
DEPARTMENT_DUMMIES	Yes	Yes
R^2	0.219	0.140
F-value	10.02***	5.83***
n	1580	1580

Panel B: Conditional correlations

	HTR Setting		**LTR Setting**	
	ε_{JA}		ε_{JA}	
ε_{ACC}	-0.314***		-0.120***	
	Low PO	**High PO**	**Low PO**	**High PO**
ε_{ACC}	-0.161***	-0.374***	-0.110***	-0.140***

*, **, *** Indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$. respectively. p-values are reported one-tailed for directional expectations and two-tailed otherwise.
Standard errors are in parentheses.

This table reports the demand-function approach to test H1a and H1b. Panel A reports the regressions of job autonomy and accountability on their joint determinants. ε_{JA} and ε_{ACC} and are the residuals obtained from regressing job autonomy (JA) and accountability (ACC) on their joint determinants.

Panel B reports the correlation of the residuals derived from the regressions in Panel A for both the HTR (high task requirements) and LTR (low task requirements) subsamples.

Within both settings, we also report the conditional correlations between the residuals for the two subsamples created based on a median split of the variable patient orientation (PO).

Please refer to the appendix for a description of the multi-item constructs.

TABLE 5
Payoff-function approach

Tobit regression with product term – PD5 as dependent variable

	Model 1	**Model 2**	**Model 3**
	HTR	**LTR**	**Overall Sample**
Intercept	-98.813**	-13.697	-5.893
	(49.114)	(21.741)	(20.405)
PS	5.371	6.873***	6.473***
	(3.358)	(1.617)	(1.461)
ACC	19.141**	-7.318**	-7.122**
	(8.663)	(3.507)	(3.427)
JA	18.405**	1.568	1.357
	(8.230)	(3.201)	(3.124)
TR_DUMMY			-122.819**
			(54.148)
ACC * JA	**-2.767****	**1.238***	1.240*
	(1.612)	**(0.682)**	(0.667)
ACC * TR_DUMMY			22.582**
			(10.265)
JA * TR_DUMMY			17.055*
			(9.905)
ACC * JA * TR_DUMMY			**-3.453****
			(1.963)
TENURE	-1.097	0.570*	0.311
	(0.670)	(0.322)	(0.292)
SIZE	-0.002	0.106**	0.071**
	(0.082)	(0.041)	(0.034)
GENDER_MALE	-10.549	-2.434	-4.884
	(9.053)	(5.517)	(4.812)
GENDER_OTHER	4.891	-11.858	-8.866
	(36.741)	(15.265)	(14.092)
STATIONARY_CARE	-7.193	-11.305**	-14.072***
	(10.782)	(5.563)	(4.864)
TI	-5.314	-0.520	-0.989
	(4.486)	(1.847)	(1.705)
AGE	1.426***	1.593***	1.588***
	(0.536)	(0.226)	(0.207)
HOSPITAL_DUMMIES	Yes	Yes	Yes
LR chi2	53.55***	198.50***	227.04***
Pseudo R^2	0.039	0.025	0.024
n	187	1188	1375

*, **, *** Indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. p-values are reported one-tailed for directional expectations and two-tailed otherwise.
Standard errors are in parentheses.

This table reports the payoff-function approach to test H2a and H2b using *PD5* as dependent variable. First, we run our regression specification for the two subsamples (i.e., Model 1, Model 2) separately and then for the overall sample (Model 3). In the Tobit regression for the HTR (high task requirements) sample, we observe 42 left-censored, 111 uncensored, and 34 right-censored observations. In the Tobit regression for the LTR (low task

requirements) sample, we observe 256 left-censored, 611 uncensored, and 321 right-censored observations. In the Tobit regression for the overall sample, we observe 298 left-censored, 722 uncensored, and 355 right-censored observations.

Please refer to the appendix for a description of the multi-item constructs.

TABLE 6

Payoff-function approach

Tobit regression with product term – OT as dependent variable

	Model 1	**Model 2**	**Model 3**
	HTR	**LTR**	**Overall Sample**
Intercept	0.160	-4.064**	-3.771**
	(5.619)	(1.730)	(1.741)
AGREED_WORKING_TIME	-0.027	0.029**	0.022
	(0.042)	(0.015)	(0.014)
ACC	0.994	0.946***	0.994***
	(0.953)	(0.295)	(0.306)
JA	1.339*	0.383*	0.419
	(0.879)	(0.278)	(0.288)
TR_DUMMY			0.612
			(4.352)
ACC * JA	**-0.281***	**-0.118****	-0.124**
	(0.185)	**(0.058)**	(0.060)
ACC * TR_DUMMY			-0.220
			(0.871)
JA * TR_DUMMY			0.687
			(0.813)
ACC * JA * TR_DUMMY			-0.089
			(0.169)
TENURE	0.034	0.033	0.038
	(0.083)	(0.026)	(0.026)
SIZE	0.003	0.005*	0.008***
	(0.010)	(0.003)	(0.003)
GENDER_MALE	-1.183	-1.302***	-1.436***
	(1.194)	(0.494)	(0.459)
GENDER_OTHER	4.765	0.324	0.630
	(4.736)	(1.343)	(1.317)
STATIONARY_CARE	-0.266	1.202**	1.037**
	(1.288)	(0.485)	(0.446)
AGE	-0.096	-0.032*	-0.052***
	(0.067)	(0.019)	(0.018)
HOSPITAL_DUMMIES	Yes	Yes	Yes
LR chi2	32.24**	79.78***	102.14***
Pseudo R^2	0.034	0.015	0.016
n	199	1279	1478

*, **, *** Indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. p-values are reported one-tailed for directional expectations and two-tailed otherwise.
Standard errors are in parentheses.

This table reports the payoff-function approach to test H2a and H2b using *OT* as dependent variable. First, we run our regression specification for the two subsamples (i.e., Model 1, Model 2) separately and then for the overall sample (Model 3). In the Tobit regression for the HTR (high task requirements) sample, we observe 72 left-censored, 121 uncensored, and 6 right-censored observations. In the Tobit regression for the LTR (low task requirements) sample, we observe 565 left-censored, 703 uncensored, and 11 right-censored observations. In the

Tobit regression for the overall sample, we observe 637 left-censored, 824 uncensored, and 17 right-censored observations.

Please refer to the appendix for a description of the multi-item constructs.

TABLE 7

Payoff-function approach

Tobit regression with product term – OT as dependent variable

	Model 1	**Model 2**	**Model 3**	**Model 4**
	HTR High PO	**HTR Low PO**	**LTR High PO**	**LTR Low PO**
Intercept	-5.420	0.021	-0.759	-2.410
	(7.943)	(9.918)	(2.814)	(2.237)
AGREED_WORKING_TIME	-0.099	0.106*	0.023	0.036*
	(0.064)	(0.062)	(0.022)	(0.020)
ACC	2.383**	0.097	0.789**	0.544*
	(1.325)	(1.826)	(0.442)	(0.401)
JA	2.830**	-0.466	0.248	0.149
	(1.239)	(1.728)	(0.419)	(0.374)
ACC * JA	**-0.512****	**-0.071**	**-0.093**	**-0.043**
	(0.240)	**(0.384)**	**(0.083)**	**(0.082)**
TENURE	0.060	-0.028	0.079*	-0.010
	(0.106)	(0.144)	(0.041)	(0.034)
SIZE	-0.018	0.031**	0.009**	0.000
	(0.015)	(0.013)	(0.004)	(0.004)
GENDER_MALE	-1.463	0.176	-1.178	-1.226**
	(1.621)	(1.846)	(0.828)	(0.587)
GENDER_OTHER	2.565	6.892	2.372	-2.000
	(7.283)	(5.684)	(1.985)	(1.791)
STATIONARY_CARE	0.460	0.330	1.277*	1.189*
	(1.993)	(1.804)	(0.754)	(0.615)
AGE	-0.128	0.000	-0.048*	-0.021
	(0.093)	(0.104)	(0.029)	(0.023)
HOSPITAL_DUMMIES	Yes	Yes	Yes	Yes
LR chi2	25.79	28.41*	56.22***	54.05***
Pseudo R2	0.046	0.	0.023	0.019
n	122	77	557	722

*, **, *** Indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. p-values are reported one-tailed for directional expectations and two-tailed otherwise.
Standard errors are in parentheses.

This table reports the payoff-function approach to provide additional insights into H2a and H2b using *OT* as dependent variable. For both subsamples, HTR (high task requirements) (Model 1 & Model 2) and LTR (low task requirements) (Model 3 & Model 4) respectively, we run two separate regressions for high patient orientation (PO) and low patient orientation (PO) respectively.

Please refer to the appendix for a description of the multi-item constructs.

APPENDIX
Construct validity [a]

Accountability (ACC)			
I have to justify my work to my supervisor			**n/a**
Job Autonomy (JA)			
Cronbach's α: 0.89	Composite reliability: 0.94	AVE: 0.83	Factor loadings
I have significant autonomy in determining how I do my job			**0.843**
I can decide on my own how to do my work			**0.877**
My supervisor grants me significant leeway in making decisions			**0.812**
Perceived Environmental Uncertainty (PEU)			
Cronbach's α = 0.76	Composite reliability = 0.82	AVE = 0.49	Factor loadings
The unit is daily confronted with emergencies			**0.561**
Patients' care is diverse with regard to the nursing activities to be performed			**0.634**
The intensity of the patients' care is unpredictable			**0.773**
Changes in the demand of care are unexpected			**0.797**
In addition to the ordinary nursing activities, nursing work often consists of unpredictable activities			**0.386**
Task Programmability (TP)			
Cronbach's α: 0.75	Composite reliability: 0.89	AVE: 0.80	Factor loadings
I know how to divide my time over the different tasks in my job			**0.705**
I understand fully which of my work objectives are more important than others			**0.705**
Performance Measures (PM)			
Cronbach's α = 0.90	Composite reliability = 0.93	AVE = 0.87	Factor loadings
In our department, key performance measures are regularly communicated, which provide information about the performance of our department			**0.804**
In order to ensure a good information flow with our department, key performance measures play an essential role			**0.804**
Effort Observability (EO)			
My supervisor regularly has the opportunity to observe my work performance			**n/a**
Importance of Innovation (INNOV)			
Cronbach's α = 0.72	Composite reliability = 0.93	AVE = 0.76	Factor loadings
I often hear of new developments in nursing practice in my work			**0.756**
I am often informed by my supervisor about new developments in nursing practice			**0.846**
I am often encouraged in my work to implement new developments in nursing practice			**0.871**
In my work, I frequently implement new developments in nursing practice			**0.789**

Task Interdependence (TI)			
Cronbach's α: 0.83	Composite reliability: 0.88	AVE: 0.60	Factor loadings
Coworkers in my unit …			
… pay attention to how coworkers in the department perform their work			**0.747**
… observe how coworkers do their job			**0.759**
… correct coworkers when they make mistakes			**0.717**
… let other coworkers know if they are doing something wrong			**0.709**
… tell the supervisor if other coworkers are doing something wrong			**0.584**

Pay Satisfaction (PS)			
Cronbach's α = 0.84	Composite reliability = 0.88	AVE = 0.59	Factor loadings
I am satisfied with my pay as a nurse			**0.773**
I am happy with my chances of getting an annual salary increase			**0.654**
I am happy with my pay compared to other nurses who do comparable work in my department			**0.750**
I am happy with my pay compared to other nurses who do similar work in similar hospitals			**0.825**
The benefits I get here, such as vacation time and retirement benefits, are better than those I could get in similar hospitals			**0.547**

Patient Orientation (PO)			
Cronbach's α: 0.57	Composite reliability: 0.81	AVE: 0.58	Factor loadings
It is particularly important to me to ensure that our patients receive the best possible care			**0.568**
I would also work overtime if it helped a patient			**0.500**
I take as much time as possible to meet the needs of our patients			**0.660**

Probability to stay within department (PD5)	
From your perspective, what is the likelihood that you will still be working in your department 5 years from now?	**n/a**

Overtime (OT)	
Actual average working hours/week (2018) - contractually agreed working hours/week	**n/a**

[a] This table illustrates the results of factor analyses for the constructs used in this study. Factor loadings > 0.350 used in the final measurement of the constructs are in bold. The factor loadings are reported based on common factor analysis.