Management Controls in Hierarchies

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We study management controls (MCs) in a multi-level hierarchy, where senior managers use MCs to motivate middle managers, who in turn use MCs to motivate rank-and-file employees. Using a field setting, we find that middle managers with a large span of control tend to prioritize standardized controls over customized controls. We also find that task diversity mitigates the benefits of standardized controls. Specifically, employee task diversity moderates the association between middle managers' span of control and their use of standardized and customized controls. In contrast, we find that senior managers with a large span of control rely less on standardized controls. This finding is consistent with the argument that senior managers choose controls to motivate middle managers' management tasks, which are more diverse than the productive tasks of rank-and-file employees. Overall, this study highlights the importance of hierarchy breadth and depth in MC design.

Keywords: hierarchy; management control, span of control.
JEL classification: M41; M12; M21.

1. INTRODUCTION

In a hierarchical organization characterized by delegated decision-making authority, managers use management controls (MCs) to align employees' actions and decisions with organizational objectives (Malmi and Brown 2008). Previous work, using employee-supervisor dyads, emphasizes the firm's external environment, technology, and strategy, as well as the characteristics of employees' tasks as contingencies of MCs (for a review, see Chenhall 2003). However, in a hierarchy, a manager is routinely responsible for a team of employees. The size of the team directly influences the cost incurred by the manager to direct employees' actions, subsequently shaping manager's control choices (Williamson 1967; Radner 1993).[1] Using a field study and surveys in which we match employees, middle managers, and senior managers, we investigate MCs in a hierarchy. Specifically, we examine how the size of a manager's team is related to the manager's control choices, and how this relation is attenuated by the diversity of subordinates' activities.

In our theory, we consider a hierarchy consisting of a principal (e.g., a firm owner or a supervisor) and several productive agents (e.g., rank-and-file employees). The principal implements MCs to direct the agents' activities. When the span of control is large, the principal faces an amplified control problem because the principal must control the productive tasks of multiple agents simultaneously (Williamson 1967). Thus, in addition to agent task characteristics (e.g., outcome measurability and task programmability; Kirsch 1996), the cost of implementing these MCs across multiple agents becomes an important determinant of their use. With multiple agents, the principal chooses between MCs that are customized for each agent and MCs that are standardized across multiple agents (Şabac and Yoo 2018).[2] We argue that a principal with a large

[1] Empirically, we capture team size by a manager's span of control, i.e., the number of employees who report directly to the manager.

[2] An example of a customized control is a manager monitoring an employee's activity and comparing the observed action to a predetermined action plan. Here, the manager must consider each employee individually and tailor the action plan to the employee's responsibilities. Examples of standardized controls include the manager measuring the

span of control tends to rely on standardized controls because the principal can implement these controls across a large team of agents at low cost. In this way, organizational structure, and particularly the principal's span of control, is an important contextual factor affecting control design.

However, we expect that the efficiency of standardized controls is reduced when agents are engaged in diverse activities. When agents perform diverse tasks, the incremental benefit of selecting customized MCs (i.e., increased precision) outweighs the reduced cost of using standardized MCs. Thus, the principal is less inclined to use standardized MCs for a large team of agents performing diverse tasks. This task diversity may arise as a function of cross-functional teams or as agent's tasks change at higher hierarchical levels. For example, at higher hierarchical levels the introduction and predominance of management tasks, as opposed to only productive tasks, creates groups of subordinates with more diverse tasks. In these cases, managers at higher hierarchical levels will tend to select more customized controls for a large team than managers at lower hierarchical levels.[3]

Testing the implications of our theory requires access to information about the use of MCs within an organization and the matching of the MC choices to control problems across multiple levels of an organizational hierarchy. For example, manager's MC choices are likely shaped both by the nature of subordinate employees' tasks as well as by their superior manager's MC choices (Ouchi 1978; Casas-Arce et al. 2023). These intensive data requirements have likely been a barrier to such empirical studies in the past. Thus, although understanding the role of middle managers in explaining MC design is of interest to academics and practitioners alike, little work has been done

performance of a team of employees or communicating an internal quality initiative to multiple employees. Here, the manager can efficiently apply these controls to many employees.

[3] While broader performance measures such as business unit profit may be more relevant at higher hierarchical levels, the greater diversity of employee contributions is likely to require other individualized MCs to adequately align the subordinate's actions.

in this area (Malmi and Brown 2008). Consistent with this gap, a panel of MC experts argues that "more research is warranted on middle managers application of management controls" (Reimer et al. 2016, p. 285). We use a field setting to answer this call.

To test our predictions, we partner with a large multidivisional professional services firm to distribute two survey waves in 2021 and 2022 to 948 middle managers at different levels of the firm's hierarchy.[4] Using a custodian approach (Vogel 2018), we are able to anonymously match employee responses with those of their middle managers, and middle managers' responses with those of their senior managers. We ask managers with supervisory responsibilities about their use of MCs (i.e., the MC choices of both senior and middle managers) and employees without supervisory responsibilities about the characteristics of their tasks. We focus on MC choices where managers by definition have greater discretion − those that are more informally specified by managers through face-to-face interactions (Hitt et al. 1990; Cardinal et al. 2004; Hartmann and Slapničar 2012; Akroyd and Kober 2020; Cai 2023). To measure the size of each manager's control problem, we rely on archival data on a manager's span of control provided directly by the firm.

We use Merchant and Van der Stede's (2017) object of control framework to structure the MC responses into action, personnel, results, and cultural controls, respectively. We argue that, in our setting, action controls, such as predetermining and monitoring subordinates' actions, are examples of more-customized controls because managers must consider each subordinate individually. In contrast, results and cultural controls, such as measuring team performance or promoting quality norms through repeated speeches, are examples of more-standardized controls because managers can efficiently apply these controls to many subordinates. To empirically

[4] Throughout the paper we refer to individuals at adjacent hierarchical levels as employees, middle managers, and senior managers, respectively. Our analysis also requires survey inputs from both subordinate employees and senior managers. We discuss our three-tier matching process and resulting sample sizes in Section 3.1.

validate this classification, we examine variety in the MC elements of action and personnel controls relative to results and cultural controls. Within teams assigned to a manager, we consistently find evidence of greater variation in action and personnel controls, lending credibility to the description of action and personnel controls are more customized, while results and cultural controls are more standardized.

To test our hypothesis, we first examine whether and how a middle manager's span of control affects the choice of MC practices. Using a matched sample of middle managers, senior managers, and employees, we find that middle managers' span of control plays an important role in their MC choices – incremental to control choice determinants identified in prior literature. Specifically, we show that a larger span of control is associated with greater reliance on results and cultural controls and less reliance on action and personnel controls. These results are consistent with managers using standardized controls to economize on the size of their control problem. We also confirm findings from previous research that the measurability of subordinates' outcomes and the programmability of their tasks (e.g., Eisenhardt 1985; Snell 1992), as well as superior managers' choices of MCs (Ouchi 1978), are important predictors of MC choice. Overall, our results suggest that as the middle managers' span of control increases, managers rely more on standardized controls that can be implemented efficiently for many subordinates.

Next, we examine how diversity in subordinate employees' tasks moderates the association between middle managers' span of control and their choice of MCs. A larger span of control may be associated with more diversity in employees' tasks (e.g., Merchant 1981). Such diversity, if it exists, may make coordination more challenging (Chenhall 2003) and reduce the benefits of standardized MCs. To examine this empirically, we introduce task diversity as a moderating variable in our hypothesis test. We find that employee task diversity mitigates the relation between span of control and standardized MCs, suggesting that standardized controls are less efficient

control practices when a manager is responsible for a large team of subordinates performing diverse tasks. These inferences hold when we consider task diversity in terms of outcome measurability and task programmability combined, and when we consider diversity in outcome measurability and diversity in task programmability separately.

Given this moderating effect of task diversity on middle manager MC choice, and our assertion that subordinate tasks become more diverse as they incorporate more management elements at higher levels of the hierarchy, we next examine the effect of span of control on MC choice for senior managers. These senior managers are responsible for middle managers, unlike middle managers who are responsible only for employees with no supervisory responsibilities. In contrast to our findings for middle managers, we find little impact of senior managers' MC choices at conventional levels of significance. However, consistent with our task diversity findings, the sign of these coefficients is opposite that of middle managers (with only the sign on cultural controls significant at standard two-tail levels). These results suggest that standardized controls are less efficient control for senior managers responsible for large teams and is consistent with the benefit to customized MCs, given the diversity of middle managers' tasks, outweighing any reduced cost of standardization for senior managers.

Our study contributes to the literature by examining organizational structure in general, and the hierarchical nature of the organization in particular, as an internal contextual factor for MC design. First, we provide evidence on how the breadth of a hierarchy influences control choice. Building on Eisenhardt (1985), which introduces the idea of the cost of outcome measurement in compensation design, we highlight the role of standardized control choices in a multiple agent MC framework. Our findings suggest that in addition to previously documented task characteristics such as outcome measurability or task programmability (e.g., Ouchi 1979; Frey et al. 2013), the size of a manager's control choice problem plays an important role in MC design. With these

insights, we contribute to contemporary work that focuses on managerial characteristics of control choice problems, including a manager's performance pressure (Bouwens et al. 2024) and the control choices of superior managers (Casas-Arce et al. 2023). More broadly, we complement the literature on the role of organizational structure in MC design (e.g., Abernethy et al. 2004; Gerdin 2005; Kristensen and Israelsen 2014).

Second, we provide evidence on how the depth of a hierarchy influences control choice. Consistent with different control problems at different hierarchical levels, we find that managers at higher hierarchical levels tend to choose more customized controls than managers at lower hierarchical levels when team size increases. Thereby, we document that the observed patterns of MCs across hierarchical levels (e.g., Ouchi 1978; Casas-Arce et al. 2023) may be more nuanced than a cascading effect alone. In doing so, our study responds to the call by Malmi and Brown (2008) for more evidence on how MCs are configured and relate to each other across hierarchical levels. In addition, we complement previous theoretical work on the delegation of management tasks to middle managers (e.g., Hofmann and Indjejikian 2021, 2024) and gain a better understanding of the hierarchical patterns of control (Christ and Vance 2018; Bouwens et al. 2024). While we are aware of one qualitative field study of control design with middle managers (Martyn 2018), we believe that we are the first to empirically investigate the role of the middle manager's span of control in MC design. In sum, we advance the literature by focusing on middle managers and using organizational characteristics, namely the breadth and depth of a hierarchical organization, to inform control design.

The paper is organized as follows. Section 2 discusses the literature and develops the hypothesis. Section 3 describes the research setting and design. Section 4 presents the results of the analyses. Section 5 concludes.

2. LITERATURE AND HYPOTHESIS DEVELOPMENT

We study a hierarchy consisting of the principal of the firm (e.g., the firm's owner or a supervising manager) and several productive agents (e.g., a team of rank-and-file employees). The agents provide unobservable inputs that result in products or services for the firm's customers.[5] The principal controls the agents' activities by selecting and implementing MC practices (e.g., Milgrom and Roberts 1992; Radner 1992; Anthony and Govindarajan 2007), where the MCs represent devices, methods, or procedures that direct the agents' actions and decisions toward achieving the principal's objectives (Malmi and Brown 2008). Examples include (i) pre-specifying an agent's actions ex ante and monitoring them ex post; (ii) providing task-specific training; (iii) setting targets ex ante and evaluating performance ex post; and (iv) communicating core values and norms through mission statements or speeches to establish shared traditions, norms, and beliefs among the agents (Milgrom and Roberts 1992; Benabou and Tirole 2011).

The principal weighs the benefits and costs of alternative MC practices (Ouchi 1979; Chenhall 2003). The benefits of a MC choice relate to its effectiveness, which varies with the characteristics of the agent's tasks. For example, tasks differ in the extent to which their outputs are measurable and performance standards are available (Eisenhardt 1985; Snell 1992). Tasks also differ in the extent to which they are programmable, reflecting the principal's understanding of the cause-effect relation between action and outcome (Thompson 1967) or of the process by which inputs are transformed into outputs (Ouchi 1977). The costs of a MC choice relates to the resources that are required to implement the MC (Baiman et al. 1995). Examples include the cost of monitoring agent behavior and performance (Ziv 2000; Friedman 2014), the cost of training to increase agent productivity (Hofmann and Indjejikian 2018), and the cost of designing a mission

[5] The organizational structure of the hierarchy is based on long-term decisions that are not easily malleable in the short run (Abernethy et al. 2004; Hofmann and Van Lent 2015).

statement and distributing it to the agents (Schein and Schein 2017). Typically, qualitative practices associated with the close personal monitoring and guidance of employee activities are more costly to implement than quantitative practices associated with performance measurement (Ouchi 1977). In a hierarchy, where decision rights are delegated to middle managers, these middle managers have discretion in their more informal face-to-face control choices (Hitt et al. 1990; Cardinal et al. 2004; Hartmann and Slapničar 2012; Akroyd and Kober 2020; Cai 2023). However, unlike formal corporate control practices (e.g., defining a mission statement), middle managers bear the cost of implementation of these MC choices.

MC is also informed by the firm's internal and external contingencies (Otley 1980). For example, Ouchi (1977) and Snell (1992), among others, find that managers prioritize measuring and evaluating employee performance when tasks are highly measurable, whereas they monitor behavior when tasks are highly programmable (for a review, see Chenhall 2003). We consider the organizational structure of the firm, specifically the number of productive agents or the size of the principal's team (Williamson 1967; Rajan and Wulf 2006), as an important internal contingency of MC design. Consistent with the contingency and economics literatures (e.g., Chenhall and Morris 1986; Chapman 1997; Abernethy et al. 2004; Hofmann and Van Lent 2015), we argue that organizational structure arrangements precede MC selection and are not easily malleable in the short run.[6]

Controlling multiple agents affects the benefits and costs of MCs (Liang et al. 2008; Hofmann and Indjejikian 2018).[7] For example, the incremental cost of evaluating the performance

[6] Consistently, in our empirical setting, the firm's organizational structure remains stable over time. That is, we find that the managers' span of control has a high autocorrelation of 0.98 (*p-value* < 0.01, untabulated analysis).

[7] We acknowledge that there is some overlap between the effects of firm size and team size on MC choice. For example, as "organizations grow larger, the number of levels of hierarchy increases, thus compounding problems of control loss … . [Managers] … will turn from behavior control to output control, which is less susceptible to this form of loss" Ouchi (1977, p. 99). However, team size likely differs from firm size as a contingency for MCs (Ouchi 1977). By

of an additional agent is low if the agents perform similar tasks and the principal uses the same technology to measure agent performance (Ouchi and Maguire 1975; Ouchi 1978). Alternatively, the principal can reach multiple agents at a low cost by communicating core values and norms through mission statements and speeches (Schein and Schein 2017). In contrast, MCs that are customized for each agent are not easily scalable, meaning that their implementation costs rise sharply with the team size. For example, the cost of monitoring individual agent's actions is likely to be excessive for large teams of agents (Snell 1992; Aghion and Tirole 1997). To the extent that pre-specifying actions requires direct contact between agents, the number of possible interactions increases exponentially with the size of the team (Hofmann and Indjejikian 2018; Graicunas 1933; Urwick 1956). Similarly, providing training to increase agent productivity may be prohibitively costly for large teams, reflecting the diseconomies of scale in guiding many agents (Hofmann and Indjejikian 2018; Graicunas 1933; Urwick 1956).[8]

Therefore, we argue that the principal's span of control (i.e., the number of agents reporting to the principal) is a critical contingency that affects MC choice. We expect that for a large span of control, the principal will tend to choose standardized MC practices that are easily scalable, as opposed to customized MC practices that are not easily scalable. Stated operationally:

H1: *The principal's reliance on standardized MCs relative to customized MCs is positively associated with the principal's span of control.*

When the principal is responsible for a team of agents with diverse tasks, relying on standardized MCs is likely to be less efficient at addressing the control problem. For example, for a team of agents with diverse activities, it is less likely that the principal can use the same

establishing a hierarchy with multiple hierarchical levels, a firm can grow in size while keeping each manager's span of control constant.

[8] This distinction between customized and standardized MCs is similar in spirit to the distinction between unique and common performance measures (Lipe and Salterio 2000).

technology to measure the agents' performance or use the same incentive contracts to motivate effort. As such, when agents perform diverse tasks, the incremental benefit of selecting customized MCs outweighs the reduced cost of using standardized MCs. Therefore, we expect the positive relation between span of control and the use of standardized controls to be less pronounced when the principal is responsible for agents performing more diverse activities.

3. EMPIRICAL STUDY

3.1. Sample and Data Collection

To test the hypothesis, we use study a large multinational professional services firm with multiple divisions, headquartered in Germany. The firm's business environment is characterized by low volatility with moderately growing sales and strong employee protection (e.g., presence of a work council in each division), suggesting a rather stable organizational structure. The firm's seven divisions include employees and managers (i.e., employees with supervisory responsibilities) at differing levels of the organizational hierarchy that provide a broad set of professional services.

We acknowledge that the firm's executive management may implement guidelines for company-wide MC practices. Anecdotal evidence and employee interviews suggests that there is variation in the extent to which lower-level managers rely on these macro-level controls to control their employees at the micro-level. This is consistent with lower-level managers typically having the superior information needed to optimally tailor MCs and with lower-level managers bearing the cost of implementing the MCs. We survey managers at differing hierarchical levels within a single firm, instead of surveying managers at approximately the same hierarchical level at different firms, allowing us to explore this variation while holding constant company-wide MC practices. Empirically, we control for the MC choices of a manager's direct supervisor.

To gain a better understanding of the structure and form of the MCs that the firm's non-manager employees are subject to, we conducted interviews with managers from the management

accounting department. Based on the insights from the interviews, we designed the questionnaire while relying on pre-established survey constructs. The survey includes questions relating to MC practices and employees' task and job characteristics.

The firm distributed the questionnaire using the online survey platform *Qualtrics*. One employee from the HR department or work council of each division serving as a "custodian," gathered a list of employees, and assigned a unique identifier to each employee reflecting their position in the organizational hierarchy (Vogel 2018). For each participant, the identifiers allow us to infer hierarchical level, superior and subordinate employees, and span of control. Finally, the custodian distributed the survey to the employees via email.[9]

Following this procedure, we conducted two survey waves across employees and managers in the firm. Because of the custodian approach, we can identify the MCs chosen by *middle managers* (who are largely responsible for employees without supervisory responsibilities) and *senior managers* (who are largely responsible for middle managers).[10] Across both survey waves, the questionnaire was distributed to 948 middle managers for which we received 517 responses – a rate of 54.5%. Importantly, we can also match the responses of each employee to their respective middle manager, and those of each middle manager to their senior manager. After requiring completed questionnaires for both matched senior managers and subordinate employees, we have 314 middle manager participants. Our tests on the association between middle managers' span of

[9] Before distributing the survey, we translated the questionnaire into German and collected feedback from academics as well as practitioners. Based on this feedback, we slightly adjusted the survey wording to account for the research site's business context and thereby make sure that the participants understand the survey questions.

[10] Employees without supervisory responsibilities are assigned to managers at various hierarchical levels (including, for example, a personal assistant to a division manager). To improve identification of senior and middle managers, we require that a senior manager's team (middle manager's team) comprises at most (at least) 50% employees without supervisory responsibility. Our results are robust to alternative cutoff values.

control and MC implementation comprise 316 middle manager-year observations. Table 1 summarizes the sample selection procedure.[11]

3.2. Variable Measurement

3.2.1. Outcome variables

From field interviews with managers from the management accounting department, we learned that the majority of rank-and-file employees and lower-level managers receive a fixed salary as compensation. Thus, their motivation is largely ensured by retention concerns, the monitoring of superior managers' and the possibility of performance-based promotions. To empirically capture the face-to-face controls employed by the middle manager, we use Merchant and Van der Stede's (2017) object of control framework to distinguish between action controls, personnel controls, results controls, and cultural controls.[12] In the following, we describe the four types of control and the constructs used in more detail.

Action controls focus on monitoring subordinates' actions (e.g., a middle manager pre-determines employees' actions and monitors them ex post). We capture action controls (*ActCtrl*) as a formative construct based on Bedford and Malmi's (2015) dimensions of (1) planning participation and (2) pre-action reviews where *ActCtrl* is the average of the two dimensions. Planning participation captures subordinate involvement in strategic planning processes, while pre-action reviews capture the extent to which managers scrutinize their subordinates' action plans before the actions are undertaken. Personnel controls ensure subordinates' skills, including training

[11] To account for potential cascading effects in MCs, we control for senior managers' MC choices when investigating the association between middle managers' span of control and their MC choices. Therefore, we require each observation in our sample to be part of a three-tier matched hierarchy reflecting responses by a senior manager, a middle manager, and (at least one) employee. Using the firm's organizational structure, there are potentially 1,134 hierarchical triads of senior manager-middle manager-employee relations; we have matched survey data for 518 hierarchical triads, reflecting a response rate of 46%. In untabulated tests, we allow all available middle manager observations in our analysis of H1 and our inferences are largely consistent.

[12] We focus on the investigation of MC practices after employees have been hired, eliminating MC practices such as the use of selection procedures in the labor market.

on how to best accomplish the assigned tasks. We measure personnel controls (*PersCtrl*) using a reduced version of Snell's (1992) construct input control. Results controls include setting and communicating performance targets, monitoring performance, and rewarding subordinates based on achieved performance. We measure results controls (*ResCtrl*) using Bedford and Malmi's (2015) four-item formative construct tightness.[13] Cultural controls establish shared traditions, norms, and beliefs among subordinates, including the formulation and communication of basic values. We measure cultural controls (*CultCtrl*) using Bedford and Malmi's (2015) four-item reflective construct social control.

Based on the survey questions, the *ActCtrl*, *PersCtrl*, *ResCtrl*, and *CultCtrl* variables represent a manager's average use of each control type for the team of assigned subordinates. To account for a manager's choice among control types, we scale the score for each type by the total score, which is the sum of the four control types. Following Govindarajan and Fisher (1990), Kirsch (1996), and Hartmann and Slapničar (2012), among others, the construction of this relative measure captures the manager's tradeoff between the control types.[14] Finally, since we distinguish between MCs at different hierarchical levels, variables with the suffix *MM* indicate the use of MC practices by a middle manager, whereas variables with the suffix *SM* indicate the use of MC practices by a senior manager (e.g., *ActCtrlMM* vs. *ActCtrlSM*).

Our measures of MC practices and task characteristics (introduced shortly) are captured through reflective and formative multi-item constructs measured on Likert scales ranging from 1 to 7. We use pre-established survey questions to capture each construct and take several established

[13] We deviate from the Bedford and Malmi (2015) measure by excluding the item concerning flexibility as the weight obtained from the principal component analysis is below the recommended threshold of 0.30 (Hair et al. 2018). Our inferences on results controls in Table 4 are unaffected by this choice.

[14] For example, in our hypothesis development, we argue that managers will rely more on standardized MCs as their span of control increases. Implicit in this argument is the assumption that the manager trades-off the relative costs and benefits of the available MC practices. Thus, relative measures of the reliance on alternative control types more accurately reflect the manager's choice problem vis-à-vis absolute levels of control.

steps to assess the validity of the applied constructs. For reflective constructs, we examine unidimensionality, construct reliability, and construct validity (Bedford and Speklé 2018; Hair et al. 2018). To assess unidimensionality, we employ a principal component analysis (untabulated) for each construct and use eigenvalues to document loading on independent constructs (Mehmetoglu and Venturini 2021). We assess construct reliability with Cronbach's alpha as a measure of internal consistency and find all reflective constructs exceed the threshold of 0.70, indicating an appropriate degree of reliability. We perform a confirmatory factor analysis to assess construct validity through tests of convergent and discriminant validity. To assess convergent validity, we evaluate standardized factor loadings and average variance extracted (AVE) (Shang et al. 2020) and document that all reflective constructs lie above the recommended level of 0.5 (Hair et al. 2018), wiith the exception of personnel control (AVE = 0.47). To evaluate discriminant validity, we apply the Fornell-Larcker criterion (Fornell and Larcker 1981) and show that the square root of AVEs of each construct exceeds the correlation with any other construct.

For formative constructs, we perform a principal component analysis and show that the weights of the items are positive and lie above the recommendend level of 0.30 (Bedford and Malmi 2015; Hair et al. 2018). We assess multicollinearity by calculating variance inflation factors (VIF) and document that all VIF values are below the recommended threshold of 3.33 (Diamantopoulos and Siguaw 2006; Petter et al. 2007). We report in detail on the survey questions and the construct validity in the appendix.

Following our theoretical arguments, we classify each control type according to its degree of standardization. We argue that results and cultural controls are more standardized while action and personnel controls are more customized, as the fomer controls can be applied to large teams of subordinates with little incremental cost (Ouchi 1978; Ouchi and Maguire 1975; Schein and Schein 2017). As empirical support for this classification, we first find that managers spend statistically

significantly less time in meetings when they rely more heavily on results and cultural controls than on action and personnel controls, especially managers with a large span of control (results untabulated). This finding is consistent with the fact that implementing results and cultural controls requires fewer resources than implementing action and personnel controls. Second, we explore variation in MC choices for a middle managers team.We find significantly greater within-team variation for action and personnel controls than for results and cultural controls (untabulated). Together, these findings support our classification and suggest that action and personnel controls are more customized, whereas results and cultural controls are more standardized.

3.2.2. Span of control

We measure each manager's span of control from archival data capturing the firm's organizational structure. The system of unique identifiers, which follows the firm's organizational structure and reflects each individual's position in the organizational hierarchy, allows us to determine the number of employees reporting to each middle manager (*SpanCtrlMM*) and the number of employees reporting to each senior manager (*SpanCtrlSM*).

3.2.3. Task and job characteristics

Prior literature shows that task characteristics are key determinants of MCs (e.g., Ouchi 1979; Rockness and Shields 1984; Kirsch 1996; Abernethy and Brownell 1997). In our main analyses we control for task characteristics along two dimensions: outcome measurability and task programmability. Outcome measurability (*OutMeas*) captures the extent to which desirable outcomes can be defined, measured, and reflect employees' performance. Task programmability (*TaskProg*) captures the extent to which subordinates' actions are observable and input-output relations are known.

A manager's aggregated experience with their responsibilities and assigned employees may also influence their choice of MCs. To control for this, we include the average tenure of the middle

manager's subordinates.[15] *Tenure* (*TenureMM*) is the natural logarithm of the average number of years the middle managers' (senior managers) subordinate employees worked in the job position. Because MC choices may vary across hierarchical levels, we also control for the manager's hierarchical level, which is known from the unique identifier in the survey data. *LevelMM* (*LevelSM*) captures the middle managers' (senior managers') level in the corporate hierarchy, while higher values indicate higher levels.

In addition to these task and job characteristics, we note that diversity in employees' tasks may make coordination more challenging and mitigate the benefits of standardized controls. Thus, in additional analyses we explore the moderating effect of these features. We rely on employees' assessment of their individual tasks to capture variation in task characteristics within a manager's team of subordinates.[16] We investigate the role of diversity in each task dimension separately, where *OutMeasDiv* (*TaskProgDiv*) is the standard deviation of the subordinate employees' assessment of their task's outcome measurability (task programmability). *TaskDiversity* is the sum of these two measures.

3.2.4. Survey design

Since we apply a survey methodology, the measurement of key variables may be subject to a common method bias (Speklé and Widener 2018). We apply several established procedures to reduce concerns of common method bias. First, to avoid ambiguity in the survey questions, we requested and received feedback on the questions from practitioners at the research site. Second, we pre-tested the survey with faculty members and students. Third, the custodian approach allows

[15] The results are consistent when we additionally control for the middle manager's tenure in the job position, the average subordinate's age, and the average subordinate's education as further measures to capture experience (results untabulated).

[16] We rely on survey results on questions similar to those underlying *OutMeas* and *TaskProg* but distributed to employees without supervisory responsibility. For example, we ask employees to which extent their supervisor is able to observe their actions.

us to ensure respondents' anonymity, thereby limiting the risk of socially desirable responses. Nonetheless, we follow Bedford and Malmi (2015) and apply a Harman's one-factor test to evaluate common method bias. The unrotated principal component analysis (untabulated) suggests that common method bias is not a significant concern as the first factor explains 26.13 percent and thereby, less than 50 percent of the variation in the measured items (Podsakoff and Organ 1986).

We also undertake several steps to address concerns of non-response bias. Custodians encourage survey participation by promoting the survey in internal division meetings and sending out reminder emails. Furthermore, we allow respondents to interrupt their survey completion and continue at a later point in time. To assess non-response bias, we apply an extrapolations approach suggested by Armstrong and Overton (1977), where we compare observations from the first and the fourth quartile in terms of response date using univariate ANOVAs for each survey wave. The results indicate no statistically significant differences in the main variables between early and late respondents. Combined with our high response rates, these results limit concerns of non-response bias.

3.3. Regression Model

To examine whether the middle manager's span of control influences the middle manager's MC choices (Hypothesis H1), we estimate regression model (1). We use middle manager-year responses that are matched across a three-tier hierarchy consisting of a middle manager, a corresponding senior manager, and corresponding subordinate employees:

$$\begin{aligned} MCMM_{jt} = {} & \beta_0 + \beta_1 SpanCtrlMM_{jt} + \beta_2 OutMeas_{jt} + \beta_3 TaskProg_{jt} + \beta_4 LevelMM_{jt} \\ & + \beta_5 Tenure_{jt} + \beta_6 MCSM_{jt} + \pi_t + \varepsilon_{jt}, \end{aligned} \tag{1}$$

where *j* refers to the individual middle manager and *t* captures the year. $MCMM$ captures a middle manager's choice of action, personnel, results, and cultural controls, respectively (i.e., *ActCtrlMM*, *PersCtrlMM*, *ResCtrlMM*, and *CultCtrlMM*). $MCSM$ captures a senior manager's choice of

action, personnel, results, and cultural controls, respectively (i.e., *ActCtrlSM*, *PersCtrlSM*, *ResCtrlSM*, and *CultCtrlSM*). We control for the senior manager's MC choice to account for potential cascading effects identified by previous research (e.g., Casas-Arce et al. 2023). The remaining variables are defined as above. π_t captures year fixed effects and accounts for differences in MC choices across years. The regression model is estimated using ordinary least squares (OLS) with bootstrapped standard errors.[17] Consistent with Hypothesis H1, we expect β_1 to be statistically significant, suggesting that the middle manager's span of control determines the middle manager's MC choices (incremental to employees' task and job characteristics). Specifically, we expect β_1 to be positive for more-standardized results and cultural controls, but negative for more-customized action and personnel controls.

3.4. Descriptive Statistics

3.4.1. Univariate descriptive statistics

Table 2 provides descriptive statistics of the variables used in our analyses. On average, a middle manager is responsible for 8 employees, with a minimum of 1 and a maximum of 31 subordinates. Further, the range of the span of control of senior managers is smaller (1→16), consistent with a narrowinf of the hierarchy at higher levels. These statistics suggest adequate variation in the span of control to assess its effects on MC choice. Regarding MC choices, both middle and senior managers place the largest relative weights on personnel and cultural controls, which taken together reflect more than half of the controls used at each hierarchical level (i.e.,

[17] The results are consistent when we cluster standard errors at the middle manager level to account for potential correlation in standard errors among middle managers. Moreover, the results are consistent when we alternatively cluster standard errors at the senior manager level to account for the hierarchical structure of the data (results untabulated).

PersCtrlMM = 29 percent, *CultCtrlMM* = 28 percent; *PersCtrlSM* = 27 percent, *CultCtrlSM* = 28 percent).

Consistent with aggregate performance measures (e.g., business unit profitability) adequately capturing performance at higher levels of the hierarchy, we find that outcome measurability is larger for senior managers than for middle managers (*OutMeas* for senior managers = 4.97; *OutMeas* for middle managers = 4.68, difference = 0.30 significantly positive, *p-value* < 0.01, untabulated). Moreover, underscoring the diversity in management tasks increasing at higher levels of the hierarchy, we find that task programmability is smaller for senior managers than for middle managers (*TaskProg* for senior managers = 4.25; *TaskProg* for middle managers = 4.63, difference = 0.38 significantly negative, *p-value* < 0.01, untabulated).

3.4.2. Correlations

In Table 3, we report the Pearson correlation coefficients among our main variables. We find that middle managers' span of control (*SpanCtrlMM*) is statistically significantly associated with middle managers' MC choices. While this correlation coefficient is positive for more-standardized controls (i.e., results and cultural controls), it is negative for more-customized controls (i.e., action and personnel controls). Although only bivariate, these results provide preliminary support of H1 and suggest that there is a positive association betweeen a middle manager's span of control and their use of standardized MCs.

We also note that correlations between task characteristics and MC choices are consistent with evidence from previous literature (e.g., Snell 1992; Eisenhardt 1985). We find no associations, however, between middle managers' span of control and the characteristics of their subordinates' tasks in terms of either outcome measurability or task programmability. These insignificant correlations between middle managers' span of control and task characteristics help alleviate concerns that the organizational structure is mechanically associated with these task characteristics

(e.g., whether employees' outcomes become less measurable and their tasks less programmable the larger the middle managers' span of control).[18] Although we did not tabulate correlations with our additional analysis variable, *TaskDiversity*, we do note that consistent with expectations task diversity is increasing with the middle manager's span of control. Moreover, and consistent with our assertion that tasks become more complex with movement up the hierarchy, in untabulated tests we find evidence of more variety in MC use for middle managers at higher levels in the hierarchy.

We now move to multivariate specifications to better isolate our research questions and make inferences from our results.

4. RESULTS

4.1. Main Findings

We begin by replicating prior findings on the role of task characteristics in influencing MC choices in our field site. We estimate equation (1), without the inclusion of the middle manager's span of control, in Table 4 Panel A. The results here are consistent with prior literature and the univariate analyses. We find that middle managers emphasize action controls the more programmable employees' tasks (COEFF = 1.10, *p-value* < 0.01 in Column 1), and results controls the more measurable employees' outcomes (COEFF = 0.93, *p-value* < 0.01 in Column 3). Middle managers deemphasize personnel controls (COEFF = –0.31, *p-value* < 0.05 in Column 2) and cultural controls (COEFF = –0.89, *p-value* < 0.01 and COEFF = –0.54, *p-value* < 0.10 in Column 4) the more measurable employees' outcomes and/or the more programmable employees' tasks.

[18] Prior work argues that a large span of control reduces a manager's incentives to collect information on subordinates' tasks, suggesting that span of control may be related to outcome measurability and task programmability (Ouchi 1977; Eisenhardt 1985). Consistently, theoretical work by Ziv (2000) and Liang et al. (2008) assumes that the precision of an aggregate performance measure decreases with the principal's span of control. However, Hofmann and Indjejikian (2018) show that for an optimized performance measurement system, span of control and performance measure precision can positively covary.

We also find broad evidence that middle managers' MC choices relate to senior managers' MC choices. Middle managers emphasize personnel controls (COEFF = 0.24, *p-value* < 0.01 in Column 2), results controls (COEFF = 0.14, *p-value* < 0.01 in Column 3), and cultural controls (COEFF = 0.14, *p-value* < 0.10 in Column 4) the more the direct supervisor emphasizes these controls. These findings are consistent with a strong link between controls at adjacent hierarchical levels, for example, because lower-level managers seek to emulate the decisions of higher-level managers (Ouchi 1978) or because MCs cascade down the hierarchy (Casas-Arce et al. 2023).

We then move to investigate our main hypothesis in Table 4 Panel B. Here we estimate model (1), testing the association between middle managers' span of control and their MC choices (H1). We find a significant positive relation between middle managers' span of control and their use of more-standardized results and cultural controls (COEFF = 0.11, *p-value* < 0.01 in Column 3; COEFF = 0.16, *p-value* < 0.01 in Column 4). We also find a significant negative relation between middle managers' span of control and their use of more-customized action and personnel controls (COEFF = –0.12, *p-value* < 0.05 in Column 1; COEFF = –0.10, *p-value* < 0.05 in Column 2). These results confirm H1 and imply that a middle manager's span of control plays a critical role in MC design, incremental to traditional task determinants and the control choice of the senior manager. Consistent with our predictions, managers appear to consider the cost savings arising from the standardization of different control types as their span of control increases.

4.1.1. Fully interacted model

In the prior section we confirm both the findings of prior literature, as related to the role of task characteristics in MC choice, and our H1 – incremental to these characteristics. It is possible, however, that the underlying task characteristics alter the relation between the manager's span of control and MC choice. To explore this possibility, in Table 5 we follow Snell (1992) and allow for interaction terms among *OutMeas*, *TaskProg*, and *SpanCtrlMM* and estimate a fully interacted

model of middle manager MC choice.[19] The results on the main effect of *SpanCtrlMM* are largely consistent with the results presented in Table 4, except for a loss of significance for *PersCtrlMM* and *ResCtrlMM* at conventional levels. The results on the two-way interactions suggest that task characteristics alter the relation between the middle manager's span of control and their use of customized control mechanisms. Here we show that outcome measurability and task programmability moderate (exacerbate) the negative relation between middle managers' span of control and their use of action and cultural (personnel) controls. Overall, these results show the existence of higher order interaction effects but continue to support our main insights into the impact of span of control on middle managers' reliance on standardized versus customized controls.

4.2. Additional Analysis

4.2.1. The role of task diversity

In the next step, we investigate the role of employees' task diversity in explaining middle managers' MC choices. The findings related to Hypothesis H1 suggest that middle managers use more-standardized controls the larger their span of control. However, a larger span of control may also be associated with higher diversity among employees' tasks – as suggested by prior literature and documented in our univariate statistics (e.g., Ouchi 1977; Merchant 1981). Such task diversity may mitigate the benefits of standardized MCs. For example, applying the same results control (e.g., the same performance measure) to employees with diverse tasks is likely less beneficial. In Table 6, we explore the extent to which task diversity moderates the association between the middle managers' span of control and their MC choices.

[19] Due to multicollinearity arising from variable interactions, we mean-center the variables in the interaction term *SpanCtrlMM×OutMeas×TaskProg*.

We construct an interaction term between *SpanCtrlMM* and the diversity of employees' tasks (*TaskDiversity*), capturing diversity in both outcome measurability and task programmability. In Table 6 Panel A, we find a significant positive interaction coefficient when examining action controls (COEFF = 0.12, *p-value* < 0.01 in Column 1) and a significant negative interaction coefficient when examining cultural controls (COEFF = –0.06, *p-value* < 0.05 in Column 4). These findings suggest that while middle managers with a large span of control rely less (more) on more-customized action controls (more-standardized cultural controls), the effect is mitigated when employees' tasks are diverse. In fact, at sufficiently high levels of task diversity (for example, above the 80th percentile) the overall effect of the manager's span of control and their use of action and cultural controls reverses. This suggests that when task diversity is high, a large span of control is associated with more (less) reliance on action (cultural) controls for diverse teams. This finding documents that the monitoring benefit of action controls in diverse task environments mitigates the increased cost of expanding this control type to multiple employees (i.e., their lack of standardization). The reverse seems to be true for cultural controls; while they are easily standardized, they are likely to provide less monitoring benefit in the case of task diversity.

We also aim to understand whether the underlying components of task diversity are differentially informing the results. We disaggregate task diversity into diversity in employees' outcome measurability (*OutMeasDiv*) and task programmability (*TaskProgDiv*). The results in Panels B and C suggest that diversity stemming from either component moderates the benefits of standardization. Overall, the additional findings are consistent with H1 regarding the importance of standardization in the MC choice of middle managers with multiple subordinates, but document boundary conditions such that the benefit to standardization is moderated by the diversity of subordinate employees' tasks.

4.2.3. The association between the senior manager's MC choices and span of control

The mitigating effect of task diversity documented in the prior subsection may be particularly relevant to understanding whether senior managers economize MC choices as their span of control increases. Task diversity among middle managers, where managers are responsible for diverse management tasks, is likely greater than that among productive employees (Zhou 2013), suggesting that the benefits to standardized controls are more limited for senior managers.

To test the expectation that standardized MCs for large team sizes are less prevalent control choices for senior managers, we exploit the depth of the firm's hierarchy. In a hierarchy, senior managers implement MCs to align the behavior and decisions of their middle managers with the firm's strategies and objectives, while each middle manager is responsible for motivating productive employees. Arguably, a senior manager's control problem is fundamentally different from a middle manager's control problem because the senior manager chooses MCs to motivate the effective execution of the middle manager's management task (Chandler 1962; Milgrom and Roberts 1992; Mookherjee 2013). Because of the different control problems faced by the senior manager and the middle manager, their MC choices are likely to differ, even when exposed to the same contextual factor. Specifically, if the middle manager's span of control calls for the use of standardized controls, the senior manager faces a more complex control problem that may alter the response.

Thus, we now investigate the association between the senior manager's span of control and her MC choices and estimate regression model (2). We investigate a two-tier hierarchy consisting of a senior manager and corresponding subordinate middle managers:

$$\begin{aligned} MCSM_{kt} = {} & \gamma_0 + \gamma_1 SpanCtrlSM_{kt} + \gamma_2 OutMeasMM_{kt} + \gamma_3 TaskProgMM_{kt} \\ & + \gamma_4 LevelSM_{kt} + \gamma_5 TenureMM_{kt} + \pi_t + \varepsilon_{kt}, \end{aligned} \tag{2}$$

where *k* captures the senior manager and *t* captures the year. $MCSM$ captures a senior manager's choices of action, personnel, results, and cultural controls, respectively (i.e., *ActCtrlSM*, *PersCtrlSM*, *ResCtrlSM*, and *CultCtrlSM*). The remaining variables are defined as above. The regression model is estimated using ordinary least squares (OLS) with bootstrapped standard errors.[20]

Table 7 presents the findings. We find a significant negative association between senior managers' span of control and their use of cultural controls (COEFF = -0.22, *p-value* < 0.05 in Column 4). Thus, senior managers less strongly rely on cultural conrols the larger their span of control. In contrast, middle managers more strongly rely on cultural controls the larger their span of control (see Table 4). The coefficients on senior managers' span of control for their use of action, personnel, and results control are insignificant at conventional levels but also of opposing sign as compared to the coefficient on middle managers' span of control (see Table 4). The coefficients on the middle managers' task characteristics (i.e., *OutMeasMM* and *TaskProgMM*) are largely consistent with the literature and the results in Table 4, confirming the important role of task characteristics in determining control choices – even at higher levels in the hierarchy.

Recall, the findings in Table 6 show the important role of task diversity in how middle managers economize on standardized controls for large teams. In addition, senior managers oversee middle managers with more diverse tasks than their employee subordinates. Consistent with this, the results here provide little evidence of economizing on standardized controls for senior managers of large teams.

[20] The results are consistent when we cluster standard errors at the senior manager level to account for potential correlation in standard errors among senior managers.

4.3. Robustness Tests

We perform several robustness tests to bolster the validity of our primary analyses (results untabulated). First, to account for systematic, time-invariant differences between the divisions, we control for the type of division in regression model (1) by categorising the seven divisions into those that offer business-to-business services and those that offer business-to-customer services. Our inferences on H1 remain. Second, conducting two survey waves may create concern that the results are subject to a consistency or recency bias (Hipp et al. 2020). To address this concern, we replicate regression model (1) using only observations from the second survey wave. Our inferences on H1 remain with the exception of a loss of significance for personnel and results controls in tests of H1 – likely due to limited power in the reduced sample.

Third, we address potential concerns regarding the use of relative measures for the four control types in our main analyses, which may cause issues related to variable scale comparability. To address these concerns and validate our use of relative measures, we consider Hartmann and Slapnicar's (2012) construct "use of outcome metrics" which captures the extent to which employees are evaluated based on outcomes rather than actions. We find a significant positive association (*p-value* < 0.01) between the use of outcome metrics and middle managers' use of results controls. We also find a significant negative association (*p-value* < 0.01) between the use of outcome metrics and middle managers' use of action controls. These findings support the comparability of variable scales.

Fourth, we consider the robustness of the threshold for classifying middle managers. In our primary analysis, we identify a middle manager as a supervisor who oversees a team comprising at least 50 percent of employees engaged in productive tasks and without supervisory functions. We alternatively use thresholds of at least 60, 70, 80, and 90 percent productive employees, and the inferences on H1 remain unchanged.

5. CONCLUSION

Using a unique field setting, we investigate how MCs are implemented in a multi-tier hierarchy. Specifically, we examine a hierarchy where the principal is responsible for the productive contributions of multiple agents. We argue that the principal economizes on the cost of implementing MCs and predict that the principal's use of standardized controls, such as results and cultural controls, is positively associated with the principal's span of control. Consistent with our prediction, we find that middle managers with a larger span of control rely less (more) on action and personnel controls (results and cultural controls), suggesting that middle managers more strongly invest in standardized controls when they are exposed to a large span of control.

We also find that employees' task diversity mitigates the benefits of standardized MCs. Particularly, we document that employees' task diversity moderates the association between the middle managers' span of control and their use of action and cultural control such that middle managers with a larger span of control more (less) strongly rely on action (cultural) controls at sufficiently high levels of task diversity. Finally, we investigate the association between senior managers' span of control and their MC choices. Whereas the middle manager is responsible for motivating employees without supervisory function, senior managers choose MCs to motivate the effective execution of middle managers' management task, suggesting that task diversity is signficantly higher at the middle managers' level. We find limited evidence that senior managers also consider their span of control when implementing MCs, consistent with the offsetting effects of span of control and task diversity in this setting.

Our study contributes to the literature by gaining a better understanding of the hierarchical patterns of control (Mookherjee 2013; Christ and Vance 2018; Bouwens et al. 2024). Following this idea, future research may study how individual control choices at different hierarchical levels are aligned to achieve overall organizational efficiency.

The study is subject to limitations. First, we rely on a field study where our results may not apply to other settings. However, this allows us an in-depth investigation of the MC implementation at different hierarchical levels which is hardly feasible when using an cross-firm approach. Second, to achieve a high response rate, we ensured that managers could complete the survey in less than 30 minutes. Therefore, we had to limit the survey to MC practices most relevant to managers at lower hierarchical levels that we identified in an interview of a manager at the research site. However, when controlling multiple employees, managers may use other MC practices not captured in the questionnaire, especially in the case they are located at higher hierarchical levels as compared to the managers we investigate in this study. Third, we aim to predict the relative reliance on different MC types. Hereby, we follow the traditional view of a substitution logic where specific MC practices are preferred over others as the context determines their relative efficiency (Chenhall 2003; Kreutzer et al. 2016; Gerdin 2020). Thus, we do not study potentially complementary interrelations between MC practices where the use of a particular MC practice enhances the benefits of other MC practices (Grabner and Moers 2013). Future research may study under which conditions different MCs are complementary in a hierarchical organization.

APPENDIX

Survey items and construct validity

Action control (ActCtrl) (formative)			
Cronbach's alpha: n/a	AVE= n/a	Anchors	PCA loadings
Planning participation (Bedford and Malmi 2015)			
To what extent are your subordinates involved in the strategic planning processes of the organizational unit (e.g. team, department)?		Very small/very high extent	0.42
Pre-action reviews (Bedford and Malmi 2015)			
To what extent do you coordinate the procedure for projects/tasks with your subordinates in advance?		Very small/very high extent	0.68
How detailed are the reports or plans you require from your subordinates before they undertake specific projects/tasks?		Very small/very high extent	0.60

Personnel Control (PersCtrl) (reflective)			
Cronbach's alpha = 0.71	AVE= 0.47	Anchors	FA loadings
Input Control (Snell 1992)			
How much importance do you place on the education and training of your subordinates?		Very little/very high importance	0.55
To what extent do your subordinates have the opportunity to broaden their range of talents?		Very small/very high extent	0.65

Survey items and construct validity (continued)

To what extent do you provide incentives for your subordinates to continue their professional training?	Very small/very high extent	0.82

Results control (ResCtrl) (formative)			
Cronbach's alpha: n/a	AVE= n/a	Anchors	PCA loadings
Tightness (Bedford and Malmi 2015)			
How frequently do you consult your subordinates about their target achievement? [Reverse coded]		very frequently (daily)/ very infrequently (annually)	0.34
To what extent do you require explanations from your subordinates for variances from target performance levels??		Very small/very high extent	0.66
To what extent is the evaluation of your subordinates based on the achievement of performance targets?		Very small/very high extent	0.67

Cultural control (CultCtrl) (reflective)			
Cronbach's alpha = 0.83	AVE= 0.56	Anchors	FA loadings
Social Control (Bedford and Malmi 2015)			

Survey items and construct validity (continued)

To what extent is there a sense of shared values, beliefs and expectations among subordinates?	Very small/very high extent	0.78
To what extent is there a consensus among subordinates about the objectives and direction of the company?	Very small/very high extent	0.73
To what extent do your subordinates feel committed to the values and objectives of the company?	Very small/very high extent	0.74
To what extent do shared values and norms provide direction to your subordinates when faced with uncertainty?	Very small/very high extent	0.76

Outcome measurability (OutMeas) (reflective)			
Cronbach's alpha = 0.84	AVE= 0.65	Anchors	FA loadings
(Bedford and Malmi 2015)			
Standards of desirable performance for your subordinates are well defined.		Very small/very high extent	0.76
Results measures accurately depict how well your subordinates have performed.		Very small/very high extent	0.94
You have several objective indicators available that measure how well your subordinates are performing.		Very small/very high extent	0.86

Survey items and construct validity (continued)

Task programmability (TaskProg) (reflective)			
Cronbach's alpha = 0.84	AVE= 0.65	Anchors	FA loadings
(Bedford and Malmi 2015)			
You can observe the actions your subordinates take to achieve results.		Very small/very high extent	0.81
By observing the actions you can distinguish effective and ineffective subordinates.		Very small/very high extent	0.92
You are familiar with the relationship between the actions performed by your subordinates and the subsequent outcomes.		Very small/very high extent	0.68

Notes: The appendix provides detailed information about the survey questions and the results of the factor analyses for the constructs used in the study. For the reflective constructs, we examine factor loadings by a confirmatory factor analysis. Further, we report Cronbach's alpha and average variance extracted (AVE). For formative constructs, we report loadings from a principal components analysis (Bedford and Malmi 2015).

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TABLE 1
Sample Selection

Unique Middle Manager Recipients	948
Unique Middle Manager Participants	517
Unique Middle Manager Participants after Three-Tier-Matching	314
Middle Manager - year - observations	518
Less middle-manager-year observations with incomplete MM responses	(129)
Less middle-manager-year observations with incomplete subordinate responses	(38)
Less middle-manager-year observations with incomplete SM responses	(35)
Final sample (Matched Middle-Manager-Year Observations)	**316**

Notes: Table 1 presents the sample derivation procedure and the final sample. Of the 948 unique middle managers who received the survey, 453 were in the first wave survey (2021) and 495 were in the second wave survey (2022).

TABLE 2
Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Median	Max
		Main analysis			
ActCtrlMM	22.65	4.67	7.02	23.03	35.82
PersCtrlMM	28.83	4.37	16.67	28.63	46.93
ResCtrlMM	20.79	4.17	8.33	21.41	31.71
CultCtrlMM	27.73	4.76	15.54	27.49	50.00
SpanCtrlMM	8.08	5.44	1.00	7.00	31.00
OutMeas	4.68	1.35	1.00	4.67	7.00
TaskProg	4.63	1.21	1.00	5.00	7.00
LevelMM	1.67	0.67	1.00	2.00	4.00
Tenure	1.34	0.71	0.00	1.52	2.30
ActCtrlSM	23.65	4.27	10.11	24.09	33.33
PersCtrlSM	27.46	3.90	15.93	27.69	35.56
ResCtrlSM	20.94	3.62	12.67	21.76	27.76
CultCtrlSM	27.95	3.67	16.76	27.57	39.74
		Additional analysis			
OutMeasDiv	0.98	0.90	0.00	0.94	3.77
TaskProgDiv	0.87	0.77	0.00	0.91	3.53
TaskDiversity	1.85	1.51	0.00	1.89	6.36
SpanCtrlSM	5.76	2.90	1.00	6.00	16.00
OutMeasMM	4.93	1.45	1.33	5.00	7.00
TaskProgMM	4.35	1.47	1.33	4.67	7.00
LevelSM	3.08	1.02	2.00	3.00	5.00
TenureMM	1.38	0.73	0.00	1.61	2.30

Notes: Table 2 presents the descriptive statistics on the variables used in our main and additional analyses. *ActCtrlMM (ActCtrlSM)* is the average of all items referring to action control as indicated by the middle (senior) manager relative to total MC. *PersCtrlMM (PersCtrlSM)* is the average of all items referring to personnel control as indicated by the middle (senior) manager relative to total MC. *ResCtrlMM(ResCtrlSM)* is the average of all items referring to results control as indicated by the middle (senior) manager relative to total MC. *CultCtrlMM(CultCtrlSM)* is the average of all items referring to cultural control as indicated by the middle (senior) manager relative to total MC. *SpanCtrlMM* (*SpanCtrlSM*) is the total number of employees (middle managers) directly reporting to the middle manager (senior manager). *OutMeas (OutMeasMM)* is the average of all items related to employees' (middle managers') outcome measurability as indicated by the middle manager (senior manager). *TaskProg (TaskProgMM)* is the average of all items related to employees' (middle managers') task programmability as indicated by the middle manager (senior manager). *LevelMM* (*LevelSM*) is the hierarchical level of the middle (senior) manager, with higher values representing higher levels. *Tenure* (*TenureMM*) is the natural logarithm of the average number of years the subordinate employees (middle managers) worked in the job position per middle manager (senior manager). *OutMeasDiv* is the standard deviation of the subordinate employees' assessment of their task's outcome measurability. *TaskProgDiv* is the standard deviation of the subordinate employees' assessment of their task's task programmability. *TaskDiversity* is the sum of *OutMeasDiv* and *TaskProgDiv.*

TABLE 3
Pearson Correlation Coefficients

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*
(1) ActCtrlMM	1.00												
(2) PersCtrlMM	-0.39***	1.00											
(3) ResCtrlMM	-0.41***	-0.10*	1.00										
(4) CultCtrlMM	-0.28***	-0.44***	-0.37***	1.00									
(5) SpanCtrlMM	-0.12**	-0.16***	0.14**	0.15***	1.00								
(6) OutMeas	0.13**	-0.15***	0.30***	-0.26***	0.04	1.00							
(7) TaskProg	0.28***	-0.08	-0.02	-0.19***	0.09	0.15***	1.00						
(8) LevelMM	-0.01	-0.03	0.12**	-0.07	-0.03	0.13**	0.04	1.00					
(9) Tenure	0.00	-0.15***	-0.04	0.16***	0.03	0.08	-0.08	-0.10*	1.00				
(10) ActCtrlSM	-0.11*	0.07	0.02	0.02	0.21***	0.01	-0.08	-0.00	-0.11*	1.00			
(11) PersCtrlSM	0.04	0.19***	-0.10*	-0.13**	-0.10*	-0.07	0.13**	-0.07	0.06	-0.55***	1.00		
(12) ResCtrlSM	0.04	-0.13**	0.10*	-0.01	0.03	0.01	0.10*	0.32***	-0.08	-0.31***	-0.17***	1.00	
(13) CultCtrlSM	0.04	-0.16***	-0.02	0.12**	-0.17***	0.06	-0.13**	-0.23***	0.14**	-0.27***	-0.24***	-0.44***	1.00

Notes: Table 3 presents the Pearson correlation between the main variables. *ActCtrlMM (ActCtrlSM)* is the average of all items referring to action control as indicated by the middle (senior) manager relative to total MC. *PersCtrlMM (PersCtrlSM)* is the average of all items referring to personnel control as indicated by the middle (senior) manager relative to total MC. *ResCtrlMM(ResCtrlSM)* is the average of all items referring to results control as indicated by the middle (senior) manager relative to total MC. *CultCtrlMM(CultCtrlSM)* is the average of all items referring to cultural control as indicated by the middle (senior) manager relative to total MC. *SpanCtrlMM* (*SpanCtrlSM*) is the total number of employees (middle managers) directly reporting to the middle manager (senior manager). *OutMeas (OutMeasMM)* is the average of all items related to employees' (middle managers') outcome measurability as indicated by the middle manager (senior manager). *TaskProg (TaskProgMM)* is the average of all items related to employees' (middle managers') task programmability as indicated by the middle manager (senior manager). *LevelMM* (*LevelSM*) is the hierarchical level of the middle (senior) manager, with higher values representing higher levels. *Tenure* is the natural logarithm of the average number of years the subordinate employees worked in the job position per middle manager. *, **, *** indicate two-tailed significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

TABLE 4

Panel A: Estimates of Equation (1) without Middle Manager's Span of Control

VARIABLES	(1) *ActCtrlMM*	(2) *PersCtrlMM*	(3) *ResCtrlMM*	(4) *CultCtrlMM*
OutMeas	0.31*	-0.31**	0.93***	-0.89***
	(0.181)	(0.146)	(0.158)	(0.209)
TaskProg	1.10***	-0.43	-0.27	-0.54*
	(0.316)	(0.292)	(0.236)	(0.299)
LevelMM	-0.25	-0.06	0.12	0.20
	(0.396)	(0.305)	(0.286)	(0.331)
Tenure	0.01	-0.96***	-0.43	1.17***
	(0.323)	(0.341)	(0.316)	(0.384)
CtrlSM	-0.10	0.24***	0.14***	0.14*
	(0.060)	(0.052)	(0.044)	(0.076)
Constant	18.50***	27.13***	15.43***	28.43***
	(2.485)	(2.613)	(1.793)	(2.445)
Year FE	YES	YES	YES	YES
Observations	316	316	316	316
Adjusted R^2	8.1%	7.1%	11.1%	12.3%

Panel B: Estimates of Equation (1) testing Hypothesis 1

VARIABLES	(1) *ActCtrlMM*	(2) *PersCtrlMM*	(3) *ResCtrlMM*	(4) *CultCtrlMM*
SpanCtrlMM	-0.12**	-0.10**	0.11***	0.16***
	(0.053)	(0.039)	(0.037)	(0.042)
OutMeas	0.32	-0.30*	0.92***	-0.92***
	(0.209)	(0.152)	(0.161)	(0.184)
TaskProg	1.16***	-0.38	-0.31	-0.58**
	(0.291)	(0.242)	(0.255)	(0.271)
LevelMM	-0.28	-0.10	0.16	0.30
	(0.385)	(0.325)	(0.227)	(0.312)
Tenure	0.08	-0.92**	-0.47*	1.10***
	(0.345)	(0.371)	(0.283)	(0.392)
CtrlSM	-0.06	0.23***	0.13***	0.18**
	(0.056)	(0.054)	(0.040)	(0.072)
Constant	18.23***	28.06***	14.93***	26.22***
	(2.187)	(1.815)	(2.029)	(2.251)
Year FE	YES	YES	YES	YES
Observations	316	316	316	316
Adjusted R^2	9.7%	8.3%	12.8%	15.3%

Notes: : Table 4 presents the OLS regression results on the role of the middle manager's span of control for the middle manager's MC choices. *ActCtrlMM* is the average of all items referring to action control as indicated by the middle manager relative to total MC. *PersCtrlMM* is the average of all items referring to personnel control as indicated by the middle manager relative to total MC. *ResCtrlMM* is the average of all items referring to results control as indicated by the middle manager relative to total MC. *CultCtrlMM* is the average of all items referring to cultural control as indicated by the middle manager relative to total MC. *SpanCtrlMM* is the total number of employees directly reporting to the middle manager. *OutMeas* is the average of all items related to employees' outcome measurability as indicated by the middle manager. *TaskProg* is the average of all items related to employees' task programmability as indicated by the middle manager. *LevelMM* is the hierarchical level of the middle manager, with higher values representing higher levels. *Tenure* is the natural logarithm of the average number of years the subordinate employees worked in the job position per middle manager. *CtrlSM* is the average of all items referring to action control (column 1), personnel control (column 2), results control (column 3), and cultural control (column 4) as indicated by the senior manager relative to total MC. Standard errors are in parentheses. *, **, *** indicate two-tailed significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

TABLE 5

Additional Analysis: Fully Interacted Model

VARIABLES	(1) *ActCtrlMM*	(2) *PersCtrlMM*	(3) *ResCtrlMM*	(4) *CultCtrlMM*
SpanCtrlMM	-0.16***	-0.05	0.07	0.19***
	(0.062)	(0.043)	(0.050)	(0.060)
OutMeas	0.57***	-0.43***	0.76***	-0.86***
	(0.189)	(0.140)	(0.233)	(0.160)
TaskProg	1.07***	-0.55***	-0.07	-0.61**
	(0.245)	(0.208)	(0.186)	(0.256)
SpanCtrlMM × OutMeas	0.13***	-0.06*	-0.05	-0.01
	(0.049)	(0.034)	(0.043)	(0.046)
SpanCtrlMM × TaskProg	0.18***	-0.25***	-0.02	0.08
	(0.062)	(0.050)	(0.053)	(0.058)
OutMeas × TaskProg	-0.19	-0.24**	0.20	0.15
	(0.192)	(0.096)	(0.162)	(0.196)
SpanCtrlMM × OutMeas × TaskProg	-0.16***	0.13***	0.14***	-0.11***
	(0.047)	(0.026)	(0.047)	(0.041)
LevelMM	0.03	-0.37	0.05	0.39
	(0.406)	(0.259)	(0.306)	(0.305)
Tenure	-0.14	-0.72*	-0.31	0.96***
	(0.337)	(0.392)	(0.302)	(0.365)
CtrlSM	-0.06	0.25***	0.14***	0.19**
	(0.053)	(0.067)	(0.044)	(0.086)
Constant	23.65***	24.08***	18.59***	20.27***
	(1.705)	(1.801)	(1.156)	(2.552)
Year FE	YES	YES	YES	YES
Observations	316	316	316	316
Adjusted R^2	20.3%	22.5%	17.0%	18.7%

Notes: : Table 5 presents the OLS regression results on the role of the middle manager's span of control for the middle manager's MC choices, allowing for interactions between task characteristics and span of control. *ActCtrlMM* is the average of all items referring to action control as indicated by the middle manager relative to total MC. *PersCtrlMM* is the average of all items referring to personnel control as indicated by the middle manager relative to total MC. *ResCtrlMM* is the average of all items referring to results control as indicated by the middle manager relative to total MC. *CultCtrlMM* is the average of all items referring to cultural control as indicated by the middle manager relative to total MC. *SpanCtrlMM* is the total number of employees directly reporting to the middle manager. *OutMeas* is the average of all items related to employees' outcome measurability as indicated by the middle manager. *TaskProg* is the average of all items related to employees' task programmability as indicated by the middle manager. *LevelMM* is the hierarchical level of the middle manager, with higher values representing higher levels. *Tenure* is the natural logarithm of the average number of years the subordinate employees worked in the job position per middle manager. *CtrlSM* is the average of all items referring to action control (column 1), personnel control (column 2), results control (column 3), and cultural control (column 4) as indicated by the senior manager relative to total MC. Standard errors are in parentheses. *, **, *** indicate two-tailed significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

TABLE 6
Additional Analyses: Role of Employees' Task Diversity

Panel A: Diversity in employees' tasks

VARIABLES	(1) *ActCtrlMM*	(2) *PersCtrlMM*	(3) *ResCtrlMM*	(4) *CultCtrlMM*
SpanCtrlMM	-0.36***	-0.06	0.19**	0.29***
	(0.069)	(0.060)	(0.096)	(0.075)
TaskDiversity	-1.19***	0.04	0.43*	0.64**
	(0.248)	(0.234)	(0.236)	(0.287)
SpanCtrlMM × TaskDiversity	0.12***	-0.02	-0.04	-0.06**
	(0.024)	(0.025)	(0.030)	(0.029)
OutMeas	0.39*	-0.32*	0.89***	-0.94***
	(0.210)	(0.176)	(0.177)	(0.193)
TaskProg	1.16***	-0.34	-0.32	-0.61*
	(0.295)	(0.262)	(0.235)	(0.346)
LevelMM	-0.44	0.03	0.23	0.29
	(0.341)	(0.297)	(0.283)	(0.354)
Tenure	0.18	-0.81**	-0.53*	0.96***
	(0.407)	(0.318)	(0.278)	(0.358)
CtrlSM	-0.08	0.22***	0.12**	0.19***
	(0.058)	(0.054)	(0.049)	(0.069)
Constant	20.75***	27.58***	14.55***	25.21***
	(2.344)	(2.571)	(2.373)	(2.543)
Year FE	YES	YES	YES	YES
Observations	313	313	313	313
Adjusted R-squared	13.8%	7.7%	12.8%	15.8%

Panel B: Diversity in employees' outcome measurability

VARIABLES	(1) *ActCtrlMM*	(2) *PersCtrlMM*	(3) *ResCtrlMM*	(4) *CultCtrlMM*
SpanCtrlMM	-0.37***	-0.05	0.22***	0.26***
	(0.074)	(0.079)	(0.077)	(0.047)
OutMeasDiv	-2.12***	0.30	1.09***	0.75*
	(0.465)	(0.427)	(0.340)	(0.409)
SpanCtrlMM × OutMeasDiv	0.23***	-0.04	-0.11**	-0.09**
	(0.058)	(0.049)	(0.048)	(0.038)
OutMeas	0.37**	-0.31*	0.90***	-0.93***
	(0.177)	(0.161)	(0.153)	(0.170)
TaskProg	1.19***	-0.38	-0.33	-0.58**
	(0.318)	(0.251)	(0.218)	(0.245)
LevelMM	-0.30	-0.08	0.20	0.30
	(0.343)	(0.286)	(0.205)	(0.324)
Tenure	0.25	-0.94**	-0.57*	1.05***
	(0.332)	(0.381)	(0.314)	(0.375)
CtrlSM	-0.06	0.23***	0.12***	0.19***
	(0.053)	(0.071)	(0.044)	(0.058)
Constant	19.74***	27.74***	14.45***	25.38***
	(2.290)	(2.570)	(1.928)	(2.456)
Year FE	YES	YES	YES	YES
Observations	314	314	314	314
Adjusted R-squared	14.7%	7.8%	13.9%	15.4%

Panel C: Diversity in employees' task programmability

VARIABLES	(1) *ActCtrlMM*	(2) *PersCtrlMM*	(3) *ResCtrlMM*	(4) *CultCtrlMM*
SpanCtrlMM	-0.29***	-0.07	0.13*	0.28***
	(0.078)	(0.072)	(0.073)	(0.069)
TaskProgDiv	-1.90***	-0.07	0.20	1.43**
	(0.606)	(0.557)	(0.447)	(0.710)
SpanCtrlMM × TaskProgDiv	0.19***	-0.03	-0.02	-0.13**
	(0.070)	(0.054)	(0.051)	(0.063)
OutMeas	0.39*	-0.32**	0.91***	-0.95***
	(0.201)	(0.144)	(0.176)	(0.190)
TaskProg	1.14***	-0.34	-0.31	-0.60**
	(0.283)	(0.304)	(0.213)	(0.268)
LevelMM	-0.49	0.03	0.20	0.33
	(0.359)	(0.356)	(0.354)	(0.455)
Tenure	0.11	-0.79**	-0.47	0.94**
	(0.384)	(0.362)	(0.360)	(0.429)
CtrlSM	-0.09	0.22***	0.13***	0.19***
	(0.057)	(0.059)	(0.051)	(0.072)
Constant	20.67***	27.66***	14.76***	25.18***
	(2.427)	(2.593)	(2.218)	(2.703)
Year FE	YES	YES	YES	YES
Observations	313	313	313	313
Adjusted R^2	12.0%	7.8%	12.1%	16.1%

Notes: Table 6 presents the OLS regression results on the role of employees' overall task diversity and the diversity in employees' outcome measurability and task programmability, respectively, for the middle manager's MC choices. *ActCtrlMM* is the average of all items referring to action control as indicated by the middle manager relative to total MC. *PersCtrlMM* is the average of all items referring to personnel control as indicated by the middle manager relative to total MC. *ResCtrlMM* is the average of all items referring to results control as indicated by the middle manager relative to total MC. *CultCtrlMM* is the average of all items referring to cultural control as indicated by the middle manager relative to total MC. *SpanCtrlMM* is the total number of employees directly reporting to the middle manager. *TaskDiversity* is the sum of standard deviations of the subordinate employees' task programmability and outcome measurability per middle manager. *OutMeas* is the average of all items related to employees' outcome measurability as indicated by the middle manager. *OutMeasDiv* is the standard deviation of the subordinate employees' outcome measurability per middle manager. *TaskProg* is the average of all items related to employees' task programmability as indicated by the middle manager. *TaskProgDiv* is the standard deviation of the subordinate employees' task programmability per middle manager *LevelMM* is the hierarchical level of the middle manager, with higher values representing higher levels. *Tenure* is the natural logarithm of the average number of years the subordinate employees worked in the job position per middle manager. *CtrlSM* is the average of all items referring to action control (column 1), personnel control (column 2), results control (column 3), and cultural control (column 4) as indicated by the senior manager relative to total MC. Standard errors are in parentheses. *, **, *** indicate two-tailed significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

TABLE 7

Additional analysis: The association between senior managers' MC choices and senior managers' span of control

VARIABLES	(1) *ActCtrlSM*	(2) *PersCtrlSM*	(3) *ResCtrlSM*	(4) *CultCtrlSM*
SpanCtrlSM	0.06	0.17	-0.01	-0.22**
	(0.079)	(0.110)	(0.081)	(0.100)
OutMeasMM	0.21	-0.65***	0.86***	-0.42
	(0.219)	(0.159)	(0.175)	(0.291)
TaskProgMM	0.49***	-0.46**	-0.48***	0.45***
	(0.180)	(0.186)	(0.121)	(0.155)
LevelSM	-0.07	-0.08	0.77***	-0.62*
	(0.237)	(0.204)	(0.221)	(0.318)
TenureMM	-0.54*	-0.14	0.38	0.30
	(0.327)	(0.294)	(0.274)	(0.362)
Constant	21.01***	32.17***	16.16***	30.66***
	(1.706)	(1.251)	(1.065)	(1.684)
Year FE	YES	YES	YES	YES
Observations	186	186	186	186
Adjusted R^2	2.6%	10.4%	24.8%	12.0%

Notes: Table 7 presents the regression results on the association between senior managers' MC choices and senior managers' span of control. *ActCtrlSM* is the average of all items referring to action control as indicated by the senior manager relative to total MC. *PersCtrlSM* is the average of all items referring to personnel control as indicated by the senior manager relative to total MC. *ResCtrlSM* is the average of all items referring to results control as indicated by the senior manager relative to total MC. *CultCtrlSM* is the average of all items referring to cultural control as indicated by the senior manager relative to total MC. *SpanCtrlAvgMM* is the total number of employees directly reporting to the average middle manager. *SpanCtrlSM* is the total number of employees directly reporting to the senior manager. *OutMeasMM* is the average of all items related to managers' outcome measurability as indicated by the senior manager. *TaskProgMM* is the average of all items related to managers' task programmability as indicated by the senior manager *LevelSM* is the hierarchical level of the senior manager, with higher values representing higher levels. *TenureMM* is the natural logarithm of the average number of years the subordinate employees worked in the job position per senior manager. Standard errors are in parentheses. *, **, *** indicate two-tailed significance at the 10 percent, 5 percent, and 1 percent levels, respectively.