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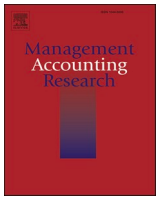

Management control systems and real earnings management: Effects on firm performance

Beatriz García Osma [a], Jacobo Gomez-Conde [b,*], Ernesto Lopez-Valeiras [c]

[a] Departmento de Economía de la Empresa, Universidad Carlos III de Madrid, Spain
[b] Departamento de Contabilidad, Universidad Autónoma de Madrid, Spain
[c] ECOBAS, Departamento de Economía Financeira e Contabilidade, Universidade de Vigo, Ourense, Spain

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ABSTRACT

We examine an unexplored side of management control systems (MCS): their links with real earnings management. We propose that interactive use of MCS supports management in identifying, evaluating, selecting, and implementing real actions that conceptually would be classified as real earnings management (REM). Interactive MCS use is predicted to enhance managerial REM actions that retain the focus of the organization on its strategic objectives, leading to higher future performance. We test our research model empirically with survey and archival data. The results support our predictions. Finally, we explore the role of other levers of control.

1. Introduction

We examine the links between the interactive use of management control systems (MCS) and real earnings management (REM).[1] REM refers to real actions taken to manage earnings that alter the timing and structure of investment, operating, and financing transactions (Schipper, 1989; Vorst, 2016). Examples of these actions include reducing R&D and advertising expenditures, offering aggressive credit terms, selling assets, overproducing, or repurchasing stock (e.g., Bushee, 1998; Graham et al., 2005; Roychowdhury, 2006; Ali and Zhang, 2015). Prior work provides mounting evidence that managers take REM actions to meet earnings targets.

The financial accounting literature has devoted significant attention to earnings management, and generally views such practices as having adverse consequences (Dechow et al., 2010), but a growing body of research documents both benefits of REM and cases where REM can be value destroying.[2] Gunny (2010) finds that firms that engage in REM to just meet earnings targets have relatively better subsequent performance than firms that do not engage in REM and miss or just meet their earnings targets. These findings are challenged by Bhojraj et al. (2009), who finds lower long-term market performance for firms that use REM to meet their earnings targets. Against this backdrop of mixed findings on the consequences of REM actions, a question arises as to the role of MCS in supporting managers in making decisions and taking these actions. In this paper, we examine whether the interactive use of MCS supports management in (i) taking real actions to meet earnings targets and that conceptually would be classified as REM, and (ii) making REM more successful in terms of improved organizational performance.

We make two predictions. First, prior work finds that the interactive use of MCS facilitates the discussion and implementation of action plans, helping managers improve the timing of their decision making and leading to better management practices. We predict that, by focusing organizational attention on strategic uncertainties that challenge firm survival, interactive use will lead to the discovery of REM actions. Interactive MCS means that system-generated data is "interpreted and discussed in face-to-face meetings of superiors, subordinates and peers" (Simons, 1995, p. 97), promoting a continual challenge and debate of underlying data that triggers action plans to meet earnings targets.

* Corresponding author at: Departamento de Contabilidad. Universidad Autónoma de Madrid, Fco Tomás y Valiente 5, 28049, Madrid, Spain.
E-mail addresses: bgosma@emp.uc3m.es (B. García Osma), jacobo.gomez@uam.es (J. Gomez-Conde), elvaleiras@uvigo.es (E. Lopez-Valeiras).

[1] We focus on attention patterns rather than MCS design (Tessier & Otley, 2012). Design effects on earnings management have been analyzed through organization identity (Abernethy et al., 2017), corporate governance (Liu and Lu, 2007; Hazarika et al., 2012), creative culture (Guggenmos, 2020) or internal control systems (Brown et al., 2014; Kroos et al., 2021).

[2] Because of its plausible negative consequences, research focuses on opportunistic earnings management, which is predicted to garble the earnings signal and lower accounting quality. However, earnings management can be informative (e.g., Subramanyam, 1996; Guay et al., 1996), and it should not be mistaken with accounting fraud.

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Simons (1995, p. 83) discusses this potential consequence of MCS use, but no prior research empirically tests it.

Second, we predict that interactive use supports the evaluation, selection, and implementation of REM actions, leading to improved future firm profitability. Through interactive use, MCS support management in timely and efficiently implementing REM actions, such as cutting back on inefficient operations and investments, as documented in Gunny (2010). In contrast, absent interactive use of MCS, REM actions likely reflect myopic decision making, where value is eventually destroyed *via* REM, as documented in Bhojraj et al. (2009), if, for example, cuts in R&D, training, maintenance, or advertising lead to reduced future sales, customer/employee dissatisfaction, or loss of competitive advantage.

Our second prediction (on performance consequences) is independent of the first one, in that firms that may already have identified REM actions, from previous experience, would also benefit from interactive use of MCS at this second stage, to support the actions of management.

While REM may appear similar to concepts examined in the management accounting literature, referring to performance management actions (e.g., Otley, 1999, 2003; Ferreira and Otley, 2009), it is a distinct concept. Performance management refers to *ex ante* (independent of news) planning and programming, as well as the use of tools to improve and maintain firm performance based on methods, metrics, processes, and systems necessary to monitor (*ex post*). A fundamental assumption in performance management is that its ultimate intention is to improve performance in the long run, and that actions are taken under the umbrella of the defined strategy. In contrast, REM refers to managers taking actions usually not included in the strategy, under short-term earnings pressures. Therefore, at least four major differences exist between REM and performance management actions, along: (1) their scope/objective (where performance is broader than earnings); (2) their timing (REM actions are taken towards the end of the period (Zang, 2012), driven by earnings pressures that emerge close to the year end, while performance management is spread throughout the period); (3) their horizon (REM actions are focused on the short-term, while performance management has a long-run horizon); and (4) the degree of repetition (REM are one-time actions). Both constructs therefore have different timing, involve different behaviors, and have different objectives (Merchant and Van der Stede, 2007).[3]

To test our predictions, we run the following analyses. First, we examine the association between interactive use of MCS and the willingness to engage in REM actions. Second, we scrutinize whether firms that interactively use MCS to select their REM actions obtain better future performance. This would be in line with our prediction that interactive use acts as a mechanism that helps managers in searching and implementing actions towards meeting their earnings targets, while avoiding taking actions that compromise the firm's future performance. In our tests, we use survey data and link it with financial statements data. The target survey participants are practice managers (mainly CEOs and CFOs), as they are likely to have the greatest knowledge on MCS use, as well as of firms' earnings benchmarks. We approached the Spanish Accounting Association (AECA) to assist in identifying and contacting suitable study participants from its membership database. AECA is the main recognized professional body for practice managers in Spain. We report the following key findings. Consistent with our predictions, interactive use of MCS is positively associated with REM. Our results also confirm that REM, in combination with interactive use of MCS, is positively related with improvements in performance, as measured by return on equity (ROE), and return on capital employed (ROCE), in three windows: t+1, t+2, and t+3. These results are consistent to the use of survey and archival-based measures of REM.

Our study makes several contributions. First, we present a novel side of interactive use of MCS: its role in supporting managerial REM actions, and reducing the potential negative consequences of REM. We extend the broad Simons' Levers of Control literature by linking MCS to external financial reporting and the incidence and consequences of earnings management. Our study contributes to the understanding on the substitutive relationship between AEM and REM (documented by Zang (2012)) by providing evidence that the interactive use is another factor that can help explain this link. Our paper thus adds to the emerging literature exploring the links between MCS and external financial reporting and taxation (e.g., Hemmer and Labro, 2008, 2019; Gallemore and Labro, 2015; Chen et al., 2018). Second, we add to the extant earnings management literature by identifying an internal mechanism that underpins REM. Prior literature provides limited insights into internal mechanisms or levers that activate managerial choices, decisions, and actions, making logical leaps from incentives to actions, without focusing on the people and systems within the firm that permit detecting earnings deviations during the period, and that spurn managerial action. Our evidence challenges the negative view in the financial accounting literature of earnings management practices and reconciles mixed prior findings on the consequences of REM (e.g., Bhojraj et al., 2009; Gunny, 2010), indicating that, in combination with interactive use of MCS, REM may be value preserving.

2. Conceptual background and literature review

2.1. Real earnings management

Earnings may be managed by altering the timing and structure of investment, operating, and financing transactions (Vorst, 2016). This is denoted real earnings management (REM), and has been investigated in the financial accounting literature by examining managerial action plans over R&D and advertising expenditures, sales price reductions, asset sales, overproduction, or stock repurchases (e.g., Bushee, 1998; Graham et al., 2005; Roychowdhury, 2006; Ali and Zhang, 2015). To affect earnings, REM actions, which may have a large monetary scale, are commonly taken near the end of the fiscal year, as managers become aware that they are not on track to meet their short-term earnings targets and take actions to resolve these shortfalls. In line with this view, survey evidence in Graham et al. (2005) suggests that around 80 percent of surveyed CFOs would decrease discretionary spending in R&D, advertising, or maintenance to achieve an earnings target. Similarly, Bhojraj et al. (2009) report that managers with equity-based incentives cut discretionary expenses to beat analysts' targets, and Gunny (2010) finds that REM is positively associated with firms meeting earnings targets.

There is a vast literature analyzing the drivers of earnings management.[4] However, prior studies rarely focus on the mechanisms that trigger decision-making and the role of MCS in supporting managerial decision making. The exceptions are the survey evidence in Dichev et al. (2013), which suggests that internal controls are a key factor in determining earnings quality, and the work of Abernethy et al. (2017, 2019a), and Brink et al. (2020), that finds that incentive and compensation

[3] Further, Armstrong (2006) identifies five steps to manage underperformers through performance management: (1) identify and agree on the problem, (2) establish the reason(s) of the shortfall, (3) decide and agree on the action required, (4) resource the action, and (5) monitor and provide feedback. While some overlap might arguably exist in the first three steps, REM actions do not involve additional resources (i.e., training, coaching or facilities) nor feedback and monitoring of future further actions. They are also likely to skip step (2), whereby the urgency to find solutions to the earnings short fall dominates any attempt to research into its roots.

[4] For example, antecedents like CEO tenure and turnover (Ali and Zhang, 2015; Choi et al., 2014) or language (Kim et al., 2017) are associated with earnings management. Also audit quality (Becker et al., 1998), audit committee expertise and independence (Bedard et al., 2004; Badolato et al., 2014), or board independence (Davidson et al., 2005) are linked with lower earnings management. See Dechow et al. (2010) for a review of this literature.

contracts, just one part of the MCS, motivate earnings management. Next, we turn to the role of MCS in supporting REM.

2.2. Management control systems in action

MCS are defined as "formal, *information-based* routines and procedures managers use to maintain or alter patterns in organizational activities" (Simons, 1995, p. 5). Following Henri (2006), this definition comprises systems of planning, reporting, and monitoring. MCS provide information that allows evaluating and identifying the optimal strategies to meet firm objectives, aligning the focus of the whole organization on meeting them. MCS increase the predictability of earnings, decrease the time spent on control tasks, attribute responsibility for outcomes to specific organizational members, reduce risks of dysfunctional behaviors, and give managers discretion to pursue multiple goal targets (Abernethy and Brownell, 1999). In sum, by fostering the alignment of management processes with organization's objectives (Ittner et al., 2003), prior work finds that MCS play a key role on people's behavior, concentrating efforts on what is considered important for the firm (Franco-Santos et al., 2012; Tessier and Otley, 2012). This notion of importance connects with the extant literature in financial accounting that indicates that a key concern for managers is reported earnings (Dechow et al., 2010).

The literature focuses on two major dimensions of MCS: design and attention patterns.[5] Briefly, MCS design refers to the scope, timeliness, aggregation, and integration of the information (Bouwens and Abernethy, 2000; Tillema, 2005; Bisbe and Malagueño, 2009), where the complexity of achieving expectations, in terms of efficiency, effectiveness, or accommodating multiple stakeholder pressures, helps to explain MCS design (Chenhall, 2003).[6] In turn, attention patterns refer to how the information is used rather than the technical design features of the MCS (Martyn et al., 2016). Hence, once MCS are designed, managers can decide how to *use* the information (Tessier and Otley, 2012; Simons, 1995): to promote discussion and learning (interactive use) or to be looked at only in case of deviances (diagnostic use).

We focus on interactive use of MCS because it refers to formal control systems that managers use to regularly involve themselves and all organization members in the decision activities and to stimulate search and learning, deriving in new strategies and action plans (Abernethy et al., 2010; Braumann et al., 2020; Müller-Stewens et al., 2020).[7] Interactive use is initiated by top management unease and focus (Simons, 2000), working as a "learning machine" (de Harlez and Malagueño, 2016), that members use "to explore problems, ask questions, explicate presumptions, analyze the analyzable and finally resort to judgement" (Burchell et al., 2005, p. 10). Managers, through an interactive use, have access to emergent patterns of activity, allowing the selection and investment of resources in those initiatives that show greater potential to reach firm benchmarks (Simons, 1995; Bedford, 2015). Therefore, a feature that characterizes this use is the collection and generation of key information and learning about competitive dynamics and internal competencies (Bisbe et al., 2007). In this regard, the interactive use must be sustained with incentives to reward individual's innovative efforts and contributions (Simons, 2000).

While prior research investigates the impact of MCS design on earnings management, the impact of MCS use has not been studied extensively. Recently, Abernethy et al. (2017) address how the design of control system links to incentives for earnings management.[8] Abernethy et al. (2017) find that a financial-based design of incentives is positively associated with earnings management actions, albeit they do not analyze future consequences.[9] Both from theoretical and practical perspectives, this conclusion is of interest and deserves further scrutiny. This justifies our focus on how managers *use*, given a design level, the MCS implemented in their organization.

3. Hypotheses formulation

3.1. Interactive use of MCS and REM

Managers are often evaluated on their earnings performance. This may manifest directly in their compensation contracts, for example, by conditioning annual bonuses to meeting an earnings target (e.g., Ittner et al., 1997), or indirectly, through stock value increases for meeting earnings benchmarks that increase managerial stock-based remuneration (McAnally et al., 2008).[10] Earnings numbers may also be important for managers concerned with not triggering debt covenants in their loan agreements, as financial covenants are commonly written using simple earnings ratios, like EBITDA over debt (Demerjian and Owens, 2016).

Against this backdrop, when current earnings are below target, they likely keep senior managers "awake at night" (Simons, 1995, p. 95), spurning them to step out of their offices to discover solutions and action plans. This is, in the words of Simons (1995, p. 96), the "personal hot button," whereby managers undertake further analysis and action through the activation of the interactive use of MCS, driven by crisis and by uncertain contexts (e.g., Simons, 1991; Widener, 2007). This lever offers a platform for continuous and open debate, challenging the *status quo*, breaking out of narrow search routines, and growing the organization potential performance (Bedford, 2015). Frequent face-to-face meetings and information sharing involve the entire organization in the search for solutions to achieve firm objectives. Interactive use supports the development of ideas and inspires organizational search and discovery (Mundy, 2010). Thus, interactive MCS are the only lever used by senior and operational managers that can trigger action plans (Simons, 1995; Chenhall and Moers, 2015; Braumann et al., 2020).

Interactive use of MCS tears down hierarchical and functional obstacles (Abernethy and Brownell, 1999; Henri, 2006), and enables continual challenge and debate, encouraging and facilitating dialogue

[5] MCS design is also denoted in prior studies as comprehensiveness or sophistication (Tillema, 2005; Hall, 2008).

[6] Tillema (2005) aggregates in five the contingent factors of MCS design: (i) uncertainty; (ii) strategy; (iii) decentralization; (iv) interdependence; and (v) span of control.

[7] Simons (1995, p. 149) notes that managers rely on financial targets, usually administered through diagnostic controls, "to create a sense of urgency and awareness that old behaviors would no longer suffice." However, diagnostic control may not be enough to encourage action (Braumann et al., 2020) as deviations originate linked to shocks to operations (e.g., competition changes, or new environmental conditions) which require engaging the entire organization in rethinking and redesigning action plans. Prior work suggests that only the interactive lever triggers the discovery and implementation of real action plans (Janke et al., 2014). We validate this argumentation in Appendix A.

[8] Abernethy et al. (2017) refer to earnings *manipulation*. Given our conceptual development, building on literature on informative earnings management and its plausible beneficial consequences, we avoid terms that suggest fraud.

[9] In their work, Abernethy et al. (2017) also analyze the effect of organization identity in mitigating this negative effect.

[10] Given that earnings are an aggregate, bottom-line, measure of performance, only top managers may have earnings targets built into their performance assessments. Middle managers and employees likely have more disaggregated targets, but often aligned with the aggregated ones. For example, targets linked to revenue generation, or to cost reductions (efficiency), once aggregated, link back to earnings (Chenhall, 2003). Because of its aggregated nature, at any given point, low earnings may be caused by numerous decisions and actions across the organization. Thus, an interactive approach would be required to face earnings concerns: involving discussions, aggregation of multiple sources of data, and assessment of plans, therefore engaging employees, managers, and middle managers, from shop-floor level workforce to the CEO. This is in the spirit of the example by Merchant and Van der Stede (2006, p. 741), where "The sales force was responsible for the day-to-day management of store-level activity, with the emphasis on securing distribution of new items and selling additional cases of items already being sold."

and information sharing, which promotes ongoing discussions and innovation in finding action plans (Janke et al., 2014). This lever also reduces potential information asymmetry between top management and employees, allowing managers to reveal their preferences and, in doing so, fostering information sharing to debate the underlying actions linked to earnings targets (Abernethy et al., 2010). In this two-way transfer of knowledge, managers learn about practical actions and contextual uncertainties, while subordinates understand timeliness, actions and targets that are important to top managers (Widener, 2007; Cools et al., 2017; Müller-Stewens et al., 2020). Interactive use permits identifying actions such as pausing scheduled investments in discretionary elements such as employee training, R&D, or advertising, allowing additional targeted discounts periods not included in the marketing strategy, or selling non-strategic assets. These actions are what the earnings management literature conceptually denotes as REM (e.g., Graham et al., 2005; Roychowdhury, 2006).

Therefore, we predict that interactive use can impact how REM strategies are formulated, where the interactive use of MCS alleviates potential incentive problems brought about by short-term earnings targets pressures. Through interactive use, managers involve themselves in the detection of new ideas and in the mobilization of resources around these ideas, triggering a stream of strategically oriented decisions (Marginson, 2002). Thus, dialogue and debates associated with interactive use create an environment that encourages firm members to discuss and evaluate the achievement of benchmarks by challenging underlying data, assumptions, and action plans, increasing the willingness to engage in REM. Given the above discussion, our first hypothesis is as follows:

Hypothesis 1. Interactive use of MCS is positively associated with REM.

Our theoretical arguments leading to H1 focus on interactive use of MCS and REM. Managers may also use discretion in the calculation of the accrual component of earnings, using the flexibility inherent to accounting standards. Such accruals earnings management (AEM) is however closely monitored and influenced by governance mechanisms both inside and outside the firm (e.g., Windisch, 2021; Kim and Luo, 2021). For example, a change in accounting method, or underestimating the bad debt provision may be contested by the auditor. Also, unlike REM, AEM affects reported earnings without altering underlying transactions, and thus, has no direct cash flow consequences (Roychowdhury, 2006; Gunny, 2010). This justifies our focus on REM *actions*. However, firms do use both real and accrual decisions to manage earnings (Schipper, 1989). AEM and REM are often viewed as substitutes (Cohen et al., 2008; Cohen and Zarowin, 2010; Badertscher, 2011; Zang, 2012), where AEM is undertaken sequentially after REM: at the end of the year, or even once it has ended, when accruals are calculated during the preparation of annual financial statements. This raises the question of to what extent the relative use of REM and AEM depends on whether the MCS are used interactively. Against the backdrop of our prior argumentation, we expect that interactive MCS use is not linked with AEM for two main reasons. First, if interactive MCS use has already supported managers' REM actions during the year in an optimal manner, by the end of the fiscal year, managers that interactively use MCS are less likely to need to undertake additional earnings management actions *via* AEM. Second, to manage earnings using accrual accounting flexibility, managers need not activate the interactive lever. AEM is conducted by managers (typically CFOs) without need to involve the whole organization in a search for actions and solutions.

3.2. Joint effects of interactive use of MCS and REM on firm performance

REM involves operating, investment, and financing actions that, as standalone business decisions, may be optimal, if they are aligned with firm strategic objectives, but they can also destroy value, if they are not. Previous literature provides limited and mixed evidence on the impact of REM on future firm performance (Xu et al., 2007; Gunny, 2010).

On the one hand, for firms engaging in sub-optimal REM strategies that alter the operations of the firm to influence reported numbers, managers may expose firms to future economic costs (Khotari et al., 2016). For example, delaying the start of a project increases the risk that competitors beat the firm in the race to market products or services. Cuts in discretionary investments, such as in advertising or in product quality, create future costs (of recovering lost customers). Cuts in maintenance costs may increase breakdowns or reduce the useful life of assets, raising the costs of correcting problems created by initial underinvestment (Vorst, 2016).

On the other hand, REM may help the firm to prevent triggering a debt covenant, reducing the possibility that debtholders intervene in the operational and strategic decisions of the company (Vorst, 2016). It may also permit meeting an analyst forecast, thereby avoiding capital market penalties (Bhojraj et al., 2009). Thus, increasing management's credibility for meeting the expectations of stakeholders is a substantial benefit of engaging in REM, enabling better performance in the future through signaling (Gunny, 2010). Finally, REM may mean choosing critically between projects, sharpening the customer-relation strategy, or cutting down on unnecessary expenses not linked to core growth and the business strategy, serving to focus the organization. This additional, unexplored, consequence of REM actions means that REM may lead to the timely discontinuation of under-performing projects, refocusing the firm on its strategic objectives and competitive advantage.

We build on prior literature and argue that the interactive use of MCS may determine the consequences of REM actions on firm future performance. An interactive use of MCS introduces criteria for the management team selection of REM actions, providing support in answering questions related to timing, risks, and economic consequences of alternative actions (Müller-Stewens et al., 2020). Top managers use MCS interactively to overcome inertia, to communicate the core of their agenda and to structure timetables (Simons, 1995; Collier, 2005). Quinn (1996) denotes this as 'good conversation' related to strategic issues and decision-making, where discussions should be vocal, reciprocating, issue-oriented, rational, imaginative, and honest. Under the umbrella of the interactive use of MCS, Quinn (1996) indicates that discussions keep the focus on the future effects of current actions, avoiding philosophical debates, and thoroughly questioning all decisions that may jeopardize the strategy of the company. Tuomela (2005) provides case study-based evidence that, through interactive MCS use, managers make sense of the goals and strategy through dialogue, which permits discussing the results within management groups, focusing on measures, and depicting alleged cause-and-effects of planned actions.[11] Thus, interactive use of MCS provides direction, integration and fine-tuning, signals preferences to the organization, and permits identifying actions that maximize the impact on performance, facilitating managerial choice of those actions that show the most potential for delivering competitive advantage (Bisbe and Otley, 2004; Bedford, 2015; Braumann et al., 2020), through enhancing teams' understanding of action-outcome relations (Speklé et al., 2017).

Once managers have decided to carry out certain REM actions, interactive use offers the opportunity to discuss, challenge the validity of the assumptions, and the action plans designed, as well as the possibility of questioning if they are suitable for firm strategy in the mid- and long term. Thus, an interactive use of MCS leads to filtering ideas and actions,

[11] Case-based research suggests that the manager (controller or management accountant) in charge of the budget or the performance measurement systems (PMS) plays a central role in meetings where information is discussed, often as 'peace-keepers,' facilitating that others negotiate and come to new solutions (Burström and Jacobsson, 2013; Malagueño et al., 2021). In such meetings, the focus is on the information provided by the accountants, and other participants see the accountant as akin to "big brother watching," since actions and proposals are assessed against financial information. Budgets and PMS offer ad hoc financial analyses including 'what-if' scenarios and 'cost benefit analyses' to support decision making (Byrne and Pierce, 2007).

delaying or abandoning them, when through discussion and debate, they are considered superfluous or unfocused (Bisbe and Malagueño, 2015).[12] Thus, we argue that interactive use of MCS aids managers in cutting firm excesses and activating efficient filtering, thereby selecting REM actions that are associated with improved performance, relative to managers who select REM actions without the aid of an interactive use of MCS.

Absent interactive use, we expect REM actions to be taken by managers under pressure, without full consideration of organizational long-term strategy and lacking in information and discussion, and thus, to be more likely to be purely sub-optimal REM actions with detrimental consequences for the firm long-term performance. This is because not all REM actions are equal, nor do they have the same consequences for different firms, or even, for the same firm at different points in time. There is a range of decisions that can be taken, not just in choosing between different REM actions (for example, deciding whether to cut expense in R&D, or in marketing, or in maintenance), but also selecting the specific actions within each of these classes of actions. That is to say, managers must decide which R&D project to cut, and also, within that project: whether to abandon it entirely, postpone it, or cut it in scope. Therefore, absent interactive MCS, managers may fail at any of these steps (identify all actions available, choose the best one, implement it adequately, etc.). If managers make unilateral REM decisions based on prior experience and earnings considerations or guided by other determinants of REM actions (see, e.g., Zang, 2012), and without the support of interactive use, they will not fully update their priors, and fail to consider that the mix of decisions to achieve firm strategic objectives varies over time. It is straightforward then to see the negative performance consequences of REM if promising research is abandoned, development of innovative products is delayed, strategic assets are not adequately identified, sold or not properly maintained.[13]

Given the above discussion, we formulate our second hypothesis as follows:

Hypothesis 2. The joint use of interactive use of MCS and REM is positively associated with firm performance.

4. Methods

4.1. Data collection

We use archival and survey data to test our predictions. Archival data comes from SABI (Bureau van Dijk).[14] The target survey participants are practice managers (mainly CEOs and CFOs) as they have the greatest knowledge of MCS use, and of the firm's earnings benchmarks. Due to the known issues commonly linked with the development of survey-based studies (e.g., achieving acceptable response rates), we approached the main recognized professional body for practice managers in Spain (AECA) to assist in identifying and contacting suitable study participants. Membership in AECA is voluntary and subject to an annual subscription fee, benefiting from training courses, conferences, or access to a professional network. Despite possible disadvantages, like non-availability of demographic data of practice managers who join AECA and those who do not, we benefit from accessing AECA practice managers mailing list and having the support of AECA, who recommend participation in the survey to its members.[15]

We developed a web-based questionnaire drawing upon previous literature.[16] It included multi-item (mainly five-point Likert scales), ranking, dichotomic, and demographic questions. We developed the survey between late 2015 and early 2016. We pre-tested it in June and July 2016 with six experts, including managers and researchers. In September 2016, we sent an email containing a cover letter (assuring that responses were anonymous, and there were no 'right' or 'wrong' answers) and a link to the online survey to the targeted participants. The final questionnaire was sent to 1,461 practice managers. To give an incentive to respond, we committed to: (i) donate to an NGO (FEDER) 1.5 Euros for

Table 1
Sample characteristics.

Panel A. *Respondent characteristics*

	Mean	Std. Dev
Manager age (years)	53.68	8.59
Manager tenure (years)	23.42	9.50
Size of the organization (number of employees)	551.27	1-23,305
Working capital (thousands of euros)	21,849.38	72,986.09
Sales (thousands of euros)	199,420.28	879,809.26
Assets (thousands of euros)	189,684.95	834,380.71
Education		**Percentage**
Primary education		0.0
High school education		1.1
Medium-grade vocational training		0.0
Professional training of a superior level		14.4
University studies of the first cycle		16.6
Secondary university studies		31.5
Master's degree		34.2
PhD		2.2

Panel B. *Comparison of variables of interest for early and late respondents*

	Mean Early respondents (First decile of responses received)	Mean Late respondents (Last decile of responses received)	t-test (p-val)
REM	−0.01	−0.18	0.243 (0.625)
AEM	−0.26	0.01	1.472 (0.233)
ROE_{t+1}	14.10	10.62	1.132 (0.564)
$ROCE_{t+1}$	14.36	7.37	1.841 (0.214)
Interactive use of MCS	12.17	13.00	1.697 (0.665)

[12] The work of Janke et al. (2014) notes that, during crisis periods, the most prominently mentioned MCS is a more interactive use of cash flow information and forecasts. For example, one financial manager from a large glass-producing company explained that the cash flow accounting information was used more intensely during the crisis by senior and operational managers to debate tough decisions. They also find that the budgeting system was used more interactively in some companies, to discuss deviations and to learn about actions to reduce those deviations.

[13] To illustrate the difference between REM guided by interactive use and other REM, suppose that a firm needs to cut expenses by 50. The firm runs a training program for its employees that may either offer two different courses, at a separate cost of 100 each (200 in total), or run one of the courses twice, for 150 in total. Both courses are good, with one of them being of higher quality. The firm would be better off not cutting any of them, but if one must be cut, then it should be the one of lower quality. If managers engage the organization to identify it, on average, (i) employees are well trained (they take the better course) and (ii) expense is lower. Then, the earnings target is achieved with an optimal cut in expenses. Alternatively, managers may fail to identify the quality of the courses, cutting the higher quality one. This would also reduce expenses, but damage human capital more, with potentially worse future consequences. Hence our prediction that REM actions, under an interactive use of MCS, can ameliorate firm performance.

[14] SABI (Iberian Balance sheet Analysis System) is a database by INFORMA D&B in collaboration with Bureau Van Dijk that comprises general information and annual accounts of Spanish and Portuguese companies.

[15] King et al. (2010) point out similar research benefits of accessing an association of practice managers.

[16] The web-based questionnaire is available in Spanish in this link (https://es.surveymonkey.com/r/Preview/?sm=FvOE2aMNJyZCqCF90E9bmP4O_2BTgpSs8pe8DiNn2VZy5rRppXO9W1t9pTs1MSEvQH). See also Appendix B for the survey questions for main constructs.

each complete response received,[17] and (ii) provide an executive summary of the results upon request. To increase the response rate, we sent two remainder emails with a link to the online survey. AECA sent one reminder to potential respondents. This survey process finished in December 2016, yielding an initial sample of 260 respondents, which represents a response rate of 17.80 %. This percentage falls within the range of 5–20 % usually reported in previous studies (Braumann et al., 2020 [14.2 %]; Speckbacher and Wabnegg, 2020 [20.4 %]; Abernethy et al., 2017 [4.8 %]; Robinson et al., 2010 [12.1 %]). We removed 79 cases from the final sample due to non-availability of archival data in SABI and/or extensive missing data.[18] The final response rate was 12.39 %.

Table 1 Panel A displays demographic data on managers' characteristics (age, tenure, and education), and their firms' features (number of employees, working capital, sales and assets). Average age is 54 years old, with 23 years of working experience. More than 80 percent of the respondents have university studies. In addition, 79 percent of the managers are in a position of CEO or CFO (91 percent comprising CEO, CFO or General Manager). The average size of the companies is 551 employees. We conducted a Harman's single-factor test to assess common method bias. The solution returns fourteen factors with eigenvalues greater than one with cumulative variance of 74.5 percent. The first factor explains less than half of the overall variance (21.7 percent). The comparison of main variable means between the early and late respondents (10 percent) also shows no significant differences (see Table 1 Panel B).

4.2. Main constructs definitions

4.2.1. Use of MCS

To measure MCS, we use questions validated in Bedford (2015); Bedford et al. (2016) and Braumann et al. (2020). These measures, in turn, draw from Henri (2006); Widener (2007); Bisbe et al. (2007), and Simons (1995). Appendix B summarizes the key questions. Items of diagnostic and interactive use refer to budgets and performance measurement systems (PMS),[19] widely associated with employee's behavior (Franco-Santos et al., 2012), decision-making (Hall, 2008), and firm strategy (Henri, 2006; Bedford, 2015; de Harlez and Malagueño, 2016). We use a five-point Likert scale with anchors of '1 = Very low extent' to '5 = Very high extent.'

Interactive use encompasses five items for each individual control system, assessing the extent to which budgets and PMS are used to: (i) provide a frequent agenda for top management activities, (ii) provide a frequent agenda for subordinate activities, (iii) enable continual challenge and debate, (iv) focus attention on strategic uncertainties, and (v) encourage and facilitate dialog and information sharing. These items place emphasis on frequent agendas for top and middle managers, uncertainties, action plans, and dialog, in line with our argumentation. The five items load on one factor. This factor could be understood as interactive use of PMS, and interactive use of Budgets (see also Appendix B) (Bisbe and Otley, 2004). However, Simons' framework establishes that firms introduce interactivity into the control package by purposefully choosing (only) an individual control system to be used interactively. For this reason and following prior work (Simons, 2000; Bisbe and Otley, 2004; Garcia Osma et al., 2018), the variable Interactive use of MCS is the degree of interactivity shown by the individual control system (PMS or Budget) that presents the maximum interactivity score.[20,21]

Diagnostic use includes a five-item measure to assess the extent to which, individually, PMS and Budgets are used to: (i) identify critical performance variables, (ii) set targets for critical performance variables, (iii) monitor progress toward critical performance targets, (iv) provide information to correct deviations from preset performance targets, and (v) review key areas of performance. In those firms where an individual MCS was absent, diagnostic use was set to zero. For each individual MCS, the five items load on one factor, interpreted (and labeled): diagnostic use of Budget, and diagnostic use of PMS. Factor analysis results support the unidimensionality of the measurement instrument, while internal consistency of both constructs was assessed using Cronbach alpha as a reliability coefficient (see Table 2). Table 3 displays descriptive statistics.

4.2.2. Real earnings management

Real earnings management is measured using the Graham et al. (2005) instrument, which consists of four items measuring REM. Respondents were told to consider a scenario where, "near the end of the year, it looks like your company might come in below the desired earnings target" (see Table 3). The question thus recreates a setting where earnings pressures emerge at the end of the period, calling for short-term decision-making focused on earnings, and independent of firm strategic considerations and performance management, consistent with our definition of REM. Within accounting norms, respondents must indicate the actions their company might take, using a five-point Likert scale ('1 = very unlikely' to '5 = very likely') to score the following REM actions: (i) decrease discretionary spending (e.g., R&D, advertising, maintenance, etc.), (ii) provide incentives for customers to buy more products this year, (iii) sell investments or assets to recognize gains this year, and (iv) delay starting a new project, even if this entails a small sacrifice in value. Factor analysis sustained the unidimensionality of the measurement instrument. We also check Cronbach alpha as a reliability test (see Table 2). Our main REM measure is similar to those used in prior work, labelled: (1) earnings manipulation (Abernethy et al., 2017) and (2) budget gaming or sandbagging (Libby and Lindsay, 2010).

We test for discriminant validity among constructs. Following Bedford and Speklé (2018), we analyze the heterotrait-monotrait ratio

[17] FEDER is an NGO in the field of rare diseases: http://www.enfermedades-raras.org. Socially friendly people may be more likely to answer. Furse and Stewart (1982) show that incentives based on promised contribution to charity generate a lower cognitive dissonance than monetary incentives.

[18] Where it was possible and as a robustness test, we also ran the models using only survey data (205 firms). Observations with one or two missing variables were maintained in the analysis. As such, the data were replaced using the mean replacement method in SPSS.

[19] We defined both Budgets and PMS in the survey instrument. Budgets refer to the planning process of all financial and cash flows that the firm will require during a certain period of time. PMS refer to the definition, management and control of objectives and targets, as well as all the resources needed to archive them. As in Bedford (2015), we ask for both Budgets and PMS, which are widely disseminated control systems. In addition, we also ask for the Competitor Focused Accounting (CFA) system, which refers to the monitoring of the competitor competitive position, and competitor appraisal based on published financial statements, strategic costing and strategic pricing. In untabulated results, we run our models including CFA by: (1) using the definition of iMCS as Interactive use of MCS = MAX (Interactive use of PMS; Interactive use of Budget; Interactive use of CFA); and (2) including "CFA adoption" (1= if the firm reports CFA adoption; 0=otherwise) as a control variable. All our inferences remain identical. For comparability with prior work, we opted to use Budgets and PMS in our empirical design.

[20] Interactive use of MCS = MAX (Interactive use of PMS; Interactive use of Budget). In robustness tests, we run all models measuring Interactive use as interactive use of budget system (sample firms use it, on average, more than PMS). When firms do not report it, we take the value of the interactive use of PMS. All inferences are retained.

[21] Our focus is on interactive use of MCS rather than design, since target pressures and deviations can be induced by different control systems. The intuition is that the level of REM is similar whether firms focus on budgets or on PMS for interactive use. To analyze this prediction, in untabulated tests, we conduct an analysis of variance (ANOVA) test with individual MCS for interactive use as independent variables and REM as the dependent variable. We find non-significant effects in both levels: (1) firms focusing on budgets for interactive use ($F = 1.635$, $p = 0.203$); and (2) firms focusing on PMS for interactive use ($F = 0.076$, $p = 0.783$). These results suggest that the effect of interactive use on REM is not contingent on MCS design.

Table 2
Factor analysis and reliability measures.

Construct	Loadings range	Cronbach's α	% Variance extracted	Eigenvalue	KMO
Interactive use of Budgets	0.915–0.943	0.960	86.623	4.331	0.907
Interactive use of PMS	0.937–0.966	0.976	90.701	4.535	0.862
Diagnostic use of Budgets	0.922–0.952	0.966	88.097	4.405	0.897
Diagnostic use of PMS	0.957–0.975	0.982	93.359	4.668	0.887
Beliefs system	0.764–0.870	0.855	70.601	2.824	0.720
Boundary systems	0.550–0.834	0.737	58.397	2.336	0.733
REM	0.574–0.682	0.503	50.325	1.613	0.603
AEM	0.687–0.826	0.637	58.726	1.762	0.621
Turbulence	0.705–0.745	0.532	51.700	1.552	0.616
Exploration innovation strategy	0.631–0.789	0.839	55.745	3.745	0.822

(HTMT) which measures the between-trait correlations to the within-trait correlations. The HTMT scores among our main latent variables range from 0.070 to 0.243 demonstrating that the constructs are sufficiently distinct.[22] Factor analysis also provide evidence in favor of good discriminant validity among the main variables (eigenvalues>1 and loadings>0.5). For robustness, we also use measures of REM based on financial statements data. We report on those analyses in our additional tests in Section 5.

4.2.3. Firm performance

We use two measures of firm performance calculated using financial statements data obtained from SABI: (i) ROE and (ii) ROCE.[23] ROE is net income over book value of equity. ROCE is net income plus financial expenses over equity plus long-term debt. We choose ROE and ROCE instead of ROA since they are less likely to be mechanically affected by the operating and investment REM actions that we study. We use three windows for each of measure: (i) performance in t+1 (where t is 2016, when we run the survey); (ii) cumulated performance over two years (t+1 plus t+2); and (iii) cumulated performance over three years (t+1 plus t+2 plus t+3). A limitation of the study is that different REM actions may have performance consequences over different time windows. We face a trade-off in setting our empirical design, in that the wider we open the window to measure performance consequences, the more likely it is that subsequent, unrelated, actions may drive the observed consequences. If we keep the window too narrow, we may not be able to capture the consequences of REM actions that unravel over longer windows. For REM actions such as engaging in abnormal production (which would lead to accumulation of inventory) or offering aggressive sales terms (which would lead to client defaults), a one-year window arguably suffices to capture the consequences of these decisions. However, other indirect second order (in magnitude) effects linked with aggressive sales and overproduction, such as, for example, loss of reputation, or employee dissatisfaction, have a more uncertain performance window. Cuts in discretionary expenses, such as advertising, maintenance, or R&D also have different time horizons for their consequences, which would likely depend on the industry the firm operates in, the rate of depreciation of its technology, etc. However, a window covering up to t+3 likely captures substantial performance consequences of such cuts.[24] Overall, given that the effects of REM may accrue over a longer window than the ones used, our evidence may underestimate the performance consequences of REM actions.

4.3. Methodological approach

We use multivariate regressions to test our hypotheses. To test Hypothesis 1, we estimate regression model (1), using iMCS as a predictor variable and REM as the dependent variable:

$$\text{REM} = \beta_0 + \beta_1 \text{ Interactive use of MCS} + \beta_2 \sum \text{Controls} + \varepsilon, \quad (1)$$

To test Hypothesis 2, we use model (2):

$$\text{Firm performance} = \beta_0 + \beta_1 \text{ REM} * \text{Interactive use of MCS} + \beta_2 \text{ REM} + \beta_3 \text{ Interactive use of MCS} + \beta_4 \sum \text{Controls} + \varepsilon, \quad (2)$$

In estimating model (1), we control for known determinants of REM. We include a set of firm-level, industry-level and managerial-level control variables. Regarding the former, we control for: size (Employees), since large firms engage less in earnings management (Kim et al., 2017) and have more developed MCS designs;[25] whether firms are listed and their Solvency ratio, following Liu and Lu (2007) and Chung et al. (2002); Voluntary disclosure, related with cases where firms "package bad news with other disclosures" (Francis et al., 2008); and for Exploration innovation strategy (factor score from five items) (Menguc et al., 2014; Bedford, 2015), as prior literature finds links between innovation strategy and MCS use (Bisbe and Malagueño, 2009; Bedford, 2015) and earnings management (Guggenmos, 2020). At the industry-level, we include Environmental turbulence (factor score from three items), as competitive and turbulent environments drive REM (Markarian and Santaló, 2014). We include industry controls across all specifications (1-digit NACE).[26] Regarding managerial-level variables, we control for Gender, as female CFOs affect earnings quality (Barua et al., 2010); and Education, Tenure, and Other job title (if the respondent has a different job title from CEO, CFO, or general manager), following Barua et al. (2010) and Aier et al. (2005), who find greater earnings quality in firms where managers have more expertise. Also, they act as proxies for manager's knowledge and ability to usefully interpret information (Li et al., 2014). In addition, we control for Revenues pressures (6-point Likert-scale item, from (1) low to (6) high

[22] Values above 0.85 indicate conceptual similarity of constructs, while low values indicate discriminant validity.

[23] We also use an additional measure: Net asset turnover. Results are qualitatively similar in t+1 and t+2, while non-significant in t+3.

[24] R&D effects are the ones that, arguably, would take longer to realize. Sougiannis (1994) estimates that a one-dollar increase in R&D expenditure leads to a two-dollar increase in profit over a 7 year-window, where most of the value is concentrated in the first half of that window, and thus, covered by our design. Indeed, the numerical example in Sougiannis (1994, p. 53) suggests that a window of t+1 to t+3, would capture 88% of the effect.

[25] Thus, our size measure is also a proxy for more developed MCS design. To test this statement, we correlate Number of Employees and Detailed budget design (Sponem and Lambert, 2016) (Factor score of three Likert-scale items: (i) Budget variance analysis for each operational manager is performed line by line, (ii) Budget monitoring reports are not very detailed and only contain aggregate data (reversed score), and (iii) Budget negotiations deal with very detailed budgets; Eigenvalue = 2.500, % variance explained = 83.3%, loadings range = 0.849–0.945, Cronbach alpha = 0.899), obtaining a positive and significant coefficient (r = 0.324, p < 0.01).

[26] For robustness, we also run this model (1) including four additional control variables suggested by Zang (2012): (i) Market share; (ii) Z-Score, (iii) Cash ETR, and (iv) Big6 Auditor. Results for H1 (iMCS on REM) remain unchanged (β = 0.166, p-value <0.05).

Table 3
Item descriptives (mean, standard deviation, theoretical range and actual range) ($N = 181$).

Construct Item	Mean	S.D.	Theor. range	Actual range
Interactive use of Budgets				
Provide a recurring and frequent agenda for top management activities	2.02	1.85	0–5	0–5
Provide a recurring and frequent agenda for subordinate activities	1.86	1.76	0–5	0–5
Enable continual challenge and debate of underlying data and action plans	1.66	1.55	0–5	0–5
Focus attention on strategic uncertainties	1.93	1.77	0–5	0–5
Dialog and information sharing with subordinates	1.83	1.68	0–5	0–5
Interactive use of PMS				
Provide a recurring and frequent agenda for top management activities	1.34	1.85	0–5	0–5
Provide a recurring and frequent agenda for subordinate activities	1.30	1.74	0–5	0–5
Enable continual challenge and debate of underlying data and action plans	1.12	1.55	0–5	0–5
Focus attention on strategic uncertainties	1.29	1.73	0–5	0–5
Dialog and information sharing with subordinates	1.29	1.74	0–5	0–5
Diagnostic use of Budgets				
Identify critical performance variables	2.37	2.04	0–5	0–5
Set targets for critical performance variables	2.35	2.06	0–5	0–5
Monitor progress	2.43	2.09	0–5	0–5
Provide information to correct deviations	2.38	2.09	0–5	0–5
Review key areas of performance	2.18	1.96	0–5	0–5
Diagnostic use of PMS				
Identify critical performance variables	1.67	2.11	0–5	0–5
Set targets for critical performance variables	1.59	2.06	0–5	0–5
Monitor progress	1.54	2.04	0–5	0–5
Provide information to correct deviations	1.60	2.04	0–5	0–5
Review key areas of performance	1.56	2.06	0–5	0–5
Real earnings management (REM)				
Q: Hypothetical scenario: Near the end of the year, it looks like your company might come in below the desired earnings target (EPS, Sales, Profits, etc.). Within what is permitted by accounting norms, which of the following choices might your company make?				
Decrease discretionary spending (e.g., R&D, advertising, maintenance…)	3.24	1.06	1–5	1–5
Provide incentives for customers to buy more products this year	2.87	1.22	1–5	1–5
Sell investments or assets to recognize gains this year	1.98	1.02	1–5	1–5
Delay starting a new project, even if this entails a small sacrifice in value	2.69	1.09	1–5	1–5
Accrual based earnings management (AEM)				
Q: Hypothetical scenario: Near the end of the year, it looks like your company might come in below the desired earnings target (EPS, Sales, Profits, etc.). Within what is permitted by accounting norms, which of the following choices might your company make?				
Postpone taking an accounting charge	1.49	0.89	1–5	1–5
Book revenues now rather than next year	1.47	0.89	1–5	1–5
Alter accounting assumptions (e.g., allowances, pensions, etc.)	1.93	1.03	1–5	1–5
Beliefs systems				
Are the values, purpose and direction of the firm codified in formal documents?	3.50	1.02	1–5	1–5
Does top management actively communicate core values to subordinates?	3.81	0.82	1–5	1–5
Are formal statements of values used to create commitment to the long-term vision of top management?	3.73	0.84	1–5	1–5
Are formal statements of values used to motivate and guide subordinates in searching for new opportunities?	3.43	0.90	1–5	1–5
Boundary systems				
Are codes of conduct or similar statements relied upon to define appropriate behavior?	3.74	0.96	1–5	1–5
Are there policies or guidelines that stipulate specific areas for, or limits on, opportunity search and experimentation?	3.39	0.91	1–5	1–5
Does top management actively communicate risks and activities to be avoided by subordinates?	3.87	0.92	1–5	1–5
Are sanctions or punishments applied to subordinates who engage in risks and activities outside organizational policy, irrespective of the outcome?	2.98	1.18	1–5	1–5
Turbulence				
Customer changes	2.83	0.86	1–5	1–5
Supplier changes	2.19	0.77	1–5	1–5
Competitor changes	2.61	0.83	1–5	1–5
Exploration innovation strategy				
Innovations that make existing products obsolete	2.94	0.73	1–5	1–5
Innovations that fundamentally change existing products	2.99	0.71	1–5	1–5
Innovations that significantly enhance customers' product experience	3.33	0.70	1–5	1–5

(*continued on next page*)

Table 3 (*continued*)

Construct Item	Mean	S.D.	Theor. range	Actual range
Innovations that require different ways of learning from customers	3.08	0.74	1–5	1–5
Being first to market with new products/services	3.19	0.77	1–5	1–5
Innovations that require radical changes in technology	3.05	0.71	1–5	1–5
Single item variables				
ROE_{t+1}	19.03	134.04	–	(1,220)–1098
$ROCE_{t+1}$	5.65	97.64	–	(1,241)–155
$Employees_t$	551.27	2,023.86	–	1–23,305
Listed firm	0.02	0.15	0–1	0–1
$Solvency\ ratio_t$	4.38	18.53	–	0–243
Gender	0.11	0.29	0–1	0–1
Education	5.25	0.79	1–7	2–7
Other job title	0.09	0.29	0–1	0–1
Manager tenure	23.42	9.50	–	0–45
Investment efficiency	2.12	1.37	1–6	1–6
Voluntary disclosure	3.11	1.03	1–5	1–5
Allowance pressure	3.27	1.27	1–5	1–5
Revenues pressures	3.69	1.84	1–6	1–6
Earnings pressures	2.82	1.35	1–6	1–6
$\Delta Cash_t$ (% change)	109.25	603.68	–	(98)–6,857
$Market\ share_t$	0.00	0.01	–	0.00–0.1
Big 6 auditor	0.20	0.40	–	0.00–1.00
Number of new products	5.34	5.47	–	0.00–56.00
Competitor diversity	2.93	0.89	1–5	1–5
Regulatory and economic unpredictability	3.40	0.98	1–5	1–5

important measure to report) and allowance pressures (5-point Likert-scale),[27] as they are associated with earnings management (Becker et al., 1998; Kim et al., 2017), and for Investment efficiency (5-point Likert-scale),[28] following Biddle et al. (2009). In testing Hypothesis 1, we also control for accruals earnings management (AEM) to isolate the effect of the Interactive use of MCS on REM. For completeness of our tests of H1, we additionally test the effect of the interactive use of MCS on AEM, as AEM and REM may be substitute strategies (Zang, 2012). AEM was measured based on Graham et al. (2005), as factor score of three 5-point Likert-scale items: (i) postpone taking an accounting charge, (ii) book revenues now rather than next year, and (iii) alter accounting assumptions (e.g., allowances, pensions, etc.).[29] We use the same set of control variables as for testing H1. Lastly, due to potential effects of the three remaining levers of control (LOC), we run two regression models, including: (i) interactive use without other LOC; and (ii) interactive use with other LOC. Beliefs systems and boundary systems are measured based on previous literature (Widener, 2007; Bedford, 2015) (more on these measures on Tables 2 and 3). We include industry controls across all specifications (1-digit NACE). To analyze the effect of interactive use of MCS on AEM, we use the same set of control variables as those used in test H1.

In testing Hypothesis 2, i.e, model (2), we control for drivers of firm performance. Following prior work (e.g., Janke et al., 2014; Heinicke et al., 2016), regarding firm-level, we include Employees as a proxy for size. We also control for manager Tenure and Gender, to proxy for risk aversion, entrenchment, and career concerns (Jin and Kothari, 2008; Abernethy et al., 2019a); and Other job title, as different titles can lead to different MCS uses or intensity. We include revenues, earnings and allowance pressures, as they are linked with earnings management and potential effects over future performance (Becker et al., 1998; Kim et al., 2017). Related to firm-level control variables, we control for Listed firms, Solvency ratio, and Cash (% of change in *t*), since debt pressures, growth opportunities and financial conditions can drive interactive MCS use and future performance (Garcia Osma et al., 2018). We control for Voluntary disclosure. Disclosure, related for example to environmental issues, has effects on firm performance due to waste reductions or efficient production among others (Broadstock et al., 2018). In addition, we control for Big 6 Audit firm, Market share (firm sales over industry sales in *t*) and Number of new products launched in the previous three years. These control variables are usually linked to REM in prior work (e.g., Zang, 2012). These determinants may drive suboptimal REM, absent interactive use or in settings with low interactive use. Lastly, we include lagged firm performance (ROE and ROCE) as a control variable to avoid the likelihood of correlated omitted variable bias.

As in model (1), we control for AEM and other LOC: Diagnostic use, Beliefs systems, and Boundary systems. These levers could influence strategic actions and decision-making, determining the search for solutions (Simons, 1995). As an example, beliefs have been linked with less earnings management and better decision making (Abernethy et al., 2017, 2019a). We include industry-level Turbulence (factor score from three items related to customer, supplier, and competitor changes), Regulatory and economic unpredictability (single item score in a five point Likert scale), Competitor diversity (single item score in a five point Likert scale), and Industry controls (1-digit NACE). Such conditions

[27] This variable reads as follows. "Hypothetically, suppose that your company has an allowance for uncollectible accounts of 1200EUR and has had a similar balance for many years. Write-offs of uncollectible accounts have been $300–400 annually, and the allowance has been increased by $300–400 annually. This year, the auditor proposes that the allowance be drawn down by $800 to make its balance match next year's expected write-offs. The auditor has voiced no opposition to the size of the allowance in the past. Your company's circumstances have not changed this year. The proposed drawdown of the allowance, if recorded, would be conspicuously shown in the financial statements and notes. As a financial officer of this hypothetical company, would you oppose or support the auditor's proposed drawdown of the allowance? (5 points Likert scale, from (1) I would not support the proposal to (5) I would support the proposal)."

[28] This variable reads as follows. "Hypothetical scenario: Your company's cost of capital is 12%. Near the end of the year, a new opportunity arises that offers a 16% internal rate of return and the same risk as the firm. To maintain the profitability expected by your investors, the objective that you have as earnings per share for this year is 1.90 EUR. What is the probability that your company will pursue this project in the following scenario: Earnings per share if you do not invest in the project: 1.40; Earnings per share if you invest in the project: 1.30? (6 points Likert scale, 0%, 20%, 40%, 60%, 80% and 100%)."

[29] A fourth item ("draw down on reserves previously set aside") was in the survey, but not included due to its low factor loading. As an additional analysis, we also test the effect of AEM in our model in the next section.

Table 4
Correlation matrix for Hypothesis 1 model ($N = 181$).

	1	2	3	4	5	6	7	8	9	10
1. REM	1.000									
2. iMCS	0.071	1.000								
3. AEM	0.157	−0.166	1.000							
4. Employees$_t$	−0.151	0.087	0.034	1.000						
5. Listed firm	−0.145	0.101	−0.132	0.159	1.000					
6. Solvency ratio$_t$	0.023	−0.054	−0.136	−0.323	−0.131	1.000				
7. Gender	−0.084	−0.240	−0.042	0.036	−0.009	0.031	1.000			
8. Education	0.019	−0.036	−0.025	−0.013	−0.002	0.043	0.013	1.000		
9. Other job title	0.124	0.053	0.039	−0.108	0.080	0.096	−0.036	−0.048	1.000	
10. Manager tenure	−0.005	0.116	−0.099	−0.021	−0.030	−0.181	−0.290	−0.169	−0.134	1.000
11 Investment efficiency	0.002	−0.097	0.097	0.209	0.113	−0.016	0.024	−0.157	−0.069	0.067
12. Voluntary disclosure	0.097	−0.199	0.249	0.004	0.026	−0.133	0.061	−0.069	−0.013	−0.080
13. Allowance pressure	−0.183	0.115	−0.063	−0.069	0.166	−0.062	−0.028	0.088	−0.057	0.135
14. Revenues pressures	0.180	−0.118	−0.070	−0.150	0.077	0.025	−0.066	0.074	0.096	0.066
15. Exploration innovation strategy	0.040	0.159	−0.004	0.057	0.081	0.096	0.101	0.122	−0.042	−0.085
16. Turbulence	0.092	0.056	−0.047	−0.201	−0.116	0.076	−0.030	0.071	0.074	0.039
17. Diagnostic use of Budgets	0.042	0.664	−0.195	0.055	0.097	−0.046	−0.222	0.076	0.031	0.076
18. Diagnostic use of PMS	0.027	0.563	−0.015	0.061	0.028	−0.021	−0.103	−0.043	0.031	−0.104
19. Beliefs systems	0.073	0.300	−0.065	−0.074	−0.135	0.020	−0.022	0.093	−0.006	−0.033
20. Boundary systems	0.192	0.263	−0.124	−0.006	0.084	−0.002	−0.019	0.135	0.008	0.016

	11	12	13	14	15	16	17	18	19	20
11 Investment efficiency	1.000									
12. Voluntary disclosure	0.080	1.000								
13. Allowance pressure	0.099	−0.125	1.000							
14. Revenues pressures	−0.036	−0.163	−0.005	1.000						
15. Exploration innovation strategy	0.017	0.012	0.026	0.010	1.000					
16. Turbulence	−0.074	−0.031	−0.043	−0.002	0.019	1.000				
17. Diagnostic use of Budgets	−0.068	−0.179	0.104	−0.046	0.149	0.039	1.000			
18. Diagnostic use of PMS	−0.040	−0.099	0.017	−0.061	0.194	0.021	0.262	1.000		
19. Beliefs systems	−0.141	0.007	0.060	−0.088	0.259	0.076	0.224	0.349	1.000	
20. Boundary systems	−0.124	−0.067	−0.007	−0.031	0.191	0.114	0.198	0.291	0.517	1.000

Correlations greater than |0.124| are significant at 0.1 level.

could affect information sharing, and managerial pressures. Table 3 displays descriptive evidence for all items.

5. Results

5.1. Main results

Hypothesis 1. (H1) posits that the interactive use of MCS is positively associated with REM. Table 4 shows correlations among variables included to test H1. All correlations are below 0.3, except for correlations among levers of control, which are in the 0.263−0.664 range, analogous to prior work (Bedford and Malmi, 2015; de Harlez and Malagueño, 2016; Braumann et al., 2020; Müller-Stewens et al., 2020).[30] Table 5 displays regression results of model (1). We find support for H1. The iMCS coefficients are positive and significant, both with and without other levers as control variables ($\beta = 0.164$, p-value <0.05)[31] and $\beta = 0.139$, p-value <0.05, respectively).

Essentially, our results suggest that interactive use can trigger REM, at least at an operational level, in a relatively rapid manner, indicating that interactive use prompts managers into rethinking their operations, spurning focus and debate, leading to the emergence of initiatives, and the discovery and implementation of new action plans. A potential concern is that this sequence of events, while plausible, may require several periods to materialize. This would be likely when interactive use aims to attain a complete overhaul of the firm business model and

Table 5
Regression results for Hypothesis 1 ($N = 181$).

	REM	
	β (t-stat)	β (t-stat)
iMCS	0.139** (1.697)	0.164** (2.034)
Diagnostic use of Budgets		0.021 (0.283)
Diagnostic use of PMS		−0.058 (−0.733)
Beliefs systems		−0.064 (−0.632)
Boundary systems		0.307*** (3.219)
AEM	0.055 (0.710)	0.094 (1.243)
Employees$_t$	−0.119 (−1.476)	−0.121 (−1.532)
Listed firm	−0.137* (−1.738)	−0.164** (−2.101)
Solvency ratio$_t$	0.043 (0.547)	0.063 (0.829)
Gender	−0.060 (−0.716)	−0.075 (−0.911)
Education	0.030 (0.391)	−0.013 (−0.169)
Other job title	0.096 (1.218)	0.098 (1.283)
Manager tenure	0.003 (0.042)	−0.020 (−0.251)
Investment efficiency	0.027 (0.346)	0.033 (0.425)
Voluntary disclosure	0.175** (2.182)	0.187** (2.380)
Allowance pressure	−0.141* (−1.823)	−0.125* (−1.640)
Revenues pressures	0.206** (2.586)	0.225*** (2.892)
Exploration innovation strategy	−0.008 (−0.102)	−0.045 (−0.549)
Turbulence	0.004 (0.057)	−0.031 (−0.408)
Industry controls	Included	Included
R^2	0.176	0.240
Adj. R^2	0.056	0.106
F-stat	1.462*	1.789**
Max. VIF	1.324	2.035

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

[30] Therefore, to assuage potential multicollinearity problems, we orthogonalize diagnostic use of budgets, diagnostic use of PMS, beliefs systems, and boundary systems. Results from the VIF analysis cross-models indicate a highest value of 2.035, well below the threshold (10) that indicate potential multicollinearity problems.

[31] As a robustness test, we run this model using 205 firms in our sample (adding the 24 observations with non-availability of financial data in SABI). Results, using only the control variables from the survey, show qualitatively similar effects.

Table 6
Additional regression results for Hypothesis 1 ($N = 181$).

Panel A. *Subsamples by exploration innovation strategy*				
	Low exploration		High exploration	
	REM			
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
iMCS	0.336** (2.419)	0.329** (2.346)	−0.004 (−0.042)	0.032 (0.288)
Diagnostic use of Budgets		0.028 (0.195)		0.097 (0.985)
Diagnostic use of PMS		0.017 (0.123)		−0.015 (−0.138)
AEM	0.090 (0.735)	0.112 (0.905)	0.075 (0.751)	0.126 (1.219)
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.445	0.502	0.265	0.309
Adj. R^2	0.174	0.186	0.085	0.100
F-stat	1.640**	1.589*	1.473	1.480*
Max. VIF	2.200	2.836	1.535	2.104
Panel B. *Subsamples by size*				
	Low size		High size	
	REM			
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
iMCS	0.130 (1.085)	0.180 (1.516)	0.253* (1.965)	0.272** (2.137)
Diagnostic use of Budgets		0.153 (1.312)		−0.178 (−1.533)
Diagnostic use of PMS		0.069 (0.552)		−0.245** (−1.997)
AEM	0.217* (1.838)	0.212* (1.850)	−0.042 (−0.342)	0.032 (0.259)
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.221	0.318	0.290	0.379
Adj. R^2	0.020	0.051	0.060	0.127
F-stat	0.919	1.192	1.260	1.505*
Max. VIF	1.575	2.575	1.586	2.174

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed). Standardized coefficients are presented.

strategy, which is not our setting. We expect that the timeliness and responsiveness of the interactive lever depends on two key elements: (1) the relative pressure and emphasis on earnings targets in the organization; and (2) the relative ability of the organization to quickly respond to detected deviations. Recall is not necessary for earnings deviations to be large to create pressures, as even a one cent deviation may be penalized harshly (Bhojraj et al., 2009).

To explore the role of firm-level emphasis on earnings pressures, we look at settings where firms are less likely to be overly concerned about short-term earnings targets, and study firms that follow an explorative innovation strategy (more long-term oriented). Results on Table 6, Panel A, show that the effect of interactive use of MCS are weaker for more explorative firms (for low exploration: $\beta = 0.329$, p-value <0.05; while for high exploration: $\beta = 0.032$, p-value >0.10). Exploratory innovation strategies imply the search for new markets and the development of novel prototypes and path-breaking technologies (Jansen et al., 2006; Abernethy et al., 2019b). Thus, firms pursuing these radical departures from prevailing competencies generate a "tolerance for slack" (Bedford, 2015, p. 13), avoiding short-termism. Marginson (2002, p. 1027) case study finds evidence in favor of this view, finding that in pressure situations, where several performance measures must be achieved, more exploratory firms tend to achieve "innovation milestones" and worry less about "securing budgetary targets."

Concerning the second element, we analyze the ability of the organization to respond to detected deviations by means of a sub-group analysis using size as a splitting variable. Large firms are more intensively monitored by their stakeholders, who are often institutional investors sensitive to earnings deviations (Bushee, 1998), making large firms more reactive to earnings pressures. In addition, large companies have more slack resources (and perhaps degrees of freedom) than small companies such that, "when poked," these resources are put into action (Chen and Hambrick, 1995, p. 461).[32] Simons (1991, p. 58) reports an increase of the interactive use of MCS when firms were "undergoing revolutionary changes which threatened their survival." Evidence in Table 6 Panel B confirms this view (i.e., for the low size subsample: $\beta = 0.180$, p-value >0.10; while for the high size subsample: $\beta = 0.272$, p-value <0.05).

For completeness, we analyze the effect of interactive use on AEM. Results in Table 7 show a significant and negative effect, including other LOC and REM as control variables (β = -0.176, p-value <0.05). This finding is consistent with our theoretical argumentation and, also, with prior work (Zang, 2012), suggesting the substitutive effects among AEM and REM. We find no evidence that other levers are significantly associated with AEM.

Hypothesis 2. (H2) posits a moderation effect of an interactive use of MCS in the link between REM and firm performance. Table 8 reports the correlation matrix among variables included to test H2. All correlations are below 0.3, except for correlations between LOC, as before, for ROE and ROCE, and for the correlations among Employees, Market share and Big 6 Audit firm.[33] We also investigate variance inflation factor (VIF) to

[32] We use an additional proxy for slack resources: working capital per employee. Results remain qualitatively similar (i.e., for the low working capital per employee subsample: β=0.154, p-value >0.10; while for the high working capital per employee subsample: β=0.404, p-value <0.05).

[33] Results remain unchanged if we run this model (2) deleting these control variables.

Table 7
Regression results for the effect of iMCS on AEM ($N = 181$).

	AEM		
	β (t-stat)	β (t-stat)	β (t-stat)
iMCS	−0.142** (−1.689)	−0.160** (−1.895)	−0.176** (−2.062)
Diagnostic use of Budgets		−0.053 (−0.656)	−0.054 (−0.678)
Diagnostic use of PMS		0.107 (1.276)	0.112 (1.338)
Beliefs systems		−0.027 (−0.257)	−0.020 (−0.192)
Boundary systems		−0.133 (−1.321)	−0.164 (−1.585)
REM			0.106 (1.243)
$Employees_t$	0.036 (0.435)	0.040 (0.482)	0.053 (0.627)
Listed firm	−0.123 (−1.530)	−0.112 (1.360)	−0.094 (−1.119)
$Solvency\ ratio_t$	−0.052 (−0.649)	−0.058 (−0.715)	−0.064 (−0.791)
Gender	−0.101 (−1.176)	−0.097 (−1.125)	−0.088 (−1.021)
Education	−0.006 (−0.075)	0.021 (0.262)	0.022 (0.277)
Other job title	0.057 (0.702)	0.057 (0.701)	0.046 (0.563)
Manager tenure	−0.065 (−0.761)	−0.038 (−0.445)	−0.036 (−0.416)
Investment efficiency	0.057 (0.695)	0.042 (0.510)	0.038 (0.463)
Voluntary disclosure	0.162** (1.976)	0.159* (1.935)	0.138 (1.643)
Allowance pressure	−0.033 (−0.407)	−0.031 (−0.381)	−0.017 (−0.212)
Revenues pressures	−0.079 (−0.961)	−0.093 (−1.125)	−0.115 (−1.372)
Exploration innovation strategy	0.015 (0.181)	0.045 (0.517)	0.049 (0.567)
Turbulence	−0.035 (−0.440)	−0.018 (−0.224)	−0.015 (−0.182)
Industry controls	Included	Included	Included
R^2	0.112	0.140	0.149
Adj. R^2	0.005	0.012	0.012
F-stat	0.906	0.967	0.991
Max. VIF	1.313	2.034	2.039

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

Table 8
Correlation matrix for Hypothesis 2 model ($N = 181$).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. REM	1.000												
2. iMCS	0.071	1.000											
3. AEM	0.157	−0.166	1.000										
4. $Employees_t$	−0.151	0.087	0.034	1.000									
5. $Solvency\ ratio_t$	0.023	−0.054	−0.136	−0.323	1.000								
6. $\Delta Cash_t$	−0.067	−0.059	−0.160	−0.009	0.148	1.000							
7. $Market\ share_t$	−0.147	0.150	0.014	0.485	−0.282	0.062	1.000						
8. Listed firm	−0.145	0.101	−0.132	0.159	−0.131	0.026	0.208	1.000					
9. Big 6 Audit firm	−0.082	−0.002	−0.044	0.482	−0.139	−0.036	0.428	0.211	1.000				
10. Number of new products	0.069	0.015	0.094	−0.004	0.092	−0.040	−0.030	−0.110	−0.169	1.000			
11. Allowance pressure	−0.183	0.115	−0.063	−0.069	−0.062	−0.068	−0.113	0.166	−0.115	0.023	1.000		
12. Voluntary disclosure	0.081	−0.157	0.184	−0.017	−0.129	0.051	−0.073	−0.052	−0.134	0.077	−0.064	1.000	
13. Revenues pressures	0.180	−0.118	−0.070	−0.150	0.025	0.010	−0.126	0.077	−0.029	−0.011	−0.005	0.072	1.000
14. Earnings pressures	0.031	−0.051	−0.119	0.059	0.103	−0.002	0.103	−0.066	0.047	0.077	−0.095	−0.130	0.055
15. Other job title	0.124	0.053	0.039	−0.108	0.096	0.144	−0.066	0.080	−0.065	−0.031	−0.057	−0.023	0.096
16. Manager tenure	−0.005	0.116	−0.099	−0.021	−0.181	−0.086	0.018	−0.030	−0.029	−0.034	0.135	0.114	0.066
17. Gender	−0.084	−0.240	−0.042	0.036	0.031	0.047	0.088	−0.009	0.054	0.050	−0.028	−0.040	−0.066
18. Turbulence	0.092	0.056	−0.047	−0.201	0.076	−0.032	−0.180	−0.116	−0.077	0.062	−0.043	−0.027	−0.002
19. Regulatory and ec. unpred.	0.061	0.068	−0.063	−0.061	0.077	0.000	−0.071	−0.080	−0.053	−0.061	−0.008	0.055	−0.043
20. Competitor diversity	0.012	0.094	−0.078	−0.083	0.033	−0.008	−0.043	−0.016	−0.174	0.022	0.005	0.037	−0.027
21. Diagnostic use of Budgets	0.042	0.664	−0.195	0.055	−0.046	−0.133	0.056	0.097	0.011	0.083	0.104	−0.141	−0.046
22. Diagnostic use of PMS	0.027	0.563	−0.015	0.061	−0.021	0.035	0.149	0.028	0.017	0.052	0.017	−0.040	−0.061
23. Beliefs systems	0.073	0.300	−0.065	−0.074	0.020	0.016	0.022	−0.135	−0.132	0.052	0.060	−0.102	−0.088
24. Boundary systems	0.192	0.263	−0.124	−0.006	−0.002	−0.033	0.091	0.084	−0.096	0.119	−0.007	−0.070	−0.031
25. ROE_{t+1}	−0.111	−0.019	−0.006	0.212	−0.125	−0.061	0.225	0.042	0.029	0.054	0.044	0.003	−0.067
26. $ROCE_{t+1}$	−0.123	−0.031	−0.025	0.102	−0.086	−0.105	0.097	0.053	−0.042	−0.011	0.122	0.056	−0.081

	14	15	16	17	18	19	20	21	22	23	24	25
14. Earnings pressures	1.000											
15. Other job title	−0.030	1.000										
16. Manager tenure	0.011	−0.134	1.000									
17. Gender	−0.003	−0.036	−0.290	1.000								
18. Turbulence	−0.022	0.074	0.039	−0.030	1.000							
19. Regulatory and ec. unpred.	0.084	−0.005	−0.016	0.008	0.172	1.000						
20. Competitor diversity	−0.011	0.059	−0.023	−0.001	0.343	0.102	1.000					
21. Diagnostic use of Budgets	0.091	0.031	0.076	−0.222	0.039	0.066	0.167	1.000				
22. Diagnostic use of PMS	−0.132	0.031	−0.104	−0.103	0.021	0.003	0.083	0.262	1.000			
23. Beliefs systems	−0.071	−0.006	−0.033	−0.022	0.076	0.140	0.082	0.224	0.349	1.000		
24. Boundary systems	0.004	0.008	0.016	−0.019	0.114	0.161	0.056	0.198	0.291	0.517	1.000	
25. ROE_{t+1}	0.066	−0.091	0.116	0.067	−0.047	−0.029	0.081	−0.031	−0.040	−0.057	−0.007	1.000
26. $ROCE_{t+1}$	−0.123	−0.031	−0.025	0.102	−0.086	−0.105	0.097	0.053	−0.042	−0.011	0.122	0.056

Correlations greater than |0.123| are significant at 0.1 level.

Table 9
Regression results for Hypothesis 2. Firm performance $t+1$ window ($N = 181$).

	ROE_{t+1}		$ROCE_{t+1}$	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
REM * iMCS		0.251** (1.665)		0.214* (1.377)
REM	−0.065 (−0.759)	−0.263* (−1.798)	−0.030 (-0.336)	−0.198 (−1.313)
iMCS	−0.133 (−1.546)	−0.147* (−1.704)	−0.139 (−1.553)	−0.149* (−1.660)
ROE_t	0.337*** (4.245)	0.327*** (4.130)		
$ROCE_t$			0.159* (1.895)	0.160* (1.907)
AEM	0.210** (2.527)	0.198** (2.384)	0.060 (0.699)	0.050 (0.580)
$Employees_t$	−0.024 (−0.150)	−0.069 (−0.420)	−0.042 (−0.252)	−0.080 (−0.470)
Solvency $ratio_t$	0.112 (0.729)	0.161 (1.032)	0.120 (0.754)	0.161 (1.000)
$\Delta Cash_t$	−0.025 (−0.166)	−0.084 (−0.540)	−0.014 (−0.089)	−0.063 (−0.394)
Market $share_t$	0.006 (0.036)	0.046 (0.282)	0.031 (0.187)	0.065 (0.383)
Listed firm	0.010 (0.111)	0.042 (0.469)	−0.010 (−0.114)	0.017 (0.187)
Big 6 auditor	0.030 (0.296)	0.031 (0.303)	0.033 (0.301)	0.032 (0.302)
Number of new products	−0.049 (−0.618)	−0.073 (−0.904)	−0.023 (−0275)	−0.043 (−0.510)
Allowance pressure	0.029 (0.342)	0.030 (0.354)	0.072 (0.837)	0.071 (0.832)
Voluntary disclosure	−0.102 (−1.195)	−0.102 (−1.207)	−0.082 (−0.930)	−0.082 (−0.935)
Revenues pressures	−0.058 (−0.688)	−0.086 (−1.014)	−0.083 (−0.966)	−0.108 (−1.224)
Earnings pressures	0.096 (1.148)	0.117 (1.392)	0.035 (0.404)	0.053 (0.616)
Other job title	0.008 (0.095)	−0.018 (−0.216)	0.021 (0.254)	−0.000 (−0.001)
Manager tenure	0.044 (0.509)	0.037 (0.438)	−0.052 (−0.586)	−0.058 (−0.651)
Gender	−0.035 (−0.400)	−0.057 (−0.646)	−0.080 (−0.881)	−0.098 (−1.074)
Turbulence	0.105 (1.159)	0.119 (1.316)	0.110 (1.175)	0.121 (1.296)
Regulatory and ec. unpred.	−0.058 (−0.693)	−0.049 (−0.589)	0.055 (0.640)	0.062 (0.723)
Competitor diversity	0.082 (0.897)	0.089 (0.979)	0.085 (0.911)	0.093 (0.994)
Diagnostic use of Budgets	−0.034 (−0.399)	−0.032 (−0.377)	−0.039 (−0.449)	−0.038 (−0.437)
Diagnostic use of PMS	0.025 (0.292)	0.044 (0.508)	0.046 (0.511)	0.062 (0.688)
Beliefs systems	−0.068 (−0.615)	−0.035 (−0.316)	−0.128 (−1.116)	−0.100 (−0.867)
Boundary systems	0.330*** (2.851)	0.310*** (2.675)	0.403*** (3.378)	0.386*** (3.231)
Industry controls	Included	Included	Included	Included
R^2	0.247	0.262	0.201	0.212
Adj. R^2	0.064	0.076	0.007	0.013
F-stat	1.348*	1.407*	1.035	1.360*
Max. VIF	4.782	4.913	4.779	4.904

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

Table 10
Regression results for Hypothesis 2. Firm performance cumulated $t+1$ plus $t+2$ window ($N = 181$).

	$ROE_{(cumulated\ t+1,\ t+2)}$		$ROCE_{(cumulated\ t+1,\ t+2)}$	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
REM * iMCS		0.239*** (2.642)		0.326** (2.172)
REM	−0.164*** (−3.137)	−0.352*** (−4.014)	−0.116 (−1.339)	−0.372** (−2.555)
iMCS	−0.095* (−1.804)	−0.108** (−2.080)	−0.099 (−1.132)	−0.114 (−1.311)
ROE_t	0.820*** (16.922)	0.810*** (17.033)		
$ROCE_t$			0.406*** (4.950)	0.407*** (5.027)
AEM	0.108** (2.136)	0.096* (1.936)	−0.009 (−0.109)	−0.025 (−0.298)
LOC controls	Included	Included	Included	Included
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.720	0.734	0.240	0.265
Adj. R^2	0.652	0.666	0.055	0.080
F-stat	10.585***	10.930***	1.298	1.433*
Max. VIF	4.782	4.913	4.779	4.904

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

check for multicollinearity. The highest value (4.913) is well below the critical threshold (<10), appeasing concerns. Table 9 displays regression results for model (2) on the $t+1$ window. For each test, we show regression outputs with and without the interaction term (our variable of interest) for ROE_{t+1}, and $ROCE_{t+1}$. REM*iMCS is positive and significant in ROE_{t+1} ($\beta = 0.251$, p-value <0.05), and in $ROCE_{t+1}$ ($\beta = 0.214$, p-value <0.10). Table 10 presents regression results for model (2) on the $t+1$ plus $t+2$ cumulated window. REM*iMCS is positive and significant in $ROE_{(cumulated\ t+1,\ t+2)}$ ($\beta = 0.239$, p-value <0.01), and in $ROCE_{(cumulated\ t+1,\ t+2)}$ ($\beta = 0.326$, p-value <0.05). Last, results in Table 11 show that the effect is also positive and significant on the $t+1$ plus $t+2$ plus $t+3$ cumulated window (($\beta = 0.189$, p-value <0.05 for $ROE_{(cumulated\ t+1,\ t+2,\ t+3)}$ and $\beta = 0.311$, p-value <0.05 for $ROCE_{(cumulated\ t+1,\ t+2,\ t+3)}$. Results provide support for H2, and suggest that the

Table 11
Regression results for Hypothesis 2. Firm performance cumulated t+1 plus t+2 plus t+3 window ($N = 181$).

	ROE (cumulated t+1, t+2, t+3)		ROCE (cumulated t+1, t+2, t+3)	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
REM * iMCS		0.189** (2.117)		0.311** (2.115)
REM	−0.147*** (−2.889)	−0.296*** (−3.425)	−0.097 (−1.142)	−0.341** (−2.391)
iMCS	−0.087* (−1.694)	−0.097* (−1.904)	−0.103 (−1.200)	−0.117 (−1.374)
ROE_t	0.835*** (17.626)	0.827*** (17.632)		
$ROCE_t$			0.445*** (5.542)	0.446*** (5.622)
AEM	0.096* (1.931)	0.086* (1.757)	−0.017 (−0.205)	−0.032 (−0.391)
LOC controls	Included	Included	Included	Included
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.732	0.741	0.271	0.295
Adj. R^2	0.667	0.675	0.095	0.117
F-stat	11.264***	11.344***	1.536**	1.660**
Max. VIF	4.782	4.913	4.779	4.904

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

effect does not reverse in the following periods.[34]

5.2. Additional tests: the role of other levers of control

A question that arises from our primary findings is to what extent other levers of control may play a role in triggering REM.[35] We address this question next.

5.2.1. Diagnostic use

Interactive control focuses attention on strategic uncertainties and opportunities by engaging managers and subordinates in continual debate and dialogue. We argue that, in the context of earnings management, rather than interaction being continual and focused on long-term strategy, interactions, albeit framed against a continual concern for earnings, intensify periodically, contingent on target achievement. This suggests that the need for REM could be prompted by diagnostic control use (i.e., relying on management by exception, managers get implicated in action only in the case of negative variance).[36] We contend, however, that diagnostic use is unlikely to resolve these deviations. This is because diagnostic control shows risks, for example, if the debates derived by negative variance leads to, at best, corrective actions. At worst, this lever can initiate debates about unproductive topics, "such as the believability of the numbers or why things are not better" (Henri, 2006, p. 535), without spurring the emergence of any corrective actions (Bedford, 2015). Additionally, over-emphasizing diagnostic control systems can redirect attention towards minimizing variances to meet short-term benchmarks and shorten efforts in the detection of new actions (Henri, 2006; Bedford, 2015).[37] To examine this possible effect, we test whether diagnostic use leads to REM. In untabulated results[38] we find that the effects of diagnostic use of budgets and diagnostic use of PMS on REM are insignificant (β = 0.052, p-value >0.10 and β = 0.046, p-value >0.10), indicating that this lever of control is not directly associated with REM, as it does not mobilize decision-making for strategic decisions.

5.2.2. Boundary systems

A boundary system can be technical and/or social (Tessier and Otley, 2012) and "delineates the acceptable domain of strategic activity for organizational participants" (Simons, 1995, p. 39). Expenditure and budgetary limits are examples of technical boundaries, and integrity or honesty codes are social boundaries (Mundy, 2010).[39] Thus, boundary systems play a "limiting role of circumscribing the domain where the company seeks new opportunities" (Ferreira and Otley, 2009, p. 265). Although Simons (1995, p. 41) also defines boundary systems "like brakes on a car: without them, cars (or organizations) cannot operate at high speeds," as providing negative boundaries and establishing clear limits on behavior.

Restricting organizational actors' experimentation and opportunity-seeking behavior has costs: the company could lose early advantages in new markets, products, or project opportunities, and hinder adaption to technological, market or environmental conditions (Simons, 1995). Therefore, boundary systems could play a role in our model,[40] constraining interactive use for searching for REM opportunities. Boundaries may limit managerial ability to search for solutions 'out of the box.' Boundary systems could also be the 'alibi' that gives managers moral license to feel free and exculpated if the decisions they make jeopardize the company's continuity in the midterm.[41] Thus, the effect of interactive use on REM (H1) is expected to be stronger in firms with low boundary control. A similar logic holds for H2. The mechanism through which interactive MCS leads to positive REM and firm performance effects will only be activated in settings with low boundary controls. Results in Table 12 confirm this view. Panel A reports the effect of Interactive use of MCS in REM by boundary systems subsamples. The

[34] Given that, as noted, we open the window to t+3 to capture long-term effects of REM actions, we run the risk of capturing, in the window that includes more future years, performance consequences of action taken in t+1 and t+2. To ensure this is not the case, we also control, in untabulated analyses, for REM in these years. Our results remain unchanged.

[35] For completeness, we run the models excluding other LOC controls. Untabulated results yield similar effects.

[36] See Appendix A for further clarification about the links between diagnostic and interactive use in an earnings management setting.

[37] Suppose that the diagnostic use in two firms is identical; then, the capacity to take actions leading to REM should vary depending on interactive use of MCS. This is the baseline assumption in prior work (Emsley, 2001; Mundy, 2010), arguing that managers use diagnostic control systems to facilitate and structure interactive use to induce solutions or new strategies.

[38] As a complement to the results in Table 5, we run this regression without controlling for interactive use of MCS.

[39] Widener (2007) or Mundy (2010) also provide examples of boundary systems.

[40] Following Gond et al. (2012), on a practical level, boundary controls are less amenable to systematic examination but can be employed to elaborate on and interpret findings.

[41] Simons (1995, p. 53) also refers to this freedom as a perverse way.

Table 12
Additional regression results. Boundary system effects ($N = 181$).

Panel A. *Additional regression results for Hypothesis 1. Boundary system effects.*

	Boundary system subsamples	
	Low	High
	REM	
	β (t-stat)	β (t-stat)
iMCS	0.136* (1.425)	0.274 (1.028)
AEM	0.051 (0.546)	0.249* (1.473)
LoC controls	Included	Included
Other controls	Included	Included
Industry controls	Included	Included
R^2	0.238	0.675
Adj. R^2	0.056	0.160
F-stat	1.308*	1.309

Panel B. *Additional regression results for Hypothesis 2 (t+1 window). Boundary system effects.*

	Boundary system subsamples			
	Low	High	Low	High
	ROE_{t+1}		$ROCE_{t+1}$	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
REM * iMCS	0.261** (1.671)	−1.546 (−1.259)	0.199* (1.328)	−1.695* (−1.511)
REM	−0.214 (−1.375)	0.924 (0.838)	−0.128 (−0.816)	1.090 (1.082)
iMCS	−0.159 (−1.547)	0.736 (1.216)	−0.166 (−1.577)	0.687 (1.277)
ROE_t	0.298*** (3.228)	0.444 (0.886)		
$ROCE_t$			0.109 (1.146)	0.825* (2.109)
AEM	0.218** (2.281)	0.399 (1.200)	0.060 (0.620)	0.402 (1.369)
LOC controls	Included	Included	Included	Included
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.326	0.817	0.314	0.864
Adj. R^2	0.099	0.002	0.083	0.161
F-stat	1.439*	0.865	1.369*	1.230

Panel C. *Additional regression results for Hypothesis 2 (cumulated t+1 plus t+2 window). Boundary system effects.*

	Boundary system subsamples			
	Low	High	Low	High
	$ROE_{(cumulated\ t+1,\ t+2)}$		$ROCE_{(cumulated\ t+1,\ t+2)}$	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
REM * iMCS	0.224*** (2.382)	−0.513 (-0.460)	0.308** (1.876)	−0.716 (-1.021)
REM	−0.325*** (-3.573)	0.226 (0.226)	−0.326** (-2.055)	0.530 (0.843)
iMCS	−0.120** (-2.001)	0.578 (1.054)	−0.151 (-1.418)	0.499 (1.484)
ROE_t	0.819*** (15.200)	0.804 (1.769)		
$ROCE_t$			0.386*** (3.997)	1.027*** (4.203)
AEM	0.118** (2.101)	−0.101 (-0.334)	−0.004 (-0.039)	0.009 (0.049)
LOC controls	Included	Included	Included	Included
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.770	0.850	0.299	0.947
Adj. R^2	0.693	0.072	0.063	0.673
F-stat	9.945***	1.093	1.368*	3.454**

Panel D. *Additional regression results for Hypothesis 2 (t+1 plus t+2 plus t+3 window). Boundary system effects.*

	Boundary system subsamples			
	Low	High	Low	High
	$ROE_{(cumulated\ t+1,\ t+2,\ t+3)}$		$ROCE_{(cumulated\ t+1,\ t+2,\ t+3)}$	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
REM * iMCS	0.183** (1.958)	−0.866 (-0.760)	0.286** (1.771)	−0.260 (-0.286)
REM	−0.271*** (-3.000)	0.466 (0.455)	−0.291* (-1.866)	−0.120 (-0.147)
iMCS	−0.115* (-1.993)	0.602 (1.072)	−0.138 (-1.319)	0.286 (0.656)
ROE_t	0.832*** (15.555)	0.738 (1.587)		
$ROCE_t$			0.438*** (4.621)	0.941** (2.979)
AEM	0.101* (1.822)	−0.043 (-0.139)	−0.022 (-0.231)	0.201 (0.845)

(*continued on next page*)

Table 12 (*continued*)

Panel D. *Additional regression results for Hypothesis 2 (t+1 plus t+2 plus t+3 window). Boundary system effects.*

	Boundary system subsamples			
	Low	High	Low	High
	ROE (cumulated t+1, t+2, t+3)		ROCE (cumulated t+1, t+2, t+3)	
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
LOC controls	Included	Included	Included	Included
Other controls	Included	Included	Included	Included
Industry controls	Included	Included	Included	Included
R^2	0.774	0.843	0.324	0.911
Adj. R^2	0.697	0.029	0.097	0.450
F-stat	10.150***	1.035	1.426*	1.976

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

coefficients of Interactive use of MCS are only positive and significant in the low boundary systems subsample, at 10 %. We observe similar patterns in testing H2 (see Panel B, Panel C, and Panel D in Table 12). The coefficients on REM*iMCS are positive and significant only in the low boundary systems subsample.

Overall, Table 12 suggests that strong boundary controls hide the impact of the interactive use in decision-making related to REM. These results are also in line with and add to previous literature that the potential non-alignment of control levers can be detrimental to the firm (Bedford and Malmi, 2015; Heinicke et al., 2016; Kruis et al., 2016).[42]

5.2.3. Beliefs systems

Beliefs systems are "formal systems used by top managers to define, communicate, and reinforce the basic values, purpose, and direction for the organization" (Simons, 1994, p. 170). These systems are documented in a very abstract and generic way in credos, mission statements, or statements of purpose. Managers use them as a positive and inspirational form of control to influence the way employees approach their work. Beliefs systems are intended to allow employees to engage in unplanned actions and reactive decisions in response to changes in business requirements (Heinicke et al., 2016). However, because of the vagueness of the message, they do not normally provide much concrete guidance. In this regard, Simons (2000) indicated that beliefs systems are not "specific enough to tell people facing difficult choices how to compete or how to choose appropriate actions in novel situations" (p. 277). Therefore, we have no ex-ante arguments on the role of beliefs systems in influencing REM. The scarce prior work analyzing this issue reports low correlations among earnings management and this organizational identity (Abernethy et al., 2017). In additional results (untabulated), we find similar patterns. First, the effect of interactive use of MCS on REM is concentrated in the low beliefs systems subsample, at 5%. Second, the effects of REM*iMCS on firm performance (in the three windows) are positive and significant only in the low beliefs systems subsamples.

5.3. Additional tests: Alternative measures of earnings management

Following extant literature, our REM measure is based on survey data. Thus, it could be conceptually abstract and latent rather than concrete and observable. To assuage concerns over whether results would hold for alternative REM measures, we reexamine our results to (i) ensure that our findings are robust and, tentatively, (ii) to engage with the financial accounting literature more directly. We create an alternative REM measure following Roychowdhury (2006), who suggests that offering aggressive credit terms to risky customers who may later default on their payments can be identified as a salient REM action. Roychowdhury (2006) argues and finds that such practices lead to abnormally low cash flows, given the reported levels of sales. REM1 is abnormal cash flows calculated as the residuals from the following year-industry regression (1-digit NACE code):

$$CFO_t/A_{t-1} = \alpha_0 + \alpha_1\,(1/A_{t-1}) + \beta_1\,(S_t/A_{t-1}) + \beta_2\,(\Delta S_t/A_{t-1}) + \varepsilon_t \quad (3)$$

where A_t is total assets at the end of period *t*, S_t the sales during period *t* and $\Delta S_t = S_t - S_{t-1}$. The residuals from model (3) can be interpreted as an indicator that the firm is offering aggressive credit terms to its customers, where the lower abnormal cash flows are, the greater the level of REM is. We classify firms as engaging in REM if they are in the lower quartile of the distribution. To ease interpretation and comparability with the survey-based measure, we multiply the residuals obtained from running model (3) by -1, so that higher values are associated with greater income increasing earnings management.

Our second measure of REM is derived from the models in Gunny (2010), which we adapt given data limitations and low number of firms per industry. Gunny (2010), in line with Roychowdhury (2006), proposes that firms may engage in REM by cutting discretionary expenses, such as maintenance or training. Also, they may improve profit margins by increasing production, which lowers product per unit cost. We use model (4) to estimate abnormally low expenses as the residuals from the following year-industry regression (1-digit NACE code):

$$SGA_t/A_{t-1} = \alpha_0 + \alpha_1\,(1/A_{t-1}) + \beta_1\,Listed_t + \beta_2\,(\Delta S_t/S_{t-1}) + \beta_3\,(INT_t/A_{t-1}) + \beta_4\,(\Delta S_t/A_{t-1}) + \beta_5\,(\Delta S_t/A_{t-1}) * DD + \varepsilon_t^{SG\&A} \quad (4)$$

where SGA_t is the Selling, General & Administrative expense in year *t*, A_t is total assets at the end of period *t*, Listed is a dummy variable that takes value 1 if the firm is listed in year *t*, 0 otherwise, S_t the sales during period *t*, $\Delta S_t = S_t - S_{t-1}$,[43] Internal funds (INT) are income before extraordinary items plus depreciation in year *t*, as a proxy for funds available for investment, and DD is a dummy variable equal to 1 when total sales decrease from *t-1* to *t*, 0 otherwise.

To estimate abnormally high production costs, we use model (5):

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1\,(1/A_{t-1}) + \beta_1\,Listed_t + \beta_2\,(\Delta S_t/S_{t-1}) + \beta_3\,(INT_t/A_{t-1}) + \beta_4\,(\Delta S_t/A_{t-1}) + \beta_5\,(\Delta S_t/A_{t-1}) * DD + \varepsilon_t^{PROD} \quad (5)$$

where $PROD_t$ is the materials expense plus change in inventory in year *t*, and all other variables are as previously defined. Abnormal SG&A and abnormal production costs are computed as the difference between

[42] In isolation, boundary systems increase REM (see Table 5) that, as we argue, could comprise sub-optimal strategies. At the same time, boundary systems also hinder the "good conversation" behind the interactive use. This is potentially an indication that further research is warranted on whether the relationships among levers of control limit or encourage certain earnings management activities over others.

[43] β_2 refers to growth opportunities in Gunny (2010) model.

Table 13
Additional regression results. Alternative measures using financial statements ($N = 181$).

Panel A. *Additional regression results for Hypothesis 1. Alternative measures using financial statements*

	REM1_Roychowdhury	REM2_Gunny	REM3_Roychowdhury&Gunny
	β (t-stat)	β (t-stat)	β (t-stat)
iMCS	0.144** (1.724)	0.125** (2.237)	0.096** (1.736)
AEM	−0.055 (-0.718)	0.017 (0.328)	0.009 (0.177)
LOC controls	Included	Included	Included
Other controls	Included	Included	Included
R^2	0.286	0.636	0.649
Adj. R^2	0.137	0.572	0.586
F-stat	1.923**	9.920***	10.351***

Panel B. *Additional regression results for Hypothesis 2 (t+1 window). Alternative measures using financial statements*

	ROE_{t+1}	ROE_{t+1}	ROE_{t+1}
	β (t-stat)	β (t-stat)	β (t-stat)
REM1_Roychowdhury * iMCS	0.266*** (1.963)		
REM2_Gunny * iMCS		0.529* (1.369)	
REM3_Roychowdhury&Gunny * iMCS			0.784** (2.214)
REM1_Roychowdhury	−0.374** (-2.571)		
REM2_Gunny		−0.620 (-1.281)	
REM3_Roychowdhury&Gunny			−0.954** (-2.161)
iMCS	−0.019 (-0.196)	−0.095 (-1.119)	−0.088 (-1.070)
$Employees_t$	−0.096 (-1.015)	0.165 (0.922)	0.277* (1.641)
LOC controls	Included	Included	Included
Industry controls	Included	Included	Included
Other controls	Included	Included	Included
R^2	0.441	0.194	0.210
Adj. R^2	0.280	0.057	0.074
F-stat	2.738***	1.422*	1.550*

Panel C. *Additional regression results for Hypothesis 2 (cumulated t+1 plus t+2 window). Alternative measures using financial statements*

	$ROE_{(cumulated\ t+1,\ t+2)}$	$ROE_{(cumulated\ t+1,\ t+2)}$	$ROE_{(cumulated\ t+1,\ t+2)}$
	β (t-stat)	β (t-stat)	β (t-stat)
REM1_Roychowdhury * iMCS	0.204* (1.535)		
REM2_Gunny * iMCS		0.361* (1.467)	
REM3_Roychowdhury&Gunny * iMCS			0.392** (1.728)
REM1_Roychowdhury	−0.364** (-2.542)		
REM2_Gunny		−0.491* (-1.593)	
REM3_Roychowdhury&Gunny			−0.538* (-1.901)
iMCS	−0.065 (-0.708)	−0.065 (-1.217)	−0.058 (-1.102)
$Employees_t$	−0.087 (-0.933)	0.160 (1.408)	0.180* (1.667)
LOC controls	Included	Included	Included
Industry controls	Included	Included	Included
Other controls	Included	Included	Included
R^2	0.466	0.673	0.676
Adj. R^2	0.312	0.617	0.620
F-stat	3.024***	12.176***	12.177***

Panel D. *Additional regression results for Hypothesis 2 (cumulated t+1 plus t+2 plus t+3 window). Alternative measures using financial statements*

	$ROE_{(cumulated\ t+1,\ t+2,\ t+3)}$	$ROE_{(cumulated\ t+1,\ t+2,\ t+3)}$	$ROE_{(cumulated\ t+1,\ t+2,\ t+3)}$
	β (t-stat)	β (t-stat)	β (t-stat)
REM1_Roychowdhury * iMCS	0.185* (1.607)		
REM2_Gunny * iMCS		0.365* (1.517)	
REM3_Roychowdhury&Gunny * iMCS			0.409** (1.850)
REM1_Roychowdhury	−0.391** (-2.971)		
REM2_Gunny		−0.483 (-1.603)	
REM3_Roychowdhury&Gunny			−0.548** (-1.986)
iMCS	0.065 (0.754)	−0.063 (-1.192)	−0.055 (-1.062)
$Employees_t$	−0.073 (-0.853)	0.160 (1.440)	0.187* (1.773)
LOC controls	Included	Included	Included
Industry controls	Included	Included	Included
Other controls	Included	Included	Included
R^2	0.520	0.687	0.691
Adj. R^2	0.398	0.635	0.638
F-stat	4.287***	13.020***	13.089***

*, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Significance levels are one-tailed for variables with a directional prediction and two-tailed otherwise. Standardized coefficients are presented.

predicted and actual level. Abnormally high and low residuals from models (4) and (5) are indicative of REM. Following Cohen and Zarowin (2010), we sum both measures to create a comprehensive metric (REM2). We then measure REM2 as the sum of the absolute values of the first and the last quartile residuals from models (4) and (5). All other values were computed as zero. Our third measure (REM3) is a combined measure of REM1 and REM2.

Table 13 presents the regression results using these alternative measures. Panel A displays the effect of interactive use of MCS on REM1, REM2 and REM3, providing additional support for Hypothesis 1 ($\beta = 0.144$ p-value <0.05; $\beta = 0.125$ p-value <0.05; $\beta = 0.096$ p-value <0.05, respectively). Panel B, Panel C, and Panel D show the results of the interaction effect (term REM *iMCS) on firm performance in the three windows, $t+1$ and both cumulated ($t+1$ plus $t+2$; $t+1$ plus $t+2$ plus $t+3$), respectively. The interaction terms are positive and significant in ROE_{t+1} for each alternative measure, REM1, REM2 and REM3 ($\beta = 0.266$, p-value <0.01; $\beta = 0.529$, p-value <0.10; and $\beta = 0.784$, p-value <0.05, respectively). Like in the first window, cumulated results also provide additional support for Hypothesis 2. The interaction terms are positive and significant in $ROE_{(cumulated\ t+1,\ t+2)}$ ($\beta = 0.204$, p-value <0.10; $\beta = 0.361$, p-value <0.10; and $\beta = 0.392$, p-value <0.05, respectively), and also in $ROE_{(cumulated\ t+1,\ t+2,\ t+3)}$ ($\beta = 0.185$, p-value <0.10; $\beta = 0.365$, p-value <0.10; and $\beta = 0.409$, p-value <0.05, respectively).

Consistent with our results using survey measurement for REM, regardless of specification, we find that the results are robust across models.

6. Conclusions

We provide novel insights on the links between MCS and earnings management through the lens of the Levers of Control (LOC) framework (Simons, 1995). In doing so, we conceptualize the interactive use of MCS as a mechanism that spurns managerial search, discovery, and implementation of action plans to correct deviations from critical values of earnings. Our evidence indicates that using the interactive lever involves the organization in the development of action plans to achieve strategic objectives, leading to REM practices that ultimately improve firm performance, relative to firms that engage in REM actions without activating the interactive lever. Prior work examines the drivers of earnings management (e.g., Liu and Lu, 2007; Ali and Zhang, 2015; Kim et al., 2016; Liu, 2016), but does not focus on how managers use MCS to achieve benchmarks and, particularly how interactive use influences REM.

A key assumption in our framework is that MCS use helps balance the needs for long-term investments, innovation, and constraints (Tuomela, 2005). To this end, we conceptualize MCS in terms of the LOC framework, since it pays special attention to the interplay of the different control mechanisms and to patterns of attention in managing organizational benchmarks (Mundy, 2010; Kruis et al., 2016). We examine a novel side of interactive use of MCS, looking at its links with REM. This sheds light on how control systems shape financial reporting and, consequently, have organizational consequences, *via* firm strategy or investment. Unlike prior research which generally uses archival data, we show evidence on *how*, through the lens of the LOC framework, managers mobilize their control systems in the search for solutions, deriving in earnings management.

The study is not without limitations. This study is vulnerable to the usual weakness relating to reliability and validity of items and tests in survey research, although we follow recommended practices in the design of the study, such as the use of different sources (archival and survey data) to measure dependent and independent variables (Bedford and Speklé, 2018). While survey measures have potential limitations, direct assessments play a key role in empirical management accounting research. We measured LOC and earnings management directly, particularly the interactive use and REM. Although the main findings of our study are in line with expectations, we also run additional analysis using alternative measures of REM based on financial statements (Roychowdhury, 2006; Gunny, 2010). Taken together, these results provide additional validity to our survey-based findings. Although we attempt to control for potential determinants of firm performance, the use of survey methodology does not allow us to fully disentangle to what extent firms are likely to take REM actions in any particular year also in the future. We run additional analysis using lagged REM from financial statements, allowing us to control for firms taking REM actions also in the following years. Results are unchanged. Future research can examine this issue using alternative research designs (i.e., panel data from two or three time-lagged surveys). An obvious limitation is that our sample was not strictly randomly selected. In contrast, we have pointed out the research benefits of accessing to an association of practice managers, like previous studies (King et al., 2010). Thus, given the limitation in sample size and sample characteristics, generalization of results must be carried out with caution.

Data availability

Data is available from the sources identified in the paper.

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Appendix A. Validation analysis. Earnings pressures and the links between diagnostic and interactive MCS

Our focus is on interactive use, and not on the inherent quality, type, or design of MCS. In our sample firms, control systems are of sufficient quality to help managers detect deviations from targets, plausibly through a diagnostic use. These deviations should be sufficiently concerning that they cannot be corrected without activating the interactive lever.[44] Therefore, for Hypothesis 1 to hold, firms should be able to activate interactive use in

[44] Minor earnings deviations could plausibly be corrected after the year end, by engaging in AEM.

Table A1
Descriptives of diagnostic use under target and bonus pressures.

		Diagnostic use of Budgets				Diagnostic use of PMS				iMCS			
		Mean	S.D.	F-Levene	T-test	Mean	S.D.	F-Levene	T-test	Mean	S.D.	F-Levene	T-test
Target evaluation pressures	Low	1.053	1.665	35.741***	−12.304***	1.160	1.814	16.515***	−2.992***	1.389	1.624	88.777***	−1.644***
	High	3.647	1.113			2.027	2.073			3.033	0.842		
Bonus/rewards pressures	Low	1.027	1.076	34.174***	−12.511***	1.076	1.808	14.996***	−3.578***	1.358	1.607	85.162***	−8.864***
	High	3.644	2.101			2.101	2.04			3.046	0.844		
Suspect firm	No	2.288	1.928	2.360*	−1.026	1.553	1.976	1.457	−0.684	2.220	1.581	1.570	−1.116
	Yes	2.736	1.865			1.864	2.120			2.618	1.462		

Target evaluation pressures (Sponem and Lambert, 2016) (Factor score of three Likert-scale items: (i) Not meeting budget targets reflects badly on performance, (ii) Not meeting budget targets has a significant impact on the performance evaluations of operational managers, and (iii) The performance of operational managers is primarily judged on their ability to meet their budget targets; Eigenvalue = 2.848, % variance explained = 94.9 %, loadings range = 0.968−0.983, Cronbach alpha = 0.973); *Bonus/reward pressures* (Sponem and Lambert, 2016) (Factor score of two Likert-scale items: (i) Budget-based rewards make up a high proportion of salary, and (ii) Rewards for operational managers depend largely on their meeting budget targets; Eigenvalue = 1.882, % variance explained = 94.1 %, loadings = 0.932, Cronbach alpha = 0.899), obtaining a positive and significant coefficient ($r = 0.324$, $p < 0.01$). We split both constructs using the median.
In addition, we identify firms porting positive changes in ROE and above the sample median during three consecutive periods (*t* to *t-2*), given that these companies could manage their earnings (Cohen et al., 2008; Roychowdhury, 2006). We labelled these as "suspect firms.".
***Represent a significance level of 0.01.

response to earnings concerns.[45] Before analyzing the effect of interactive use of MCS on REM, we provide an overview and validation of the underlying reasoning on how managers activate an interactive use of MCS.

As noted, an important driver of earnings management is the pressure on managers to deliver short-term performance (Matsunaga and Park, 2001; Cheng et al., 2016). Managers concerned about within-period earnings are likely to frequently monitor and request data on any deviations from targeted earnings. To that end, diagnostic use of MCS is fundamental to keep track of earnings goals throughout the period (Braumann et al., 2020). Firms use MCS diagnostically to monitor that performance goals are achieved. Based on a diagnostic use, managers can evaluate how earnings benchmarks must be planned (*ex ante*), and how to measure achievement of organizational goals (*ex post*) (Rossing, 2013). Therefore, diagnostic MCS provide direction, helping in identifying and setting targets, and in monitoring progress toward critical performance variables, being looked at only when deviances from established targets are observed (Tessier and Otley, 2012). We provide evidence supporting this reasoning in Table A1, where high pressured firms show higher values in diagnostic, and also, interactive use. Although our data does not allow us to analyze timing in detail, this evidence indicates that in pressured firms, both levers can be active within a single period, as in Rossing (2013), when diagnostic use leads to the detection of deviations, and interactive use is needed to formulate solutions.

Our theoretical expectation is that managers use MCS diagnostically to identify deviations and the critical variables that influence achieving their earnings targets. Diagnostic MCS could also sometimes provide information to correct minor deviations, by identifying, for example, if revenues are down in a particular product line because of inventory shortages, insufficient staff, or other reasons. However, more generally, when managers pressured by earnings targets put high emphasis on critical deviations detected by the diagnostic control, we expect this will lead to an intensification of the interactive use of MCS, focusing managers' attention on actions that could reverse earnings concerns. A large body of literature provides evidence of earnings management surrounding simple earnings targets such as avoiding losses or reporting small increases in earnings, both in public (Burgstahler and Dichev, 1997) and private firms (Burgstahler et al., 2006). This literature concludes that managers engage in earnings management to push earnings from being just below to just above target (Bhojraj et al., 2009).

The research on the links between diagnostic and interactive use is growing, and there is evidence suggesting that the diagnostic lever may trigger interactive use. For example, Mundy (2010) argues that managers use diagnostic control systems to facilitate and structure interactive use to induce solutions or new strategies. In her case study, Mundy (2010) presents evidence that managers who oversee various departments and areas have limited time to devote to each. She also shows that interactive control systems were introduced when the aggregated results reported by the diagnostic control identified the extent of the problem. Managers use diagnostic control systems to focus on exceptions and activate interactive control to aid them to understand the nature of eventual problems. The work of Emsley (2001) also provides support for our prediction that diagnostic use can trigger interactive use. Emsley (2001) notes that diagnostic control systems allow managers to identify the problem that has generated the variance, this, in turn, leads managers to recognize the cause which, sequentially, can lead to solving the problem through the debate generated by interactive use. Therefore, we expect that once the manager, through diagnostic use, detects problems in reaching a target and is pressured, the variance will be managed through intensifying the interactive use of MCS. Untabulated results provides evidence on the positive and significant effect of diagnostic use on interactive use ($\beta = 0.586$, p-value <0.01, $\beta = 0.362$, p-value <0.01, for budgets and PMS, respectively).

Appendix B. Survey questions for main constructs

Interactive use
Q: To what extent does the top management team use PMS (Budgets) for the following (Very low extent/Very high extent):
Provide a recurring and frequent agenda for top management activities
Provide a recurring and frequent agenda for subordinate activities
Enable continual challenge and debate of underlying data, assumptions and action plans with subordinates and peers
Focus attention on strategic uncertainties
Encourage and facilitate dialog and information sharing with subordinates

[45] Rossing (2013) provides evidence from a case study on how managers transition from a diagnostic to an interactive use *during the year* to manage tax strategies.

Diagnostic use
Q: To what extent does the top management team use PMS (Budgets) for the following (Very low extent/Very high extent):
Identify critical performance variables
Set targets for critical performance variables
Monitor progress toward critical performance targets
Provide information to correct deviations from preset performance targets
Review key areas of performance

Real earnings management
Q: Hypothetical scenario: Near the end of the year, it looks like your company might come in below the desired earnings target (EPS, Sales, Profits, etc.). Within what is permitted by accounting norms, which of the following choices might your company make? (Very unlikely/very likely)
Decrease discretionary spending (e.g., R&D, advertising, maintenance…)
Provide incentives for customers to buy more product this year
Sell investments or assets to recognize gains this year
Delay starting a new project, even if this entails a small sacrifice in value

Accrual based earnings management
Q: Hypothetical scenario: Near the end of the year, it looks like your company might come in below the desired earnings target (EPS, Sales, Profits, etc.). Within what is permitted by accounting norms, which of the following choices might your company make? (Very unlikely/very likely)
Postpone taking an accounting charge
Book revenues now rather than next year
Alter accounting assumptions (e.g., allowances, pensions, etc.)

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