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MIDDLE MANAGERS' ENGAGEMENT IN AUTONOMOUS STRATEGIC ACTIONS: DOES IT REALLY MATTER HOW TOP MANAGERS USE BUDGETS?

Abstract. Fostering middle managers' entrepreneurial behavior is a key concern for established firms. Budgets are one of the most widely used management tools in organizations and several conceptual articles claim that the way in which they are used – most notably, an interactive way – affects middle managers' autonomous strategic actions (ASA). This type of entrepreneurial behavior in established firms focuses on opportunities outside the firms' currently served product-market domains. Using structural equation modeling (SEM) and a formative measurement instrument for interactive use of budgets, we test these claims advanced in conceptual literature within a broad sample of large firms. We find that the way in which budgets are used does not significantly impact middle managers' engagement in ASA. In contrast, firms' boundary systems and middle managers' autonomy seem important antecedents to ASA. [130 words]

Keywords: budgets; interactive use; autonomous strategic action; middle managers

Managerial Relevance Statement. Budgets are one of the most widely used management tools in organizations and several conceptual articles claim that the way in which budgets are used influences the level of a particular type of intrapreneurship: middle managers' autonomous strategic actions (ASA). This type of intrapreneurship focuses on new business opportunities by introducing new products to new markets. An interactive way of using budgets has been suggested to foster such intrapreneurial behaviors. Since fostering middle managers' entrepreneurial behavior is a key concern for many established firms today, and as managers can choose the way in which they use budgets, testing these claims empirically has high practical importance for advising engineering management. We draw on a broad sample of large Danish firms to test these claims for the use of annual budgets.

In contrast to views advanced in conceptual literature, our results suggest that the way annual budgets are used does not significantly impact the level of ASA. Rather, it is boundary systems and middle managers' autonomy which significantly affect the level of such intrapreneurship. Our findings thus provide advice to engineering managers on where to look in order to promote intrapreneurial behaviors. [190 words]

1. Introduction

Budgets, “the quantitative expression of a proposed plan of action by management” ([1], p. 206), are one of the most widely used management tools in organizations (e.g., [2],[3], [4]) and thus regularly attract scholarly interest. Much of this significant body of work studied the existence of budgets, the role of participation in setting budget targets, and their effects on individual behavior and firm-level performance (e.g., [5] - [14]). These efforts have greatly enhanced our understanding of budgets. Yet, scholars increasingly agree that budgets – and management control systems generally – can be used in different ways, and that the way in which they are used is what should largely determine their effects (e.g., [15] - [20]).

For instance, as early as in 1980 Burchell et al. [21] suggested that managers can use management control systems – that is: formal, information-based systems designed to influence patterns of behavior within an organization through forecasting developments and outcomes of alternative courses of actions, coordinating activities, and tracking status and performance [18] – in either an “answer machine” manner or in a “dialogue or idea creation” way. Janssen et al. [22] distinguish a conceptual use from an instrumental and a symbolic use and find that their effects differ. Abernethy and Brownell [15], in turn, find that management control systems can be used in an enabling and a coercive manner, again with differing effects. The arguably most influential typology of different ways of using management control systems, however, is from Simons [18]. Drawing on case research, he submits that firms differ in how strongly they use management control systems “interactively,”

respectively “diagnostically.” According to Simons ([18], [19]), using a management control system interactively, means that the information generated by the system (i) is “an important and recurring agenda addressed by the highest levels of management” [18, p. 97], (ii) attracts “frequent and regular attention from operating managers at all levels of the organization” [18, p. 97], (iii) is “interpreted and discussed in face-to-face meetings of superiors, subordinates, and peers” [18, p. 97], and (iv) is “a catalyst for the continual challenge and debate of underlying data, assumptions, and action plans” [18, p. 97]. Using a system “diagnostically,” in turn, corresponds to drawing on its information so to check that “things are on track” – meaning that managers devote little attention to it and simply use the system like a thermostat [18]. Simons goes on to submit that using budgets interactively fosters middle managers’ intrapreneurial behavior, and in particular, “autonomous strategic actions” [18], [19].

Autonomous strategic actions (ASA) are bottom-up entrepreneurial efforts of middle managers within established firms which recognize and explore opportunities outside the firm’s currently served product-market domains [24]. By focusing on new products for markets so far unserved by the firm, they are a particular type of intrapreneurial activity which may, if successful, entail important changes in the markets served and products offered by a firm. They have therefore been suggested to be one source of strategic renewal [25],[26]. Yet, little is known so far on what role budgets play in fostering (or hampering) this type of intrapreneurial behavior – and, especially whether interactively used budgets increase ASA or not.

Simons’ claim has been reiterated in the literature and is conceptually appealing, yet it contrasts sharply with the (implicitly) held view in much of the literature that management control systems, specifically budgets, hamper employee initiative, intrapreneurship, and firm adaptation (e.g. [9]). However, following Simons [18], [19], such an effect should only be the result when budgets are used diagnostically, whereas an interactive use of budgets should

heighten the level of intrapreneurial activities of the kind of “autonomous strategic actions.”

We therefore put these claims under empirical scrutiny. We focus on annual budgets and middle managers’ engagement in autonomous strategic action because middle managers have been identified as pivotal for such actions [24], [26]. Hence, in the following we answer the question “does it matter for middle managers’ engagement in autonomous strategic action whether top managers use budgets interactively or diagnostically?”

Our study contributes to the literature in several ways. First, we provide rare evidence on the relation of ASA with how managers use annual budgets – a relation that seldom attracts attention. Second, this study is the first to use a formative measurement instrument to capture interactive use of a control system. While literature agrees that interactive use is a formative construct (e.g. [17]), studies on interactive use of control systems have relied on reflective measurement instruments (e.g., [4],[16],[20],[27] - [30]), thus potentially suffering from misspecification bias (e.g. [31]). Similarly, in contrast to extant research about the control systems-ASA relation, we draw on a multi-item operationalization of ASA which is in line with Burgelman’s [24], [26] descriptions of autonomous strategic action, thereby avoiding confounding ASA with other intrapreneurial behaviors. Thirdly, we consider the various ways of using budgets alongside so called boundary and belief systems. We thus contribute to the sparse number of empirical studies that test all the “levers of control” in Simons’ [18] framework within a single study. In fact, our results underscore the importance of considering boundary systems for ASA – and hence, of a “lever” that so far has attracted little systematic research.

2. Degree of Using Budgets Interactively and Autonomous Strategic Action

In order to answer our research question, we first discuss Simons’ [18] concept of interactive vs. diagnostic use, its relation to his “levers of control” framework, and literature on the

impacts of different ways of using budgets. Subsequently, we discuss the knowledge about the antecedents of ASA and specify the hypotheses to test.

2.1 Different Ways of Using Budgets within Simons' Levers of Control Framework

Whether intended or not, the way in which management tools are used shapes the nature and extent of individual contributions to an organization [49]. In his “levers of control” framework, Simons [18] posits that top managers have four levers at their disposal for shaping these contributions: the firm’s belief systems, its boundary systems, the degree of how interactively they use a control system, and the degree of diagnostic use.

Belief systems relate to an organization’s core values and are “used to inspire and direct search for new opportunities” [18, p. 7]. Such shared values pull individuals’ actions to the yet-to-be realized innovations (e.g., [53]). Moreover, they influence managers’ perception of reality, thus giving a meaning to the strategic choices (e.g., [53], [54]). Boundary systems, in turn, “delineate the acceptable domain of activity for organizational participants” [18, p. 39] and serve “to set limits on opportunity-seeking behavior” [18, p. 7]. Within Simons’ levers of control framework, belief systems and boundary systems complement each other since the “use of imprecise belief systems inspires unfocused search efforts that risk dissipating the resources and energies of the firm” [18, p. 40], a danger that boundary systems curb. The third lever is the degree to which top managers use a formal, information-based management tool to draw attention to the strategic uncertainties facing the organization [17] - [19]. By strategic uncertainties he means “the uncertainties and contingencies that could threaten or invalidate the current strategy of the business” [18, p. 94]. In contrast to this manner of using control systems, which he terms “interactive use,” when used diagnostically, formal information-based management systems serve primarily as means for confirming that everything is going according to pre-set goals, standards, processes, and procedures and for triggering corrective actions if deviations from standards are spotted – they are used in a

similar manner as a thermostat, which triggers adaptive action if the actual temperature deviates from the preset standard [18].

Simons [18, p. 109] highlights “annual profit plans or budgets, second year forecasts, and strategic operating and financial plans” as examples of management tools that managers often use interactively. By drawing the attention of managers on all levels of an organization to these strategic uncertainties interactively used management tools “stimulate search and learning, allowing new strategies to emerge as participants throughout the organization respond to perceived opportunities and threats” [18, p. 91]. Consequently, interactively used tools should enhance innovation, creativity, learning, and development of new organizational capabilities (e.g., [16], [20]). Yet, Simons equally notes that annual budgets and profit plans are frequently used as diagnostic control systems [18]. In these cases, budgets serve top management as “levers for implementing intended strategies” [18, p. 3], [47]. Not surprisingly, a diagnostic use of control systems has often been linked to enhanced current financial efficiency and implementation of cost strategies (e.g., [51], [52]), but also to lower innovation, creativity, adaptation, development of new capabilities and longer-term performance (e.g., [16]).

While the available case and anecdotal evidence is illustrative of the theoretical points made by Simons, little empirical evidence testing the proposed link between interactively used formal, information-based systems and ASA in larger samples is available. Bisbe and Otley [17] concentrate on the effects of an interactive use of control systems on innovation and performance, while Bellora-Bienengräber and Günther [29] address product development and organizational performance, and Bedford [47] concentrates on the performance effects. Whereas ASA are related to product innovations and may eventually affect performance, they are a distinct phenomenon. They focus on middle managers’ recognition and exploration of business opportunities in new product-market domains – and hence, ASA are not the same as

top-down driven corporate entrepreneurship or innovation more broadly. In other words, ASA relates to the front-end of a group of product innovations, for which managers in the focal firm face substantial knowledge gaps and for which they do not ex ante have the sign-off from top management, yet which may, if ex post signed-off and implemented, entail important changes in the markets served and products offered by a firm. They are thus likely to lead to what is sometimes called “radical innovation” [64]. For these reasons, insights about the role of budgets or their different ways of use for product innovation within the markets already served by a firm, may not translate to ASA. This even more so as the evidence on the impact of different manners of using budgets on innovation or related constructs is very limited and suffers from an important measurement-related issue: While literature agrees that interactive use is a formative construct (e.g., [17]), all studies on interactive use of control systems have relied on reflective measurement instruments (e.g., [4], [16], [20], [27] - [30]), thus potentially suffering from a misspecification bias (e.g. [31]).

Yet, the situation is even more problematic within the literature focusing on the link between budgets and ASA. Only one small study so far has tried to shed light on the impact of interactive use of budgets on ASA. While this study by Hofmann, Wald and Gleich [30] is informative, the small sample size and the way autonomous strategic action and interactive use of budgets were measured, puts tight limits on the conclusions that can be drawn for the role of different ways of using budgets for ASA. In particular, the measures used to capture ASA are quite remote from how Burgelman [24], [35] and Burgelman and Grove [26] describe ASA. They are, in fact, more likely to capture what Burgelman [24] calls “induced strategic action,” than to measure ASA — which in Simons’ framework seems more related to belief systems and diagnostic controls. The study thus very likely picked up other behaviors, but not ASA. Moreover, the study treats interactive use as a reflective, rather than a formative construct, which stands in contrast to the descriptions given in Simons [18] and

which may have led to a misspecification bias in findings (e.g. [31]). Thus, drawing any conclusions about the empirical veracity of Simons' claims based on the study seems highly problematic.

As Simons' [18] [19] claims have been around for a number of years now and have been reiterated in literature, it is time to empirically test, whether it truly matters how top managers use budgets for the level of middle managers' ASA. The first step for doing so is to review the knowledge on the antecedents to ASA, to clarify the relation.

2.2 Antecedents to Autonomous Strategic Action

Extant research highlights two groups of factors as especially important for the level of ASA: an organization's structural and its strategic context.

The structural context "refers to the various administrative mechanisms which top management can manipulate to influence the perceived interests of the strategic actors at the operational and middle levels in the organization" ([24]: p. 1350). Thus, notably, the structural context comprises organizational structure and allocation of decision-rights, resource availability and allocation to lower-level members, the degree of formalization of positions and relationships, project screening criteria, as well as planning and performance measurement systems (e.g., [24], [35], [41], [42]). Budgets are thus one element of an organization's structural context. Allocation of decision-rights – especially, middle managers' decision-making autonomy, is the element within the structural context that so far has received most of the attention in empirical research on ASA (e.g., [37], [41], [43],- [45]). The available evidence consistently points to autonomy being an important explanatory variable for the level of ASA. In contrast, based on case evidence, formalization of positions and relationships, in turn, seems to inhibit ASA engagement [32] as well as bottom-up driven innovation and change more generally [36]. Evidence is scarcer with respect to the impact of

planning, budgeting, cost accounting, and incentive systems on ASA. Firms' incentive systems have not been found to matter for the level of ASA [46].

Annual budgets, in turn, and notably different ways of using them have been suggested by Simons [18] (drawing on case research) to foster ASA provided that they are used by top managers in a way that he terms "interactive use." In contrast, he submits that using budgets – or any other management control tool more generally – in a "diagnostic" way, i.e. only to verify whether "things are on track," can serve top management as lever to implement intended strategies [18], [47], yet not for fostering ASA. In fact, a diagnostic use may even hamper ASA. So far only other study besides Simons' work has tried to shed light on the impact of interactively used budgets on ASA [30], and this study suffers, as already described, from multiple shortcomings. Obviously, there is a broad and rich body of empirical literature on change and innovation. Yet, very little of this evidence speaks to the diagnostic, interactive use of budgets-ASA relations. For example, there is some anecdotal evidence in the literature on innovation and change regarding the impact of management practices that focus on controlling subordinates or imposing senior managers' will (e.g., [36]) – and hence, a use of management practices which resembles what Simons' termed "diagnostic use." This evidence can be viewed to support Simons' view about a detrimental effect of a diagnostic use for ASA. However, as outlined, ASA are a particular type of intrapreneurship – and thus insights for the broad phenomena of innovation or change more generally may not necessarily apply to ASA. Therefore, based on the evidence, it is not possible to assess whether different forms of using budgets truly affect the level of ASA and, hence, to judge the validity of Simons' [18] claims.

By strategic context, extant literature on ASA refers to all those factors affecting how managers perceive the strategic situation of their firm, whether and how managers can question the strategic direction, voice ideas for alternatives, and create political leeway to

trigger top managers to retroactively rationalize an autonomous initiative to become part of the (renewed) official strategy (e.g., [24],[35]). Thus, several studies highlight top managers' support for entrepreneurial behavior – including a clear signaling of support for bottom-up initiatives for and experimentation with new products or service offerings, new markets or market segments and their exhibited openness to discuss new business ideas – as a core element of the strategic context which fosters lower- and middle-level members' ASA (e.g., [24], [32], [35], [37], [38]) and bottom-up driven innovation and change (e.g., [36]). Besides top management support, belief systems and boundary systems as described by Simons [18] seem to refer to two additional aspects of an organization's strategic context. They influence managers' perception of reality, thus giving a meaning to the strategic choices (e.g., [53], [54]), and “delineate the acceptable domain of activity for organizational participants” [18, p. 39]. In fact, Simons' idea of boundary systems resonates well with the emphasis put in strategic entrepreneurship literature on “organizational boundaries” [55, p. 261], such as precise explanations of outcomes expected from organizational work as another important antecedent to middle managers' entrepreneurial behavior (e.g., [32],[55]). So far, however, neither Simons' (1995) boundary systems, nor the “organizational boundaries” highlighted in the strategic entrepreneurship literature have been studied empirically in their relation to ASA. An organization's performance has been suggested as another element of the strategic context. Yet, while some case evidence as well as organizational learning theory [39], [40] suggest that declining performance of an organization may be an antecedent to ASA, survey evidence failed to find such a relation [37].

Overall, surprisingly little is known about the role of different ways of using budgets for ASA. As annual budgets are one of the most widely used management tools in organizations (e.g., [2] - [4]) and since scholars increasingly agree that the way in which management tools are used is decisive for their effects on individual behaviors as well as

organization-level outcomes (e.g., [16] - [20]), our present knowledge is unsatisfactory as it hampers the formulation of recommendations for practitioners interested in enhancing the level of intrapreneurship experienced by their firms. Hence, Marginson's [49] call to explore the role of different uses of control systems for autonomous strategic action remains valid.

2.3 Hypotheses

In the following, we present the relationships between different ways of using annual budgets and ASA, drawing on Simons [18]. Since research on ASA has already identified top management support and autonomy as important for understanding middle managers' engagement in ASA, we consider these two factors alongside the different uses of budgets in the model that we develop. Moreover, we enrich this model by two additional factors taken from work by Simons on his "levers of control" framework [18]. Figure 1 summarizes the hypothesized relations.

----- Insert Figure 1 about here -----

Simons [18] relates his concept of the interactive use of controls to Robert Burgelman's work on ASA and submits that diagnostic use of information-based management systems has fundamentally different effects on ASA than an interactive use. Thus, for example, he notes that "interactive control systems guide the experimentation and learning that are necessary for new autonomous strategic initiatives to emerge and be tested in the organization" [18, p. 107]. He cites Alfred Sloan's use of control systems at General Motors as a historical example of such a renewal induced by an interactive use of control systems. Marginson [49] points in a similar direction by stressing that the way control systems are used should influence ASA. Such an effect seems plausible, since a key feature of an interactive use, according to Simons [18, p. 97] is the intensive, frequent discussion and interpretation of the respective information in face-to-face meetings of superiors, subordinates, and peers. As Aiken et al. [48, p. 637] have already noted, extensive internal

verbal communication “facilitates the rapid diffusion of information throughout the organization [...] about performance gaps and promotes a cross-fertilization of ideas about possible solutions.” Moreover, such an exchange implied by an interactively used control system, may promote middle managers’ engagement in developing and promoting new ideas, new products or services, and change more generally as it makes it easier to “locate supporters more easily and thus develop a political base for the proposal” [48, p. 637].

Similarly, since an interactive use in addition to the regular face-to-face meetings implies continual challenging and debate of underlying data, assumptions, and action plans [18], interactive use resembles collaborative problem-solving processes, which have been found to foster innovation in organizations [50], [64]. In fact, using formal, information-based control systems in an interactive way may provide for the type of strategic conversations between middle and top managers that have been found important for adaptation, change, and innovation [50]. While the phenomenon of interactive use as defined by Simons [18] is thus more comprehensive than the constructs of extensive internal verbal communication or collaborative problem-solving processes, which have been studied in the literatures on innovation and change, it seems likely that interactive use should have similar effects – and according to Simons’ [18] claims, it should foster ASA. Since budgets are one of the most ubiquitous information-based managerial tools, the extent to which they are used interactively is likely to have pronounced effects on middle and lower-level managers’ ASA. In line with Simons’ [18] claims, our first hypothesis thus is:

H1: The greater the interactive use of budgets, the higher c.p. the level of middle managers’ engagement in autonomous strategic action.

A diagnostic use of budgets draws managerial attention to spotting deviations from the plan and to developing corrective actions to close potential gaps [18]. This should facilitate the realization of an intended strategy as it leads to a focus on operational

challenges [18], [47]. Yet, at the same time it implies that attention is diverted from strategic uncertainties and from questioning the plans and the firm's current business model. Without such questioning of the organization's intended strategy and the firm's business model, however, it is unlikely that middle- and lower-level managers can scan the environment sufficiently broadly and intensively for new business opportunities related to new product or service offerings for markets which are not yet served by the firm. In other words, by diverting attention to attaining existing plans, rather than to the strategic uncertainties, diagnostically used budgets reduce the likelihood that middle- and lower-level managers engage in ASA. Therefore, our second hypothesis reads as follows:

H2: The greater the diagnostic use of budgets, the lower c.p. the level of middle managers' engagement in autonomous strategic action.

Boundary and belief systems. According to Simon's levers of control framework, belief systems and boundary systems play an important role in influencing managers' behaviors since the "use of imprecise belief systems inspires unfocused search efforts that risk dissipating the resources and energies of the firm" [18, p. 40], a danger that boundary systems curb. Thus, belief systems can be considered to create the desire for middle- and lower-level members of an organization to engage in ASA, while boundary systems motivate them to do so as they provide guidance to them – and thus heighten the coordination of actions among individuals and facilitating cooperation and knowledge sharing, thereby ultimately rendering discovery and development new business opportunities more likely. Without boundaries, a firm's financial and non-financial (e.g., time and attention) resources may be spread too broadly to allow any individual initiative to grow sufficiently so as to prove its economic viability—and thus to lead to strategic renewal. Middle managers fearing that their engagement in ASA may never bear fruit in the sense of their initiative reaching a

“proof of concept” stage due to a lack of resources, likely will not engage in such actions in the first place. Our third and fourth hypothesis thus read as follows:

H3: The stronger the belief systems, the higher c.p. the level of middle managers’ engagement in autonomous strategic action.

H4: The stronger the boundary systems, the higher c.p. the level of middle managers’ engagement in autonomous strategic action.

Middle managers’ autonomy. Much of the strategic management, innovation, and change literature posits that bureaucratic decision-making processes can impede new organizational ideas and initiatives (e.g., [32], [33], [36], [48], [56]), thus inhibiting ASA [24], [45]. Therefore, the delegation of decision-making rights to middle managers is often portrayed as an antecedent to innovation, adaptation, and entrepreneurship in established firms (e.g., [32]). Moreover, autonomy has been proposed as an important motivator that should enhance performance in creative and innovative activities (e.g., [57], [58]). Hence, we expect decision-making autonomy to have a positive effect on ASA—an expectation also supported by (albeit quite limited) evidence (e.g., [24], [30], [37]). This leads to our fifth hypothesis:

H5: The larger middle managers’ autonomy in market and product-related decisions, the higher c.p. the level of their engagement in autonomous strategic action.

Top management support. Top management support for experimentation and entrepreneurship is another commonly suggested antecedent of ASA and related concepts such as innovation (e.g., [24], [32], [36], [42], [59]). Top management can be instrumental in encouraging such behaviors by facilitating experimentation and risk-taking through their own behavior at both the individual and team levels (e.g., [24],[50],[60],[61]). Thus, for instance, Kanter [36] identified insufficient support for experimentation and entrepreneurship as a core roadblock to innovation and change. Management support denotes a clear signaling of

support for bottom-up initiatives for and experimentation with new products or service offerings, new markets or market segments, and a readiness for and active engagement in discussing ideas in an honest, serious and interested manner [24], [32], [35], [58]. Such behavior by top managers not only shows that they trust middle managers [50], but also that they have confidence in the abilities of the members of their organization to perform effectively and to succeed in working on challenging jobs and projects [38], [62]. It implies that knowledge and facts are decisive rather than hierarchical positions (e.g., [35], [36]). Moreover, by fostering open discussion of new ideas and by acknowledging the inherent risks with experimentation, i.e. that many—if not most of such initiatives will not turn out to be very successful economically [24], [32], top management support reduces the (career) risks of engaging in ASA (e.g., [38]).

Not surprisingly, top management support for experimentation and entrepreneurship has been shown in studies to enhance individuals' creativity and innovation behavior (e.g., [50],[63]) and ASA [37]. Hence, in line with literature we expect that the signal of support by top management “is a strong antecedent of autonomous strategic behavior on the part of middle-level managers' behavior as well as others in the firm” [32, p. 703]. Thus, our next hypothesis reads as follows:

H6: The stronger the top management support, the higher c.p. the level of middle managers' engagement in autonomous strategic action.

3. Method

There are several ways of testing the claims advanced in conceptual literature about the role of interactively used budgets for ASA. Therefore, we describe the research design, sample, data collection, measurement instruments, and analytical procedure used in the following sub-sections.

3.1 Research design and population

We are interested in empirically testing claims voiced in conceptual literature on how different ways of using budgets – especially, the extent to which budgets are used in an interactive way – affect the engagement of middle managers in ASA. Since literature does not limit these claims to a particular industry, but maintains them to apply to all kinds of industries, a survey collecting data from firms in a broad range of industries seems best suited for validly testing these claims. As an open economy with a variety of industries, Denmark seems a suitable site for such a survey as Danish firms should be representative of firms in many other countries. Moreover, Danish firms in general are quite willing to participate in surveys, as indicated by comparatively large response rates, thereby reducing the dangers of non-response bias.

3.2 Sample and data collection procedure

Whenever possible, we relied on existing measurement instruments. Nevertheless, we engaged in extensive pre-testing of our survey instrument. The instrument used for collecting data was pre-tested in face-to-face meetings with three managers; subsequently, the questionnaire was pre-tested on a sample of 92 managers from 62 firms (not included in the main dataset). These pre-tests raised no concerns.

Subsequent to these pre-tests, data for testing the hypotheses was collected as part of a larger data collection effort. The heads of marketing of the 500 largest companies in Denmark (in terms of the number of employees) were contacted with personalized letters and each was asked to fill in a two-page survey instrument. The 500 companies cover a broad set of industries and have at least 275 full-time employees. The questionnaire included items on budgets, boundary and belief systems, autonomy, management support and ASA in addition to several control variables.

Two weeks after the initial letter, a second letter with the questionnaire was sent to the respondents who had not responded to the first letter. These two waves of mailing produced

141 responses. In a third step, the remaining respondents were contacted by phone and asked to participate in the survey. Out of these, 171 answered the questionnaire, yielding a total of 312 responses or a response rate of 62.4%. The survey was complemented by additional data collected from a national database of Danish firms (Koebmandsstandens oplysningsbureau, or KOB), including the primary industry affiliation, number of employees, core financial data, and the firm's founding year.

To assess the potential presence of a non-response bias, we conducted tests on information from KOB regarding, among others, sector, size, turnover, firm age, capital structure and legal form, comparing the responding companies with the non-responding ones. None of the tests suggested that the non-responding firms differ from the responding ones.

To address the risk of common method bias tainting our findings, we used procedural and statistical means recommended in the literature (e.g. [69] - [71]). Procedural remedies comprised the use of a cover story that avoided a link to ASA, relying on existing scales whenever possible, assuring respondents of the confidentiality of their responses, and including the scales in a larger set of scales dealing with quite diverse topics. The latter reduces the likelihood of respondents making associations between the constructs. Our hypothesized relationships seem unlikely to be part of respondents' theory-in-use, which reduces dangers of common method bias [71].

We conducted three statistical tests to check for the presence of common method bias. Firstly, Harman's one-factor test [69] on all items underlying the latent factors suggest that no single factor accounted for most of the variance explained (variance explained of individual factors ranged from 5.3% to 36.6%). Moreover, all items loaded on their conceptualized factors. Secondly, following the recommendations by Craighead et al. [70], we conducted a confirmative factor analysis comparing a one-factor model with a multifactor model, corresponding to all items loading onto their conceptualized factors. Chi-square

difference testing ($\Delta\chi^2$) comparing these two models clearly indicated that the multifactor model better fits the data ($\Delta\chi^2 = 2015.63$; $df = 10$, $p < 0.001$). Thirdly, we conducted the marker variable test [70]. We drew on a set of several items that should not be related to ASA based on theoretical grounds, among others the firms' formal risk management procedures. None of these variables was statistically significantly linked to ASA, thus confirming the findings of the two previous tests that no common method variance is present. All three tests thereby indicate that common method variance is unlikely to bias our results [69].

3.3 Measurement instruments

Core independent variables of interest to us are not directly observable, but are latent constructs. To reduce measurement error, we relied on multiple observed items for each of these constructs. Appendix 1 gives the exact wording. As reported in Appendix 1, the constructs display high levels of reliability, as indicated by composite reliabilities (CR) above 0.83 and average variance extracted (AVE) ranging from 0.59 to 0.81 [67]. The latent constructs meet the convergent criteria with each loading being significantly related to its underlying factor. Finally, a test of normality was conducted as recommended by Hult et al. [68]. The test indicated no reason for concern.

Interactive use of budgets. Several measures for interactive use of control systems have been used in literature in the recent past. Most of them relied on reflective measures (e.g. [4], [16], [27], [28]), whereas Simons' [18] descriptions of interactive way of use rather point toward a multi-dimensional formative construct [65]. Since no such operationalization existed for the interactive use of budgets when we collected our data, a new measurement instrument had to be developed. Drawing on Simons [18], we thus formulated items to measure interactive use of annual budgets as a four-dimensional formative construct. The four dimensions correspond to the four characteristics of an interactive use of a control system as defined by Simons [18, p. 97]. After extensive pre-testing, measurement of the

construct of interactive use of budgets in the main sample drew on three items per dimension. We implemented the formative measure as a set of four lower-level constructs with each measuring one of the four dimensions outlined by Simons. To assess the measurement of interactive budget use, we followed the recommendations for assessing higher-order formative constructs by Steenkamp and van Trijp [78] and Gerbing and Hamilton [79].

In an exploratory factor analysis, the 12 items loaded onto their four conceptualized dimensions. A confirmative factor analysis corroborates this finding: As indicated by the Chi-square difference test ($df=6$, $p < 0.001$), the four-factor model ($\text{Chi}^2 = 204.94$, $df = 48$; CFI = 0.93, RMSEA = 0.08) fits the data substantially better than a one-factor model ($\text{Chi}^2 = 335.09$, $df = 54$, CFI = 0.87; RMSEA = 0.10). This supports the independence of the four lower-level constructs which are used to form the formative higher-order construct of interactive use of budgets. Such independence is a prerequisite for a valid measurement of a higher-order formative construct. Appendix 1 provides details on the scale (original measures in Danish, translated by the authors).

Diagnostic use of budgets. For measuring diagnostic use of budgets, we adapted an established and validated scale for diagnostic use of performance measurement systems from Henri [16]. The four-item reflective scale lends itself to being transferred to budgeting and budgets and was measured on 7-point Likert scales (1 = *fully disagree*, 7 = *fully agree*). Cronbach's alpha is 0.88, similar to the results in other studies (e.g. [30], [47]). Appendix 1 reports the details.

Boundary systems. Boundary systems are captured by a set of four items developed by Widener [27]. The four items were measured using 7-item Likert scales (1 = *fully disagree*, 7 = *fully agree*). Cronbach's alpha is 0.86. See Appendix 1 for details.

Belief systems. Similar to boundary systems, assessment of the firm's use of belief systems draws on an existing scale [27]. Appendix 1 gives the exact wording of the four

items. Responses to these four items were collected using 7-item Likert scales (1 = *fully disagree*, 7 = *fully agree*). Cronbach's alpha of the scale in our sample is 0.89.

Top management support. Assessment of top management's support for entrepreneurship relied on an adjusted version of a scale by Choi [58]. The items focus on top managers' openness to ideas and exchange with their subordinates—leaving aside other aspects of (a more generally defined) leadership climate. Responses were collected on a 7-point Likert scale (1 = *fully disagree*, 7 = *fully agree*). Cronbach's alpha is 0.85. (Appendix 1 provides details on the items and their measurement properties.)

Middle managers' autonomy. To measure middle managers' market-related autonomy, we drew on a subset of three items out of a broader reflective scale initially developed and validated by Andersen [43], which has since been used in several studies (e.g., [37]). The items used in the present study relate to middle managers' market and product-related autonomy in the past three years (2010-2013). We relied on 7-point Likert scales ranging from 1 (*fully disagree*) to 7 (*fully agree*). Cronbach's alpha is 0.80.

Autonomous strategic action. Seven items from Linder and Bothello [37] measure how often middle managers engage in ASA (see Appendix 1). All items were measured on 7-point Likert scale (1 = *never*, 7 = *always*). Factor analysis confirmed the unidimensionality of the measure, which exhibits a Cronbach's alpha of 0.91.

Controls variables. Several control variables served to better distill the effects of different ways of using budgets for ASA. Firm size and age have been linked to bureaucracy and firms' entrepreneurial and innovative activities (e.g. [38]). To control for size, we follow common practice and apply a natural logarithm to the total amount of assets, as listed in the public database. Firm age draws on the founding year of a firm reported in the same database. Given that levels of ASA, decision autonomy and way of budget use are all perceptual by nature, experience with the pivotal firm is important. Therefore, we follow Larsen [64] and

collect respondents' tenure with their organization. The average tenure was 13.07 years, suggesting that they were sufficiently acquainted with their organizations to provide accurate responses. Finally, to control for potential sector effects, we relied on firms' primary industries, as indicated by their NACE-codes (the E.U.'s equivalent to the U.S.' SIC-codes).

To control for these various effects in structural equation modeling, we regressed each item of the ASA scale on the various controls prior to running the SEM models. The actual SEM models then drew on the residuals of these regressions, which were saved in new variables.

3.4 Analytical procedure

Structural equation modeling (SEM) facilitates such simultaneous testing and allows explicitly considering measurement error [74]. It thus seems ideally suited for testing our hypotheses. Two alternative procedures are common: a covariance-based and a variance-based (partial least squares) approach. Each approach has its strengths.

Availability of a broad range of indicators for assessing model fit is an advantage of covariance-based approaches. Such indicators permit the testing hypothesized relations in two ways [77]: 1) by testing the full hypothesized model and assessing path coefficients and their respective statistical significances, and 2) by testing the fit of alternative nested models within the full hypothesized model for whether they offer better model fit than the hypothesized model. If this is the case, then this provides additional comfort to rejecting the hypotheses related to those constructs removed when creating these nested models through systematic model trimming. Since all known indicators have their limitations, an analytical procedure for which a broader set of such indicators is available is less likely to lead to an erroneous rejection of hypotheses. In comparison to covariance-based SEM, partial least squares (PLS) makes less restrictive assumptions about the underlying distributions of the variables [75]. It is thus also well-suited to smaller samples. In contrast to covariance-based

SEM, PLS additional affords the advantage of being a procedure that allows a kind of “explorative testing,” making it well-suited to researching phenomena about which little is known.

Our main objective is to test established theorizing by Simons [18] and we draw on a comparatively large sample for a survey study. Therefore, neither the possibility for exploration, nor the suitability of the analytical approach for smaller samples are of primary importance to us. In contrast, having a broad set of different model fit indicators seemed important to us as it offers a particularly robust way of testing nested models as it allows basing the testing of hypotheses on two assessments: the significance of path coefficients in the hypothesized model and the fit of alternative, nested models [74], [77]. If the model with the best fit corresponds to the hypothesized structural model, this suggests accepting all hypothesized relationships; if in contrast, any of its nested sub-models boots the best model fit, this indicates that the hypotheses corresponding to the relationships excluded from the respective nested model should be rejected. Consequently, we rely on covariance-based structural equation model using AMOS 22 in a two-stage procedure recommended by Anderson and Gerbing [76]. The first stage involves estimating the measurement model using confirmatory factor analysis (CFA) to determine convergent and discriminant validity. The second stage compares the theoretical structural model with the measurement model. The structural model provides path coefficients and their significances, and hence, allows testing our hypotheses. As recommended by Gerbing and Anderson [77] we compare a set of nested models as a second test of the hypothesized relationships by drawing on model fit indicators like, for example, the goodness-of-fit index (GFI) and the root mean square error of approximation (RMSEA).

4. Results

As Table 1 shows, among the core constructs which are of interest for testing the hypothesized relations boundary and beliefs systems, middle managers' decision-making autonomy, and top management support for experimentation show greater correlations with ASA than the way in which budgets are used. In particular, diagnostic use does not correlate with ASA at common thresholds for statistical significance. This gives a first indication that hypothesis 2 may not receive empirical support in our sample.

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

Following the two-step procedure of Anderson and Gerbing [76], we first estimated the measurement model before analyzing the structural model which we use to test the hypothesized relations in SEM. The chi-square test of the measurement model was significant; however, its sensitivity to sample size is well-known and criticized [74]. Thus, reliance on multiple fit indices rather than on the chi-square test alone is recommended, and we proceeded to inspect several comparative goodness-of-fit indices that measure the proportional improvement of the model fit by comparing the hypothesized model with a restricted baseline model.

As recommended by Hult et al. [68] and Gerbing and Anderson [77], the fit of the models was tested using the root mean square error of approximation (RMSEA) and the global comparative fit index (CFI) in addition to the normed fit index (NFI) and the Tucker-Lewis index (TLI). The CFI [80] takes into consideration sample size, and values of 0.90 or better indicate a model with a good fit. The root mean square error of approximation (RMSEA) is sensitive to the number of estimated parameters in the model, as it considers the error of approximation in the population; values below 0.08 indicate a good fit. The fit characteristics of the measurement model suggest that the model fits the data well (NFI = 0.81, TLI = 0.86, CFI = 0.88, RMSEA = 0.05) and the measures used thus are suited to testing the hypothesized relations in a structural model.

Based on the hypothesized relations, our structural model comprises ASA as a dependent variable and interactive use of budgets, diagnostic use, boundary systems and belief systems, top management support and autonomy as independent variables. Calculating this model in AMOS shows that the hypothesized relationships of diagnostic use of budgets, interactive use of budgets, management support and belief systems with ASA fail to attain statistical significance at common threshold-levels. This suggests rejecting hypotheses 1, 2, 3 and 6, while accepting hypotheses 4 and 5. Yet, as recommended by Gerbing and Anderson [77] and Kline [74], we conduct a second test of the hypotheses by calculating a set of models nested within our hypothesized model and comparing the model fits of these nested models among each other and with the hypothesized model is advisable. It likely results in a more parsimonious model that fits the data better than the hypothesized model – thus giving additional comfort to rejecting certain hypotheses.

Starting point of these nested models is the hypothesized model, which is the most comprehensive model of these nested models. As Table 2 shows, the fit indicators for this Model 1 suggest that it badly fits our data (e.g., CFI = 0.79 and RMSEA = 0.06).

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

This lends further comfort to our preliminary conclusion that some of the hypothesized relations cannot be supported empirically in our sample. Following a stepwise approach, we test whether the model fit improves when removing relations from Model 1. Since several variables in Model 1 do not show statistically significant relations with ASA, several alternative nested models of Model 1 are conceivable.

The path coefficient of diagnostic use of budgets with ASA is furthest away from attaining statistical significance. Moreover, the two variables do not exhibit a statistically significant pair wise correlation. This suggests removing diagnostic use so to create a first nested model (Table 1). This yields the more parsimonious Model 2, which exhibits – as also

indicated by the Chi-square difference test ($\Delta\chi^2$) better fit to the data than Model 1 (CFI = 0.85; RMSEA = 0.06; $\Delta\chi^2 = 666.79$; $df = 137$, $p < 0.001$). This gives additional comfort to rejecting hypothesis 2. Like in the original Model 1, neither interactive use of budgets (IB), nor firms' belief systems are significantly linked to ASA (at common threshold levels) in this more parsimonious Model 2. This suggests that model fit might further improve when dropping them (which would indicate that their hypotheses should be rejected). Yet, before testing such further trimmed models, we calculated an alternative Model 2b: instead of dropping the diagnostic use of budgets from Model 1, one could remove the interactive use. Like Model 2, this alternative way of trimming Model 1 boosts significantly improved fits relative to Model 1 ($\Delta\chi^2 = 1175.08$; $df = 391$, $p < 0.001$). This provides additional evidence that hypothesis 1 cannot be supported for our sample.

Since the relation between beliefs systems and ASA did not attain statistical significance in either Model 1 or the more parsimonious Models 2 and 2b, dropping belief systems may allow an enhanced model fit. This would indicate that belief systems are not related to the level of ASA – and hence, further substantiate our initial conclusion that hypothesis 3 should not be accepted. Model 3 which results from dropping belief systems from Model 2 exhibits overall acceptable fit with the data (CFI = 0.88, RMSEA = 0.05). Similarly, a Model 3b can be calculated when removing belief systems from Model 2b. The $\Delta\chi^2$ statistic suggest that dropping belief-systems indeed significantly improves fits in comparison to Model 2 ($\Delta\chi^2 = 389.44$; $df = 121$, $p < 0.001$), respectively Model 2b ($\Delta\chi^2 = 337.91$; $df = 89$, $p < 0.001$). Consequently, we cannot find support for hypothesis 3.

To shed additional light on the hypothesized relations, we engage in further model trimming. Model 4 relates boundary systems, autonomy, and top management support to ASA, but excludes the two budgetary uses along with the belief systems. It exhibits good fit with the data (CFI = 0.92, RMSEA = 0.05). This is corroborated by the χ^2 –difference test

showing a significant improvement of model fit when moving from model 3 to model 4 ($\Delta\chi^2 = 621.41$; $df = 265$, $p < 0.001$), from model 3b to 4 ($\Delta\chi^2 = 164.65$; $df = 73$, $p < 0.001$). Yet, whereas earlier research found top management support for entrepreneurship to statistically significantly affect the level of ASA (e.g. [37]), Model 4 does not suggest such a relation.

In fact, as Model 5 illustrates, model fit improves ($\Delta\chi^2 = 1442.55$; $df = 77$, $p < 0.001$) when top management support is removed as a variable. This calls hypothesis 6 into question. Model 5 boosts very good fits ($CFI > 0.95$, $RMSEA < 0.05$) and shows significant positive effects of both autonomy and boundary systems on ASA. This lends support to hypotheses 4 and 5. Table 2 summarizes these fits for the nested models.

Overall, the analysis of the path coefficients in AMOS and the comparison of model fits for the nested models suggest that hypotheses 1 and 2 about the impact of how budgets are used on ASA cannot be supported with our data. In contrast, boundary systems (hypothesis 4) and middle managers' autonomy (hypothesis 5) seem important for understanding the level of ASA, which a firm experiences. Figure 2 depicts the two relations out of the six ones hypothesized that truly seem to matter for explaining the level of ASA.

----- Insert Figure 2 about here -----

5. Discussion

Our study does not find a statistically significant impact of how interactively budgets are used for the level of middle managers' engagement in ASA. Instead, boundary systems and the extent of middle managers' autonomy in market-related decisions are significant factors for explaining the level of ASA experienced by firms.

These findings stand in contrast to the predictions of Simons [18], who submitted that interactive use of budgets fosters middle managers' ASA. Different ways of using budgets may have a plethora of effects—functional or dysfunctional ones (see Parker [66] for an overview of effects suggested in literature), but seem not to affect the level of ASA. In

contrast, boundary systems have – as hypothesized – a positive impact on middle managers' engagement in ASA. This suggests that boundary systems are important for motivating middle managers to engage in ASA. As outlined earlier, several explanations for such an effect can be given. Boundary systems provide guidance and thus heighten the coordination of actions among individuals and facilitate cooperation and knowledge sharing. This can be expected to render finding and successfully developing new business opportunities more likely – something that middle managers may consider when contemplating an investment of time and effort into ASA. Moreover, guidance avoids spreading a firm's financial and non-financial resources too broadly to allow any individual initiative to grow sufficiently to prove its economic viability. Middle managers fearing that their engagement in ASA may never bear fruit in the sense of their initiative reaching a “proof of concept” stage due to a lack of resources, are unlikely to engage in such actions in the first place.

Consequently, our study highlights that boundary systems are an antecedent of ASA – an antecedent which so far has not received attention in the literature on ASA. Moreover, it underscores the importance of autonomy for ASA. At the same time, it calls some of the claims voiced in literature into question. At least for ASA, boundary systems seem to be the lever within Simons' [18] framework that is of greater importance than whether budgets are used interactively or diagnostically.

Our findings seem robust with respect to the functional relationships assumed, the consideration of interaction or mediation effects, whether one considers performance as an antecedent or not, or the analytical procedure used: We ran the models with the squared values for the interactive way of using budgets and for the diagnostic use to allow for exponential relationships of these forms of using budgets to explain firms' ASA. Yet, results are the same as the ones described in the results section which assumed linear relationships (details not reported here for parsimony, but available upon request). Besides testing for

alternative functional relationships, we ran models that allowed for interaction effects between autonomy, interactive use, diagnostic use, respectively top management support. None of these models offered a superior fit with our data. Finally, we tested whether past performance of firms explains the level of ASA – as anecdotal evidence suggests. However, like Linder and Bothello [37], we did not find such a relation.

To verify that our results for the acceptance/rejection of the hypotheses about the role of the different ways of using budgets are not due to the choice of our analytical procedure – covariance-based SEM – and given the growing popularity of the partial least squares method in management research, we conducted the full analysis in variance-based SEM (PLS) using the SmartPLS 3.2.4 software. Results – not reported here for parsimony, but available from the authors upon request – yield the same conclusions for the impact of the two different ways of using budgets than when using covariance-based SEM. Regardless of whether one uses a covariance-based or a variance-based SEM, the way in which budgets are used does not seem to be related to the level of ASA experienced by the firms in our sample. In contrast, autonomy and boundary systems are. This lends additional comfort to rejecting hypotheses 1 and 2 and accepting hypotheses 4 and 5.

Even though our results seem fairly robust, several limitations merit attention. Firstly, our study relied on a single key informant per organization. Whereas we followed common procedural recommendations to minimize the risk of common method bias tainting our results and while all three statistical tests which we carried out do not suggest common method bias being a problem, further studies with multiple respondents per firm seem warranted. The core constructs of interest to us are of perceptual nature and members within one organization may perceive them differently. While we do not have a reason to suspect a systematic bias in responses, explicit assessment of heterogeneous perceptions when measuring the variables

may help reduce noise in the data and thus reduce the risk of accidentally rejecting a hypothesis.

Secondly, the cross-sectional nature of our data implies that we cannot empirically test causality, but merely show associations. Our directional claims can thus only be drawn from the underlying theory. While we do not have a reason to suspect that these directional claims are invalid, future research should test the hypotheses with data suited to causal inferences, such as lagged survey data or data from experiments.

Thirdly, our study captured middle managers' engagement in ASA, but not the results of these efforts and their implications for firm performance. Given the nature of ASA, spotting the results of ASA and their consequences for performance require data which allows models with substantial time lags. Since our data was collected recently, it would be unreasonable to expect that the differences in middle managers' engagement in ASA would already have translated into performance differentials between firms. Yet, while scholars agree that ASA are an important source of strategic renewal, adaptation and firm-longevity ([24], [32], [35], [45]), there is little empirical evidence on this matter. Our study cannot address this issue. Therefore, more research linking ASA to such outcomes as enhanced performance or strategic renewal is needed.

While these limitations call for caution in interpreting results, it is important to note that our results for middle managers' autonomy mirror those obtained in an earlier study by Linder and Bothello [37] on data collected in 2009 from CFOs and prior anecdotal and case-based evidence (e.g., [24], [26]). This lends some comfort to accepting the other parts of our findings.

6. Conclusion

An increasing number of scholars agrees that the way in which budgets are used is decisive for their behavioral and firm-level consequences (e.g., [15], [18], [19]). Thus, in his seminal

work on the levers of control, Simons [18], [19] explicitly links interactive use to autonomous strategic action. Yet, while his claim is compelling and has been reiterated in literature over the past two decades, little is known about its empirical validity.

Our results do not allow us to support Simons' [18] claim that using annual budgets in an interactive way enhances the level of middle managers' engagement in ASA. Yet, boundary systems and the extent of middle managers' autonomy in market-related decisions seem significant factors in explaining ASA. These results are important for ongoing theory-building efforts and for advising practitioners.

Business practitioners can take away from this study that delegating decision-rights to middle managers promises to foster autonomous strategic action. Besides autonomy, an organization's boundary systems seem to matter. Our study contributes to the literature in at least three ways. First, we provide rare evidence on the relation of autonomous strategic actions with how managers use a ubiquitous managerial practice—annual budgeting—a relation that seldom attracts attention from scholars in strategic entrepreneurship or business innovation.

Second, we are the first to use a formative measurement instrument to capture interactive use of a control system. While literature agrees that interactive use is a formative construct (e.g., [17]), studies on interactive use of control systems have relied on reflective measurement instruments (e.g., [4], [16], [20], [27] - [30]), thus potentially suffering from a misspecification bias (e.g., [31]). To our best knowledge, we are the first to use a formative measurement instrument of interactive use – and hence, an instrument which corresponds to Simons' [18] conceptualization [17]. Similarly, in contrast to research about the control systems-ASA relation, we draw on a multi-item operationalization of ASA which is in line with Burgelman's [24], [26] descriptions of ASA, thereby avoiding confounding ASA with other intrapreneurial behaviors.

Thirdly, we test the impact of diagnostic and interactive use of budgets together and within Simons' [18] levers of control framework, considering the different ways of using budgets alongside boundary and belief systems. We thus contribute to the still sparse empirical literature that tests all the levers in Simons' framework within a single study. In fact, our results underscore the importance of considering boundary systems for autonomous strategic action – and hence, of a “lever” that so far has attracted little systematic research.

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Figure 1: Theoretical model and hypotheses

Figure 2: Results for Model 5

Standardized betas. Significance levels: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Appendix 1: Measures*

Dimensions and Variables	Construct Reliability	AVE	Factor Loadings	Indicator Reliability
Interactive Use of Budgets (IB)	0.95	0.85		
Intensive Use by Top Management				
- Budget controls are an important and continuous part of top management tasks			0.85	0.72
- All managers in the organization are involved in the budgeting process			0.80	0.64
- Top management often uses budget information as a means of questioning and debating the ongoing decisions and actions of departments			0.89	0.79
Intensive Use by Operating Managers				
- The budget information forces both top management and managers at all levels of the firm to continuously question and revise their assumptions			0.85	0.72
- Top management often use budgeting information as a means of questioning and debating the ongoing decisions and actions of department/managers			0.89	0.79
- The budgeting process is continuous and it demands regular and frequent attention from managers at all levels			0.87	0.75
Face-to-Face Interpretation and Discussion				
- There is a lot of interaction between top managers and department/unit managers in the budget process.			0.83	0.69
- Top management uses the budgeting process to discuss the competitive actions of the company with middle managers.			0.89	0.79
- The budgeting process creates discussions between top management and middle managers on the expectations of the company plan.			0.88	0.77
Focus on Strategic Uncertainties				
- Budgets and budget controls help top management and middle managers to discuss risks and opportunities that can affect the strategic goals of the company			0.87	0.76
- The budgeting process unites top management and middle managers in open discussions about the company's strategy and activities			0.85	0.72
- Top managers continuously discuss the budget and budget controls with middle managers.			0.82	0.68
Diagnostic Use of Budgets (DB)	0.89	0.66		
- Budgets are used to ensure that everything is on track			0.80	0.65
- The fulfillment of budget goals is monitored closely			0.90	0.81
- We analyze deviations from the budget closely			0.90	0.80
- In case of a negative deviation, corrective action is initiated			0.85	0.72

* Original measures in Danish, translated into English by the authors

Appendix 1: Measures* (Cont.)

Dimensions and Variables	Construct Reliability	AVE	Factor Loadings	Indicator Reliability
Middle Managers' Autonomy (AUTO)	0.82	0.61		
- Activities aiming at increasing market share			0.88	0.77
- Sales to new customer segments or markets			0.90	0.81
- Development of significant new products			0.76	0.58
Boundary Systems (BC)	0.86	0.61		
- Our firm relies on formal guidelines for specifying appropriate behavior			0.83	0.69
- Our code of business conduct and other guidelines specify behaviors that are off-limits			0.88	0.77
- Our firm has a system that communicates risks and activities that should be avoided			0.83	0.69
- Our workforce knows the firm's code of business conduct			0.82	0.67
Belief System (BS)	0.89	0.68		
- Our mission statement clearly communicates the company's core values to our workforce			0.85	0.72
- Top managers act according to the company's core values, thus creating a common direction			0.86	0.74
- Our employees know the company's core values, direction and purpose			0.89	0.79
- Our mission statement inspires our managers and employees			0.89	0.79
Top Management Support (SUP)	0.85	0.59		
- They actively seek middle managers' opinions and ideas about strategic issues			0.83	0.69
- They are open to new ideas and initiatives from all employees			0.81	0.66
- They appreciate it when middle managers experiment with new ideas and products			0.81	0.66
- They listen to middle managers when significant decisions are made			0.87	0.76
Autonomous Strategic Actions (ASA)	0.92	0.63		
- Wonder how to improve business and the firm's strategic position by introducing new products to new markets/customer segments			0.77	0.59
- Seek information on business areas (products, markets) outside the firm's current activities			0.79	0.63
- Look for ideas on new business opportunities for the firm by selling new products to new markets			0.85	0.73
- Develop plans on how new business opportunities in new markets can be implemented into			0.80	0.63

the firm's activities.

- Seek support on the part of top management for ideas to start sales/production of new products for new markets	0.82	0.67
- Search for more resources outside regular budgeting processes for projects aiming at introducing new products to new markets outside the normal budget procedure	0.80	0.64
- Form coalitions with other managers in the firm in order to rally support and approval for going with a new product into a new market	0.80	0.64

Table 1: Correlations

Variables	1	2	3	4	5	6
1 Autonomous Strategic Actions (ASA)	0.91					
2 Belief Systems (BS)	.24 **	0.89				
3 Top Management Support (SUP)	.31 ***	.55 ***	0.85			
4 Boundary Systems (BC)	.38 ***	.55 ***	.36 ***	0.86		
5 Diagnostic Use of Budgets (DB)	.15	.33 ***	.27 ***	.34 ***	0.88	
6 Middle Managers' Autonomy (AUTO)	.25 **	.08	.26 ***	.06	-.01	0.80
7 Interactive Use of Budgets (IB)	.21 *	.43 ***	.43 ***	.38 ***	.72 ***	.18 **

N = 295. Significance of correlations: *** $p < .001$; ** $p < .01$; * $p < .05$ (two-tailed test). Cronbach's alphas along the diagonal.

Table 2: Alternative Structural Models

Model and description	χ^2	$\Delta \chi^2$	df	NFI	Delta2	TLI	CFI	RMSEA
0 Measurement model	1394.28		640	0.81	0.88	0.86	0.88	0.049
1 Model 1 (DB, IB, BC, BS, AUTO, SUP)	1979.20	584.92 ***	655	0.72	0.80	0.77	0.79	0.064
2 Model 2 (IB, BC, BS, AUTO, SUP)	1312.41	-666.79 ***	518	0.77	0.85	0.83	0.85	0.055
2b Model 2b (DB, BC, BS, AUTO, SUP)	804.12	-1175.08 ***	294	0.81	0.87	0.84	0.87	0.059
3 Model 3 (IB, BC, AUTO, SUP)	922.97	-389.44 ***	397	0.81	0.88	0.86	0.88	0.051
3b Model 3b (DB, BC, AUTO, SUP)	466.21	-337.91 ***	205	0.85	0.91	0.89	0.91	0.050
4 Model 4 (BC, AUTO, SUP)	301.56	-621.41 ***	132	0.87	0.92	0.90	0.92	0.051
5 Model 5 (BC, AUTO)	159.01	-142.55 ***	75	0.90	0.95	0.93	0.95	0.047

Significance levels: *** $p < .001$; ** $p < .01$; * $p < .05$ (two-tailed test).

DB = Diagnostic Use of Budgets; IB = Interactive Use of Budgets; BC = Boundary Systems; BS = Belief Systems; AUTO = Middle Managers' Autonomy; SUP = Top Management Support

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