ADVANCES IN MANAGEMENT ACCOUNTING

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ADVANCES IN MANAGEMENT
ACCOUNTING VOLUME 29

ADVANCES IN MANAGEMENT ACCOUNTING

EDITED BY

MARY A. MALINA
University of Colorado Denver, USA

United Kingdom – North America – Japan
India – Malaysia – China

Emerald Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2017

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-78743-298-7 (Print)
ISBN: 978-1-78743-297-0 (Online)
ISBN: 978-1-78743-441-7 (Epub)

ISSN: 1474-7871 (Series)

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LIST OF CONTRIBUTORS

Eleftherios Aggelopoulos	Adjunct Lecturer, Department of Business Administration, University of Patras, Rio Patras, Greece
Chris Akroyd	Assistant Professor, College of Business, Oregon State University, Corvallis, OR, USA
Tjerk Budding	Assistant Professor, Department of Accounting, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
Gary M. Fleischman	Professor of Accounting, Rawls College of Business, Texas Tech University, Lubbock, TX, USA
Eric N. Johnson	Clara R. Toppan Professor of Accounting, University of Wyoming, Laramie, Wyoming USA
Matthew Leach	Senior Research Fellow, Division of Health Sciences, City East Campus, University of South Australia, Adelaide, Australia
Adam Maiga	Associate Professor of Accounting, College of Business, Columbus State University, Columbus, GA, USA
Winnie O'Grady	Senior Lecturer, Department of Accounting and Finance, The University of Auckland, Auckland, New Zealand
Martijn Schoute	Assistant Professor, Department of Accounting Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

Inara Scott Assistant Professor, College of Business, Oregon State University, Corvallis, OR, USA

Basil P. Tucker Senior Lecturer, City West Campus, University of South Australia, Adelaide, Australia

Kenton B. Walker Director, School of Accountancy, University of Memphis, Memphis, TN, USA

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INTRODUCTION

This volume of *Advances in Management Accounting* (*AIMA*) represents the diversity of management accounting topics, methods, and author affiliations which form the basic tenets of *AIMA*. Included are papers on traditional management accounting topics, such as cost systems, budgeting, and performance measurement, as well as articles on broader topics of interest to management accountants, such as assessing management accounting service quality and the research–practice gap. The chapters in this volume utilize a wide-variety of methods, including archival data analysis, surveys, and qualitative field studies. Finally, the diversity in authorship is apparent with affiliations from Australia, Greece, the Netherlands, New Zealand, and the United States.

This volume begins with a study by Schoute and Budding that provides new insights into how the design and intensity of use of cost systems of governmental organizations change in response to changes in environmental and funding uncertainty. Research on relevance of contextual factors for cost systems design and intensity of use has been among mainstream debates in the management accounting literature for decades. Previous research has focused on how the level of cost system design and/or intensity of use characteristics is related to the level of contextual factors. This study, on the other hand, focuses on how changes in cost system design and intensity of use characteristics are related to changes in contextual factors.

The next chapter explores the principles of beyond budgeting. O'Grady, Akroyd, and Scott draw on the radical decentralization literature to distinguish between beyond budgeting leadership and process principles. They suggest that various combinations of management structure and control processes will produce varying levels of adaptability to change and provide a basis for comparing and understanding the changes organizations make to move beyond budgeting.

The third chapter in the volume revisits the performance impacts of activity-based costing. Maiga uses survey data from a cross-section of 369 U.S. manufacturing plants to investigate the main and interaction effects of activity-based costing and information systems integration on plant performance.

The author posits that activity-based costing, internal information system, and external information system integration can reinforce each other in all possible combinations for improving cost, quality, and cycle times.

Fleischman, Johnson, and Walker address the topic of how to measure quality of management accounting services. Given the practical relevance of management accounting on grounds of the usability and relevance of information generated by management accounting systems, it is surprising that prior management accounting research is rather silent on issues of management accounting service quality. Drawing on the concepts of service quality and service performance, the authors investigate four related research questions in the context of management accounting service quality from both provider and user perspectives.

The fifth chapter in this volume examines the research–practice gap in nursing, with the goal of understanding whether the history and challenges of academic nursing research might be useful for accounting researchers that seek to cover the gap in managerial accounting research. Tucker and Leach draw on diffusion theory to aid in understanding how the research–practice gap was bridged in nursing research. The issues raised in this study are important for the advancement of management accounting research in terms of establishing credibility, linking academia generally with the business community and for being true thought leaders in our discipline.

The final chapter by Aggelopoulos is an archival study investigating how the performance of Greek bank branches varies when the external environment changes dramatically. The author identifies sources of inefficiencies that provide indicators for decision makers in assessing the quality of bank performance. Given the similarities of the "bank-driven" crisis economy of Greece with other crisis European economies, the empirical results offer useful information on performance change at the retail banking level in difficult times.

The six chapters in Volume 29 represent relevant, theoretically sound, and practical studies that can greatly benefit the management accounting discipline. They manifest the journal's commitment to providing a high level of contribution to management accounting research and practice.

Mary A. Malina
Editor

CHAPTER 1

CHANGES IN COST SYSTEM DESIGN AND INTENSITY OF USE IN TIMES OF CRISIS: EVIDENCE FROM DUTCH LOCAL GOVERNMENT

Martijn Schoute and Tjerk Budding

ABSTRACT

Purpose: *This study examines whether changes in environmental and funding uncertainty during the first three years after the outbreak of the global financial crisis (which we presume to have increased significantly) are associated with changes in cost system design and intensity of use.*

Designlmethodologylapproach: *A dataset of survey responses from 56 Dutch municipalities is used for the empirical analyses. In the questionnaire, a senior-level financial manager reflected on the changes that he or she had perceived during the three years prior to the study (which was conducted at the end of 2010).*

Findings: *The results show that during these years, on average, environmental and funding uncertainty have indeed significantly increased, whereas cost*

Advances in Management Accounting, Volume 29, 1–31

ISSN: 1474-7871/doi:10.1108/S1474-787120170000029004

system design and intensity of use have shown little change. The results further indicate that change in environmental uncertainty is positively related to changes in cost system complexity and cost system inclusiveness for activities and/or programs, whereas change in funding uncertainty is positively related to change in cost system intensity of use for product costing purposes. Also, change in cost system complexity is positively related to changes in cost system intensity of use for both operational control and product costing purposes.

Originality/value: *Whereas previous large-scale research tends to focus on how the level of cost system design and/or intensity of use characteristics is related to the level of contextual factors, this study focuses on how changes in cost system design and intensity of use characteristics are related to changes in contextual factors. Also distinctive is that this study focuses on local government organizations experiencing a fiscal crisis.*

Keywords: Management accounting change; cost system design; cost system intensity of use; uncertainty; local government; fiscal crisis

INTRODUCTION

To date, our knowledge about the design and use of cost systems in public sector organizations operating in "normal" circumstances is limited (e.g., Geiger & Ittner, 1996), and we know even less about this (and many other accounting) topic(s) in times of crisis (Bracci, Humphrey, Moll, & Steccolini, 2015). To extend this knowledge, this study focuses on changes in the design and use of cost systems in Dutch local government, which are the core part of their administrative systems that provide financial information to the municipal managers and decision makers, during the first three years after the outbreak of the global financial crisis. It follows the contingency-based literature on management accounting and control systems (MACSs), in assuming that in order to be effective, an organization's MACSs have to be aligned with the nature of its internal and external environment. Here we focus in particular on changes in the level of environmental and funding uncertainty because we expect these two factors to be (most) highly affected by the current fiscal crisis that has resulted from the recent global financial and economic crisis (Kickert, 2012; Janke, Mahlendorf, & Weber, 2014), and because contingency-based research, on which we strongly build when developing our hypotheses, has shown that the level of uncertainty that an organization is (perceived to be) confronted with has a large impact on the design and use of MACSs

(Chenhall, 2003; Otley, 2016).[1] We explicitly focus on *both* environmental and funding uncertainty, given that, whereas these two types of uncertainty are typically closely related in private sector organizations, this is mostly not (or at least not as much) the case in public sector organizations. In general, contingency-based research suggests that when environmental and funding uncertainty increase, organizations use more sophisticated cost systems and make more intensive use of cost information for managerial decision-making purposes (e.g., Khandwalla, 1972; Gordon & Miller, 1976; Al-Omiri & Drury, 2007). These relationships have mostly been studied and found in studies of private sector organizations operating in "normal" circumstances, however, and may not (fully) apply to public sector organizations and/or times of crisis.

This study thus aims to examine whether changes in environmental and funding uncertainty during the first three years after the outbreak of the global financial crisis are associated with changes in how cost systems are designed, and in how intensively these systems are used for different purposes. Our overall objective is to examine how different types of uncertainty, cost system design, and cost system intensity of use evolve and co-evolve over time, in particular among local government organizations experiencing a fiscal crisis. A dataset of survey responses from 56 Dutch municipalities is used for the empirical analyses. We believe that Dutch local government provides an ideal setting for our study because changes in financial reporting regulations in 2003 have provided more autonomy for Dutch municipalities to design their cost system. Due to this change in autonomy, we are able to assess whether simultaneous changes in cost system design and intensity of use have occurred as a response to (presumably significantly) increased levels of environmental and funding uncertainty during the crisis in a substantial number of organizations. Also, the fact that these organizations share many similarities (e.g., in terms of task characteristics and technology; cf., Johansson & Siverbo, 2014) provides some natural control against omitted variable bias. We follow the approach of Baines and Langfield-Smith (2003) by asking our respondents to reflect on the changes they had perceived during the three years prior to the study (which was conducted at the end of 2010).[2] We focus on a three-year time frame because it seems reasonable for the relationships that we focus on and the fact that we have no strong a priori theory or empirical support to predict another particular time frame. Underlying the study is a research model that basically assumes that changes in cost system design are related to changes in the context in which the cost system is being used, and that both are related to changes in how intensively the cost system is used within that context.

This study aims to contribute to the literature on the design and effectiveness of cost systems in at least two ways. First, whereas previous large-scale

research tends to focus on how the level of cost system design and/or intensity of use characteristics is related to the level of contextual factors, our study focuses on how changes in cost system design and intensity of use characteristics are related to changes in contextual factors. We examine both the extent to which there have been, as well as associations among, changes in the design and intensity of use of cost systems, and in the context in which these systems are being used. Moreover, different from related studies, which have mainly focused on rather broad conceptualizations of management accounting change, such as the number of changes (e.g., Libby & Waterhouse, 1996) and/or how these changes can best be classified (e.g., Sulaiman & Mitchell, 2005), our study focuses on changes in specific cost system design and intensity of use characteristics. Second, whereas previous large-scale research in this area tends to focus on private sector organizations operating in "normal" circumstances, our study focuses on local government organizations experiencing a fiscal crisis. As such, our study is conducted in a different setting and during a special time period and provides new insights into how the design and intensity of use of cost systems of governmental organizations change in response to changes in environmental and funding uncertainty. Although *some* of the relationships examined in this study have been studied before, only a few prior studies have done so in public sector organizations, and *none* has done so in terms of changes and/or in times of crisis.

The remainder of this chapter is structured as follows. Section 2 discusses background and hypothesis development. Section 3 describes the research methods. Section 4 presents and discusses the results. Finally, Section 5 summarizes and concludes the study.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Fig. 1 shows the conceptual research model describing the variables and the relationships examined in this study.[3] In the following subsections, we first provide background on Dutch local government, and then review the literature and develop our hypotheses.[4]

Background on Dutch Local Government

Dutch Local Government and the Fiscal Crisis

In the Netherlands, municipalities are considered the most important and visible level of subnational government in the Dutch decentralized unitary

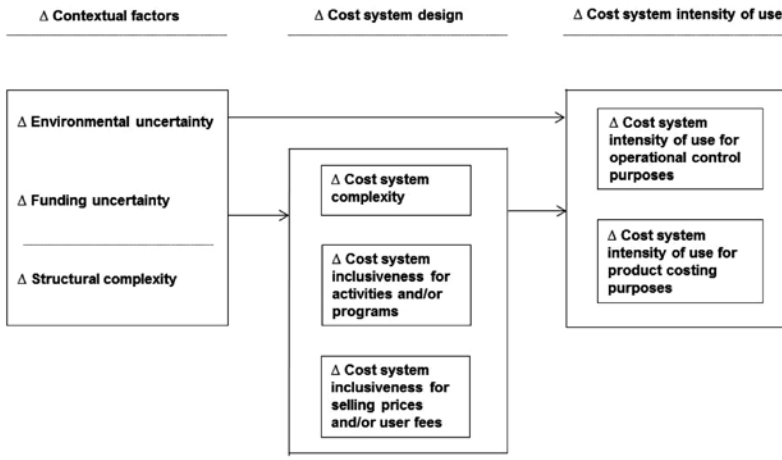

Fig. 1. Conceptual Research Model.

state (Hendriks & Tops, 2003). They are rather autonomous in organizing their business operations, and central government funding is by far their most important source of income. This funding is effectuated via specific and general grants. Specific grants are earmarked revenues meant to finance (most of) local governments' duties imposed by the central government and are based on the specific cost drivers of the activities performed. General grants are not earmarked and come from the municipal fund, which allocates the available resources among all municipalities. Since the amount of the municipal fund depends upon the central government's expenditures (this is called the "go upstairs, go downstairs" approach), the exact amount of this fund is unknown until about two years after each budget year. As their income from the municipal fund covers approximately one-third of their expenditures, this delay (always) causes considerable uncertainty for the municipalities. Similar to governmental organizations in many other Organisation for Economic Co-operation and Development (OECD) countries, Dutch municipalities are strongly impacted by the current fiscal crisis. As a result, these organizations have to cut back expenditures, while at the same time the demand for (improved) public services continues (Pollitt, 2010). According to Kickert (2012), the recent/current global financial, economic, and fiscal crisis consisted of three stages: (1) the financial crisis, causing governments (in 2008) to save and support banks; (2) the economic crisis, causing governments (in 2009) to take economic recovery measures; and (3) the fiscal crisis of state debts and budget deficits, causing governments (from 2010 onwards) to take

fiscal cutback measures. With hindsight, until the end of 2010, Dutch municipalities have been relatively sheltered from the crisis, in the sense that the central government did not reduce its funding to the municipalities.

In the course of 2010, this situation changed dramatically. In April of that year, a working group of Dutch public officials, appointed to consider possible cutback measures for the central government, proposed to reduce the municipal fund by 1.7 billion euros, about 10% of its amount, after a period in which it had been relatively stable, in terms of level and structure, for a number of consecutive years (Ministry of Finance, 2010). In the coalition agreement of the new cabinet that came into office in October 2010, it was announced that this cabinet intended to lower the municipal fund considerably. This would mainly be done by re-implementation of the "go upstairs, go downstairs" approach. Due to the crisis, this approach was not followed during the years 2009–2011, but the coalition intended to use it again from 2012 onward. The negative financial effect of this measure was first calculated to be 1.34 billion euros for the municipalities and provinces together (Coalition Agreement, 2010), but on December 6, 2010 (so about two months later), the Dutch Ministry of the Interior and Kingdom Relations announced that recalculation revealed that this amount had to be adjusted to 1.77 billion euros (Ministry of the Interior and Kingdom Relations, 2010).

It was exactly in this period that we send out our survey, so at that moment, the level of uncertainty about the income received from the central government had recently increased (even more) heavily because of the possible reductions of the municipal fund. However, this change in funding uncertainty was even greater because not only the size of the fund was being reconsidered, but also how it would be allocated among the municipalities, as the criteria and their weights were under study of a working group. In addition to this uncertainty about their funding, municipalities were also confronted with changes in other types and sources of uncertainty, such as increases in the level of environmental and funding uncertainty due to changes in customer behavior (cf., Budding, 2004). The new cabinet's intention to further decentralize activities from the central government to the municipalities (in particular in the area of social services), also increased their level of environmental and funding uncertainty, especially because these decentralizations were accompanied by significant cuts in the available budgets, as the municipalities were assumed to execute these activities more efficiently.

Cost System Design and Intensity of Use in Dutch Local Government

In Dutch local government, cost systems are the core part of the administrative systems that provide financial information to municipal managers and

decision makers. Until 2004, Dutch municipalities were required by law to use rather sophisticated cost systems, in that they had to report their costs and revenues according to a standard, rather detailed format and to use a specific method (the "cost pool method") to allocate their indirect costs, for external reporting purposes. These obligations were withdrawn in 2003. However, parallel to this withdrawal, new regulations forced the municipalities to provide information on the costs and revenues of their activities, on a full cost basis, to Statistics Netherlands. Moreover, full cost information also remained important for price setting purposes, as Dutch municipalities are allowed to charge tariffs up to full costs for a number of specific services (Groot & Budding, 2004).

Research conducted shortly after this policy change revealed that there were indications that some municipalities used this freedom to make (limited) simplifications to their cost systems; besides for most municipalities, the design of their cost system was not an issue of much interest (Dekker & Budding, 2005). This changed at the end of 2009, when the *Commissie BBV* (the municipal financial reporting interpretations committee) aimed to publish a note in which recommendations were to be given to the municipalities on the design of their cost system. Stimulated by this, in the beginning of 2010, the Federatie van Algemene Middelenmanagers bij de Overheid (FAMO)[5] organized a number of workshops, which attracted a large number of participants, in particular, municipal financial managers and senior policy advisors. This indicates that cost system design had become an issue of interest for Dutch local government. The main elements in the discussions were (1) whether the cost systems could be simplified, and if so how, and (2) related to the first issue, how much freedom Dutch law actually provides, given that full cost information is still necessary for a number of (obligatory) purposes. The workshops indicated a large variation in views on these issues and, due to the fact that also within the committee the opinions varied greatly, the *Commissie BBV* ultimately also did not succeed in formulating recommendations.

Literature Review and Hypothesis Development

Management Accounting Change and Its Determinants

Contingency-based research on MACSs assumes that in order to be effective, an organization's MACSs have to be aligned with the nature of its internal and external environment. Whereas contingency-based studies typically analyze the alignment between a MACS and its environment at one point in time, this can also be analyzed from a change perspective.[6] Modell (2007)

has reviewed the growing literature on management accounting change and classified the research on this subject into two broad categories: factor studies and process-oriented approaches. Factor studies seek to identify the contextual factors that contribute to and hamper the effective implementation of management accounting techniques, in particular "novel" ones such as activity-based costing (ABC). These studies are thus concerned with identifying the factors that explain management accounting change, or a lack thereof. As observed by Modell, they are similar to the (more general) contingency-based research on MACSs that seeks to identify what factors determine differences in the design and use of MACSs, and subsequent implications for the effectiveness of such systems, but are more concerned with the dynamic aspects of implementation. The studies that were classified in the second category ("process-oriented approaches") by Modell are more interested in the intricate social and political dynamics of implementation. They examine the change processes in much greater detail, using theories that "share a concern with the wider social and political ramifications of change beyond merely managerial considerations" (Modell, 2007, p. 344). The main theories used in these studies are various institutional theories, such as new institutionalism and old institutional economics (e.g., Siti-Nabiha & Scapens, 2005).

Similar to the (more general) contingency-based research on MACSs, contingency-based studies of management accounting change (i.e., what Modell (2007) refers to as "factor studies") have examined the influence of a wide variety of factors, related to both the internal and external environment of organizations, on (in most cases rather broad conceptualizations of) management accounting change. Using a dataset of Canadian manufacturing firms, Libby and Waterhouse (1996) analyzed changes in MACSs and several contextual factors for the years 1991–1993. They found that the firms in their study "did not experience a paradigm shift in accounting but instead present evidence that is consistent with evolutionary change" (Libby & Waterhouse, 1996, p. 147). That is, MACSs were not added or deleted completely but were changed incrementally. Furthermore, they found that MACSs are relied upon more in organizations facing greater competition and that competitiveness is also associated with change. Their study has been replicated and extended in later time periods in Singapore (1995–1997; Williams & Seaman, 2001), Malaysia (1997–2001; Sulaiman & Mitchell, 2005), and France (2002–2005; Chanegrih, 2008). Chanegrih (2008) compared the findings of these four studies and found large differences in the average annual number of changes, which he believes may be caused by the varying macroeconomic conditions at the times of the studies. In all studies, compared to changes in other types of MACSs, the number of changes in cost systems was relatively low.

Furthermore, Chanegrih confirmed Libby and Waterhouse's observation that MACS changes are more evolutionary than revolutionary in nature. This is especially the case for cost system changes: Chanegrih (2008) found that 38.1% of the changes in cost systems are (only) operational modifications.

Instead of focusing on the number of changes in MACSs and/or how these changes can best be classified, and how these aspects are related to contextual factors, Baines and Langfield-Smith (2003) have examined the determinants of management accounting change more directly, using survey responses from Australian manufacturing firms. They asked their respondents, among others, to what extent their business unit during the past three years had been confronted with changes in its competitive environment, had changed its competitive strategy, and had changed its use of a range of contemporary management accounting practices. Baines and Langfield-Smith hypothesized that as firms will be facing a more competitive environment, they will adapt their competitive strategy toward a differentiation strategy, which in turn will result in (among others) greater use of advanced management accounting practices. Using covariance-based structural equation modeling (CB-SEM), they found empirical support for these hypotheses.

Changes in Contextual Factors and Cost System Design

Since the late 1980s, researchers have extensively studied the design, use, and effectiveness of cost systems. Initially, they have mainly focused their attention on the determinants and performance consequences of ABC adoption (e.g., Bjørnenak, 1997; Cagwin & Bouwman, 2002), whereas more recently they have shifted their attention to examining these issues in relation to the complexity or "sophistication" of cost systems in terms of the applied overhead absorption procedures (e.g., Abernethy, Lillis, Brownell, & Carter, 2001; Drury & Tayles, 2005). In these latter studies, the design of cost systems is operationalized mainly based on the number of cost pools and cost allocation bases used in the system. Brierley (2008) has criticized this literature, however, for still being too narrow in defining and measuring cost system design choices. Based on field study interviews with British management accountants, he identified 16 different definitions of "cost system sophistication," of which the complexity of cost systems in terms of the applied overhead absorption procedures and the inclusiveness of product costs were the most important. Brierley, therefore, argued that in addition to the complexity of cost systems as defined above, other definitions of "sophistication" are also important and should also be examined. In this study, we build on the two main definitions of "cost system sophistication" identified by Brierley (2008),

cost system complexity and cost system inclusiveness (which we define as the extent to which indirect costs are allocated to major types of cost objects), and for the latter distinguish between two major types of cost objects: cost system inclusiveness for activities and/or programs and cost system inclusiveness for selling prices and/or user fees.

Concerning the effect of environmental uncertainty on cost system design choices, attention has in particular been paid to the level of competition that organizations face, as (changes in) market activities of competitors are a major source of uncertainty for many organizations (Otley, 2016). Studies have typically found that when organizations face more intensive competition, they use more sophisticated cost systems (e.g., Khandwalla, 1972; Gordon & Miller, 1976; Al-Omiri & Drury, 2007). It is argued that in those circumstances organizations have a greater need for complex cost systems that (are presumed to) more accurately assign costs to their products and/or other cost objects. This is important given that in highly competitive markets any mistakes made from relying on inaccurate cost information are more likely to be exploited by competitors (Drury & Tayles, 2005; Al-Omiri & Drury, 2007). Similarly, facing more intensive competition also increases organizations' need for detailed cost information, which is typically satisfied by increasing cost system inclusiveness. Having such information is important given that in highly competitive markets organizations are typically forced into intensive cost control and/or reduction efforts, which require good insight into their costs, in particular overhead costs. Although municipalities face less competition from competitors than most private sector organizations, for them other sources of environmental uncertainty, such as (changes in) actions of the central government and customer behavior (cf., Budding, 2004), are also (or relatively more) important. Given that these other sources of environmental uncertainty also generally increase organizations' information demand, they seem to have a similar effect on cost system design as (changes in) market activities of competitors. Overall, we believe that these arguments equally apply when focusing on changes in (as opposed to the level of) these variables and therefore expect that when municipalities experience more environmental uncertainty, their need for both accurate and detailed cost information increases, and as a result, their need for a more complex and inclusive cost system. Accordingly, we hypothesize that:

Hypothesis 1. Change in environmental uncertainty is (a) positively related to change in cost system complexity, (b) positively related to change in cost system inclusiveness for activities and/or programs, and (c) positively related to change in cost system inclusiveness for selling prices and/or user fees.

Studies of governmental organizations tend to focus primarily on the influence of factors that are more idiosyncratic for such organizations, such as the influence of (differences or changes in) funding sources. In a study among 59 units of the U.S. Federal Government, Geiger and Ittner (1996) found that units that are required to cover their expenditures through sales revenues for goods and services to other government agencies or the private sector, and that as a result have to cope with more funding uncertainty, tend to implement more sophisticated cost systems than units without such requirements. Similarly, Cavalluzzo, Ittner, and Larcker (1998) analyzed the introduction of external competition and fee-for-service requirements in branches of the U.S. Federal Reserve System and found that these entities responded to the new legislation by improving their efficiency and by reallocating indirect costs to less competitive services. These studies thus show that governmental organizations react to changes in their funding sources by changing the design (and use) of their cost system. Geiger and Ittner (1996) particularly found evidence showing that change in funding uncertainty is positively related to cost system inclusiveness for selling prices and/or user fees in that their results show that "revolving funds [which is their proxy for funding uncertainty] are positively related to full costing and the number of overhead categories […], consistent with revolving funding's requirement to [fully] recover costs through sales revenues" (p. 561). We also expect a positive relation with our other two cost system design characteristics, given that (similar to change in environmental uncertainty) when municipalities experience more funding uncertainty, their need for both accurate and detailed cost information increases, and as a result, their need for a more complex and inclusive cost system. We, therefore, hypothesize that:

> **Hypothesis 2.** Change in funding uncertainty is (a) positively related to change in cost system complexity, (b) positively related to change in cost system inclusiveness for activities and/or programs, and (c) positively related to change in cost system inclusiveness for selling prices and/or user fees.

Changes in Contextual Factors and Cost System Intensity of Use

With regard to the intensity of use of cost systems for different purposes, we build on Geiger and Ittner (1996) and distinguish between intensity of use for operational control purposes, such as to manage activities and/or programs, and intensity of use for product costing purposes, such as to determine selling prices and/or user fees. This seems important given that prior studies suggest that usage for typical operational control purposes generally requires a more complex cost system than usage for typical product costing purposes

(e.g., Kaplan & Cooper, 1998). This is based on the fact that for operational control purposes an understanding of what causes costs to occur is important, which is much less the case for product costing purposes (Kaplan & Cooper, 1998; Schoute, 2009). On the other hand, for product costing purposes it is relatively more important that all relevant costs are included, as cost-based prices will, for example, be used to determine selling prices and/or user fees and for inventory valuation.

In general, studies have found that when organizations face more intensive competition, and as a result have to cope with more environmental uncertainty, they not only use more sophisticated cost systems but also make more intensive use of cost information for managerial decision-making purposes (e.g., Khandwalla, 1972; Gordon & Miller, 1976; Al-Omiri & Drury, 2007). Therefore, we expect that when municipalities experience more environmental uncertainty, they will intensify their usage of cost information for both operational control and product costing purposes. Accordingly, we hypothesize that:

Hypothesis 3. Change in environmental uncertainty is (a) positively related to change in cost system intensity of use for operational control purposes, and (b) positively related to change in cost system intensity of use for product costing purposes.

Geiger and Ittner (1996) not only found that units of the U.S. Federal Government that have to cope with more funding uncertainty tend to implement more sophisticated cost systems than other units but also that such units tend to make more use of cost system data for a wide variety of managerial decision-making purposes. That is, they found evidence showing that revolving funding (i.e., a higher level of funding uncertainty) is positively related to the use of cost system data for both operational control and product costing purposes. In our research setting, funding uncertainty is likely to have an effect on the intensity with which municipalities use their cost system for operational control purposes because in circumstances of greater funding uncertainty they may be more inclined to undertake cost control and/or reduction efforts. At the same time, funding uncertainty is also likely to have an effect on the intensity with which they use their cost system for product costing purposes, given that they have the possibility to charge tariffs up to full costs for a number of specific services (cf., Groot & Budding, 2004). Extending these arguments to relationships between changes in these variables, we hypothesize that:

Hypothesis 4. Change in funding uncertainty is (a) positively related to change in cost system intensity of use for operational control purposes, and (b) positively related to change in cost system intensity of use for product costing purposes.

Changes in Cost System Design and Cost System Intensity of Use

Given that for typical operational control purposes an understanding of what causes costs to occur is important, usage for such purposes generally requires a relatively complex cost system (e.g., Kaplan & Cooper, 1998). This suggests that when municipalities' cost systems are more complex, these systems will probably be intended and used more intensively for operational control purposes. Accordingly, we hypothesize that change in cost system complexity is positively related to change in cost system intensity of use for operational control purposes:[7]

Hypothesis 5. Change in cost system complexity is positively related to change in cost system intensity of use for operational control purposes.

When municipalities' cost systems are used more intensively for operational control purposes, such as to manage activities and/or programs, this will probably not only translate into the complexity of their cost system but also into the extent to which they allocate indirect costs to (internal/intermediate) cost objects such as activities, departments, and programs. That is, those responsible for the costs of managing these kinds of cost objects will typically not only be held responsible for their direct costs but also for (some or all of) their indirect costs. This increases their need for good insight into these costs, which is also the case when such cost objects are the object of intensive cost control and/or reduction efforts (i.e., other operational control purposes). Accordingly, we hypothesize that change in cost system inclusiveness for activities and/or programs is positively related to change in cost system intensity of use for operational control purposes:

Hypothesis 6. Change in cost system inclusiveness for activities and/or programs is positively related to change in cost system intensity of use for operational control purposes.

Finally, given that for product costing purposes, it is relatively important that all relevant costs are included, usage for such purposes generally requires a relatively large part of all indirect costs to be allocated to the main cost objects (e.g., Kaplan & Cooper, 1998). This suggests that when municipalities' cost systems allocate more of such costs to their products and services, these systems will probably be intended and used more intensively for product costing purposes, particularly as Dutch municipalities are allowed to charge tariffs up to full costs for a number of specific services (cf., Groot & Budding, 2004). Accordingly, we hypothesize that change in cost system inclusiveness for selling prices and/or user fees is positively related to change in cost system intensity of use for product costing purposes:

Hypothesis 7. Change in cost system inclusiveness for selling prices and/or user fees is positively related to change in cost system intensity of use for product costing purposes.

RESEARCH METHODS

Sample and Data Collection

The data used in this study are from a multipurpose survey, supported by the FAMO, and conducted in the period December 2010–February 2011 (see also Schoute & Budding, 2017). The target population was 426 Dutch municipalities, including all 430 municipalities at the time of research except the 4 largest. These were excluded because each has special legal, administrative, and financial arrangements with the central government which do not apply to other Dutch municipalities (cf., Groot & Budding, 2004). We mailed a 16-page questionnaire to a senior-level financial manager of the municipalities because these managers are likely to be knowledgeable about their municipality's situation concerning the variables of interest. To obtain their names and addresses, we used the member list of the FAMO. We selected only those members who were working as a "concern controller" or "chief financial officer."[8] For the non-FAMO members, we contacted the municipalities by phone to ask for the name of the most appropriate respondent. We followed many recommendations from Dillman's (2000) Tailored Design Method. The questionnaire was extensively pretested with three management accounting faculty colleagues and three practitioners with extensive knowledge of costing practices in Dutch local government, to assess and enhance understandability and content validity. Our procedure consisted of, at the most, four moments of contact. First, the respondents were sent a questionnaire; two weeks later, a reminder postcard; four weeks later, a replacement questionnaire; and finally, two weeks later, a reminder fax. Together with the questionnaire and the replacement questionnaire, the respondent was sent an accompanying letter explaining the objectives of the study and guaranteeing confidentiality, and a postage-paid return envelope.

A total of 87 municipalities returned the questionnaire, of which one was unusable. The overall usable response rate was, therefore, 20.2%. We conducted two analyses to investigate the possibility of nonresponse bias. First, we compared the respondents to the nonrespondents in terms of size (measured as the natural log of their number of inhabitants) and regional (provincial) representation. The results show that, on average, the municipalities that responded have a similar number of inhabitants and are from similar regions

as the municipalities that did not respond. Second, we conducted an early–late respondents analysis, with early and late respondents, respectively, defined as having sent back the initial or the replacement questionnaire, which shows (only) some significant differences in means for the variables examined in this study.[9] Together, these results suggest that nonresponse bias may, but is not likely to, have an influence on the results of this study. The average respondent is 46.5 years of age, has been working for his/her employer for 11.5 years, and has 15.5 years of experience in his/her current or in a similar position (with his/her current or another employer). Also, 97.7% of the respondents have at least a bachelor degree, and 56.5% have at some time during their career worked in the private sector. All respondents occupy a senior-level financial management position in their municipality (with job titles such as "head of the department of finance," "controller," or "senior policy advisor"), and are important users of the information that the cost system of their municipality provides (partly acting as intermediary for nonfinancial managers and aldermen). In Dutch municipalities, such employees are usually not involved in (or in charge of) doing the administrative work ("keeping the records"), but instead use data from the administrative system for different types of financial analyses and for internal and external financial reporting. They will typically be involved in the design of the cost system, however, which is often part of the administrative system, as well as in decisions made concerning changes in these systems. For the analyses reported in this study, the available number of observations is less than the overall sample. The sample left after using list-wise deletion for handling missing values comprised 79 cases. Moreover, given our specific focus on the three years prior to the study, we only include respondents that had been working for their employer for at least three years and that had at least three years of experience in their current or in a similar position (with their current or another employer), which provides us with a final sample of 56 cases for our main analyses.[10]

Measures

This section describes all the variables examined in this study and the measurement instruments used to measure them (see also Appendix A). To keep the questionnaire a manageable length, all instruments are single-item and use five-point Likert-type scales ranging from 1 (strongly decreased) to 5 (strongly increased). For each variable, the respondent was asked to reflect on the changes that he/she perceived during the three years prior to the study (i.e., 2008–2010).[11]

Changes in Contextual Factors

We examine changes in three contextual factors: (a) environmental uncertainty, (b) funding uncertainty, and (c) structural complexity (which is used as a control variable; see footnote 3). These variables were measured by, respectively, asking the respondents to indicate to what extent (a) the level of uncertainty about the external environment (e.g., market and technological developments; cf., Budding, 2004; Carmeli, 2004) had changed (ΔENV_UNC), (b) the level of uncertainty about the income received from the central government had changed ($\Delta FUND\_UNC$), and (c) the complexity of the structure (in terms of the number of hierarchical levels and the number of departments) of their municipality had changed ($\Delta STRUCT\_COMPL$).

Changes in Cost System Design

We examine changes in three cost system design characteristics: (a) cost system complexity, (b) cost system inclusiveness for activities and/or programs, and (c) cost system inclusiveness for selling prices and/or user fees. These variables were measured by, respectively, asking the respondents to indicate to what extent (a) the complexity of their municipalities' cost system had changed (ΔCS_COMPL), (b) the percentage of indirect (overhead) costs that is allocated to activities and/or programs had changed (ΔCS_INCLUS_ACTIV), and (c) the percentage of indirect (overhead) costs that is allocated to selling prices and/or user fees had changed (ΔCS_INCLUS_PRIC).

Changes in Cost System Intensity of Use

We examine changes in two cost system intensity of use characteristics: (a) cost system intensity of use for operational control purposes and (b) cost system intensity of use for product costing purposes. These variables were measured by, respectively, asking the respondents to indicate to what extent (a) the intensity with which the cost system is used for operational control purposes (such as performance measurement and budgeting) had changed (ΔCS_INTENS_OPER) and (b) the intensity with which the cost system is used for product costing purposes (such as determining user fees and inventory valuation) had changed (ΔCS_INTENS_PROD).

RESULTS

Descriptive Statistics and Correlations

Table 1 presents the descriptive statistics (Panel A) and Pearson correlations (Panel B) for the variables of interest.

Table 1. Descriptive Statistics and Pearson Correlations.

Variables	Panel A					Panel B						
	Mean	SD	Median	Min	Max	ΔCS_COMPL	ΔCS_INCLUS_ACTIV	ΔCS_INCLUS_PRIC	ΔCS_INTENS_OPER	ΔCS_INTENS_PROD	ΔENV_UNC	$\Delta FUND\_UNC$
ΔCS_COMPL	2.946	0.724	3.00	1	5	–						
ΔCS_INCLUS_ACTIV	2.929	0.599	3.00	1	5	0.662***	–					
ΔCS_INCLUS_PRIC	3.071	0.599	3.00	1	5	0.470***	0.674***	–				
ΔCS_INTENS_OPER	2.857*	0.586	3.00*	1	4	0.539***	0.437***	0.237*	–			
ΔCS_INTENS_PROD	3.071	0.568	3.00	1	4	0.496***	0.390***	0.306**	0.524***	–		
ΔENV_UNC	3.946***	0.699	4.00***	3	5	0.282**	0.295**	0.096	0.114	0.102	–	
$\Delta FUND\_UNC$	4.339***	0.695	4.00***	3	5	0.001	–0.072	–0.016	0.077	0.168	0.300**	–
$\Delta STRUCT\_COMPL$	2.804*	0.818	3.00*	1	5	0.381***	0.305**	0.029	0.168	0.070	0.108	–0.073

Notes: $N = 56$; ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively. In Panel A, significance indicates whether the mean (median) is significantly different from 3 ("remained about the same") according to the one-sample *t*-test (one-sample Wilcoxon signed ranks test). Variable definitions: ΔENV_UNC = change in environmental uncertainty; $\Delta FUND\_UNC$ = change in funding uncertainty; $\Delta STRUCT\_COMPL$ = change in structural complexity; ΔCS_COMPL = change in cost system complexity; ΔCS_INCLUS_ACTIV = change in cost system inclusiveness for activities and/or programs; ΔCS_INCLUS_PRIC = change in cost system inclusiveness for selling prices and/or user fees; ΔCS_INTENS_OPER = change in cost system intensity of use for operational control purposes; ΔCS_INTENS_PROD = change in cost system intensity of use for product costing purposes.

As observed in Panel A, on average, senior financial managers perceived no significant changes in cost system design during the years 2008–2010, whereas for changes in cost system intensity of use, they only perceived that intensity of use for operational control purposes had decreased. They did perceive significant changes in the contextual factors, however. On average, as may be expected given the crisis, environmental and funding uncertainty were both perceived to have increased, and structural complexity was perceived to have decreased.[12] Overall, this indicates that during the first three years after the outbreak of the global financial crisis, environmental and funding uncertainty have significantly increased, whereas cost system design and intensity of use have shown little change.

As observed in Panel B, the three variables reflecting on changes in cost system design and the two variables reflecting on changes in cost system intensity of use are all positively correlated. This indicates that changes in these variables, to the extent that they have occurred during the years 2008–2010, appear to have occurred together. The correlations with the changes in contextual factors show several significant associations with changes in cost system design but not with changes in cost system intensity of use.

PLS Path Modeling

Given the complexity of the research model in relation to our sample size, we use partial least squares structural equation modeling (PLS-SEM), as opposed to CB-SEM, to analyze the research model and next test the robustness of our analysis using OLS and ordinal regression.[13] We use SmartPLS 3 for the analysis (Ringle, Wende, & Becker, 2014) and bootstrapping to compute *t*-values of coefficients ($N = 5000$). Table 2 presents the PLS path modeling results and Fig. 2 presents a graphical representation of the supported and unsupported linkages.[14]

As observed in Table 2, the R^2s vary between 1.2% and 33.6%, showing adequate model fit for all endogenous latent variables except change in cost system inclusiveness for selling prices and/or user fees (ΔCS_INCLUS_PRIC).

For the hypothesized effects of change in environmental uncertainty, we find support for H1a and H1b, which predict that change in environmental uncertainty (ΔENV_UNC) is positively related to change in cost system complexity (ΔCS_COMPL) and change in cost system inclusiveness for activities and/or programs (ΔCS_INCLUS_ACTIV), but not for H1c, which predicts that change in environmental uncertainty is positively related to change in cost system inclusiveness for selling prices and/or user fees (ΔCS_INCLUS_PRIC). Possible explanations for the different findings for the inclusiveness variables are that

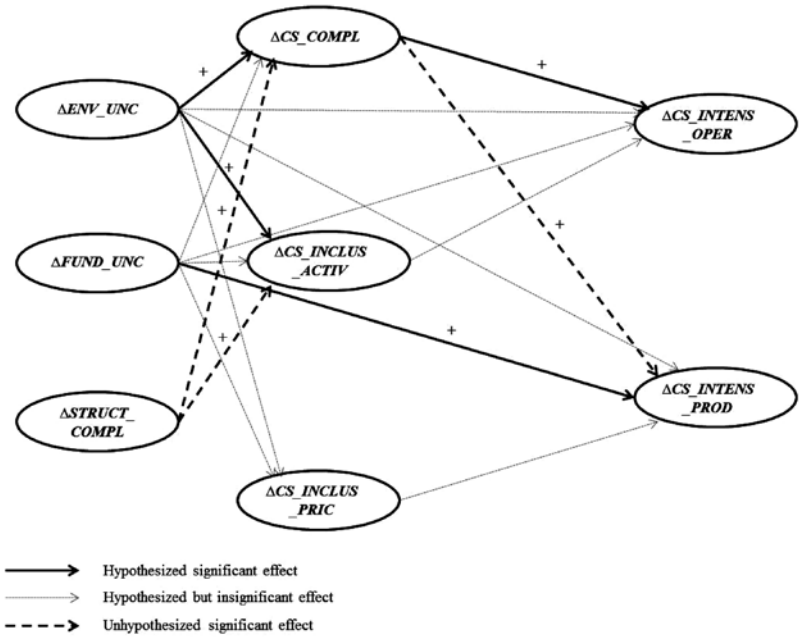

Fig. 2. Graphical Representation of the Supported and Unsupported Linkages.

(a) allocating a higher percentage of indirect costs to activities and/or programs may be relatively more relevant for the cost control and/or reduction efforts that many organizations are forced into in highly competitive markets (although this is less relevant in our research setting than for many private sector organizations) or due to other sources of environmental uncertainty, and (b) municipalities may be relatively more hesitant to change the percentage of indirect costs allocated to their selling prices and/or user fees because of cost-sensitivity of their clients and/or because it may be difficult to reverse any changes made at a later point in time. For change in funding uncertainty, the results provide no support for H2a, H2b, and H2c, which predict that change in funding uncertainty ($\Delta FUND\_UNC$) is positively related to change in cost system complexity (ΔCS_COMPL), change in cost system inclusiveness for activities and/or programs (ΔCS_INCLUS_ACTIV), and change in cost system inclusiveness for selling prices and/or user fees (ΔCS_INCLUS_PRIC). This indicates that change in funding uncertainty did not have a strong influence on changes in the design of the municipalities' cost systems. Overall, the findings for changes in environmental and funding uncertainty provide some support for the idea that changes in these two types of uncertainty have different effects on changes in the design of cost systems.

Table 2. PLS Path Modeling Results.

Variables	ΔCS_COMPL	ΔCS_INCLUS_ACTIV	ΔCS_INCLUS_PRIC	ΔCS_INTENS_OPER	ΔCS_INTENS_PROD
ΔENV_UNC	0.260**	0.311**	0.109	–0.126	–0.134
	(2.098)	(2.326)	(0.812)	(1.109)	(1.236)
$\Delta FUND\_UNC$	–0.052	–0.146	–0.047	0.128	0.211*
	(0.616)	(1.214)	(0.415)	(1.124)	(1.897)
ΔCS_COMPL				0.488***	0.471***
				(2.658)	(2.708)
ΔCS_INCLUS_ACTIV				0.311	0.191
				(1.146)	(0.828)
ΔCS_INCLUS_PRIC				–0.186	–0.024
				(0.851)	(0.133)
$\Delta STRUCT\_COMPL$	0.349***	0.261**	0.014	–0.084	–0.137
	(2.952)	(2.029)	(0.193)	(0.995)	(1.254)
R^2	0.206**	0.182**	0.012	0.336**	0.313***

Notes: $N = 56$; Cell statistics are standardized coefficients and *t*-values. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively. As recommended by, for example, Hair, Ringle, and Sarstedt (2011) and Henseler, Ringle, and Sinkovics (2009), we used the options "path weighting scheme" (as weighting scheme during the PLS procedure) and "individual sign changes" (to deal with sign changes during the bootstrapping procedure) for our analysis. Variable definitions: ΔENV_UNC = change in environmental uncertainty; $\Delta FUND\_UNC$ = change in funding uncertainty; $\Delta STRUCT\_COMPL$ = change in structural complexity; ΔCS_COMPL = change in cost system complexity; ΔCS_INCLUS_ACTIV = change in cost system inclusiveness for activities and/or programs; ΔCS_INCLUS_PRIC = change in cost system inclusiveness for selling prices and/or user fees; ΔCS_INTENS_OPER = change in cost system intensity of use for operational control purposes; ΔCS_INTENS_PROD = change in cost system intensity of use for product costing purposes.

With respect to the hypothesized effects of changes in the two contextual factors on changes in cost system intensity of use, we only find support for H4b, which predicts that change in funding uncertainty ($\Delta FUND\_UNC$) is positively related to change in cost system intensity of use for product costing purposes (ΔCS_INTENS_PROD). This supports that the use of cost systems for product costing purposes becomes more important in conditions of decreasing financial resources (cf., Geiger & Ittner, 1996) and suggests that the possibility that Dutch municipalities have to charge tariffs up to full costs for a number of specific services may be used more as their funding by the central government becomes less (or at least, less certain).[15] The results provide no support for H3a and H3b, which predict that change in

environmental uncertainty (ΔENV_UNC) is positively related to changes in cost system intensity of use for operational control and product costing purposes (ΔCS_INTENS_OPER and ΔCS_INTENS_PROD), and for H4a, which predicts that change in funding uncertainty ($\Delta FUND\_UNC$) is positively related to change in cost system intensity of use for operational control purposes (ΔCS_INTENS_OPER). Apparently, except for the relationship between the changes in funding uncertainty and intensity of use for product costing purposes, changes in the two contextual factors did not have a strong influence on the intensity of use of the municipalities' cost system.[16]

With respect to the hypothesized effects of changes in the cost system design characteristics on changes in cost system intensity of use for different purposes, we find support for H5, which predicts that change in cost system complexity (ΔCS_COMPL) is positively related to change in cost system intensity of use for operational control purposes (ΔCS_INTENS_OPER). Given that change in cost system complexity (ΔCS_COMPL) is also significantly positively related to change in cost system intensity of use for product costing purposes (ΔCS_INTENS_PROD), the results suggest that more complex (and presumably more accurate) cost systems may not only be beneficial for operational control purposes, for which an understanding of what causes costs is important, but also for product costing purposes. Also, the results provide no support for H6, which predicts that change in cost system inclusiveness for activities and/or programs (ΔCS_INCLUS_ACTIV) is positively related to change in cost system intensity of use for operational control purposes (ΔCS_INTENS_OPER). Similarly, the results also provide no support for H7, which predicts that change in cost system inclusiveness for selling prices and/or user fees (ΔCS_INCLUS_PRIC) is positively related to change in cost system intensity of use for product costing purposes (ΔCS_INTENS_PROD). Overall, given that the effects of change in cost system inclusiveness for activities and/or programs (ΔCS_INCLUS_ACTIV) on change in cost system intensity of use for product costing purposes (ΔCS_INTENS_PROD) and change in cost system inclusiveness for selling prices and/or user fees (ΔCS_INCLUS_PRIC) on change in cost system intensity of use for operational control purposes (ΔCS_INTENS_OPER) are also not significant, changes in the inclusiveness of the municipalities' cost system are found to be unrelated to changes in the intensity with which these systems are used for managerial decision-making purposes.

Finally, the results show that change in structural complexity, which we control for in the empirical analyses, is positively related to change in cost system complexity and change in cost system inclusiveness for activities and/or programs. These findings are consistent with those from prior

contingency-based (level) studies (e.g., Groot & Budding, 2004; Al-Omiri & Drury, 2007) and reinforce the importance of structural complexity for shaping cost system design. As their organizational structure is (becomes) more complex, the cost system of an organization is (is adapted to become) also more complex. This happens in order to ensure that this system continues to reflect their structure after adapting it. Similarly, as their organizational structure is (becomes) more complex, meaning that their organizational model involves more hierarchical levels and departments (cf., Aardema, 2010), their need for detailed cost information concerning their activities and programs is higher (increases).

DISCUSSION AND CONCLUSIONS

This study uses survey data from 56 Dutch municipalities to examine whether changes in environmental and funding uncertainty during the first three years after the outbreak of the global financial crisis (which we presume to have increased significantly) are associated with changes in how cost systems are designed and in how intensively these systems are used for different purposes. The results show that during these years, on average, environmental and funding uncertainty have indeed significantly increased, whereas cost system design and intensity of use have shown little change. The results further indicate that change in environmental uncertainty is positively related to changes in cost system complexity and cost system inclusiveness for activities and/or programs, whereas change in funding uncertainty is positively related to change in cost system intensity of use for product costing purposes. Also, change in cost system complexity is positively related to changes in cost system intensity of use for both operational control and product costing purposes.

Some of the empirical results merit further discussion. Overall, most of the relationships found in this study are consistent with findings from previous contingency-based research on how these variables are related to each other in terms of their level at one point in time, which reinforces their importance for shaping cost system design and intensity of use. To the extent that our results do not match the expectations, this may have different causes. First, it may partly be due to the specific time period that our study focuses on, in that it may have been so extreme that certain relationships that hold in "normal" circumstances did not hold in this particular time period. Second, it may also partly be due to specific circumstances of the municipalities that our study focuses on, such as the fact that they come from a situation in which they were required by law to use rather sophisticated cost systems for external reporting

purposes, which may have caused them to react in opposite directions, with some of the municipalities decreasing (as opposed to increasing) the complexity, inclusiveness, and/or intensity of use of their cost system.[17]

Our survey data provide some additional insights into these issues, in the sense that in the questionnaire, we have not only asked the respondents to reflect on the changes in the variables of interest that they perceived during the three years prior to the study (i.e., 2008–2010) but also on the changes in these variables that they expected for the next three years (i.e., 2011–2013). On average, senior financial managers expected significant changes for all cost system design and intensity of use characteristics during these next years, except for cost system inclusiveness for activities and/or programs. For the three design characteristics, they expected that cost system complexity would decrease,[18] whereas cost system inclusiveness for selling prices and/or user fees would increase. For the two intensity of use characteristics, they expected that the cost system intensity of use for both operational control and product costing purposes would increase. For the contextual factors, on average, as may be expected given the crisis, both environmental and funding uncertainty were expected to increase (and no changes were expected for structural complexity).[19] Overall, this indicates that during the years 2011–2013, environmental and funding uncertainty were again expected to increase, but now also cost system design and intensity of use were expected to show much change, suggesting that some municipalities may have postponed changing the design and intensity of use of their cost system as a response to the increased levels of perceived environmental and funding uncertainty.[20]

From a theoretical point of view, our results are consistent with earlier research that has shown that management accounting changes more often lag behind changes in contextual factors (e.g., Dunk, 1989; Janke et al., 2014). Given that some of the expected relationships are found but others not, our results suggest that some cost system design and intensity of use characteristics may be adapted more quickly to changes in certain contextual factors than others. More research on this issue is necessary, however, preferably using more detailed focused surveys and/or longitudinal studies of particular organizations. From a managerial point of view, our results provide more insight into the changes that Dutch municipalities have made in the design and intensity of use of their cost system during the first three years after the outbreak of the global financial crisis in order to keep their system aligned with the context in which it is being used. This clearly shows that cost system design and intensity of use are not static but can be (and are being) changed if the nature of the environment of an organization changes.

The findings of this study are subject to a number of limitations. Because cross-sectional research can establish associations, but not causality, the direction of effects cannot be established with certainty. Also, there may be omitted variables that may bias the results. Another issue that may potentially influence the findings is measurement error, especially as all measures are single-item, perceptual measures. Furthermore, we have conducted a cross-sectional survey using retrospective measures, that is, by asking the respondents to reflect on a past time period. Future studies may want to examine the changes (and relationships among the changes) in the variables of interest using a longitudinal survey in which a questionnaire is repeatedly sent to the same sample of organizations. Another issue is that the survey data were collected from one respondent in each municipality, who were all working as financial managers. Although such respondents are likely to be knowledgeable about their municipalities' situation concerning the variables of interest, their positions may have led to common method bias. Finally, there is the issue of generalizability. The sample size of this study is rather limited, and although comparisons with the population show that the sample is representative in terms of size and regional representation, it may be biased with respect to other (unknown) variables. Despite these limitations, this study presents a step further in our understanding of (changes in) the design and intensity of use of cost systems, in particular as used by local government organizations experiencing a fiscal crisis.

NOTES

1. As defined by Otley (2014, pp. 83–84), uncertainty is "basically a lack of ability to predict the future events which may occur and/or to forecast the likely consequences of such events. It is not an objective phenomenon but rather an attribute of a person (or group of persons) attempting to understand the world and how it operates." Consistent with this definition, contingency-based research typically relies on managers' *perceptions* to measure the different types and sources of uncertainty (Otley, 2016), as "it is these perceptions that will influence decisions with respect to […] [changes in] organizational and management accounting variables" (cf., Baines & Langfield-Smith, 2003, p. 684).

2. Although we examine our focal variables and relationships among local government organizations experiencing a fiscal crisis, we do *not* (aim to) *directly* examine whether the design and intensity of use of their cost systems have been affected by the current fiscal crisis. A suitable approach for doing so would, for example, have been to conduct a longitudinal survey, by sending the same questionnaire to the same sample of municipalities both before and (some time) after (the beginning of) the fiscal crisis.

3. As shown in Fig. 1, in addition to our focal variables and relationships, we control for the influence of change in structural complexity. We do so because organizational structure has frequently been argued and shown to be related to cost system design and intensity of use (e.g., Groot & Budding, 2004; Al-Omiri & Drury, 2007), and the fact that many Dutch municipalities recently seem to have simplified their organizational structure by implementing an organizational model that involves less hierarchical levels and departments (cf., Aardema, 2010).

4. When developing our hypotheses, we strongly build on (contingency-based) level studies (similar to, e.g., Baines & Langfield-Smith, 2003) and employ a Cartesian (continuous and incremental change) approach to fit (cf., Gerdin & Greve, 2004). We consider it an empirical question whether the relationships found in level studies equally apply when focusing on the relationships among changes in our variables of interest, in particular during an extremely uncertain time period such as the one we focus on.

5. The FAMO is an association of financial managers working in Dutch governmental organizations.

6. In fact, as argued by Donaldson (2001), change is a core element of contingency-based research, in that "a model of organizational change exists in structural contingency theory, in which contingency changes cause change in organizational structure. This unified theory of organizational change that goes across the contingencies […] is one more sense in which there is the contingency theory of organizations" (p. 9).

7. Since we do not have a clear expectation for the relationship between changes in cost system complexity and intensity of use for product costing purposes, we do not state a directional hypothesis for this relationship, but consider this as an (implicit) empirical question. The same applies for the relationships between changes in cost system inclusiveness for activities and/or programs and intensity of use for product costing purposes and between changes in cost system inclusiveness for selling prices and/or user fees and intensity of use for operational control purposes.

8. These job titles are commonly used in Dutch municipalities for their most senior-level financial manager.

9. For the final sample, this test shows a significant difference for the ΔENV_UNC and ΔCS_INTENS_OPER variables ($t(54) = 2.672$, $p = 0.010$ and $t(54) = -1.730$, $p = 0.089$, respectively).

10. As a robustness check, we have also analyzed the research model based on the sample of 79 cases. All conclusions concerning the hypotheses remain the same as those reported in this chapter.

11. It is important to note that in order to address common method bias the questions about changes in contextual factors were clearly separated from the questions about changes in cost system design and intensity of use. Also, Harman's single-factor test shows that the first factor in an unrotated factor solution explains considerably less than half of the overall variance in the variables, suggesting that common method bias is not a significant concern.

12. This latter finding corresponds with the observation in Dutch professional journals that in the last few years before 2010, many Dutch municipalities have simplified their organizational structure by implementing an organizational model that involves less hierarchical levels and departments (e.g., Aardema, 2010).

13. Given that all variables have been measured using single-item instruments, the PLS path modeling results are exactly the same as the results of estimating a series of OLS regression models, except that PLS path modeling bases the significance of the effects on *p*-values obtained from bootstrapping as opposed to asymptotic *p*-values. Overall, the *p*-values obtained from both analyses are quite similar. In addition, because of the (arguably ordinal) nature of our variables, we have also estimated a series of ordinal regression models to analyze the research model. Overall, the results are similar to the PLS path modeling results reported in Table 2.

14. We have also analyzed the research model after adding two additional control variables: organizational size and ERP implementation. For this analysis, we measured organizational size as the natural log of the municipalities' number of employees and identified the municipalities that have implemented an ERP system during the years 2008–2010 by examining their annual reports (especially the section on "bedrijfsvoering" (business operations), which is a mandatory part of the annual reports of Dutch municipalities). We find some evidence that ERP implementation is positively related to change in cost system inclusiveness for selling prices and/or user fees (ΔCS_INCLUS_PRIC), although the model fit for this endogenous latent variable remains relatively low and is insignificant. Importantly, all conclusions concerning the hypotheses remain the same as those reported in this study.

15. Note that our results do not suggest that Dutch municipalities have indeed increased the tariffs for some of their services during the time period on which our study focuses but only that they seem to have looked more intensively at the possibilities for doing so as they perceived funding uncertainty to have increased more.

16. Given that these hypothesized relationships may involve not only direct but also indirect effects, an alternative, complementary way of testing them is by looking at the total effects as opposed to the direct effects that are reported in Table 2. All conclusions concerning these hypothesized relationships remain the same as those based on the direct effects, except for H4b, as the total effect of $\Delta FUND\_UNC$ on ΔCS_INTENS_PROD is not significant (which is due to a negative, although not significant, indirect effect). The total effects of ΔENV_UNC on ΔCS_INTENS_OPER (H3a) and ΔCS_INTENS_PROD (H3b) are also not significant, despite the fact that the indirect effects are both positive and significant (which is due to their negative, although not significant, direct effects).

17. It should be emphasized, however, that the changes in financial reporting regulations that provided more autonomy for Dutch municipalities to design their cost system already date from 2003.

18. Note that this is opposite to what one would expect based on prior research among private sector organizations. For example, Ezzamel and Bourn (1990) find that during a financial crisis, organizations tend to adopt more sophisticated cost systems. Due to the situation where Dutch municipalities come from, however, for them it seems to be simplifying these systems what will improve their effectiveness for managerial decision-making purposes.

19. Due to the developments in Dutch local government during the time period that our study focuses on, the nature of the uncertainty as perceived by our respondents may slightly differ between the two time periods, in that during the years 2008–2010, they became (increasingly) uncertain about what would happen to their municipality and when, whereas for the years 2011–2013 (at least as expected at the time of

research), they were aware that their municipality would now soon be confronted with the consequences of the crisis, while at the same time still being uncertain about what that would exactly mean for their municipality.

20. For five variables (ΔENV_UNC, $\Delta FUND\_UNC$, ΔCS_COMPL, ΔCS_INCLUS_PRIC and ΔCS_INTENS_OPER), the differences in means between the two time periods are significant.

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APPENDIX A: MEASUREMENT INSTRUMENTS USED

Changes in Cost System Design

For each of the following aspects with regard to the cost system of your municipality, indicate to what extent they have changed during the past three years (Scale: 1 = *strongly decreased*, 2 = *somewhat decreased*, 3 = *remained about the same*, 4 = *somewhat increased*, and 5 = *strongly increased*):

- The complexity of the cost system (in terms of the number of cost pools and cost allocation bases used) **(**ΔCS_COMPL**)**
- The extent to which indirect (overhead) costs are allocated to activities and/or programs **(**ΔCS_INCLUS_ACTIV**)**
- The extent to which indirect (overhead) costs are allocated to selling prices and/or user fees **(**ΔCS_INCLUS_PRIC**)**

Changes in Cost System Intensity of Use

For each of the following aspects with regard to the cost system of your municipality, indicate to what extent they have changed during the past three years (Scale: 1 = *strongly decreased*, 2 = *somewhat decreased*, 3 = *remained about the same*, 4 = *somewhat increased*, and 5 = *strongly increased*):

- The intensity with which the cost system is used for operational control purposes (such as performance measurement and budgeting) **(**ΔCS_INTENS_OPER**)**
- The intensity with which the cost system is used for product costing purposes (such as determining user fees and inventory valuation) **(**ΔCS_INTENS_PROD**)**

Changes in Contextual Factors

For each of the following aspects with regard to characteristics of your municipality, indicate to what extent they have changed during the past three years (Scale: 1 = *strongly decreased*, 2 = *somewhat decreased*, 3 = *remained about the same*, 4 = *somewhat increased*, and 5 = *strongly increased*)

- The level of uncertainty about the external environment (e.g., market and technological developments) **(**ΔENV_UNC**)**

- The level of uncertainty about the income received from the central government **(**$\Delta FUND\_UNC$**)**
- The complexity of the structure (in terms of the number of hierarchical levels and the number of departments) **(**$\Delta STRUCT\_COMPL$ – used as a control variable**)**