

Drivers of and barriers to management accounting change

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Abstract

Empirical studies report a gap between theoretical concepts of management accounting and the actual practice in organizations. Specifically, there is a virtual absence of literature on the individual factors that drive or hinder the adoption of sophisticated management accounting concepts. In this paper, we analyze drivers and inhibitors of management accounting change from a managerial perspective. Our research model is an adoption of the theory of planned behavior and reasoned action (Ajzen and Fishbein, 1980: Understanding Attitudes and Predicting Social Behavior. Prentice Hall: Englewood Cliffs, NY). Based on survey data of 161 banks in German-speaking countries, we show that management accounting change is driven by board expectations, transparency, and profitability. IT capabilities and behavioral control enable change. Only organizational change impedes the adoption of sophisticated methods. The factors costs and staff do not have a significant impact on manager's attitude. Moreover, in a group analysis, we analyze if the importance of drivers and barriers differs between banks with a focus on sophisticated financial measures compared to banks with a focus on a broad set of non-financial measures. We find that banks which manage by means of financial measures are more profitability driven by board and managerial encouragement. Banks using non-financial measures tend to increase transparency but struggle with organizational change.

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1 Introduction

Performance measurement in banking has undergone a tremendous change in the last two decades: in the 1990s there was greater awareness of the need for more adequate risk-return measurement (Kimball, 1997). In addition, banks were faced with the challenge of implementing “innovative” performance measures based on economic profit instead of accounting earnings. The ultimate objective was to take risk-adequate opportunity costs of equity into account (Kimball, 1998). However, banks refused to adopt these innovative measures (see e.g. for German-speaking countries in year 2000 Grimmer, 2003). Specifically, several studies showed there is a gap between theory and practice in applying financial methods (e.g. Graham and Harvey, 2001; Mao, 1970). This confirms that the adaptation of management accounting methods is not always rational and that management accounting has to be recognized as organizational rules and routines whose design depends on change processes (Burns and Scapens, 2000). This paper addresses the question of which factors drive banks to or hinder them from adopting sophisticated performance measures. As outlined by Cobb et al. (1995), managers in charge of management accounting play a critical role when evaluating changes:

As catalysts they initiated the change process, but without their leadership role the change process may have faltered in the face of the barriers. (Cobb et al., 1995, p. 172)

We therefore explicitly analyze drivers of and barriers to management accounting change from a managerial perspective. Specifically, we aim to analyze the impact of

drivers and barriers on the attitude of managers and their willingness to adopt sophisticated accounting methods. Thus, our first research question is:

What is the impact of drivers and barriers on a manager's intention to use sophisticated methods in management accounting?

Previous studies have differentiated between the adoption of financial and non-financial measures in management accounting (e.g. Hussain and Hoque, 2002; Vaivio, 1999).

While they examine factors affecting non-financial measures change, we find a lack of studies which compare the impact factors of the adoption of financial and non-financial measures. Therefore in this paper we address our second research question:

How does the impact of drivers and barriers on a manager's intention to use sophisticated methods in management accounting differ between banks which focus on sophisticated financial or non-financial measures?

The research questions are analyzed using structural equation modeling based on survey data from the banking industry. Based on 161 responses from banks in German-speaking countries¹, we are able to make five contributions:

1. Board expectations, transparency, profitability, agency problems, data quality, IT application support, and personal incentives positively influence managers' attitudes towards the adoption of sophisticated methods (drivers).
2. Organizational change negatively impacts managers' attitudes towards the adoption of sophisticated methods (barriers).

¹ In our paper we use "German" to refer to the German-speaking countries of Germany, Austria and (part of) Switzerland.

3. Managers', attitudes towards the adoption of sophisticated methods, managers', behavioral control, and environmental factors have a significant impact on the intention to adopt sophisticated methods.
4. Profitability, board expectations, and personal incentives have a greater positive impact for those adopting stronger sophisticated financial accounting measures.
5. Transparency has a greater positive, and organizational change a greater negative impact for those adopting stronger sophisticated non-financial measures.

The remainder of our paper is structured as follows: the next section reviews related literature and develops our hypotheses as well as our research model. After that we discuss our data collection and our measurement methodology. The fourth section reports our descriptive results, PLS analyses, and the robustness checks of our findings. In section five we discuss our results. Our paper concludes with a summary and suggestions for further research.

2 Literature review and hypotheses development

2.1 Previous research on management accounting change

Since Hopwood (1987) asked for further research into accounting change there have been several studies which analyze aspects of management accounting change. Libby and Waterhouse (1996) detected that little is known about the forces which induce or act to impede management accounting systems change. Atkinson et al. (1997) saw one extremely fertile area for research in a systematic inquiry into facilitators and barriers.

Yakhou and Dorweiler (1995) recommended further research into why some companies are slower than others in adopting management accounting innovations.

One of the first evidence-based studies was published by Innes and Mitchell (1990), who identified in seven case studies, factors which cause management accounting change. In these findings Cobb et al. (1995) missed the consideration of barriers-factors which hinder or prevent change and therefore developed an accounting change model based on a case study of a bank. Overall the processes of change are forced by a combination of random, systematic and internal factors (Burns and Scapens, 2000).

In our study we test drivers and barriers that influence management accounting change.

We focus on a single industry, due to the fact that a single industry analysis has substantially higher internal validity than a cross-sectional analysis (Ittner et al., 2003).

We selected the banking industry because Ittner et al. (2003) argued that financial services firms are actively discussing their choice of performance measures and value drivers. Although banks have developed better measures for dealing with risks than other industries (Beasley et al., 2005). Williams and Seaman (2001) found that the determinants of management accounting change cannot be generalized from the manufacturing and industrial sectors to the service sector. Also Al-Omiri and Drury (2007) reported that the financial services sector differs from other industries significantly. Because Helliari et al. (2002) found that development in banks' profitability reporting systems was different from that in other industries, we have to discuss which factors mentioned in previous research into other industries are relevant for the banking industry. There are some earlier studies about management accounting design which also focused on the banking industry (e.g. Cobb et al., 1995; Grimmer, 2003; Helliari et al., 2002; Hussain and Hoque, 2002; Ittner et al., 2003). Luther and

Longden (2001) showed that motives for management accounting change can differ from country to country. To avoid national bias, we focus our study on a specific language area.

2.2 Intention to change

Our research model is based on the intention to change management accounting as a dependent variable. In the change literature we find different approaches to the analysis of dependent variables: one possibility is to examine the factors of some specific changes implemented, which is often done in case study research (e.g. Cobb et al., 1995; Helliard et al., 2002; Hussain and Hoque, 2002; Innes and Mitchell, 1990; Waweru et al., 2004). An alternative approach is to use the number of changes during a specific time period (developed by Libby and Waterhouse, 1996; adopted by Williams and Seaman, 2001; Williams and Seaman, 2002). However, these approaches are limited as they do not reflect how the decision process that led to change was shaped. Thus, we take a closer look at the antecedents of decision processes that do or may not entail changes. As mentioned above, we want to analyze drivers of and barriers to management accounting change from a managerial perspective to take account of the critical role of leaders in change process (Cobb et al., 1995). Therefore, we aim to analyze the impact of drivers and barriers on the attitude of managers and their willingness to adopt sophisticated accounting methods. The theory of reasoned action suggests that a person's behavior is determined by his/her intention to perform a specific behavior and that this intention is, in turn, a function of his/her attitude towards that behavior and his/her subjective norm (Ajzen and Fishbein, 1980). The best predictor of actual behavior is intention. Intention is the cognitive representation of a person's

readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior.

The individual's attitude towards management accounting change plays a major role in the analysis of the drivers of and barriers to change. Even if the attitude does not directly necessitate the outcome, it has great impact on the behavior of the individual during the decision making process (Ajzen, 1996). Therefore, a closer look at the antecedents of attitude is needed. Only if the antecedents of attitude are analyzed in greater detail is further research on the decision process from a behavioral perspective feasible in order to understand the final decision for/against management accounting change. We also find this approach in research into IS change: Nicolaou et al. (1995) use the respondent manager's intention to change a system as a dependent variable.

2.3 Research model

Based on the theory of reasoned action, we analyze management accounting literature to identify factors that influence attitude and intention. In the following we discuss these factors and explain how they have impact on the attitude and/or intention of management accounting change.

2.3.1 Staff

Using case studies, previous research has identified accounting staff as a facilitator which influences the potential for accounting change (Cobb et al., 1995; Innes and Mitchell, 1990). In field studies (e.g. Laitinen, 2001; Luther and Longden, 2001) the role of accounting staff was tested as a factor determining accounting change. While Luther and Longden found a significantly positive influence in countries with less developed management accounting, Laitinen showed that some companies appreciate

that the lack of availability of staff is a deceleration factor, but that management accounting change cannot be avoided because of this.

The availability of staff as a determining factor in management accounting change can be referred to as a resource based view (Barney, 1991):

Hypothesis 1: The greater the availability of qualified staff, the more positive the attitude to improving management accounting.

2.3.2 Cost

The manager's decision to improve a system depends not only on the benefits but also on the cost of innovation (Nicolaou et al., 1995). Yakhou and Dorweiler (1995) identified implementation cost and cost of operating as a barrier to the adoption of new accounting techniques. Laitinen (2001) also identified a group of companies with simultaneous low management accounting change budgets and an extreme unwillingness to change.

Because an accounting change can be rejected if it is too costly, we test the following hypothesis:

Hypothesis 2: The lower the expected costs of the change, the more positive the attitude to improving management accounting.

2.3.3 Transparency

Williams and Seaman (2002) defined the providing of information for managerial decision making and evaluation as one of three fundamental elements of management accounting. This shows that management accounting helps to convey information to the top management and to enhance transparency in decision making.

In the financial services sector a higher percentage of indirect costs arises than in other industries (Al-Omiri and Drury, 2007), which indicates that the cost structure of banks

is less transparent. In different analyses Al-Omiri and Drury (2007) found a relation between a higher percentage of indirect costs and more sophisticated costing systems. Laitinen (2001) also found that a ‘need for intensifying financial control’ is an acceleration factor for change-oriented companies, where management accounting change happens quickly. In a case study, Tuomela (2005) found that the company studied introduced a new performance measurement system to address all key success factors. Williams and Seaman (2002) found that management accounting change brings about an increase in perceived management-relevant information.

The general conclusion to be deduced from this evidence is that it shows that management accounting change can exist alongside an increase in transparency.

Following this we adopt the following hypothesis:

Hypothesis 3: The better the chance of increased transparency, the more positive the attitude towards improving management accounting.

2.3.4 Profitability

Another fundamental element of management accounting is the intention to enhance an organization’s outcomes at the operating level (Williams and Seaman, 2002). But the evidence of earlier studies analyzing a possible relationship between accounting choice and performance is mixed (Ittner and Larcker, 2001).

Earlier empirical papers tested or identified the request for better financial performance as an acceleration factor for management accounting change. Innes and Mitchell (1990) mentioned poor financial performance as a catalyst, where accounting change can lead to remedial action. The need for the improvement in profitability was identified by Laitinen (2001) as an acceleration factor for change-oriented companies. This group

comprises larger companies with a high level of competition and non-customized products. Furthermore, Tuomela (2005) found that the goal of profitable growth leads to the adoption of new non-financial measures (i.e. measures relating to employees and customers) because employees and customers are instrumental in creating shareholder value. Waweru et al. (2004) present evidence that companies with decreasing financial performance are more likely to change their management accounting practices. We summarize the goal of enhancing profitability in the following hypothesis:

Hypothesis 4: The better the chance of enhancing profitability, the more positive the attitude towards improving management accounting.

2.3.5 Board expectations

Previous studies have shown that individuals like board members and chief financial officers can influence accounting change. Cobb et al. (1995) and Luther and Longden (2001) explicitly stated that changing such individuals was a significant change factor. A change in the information needs of the management or a change in leaders was identified by Laitinen (2001) as an acceleration factor for companies, which can effect management accounting change quickly. The dissatisfaction of top management with existing accounting information was identified by Innes and Mitchell (1990) as a spur to change.

Following the accounting change model of Cobb et al. (1995) individuals of the top management play a dual role in the change process. On the one hand leaders are catalysts which initiate management accounting change processes, what we summarize in the following hypothesis 5. On the other hand the top management's leadership ability is necessary to overcome barriers (Cobb et al., 1995). This aspect will be revisited in hypothesis 12.

Hypothesis 5: The higher the expectations of the board, the more positive the attitude towards improving management accounting.

2.3.6 Personal incentives

Agency theory predicts that incentives can influence managers' attitudes (e.g. Ewert and Wagenhofer, 2003). Cobb et al. (1995) described the leaders as facilitators and crucial factors in management accounting change. Their attitudes become important in the change process and influence other factors. Because of this we test for personal incentives for managers which would facilitate the accounting change:

Hypothesis 6: The stronger the personal incentives for the manager to improve management accounting, the more positive the attitude towards improving management accounting.

2.3.7 Agency problems

A broad strand of earlier research has discussed the question of whether agency conflicts influence (external) accounting choice (Fields et al., 2001). From the perspective of management accounting Holmstrom (1982) examined agency problems in the hierarchies of various organizations and noted that it was important to reduce such conflict in the choice of monitors. Maher (1987) identified the degree of information asymmetry as one factor affecting the choice of divisional accounting measures.

In our study agency problems can appear because the analyzed management accounting changes regard measures of business units. Consequentially, conflicts of interpreting these measures can occur between business units' managers and management accountants. While business units' managers can inform top management about great

business success management accountants can see deficits in economic profitability or that business units' success does not fit with overall business goals. Therefore, the following hypothesis is tested:

Hypothesis 7: The greater the awareness of agency problems, the more positive the attitude towards improving management accounting.

2.3.8 IT application support

According to the resource-based view (Barney, 1991), companies can acquire competitive advantages through the use of unique, non-imitable resources. Several studies have shown that IT applications can be one of those resources (e.g. Barney et al., 2001; Barney, 2001; Bharadwaj, 2000; Tallon et al., 2000). In banking, IT applications are critical in supporting business processes (Helliard et al., 2002). Since almost all banking products are digitally handled using IT applications, these systems are valuable sources for management accounting.

In earlier research IT has been shown to cause management accounting change (e.g. Cobb et al., 1995; Helliard et al., 2002). Luther and Longden (2001) identified 'advances in information technology' applications as the factor with the highest value of all causes of management accounting change. Laitinen (2001) identified a group of 'change-oriented companies' which denoted a 'good availability of the suitable new software' as an important acceleration factor.

We hypothesize that better availability of IT applications has a positive impact on management accounting change.

Hypothesis 8: The better the IT support, the more positive the attitude towards improving management accounting.

2.3.9 Data quality

As outlined above, using IT applications is critical for bank management accounting. However, the technology or the software itself is worthless without appropriate data. If the business units do not provide sufficient data quality, the output of these systems cannot be used for effective managerial decisions. Bank management information systems maintain and produce the data used by banks to plan, evaluate, and diagnose financial information. In addition to internal usage, the data produced is reported to external stakeholders such as stockholders or financial authorities. Thus, the data has to be very accurate and fine-grained (Kaplan et al., 1998).

A study by Yakhou and Dorweiler (1995) identified missing data quality as a reason why management accounting innovations (advances) are not adopted. Helliar et al. (2002) argued that improved data quality leads banks to better analysis of costs, performance measurement and control. The need for data as a resource for management accounting leads us to the following hypothesis:

Hypothesis 9: The better the data quality, the more positive the attitude towards improving management accounting.

2.3.10 Organizational change

Case studies have presented the reorganization of the organizational structure as a facilitator for management accounting change (Innes and Mitchell, 1990). These findings are confirmed by field research (Laitinen, 2001; Luther and Longden, 2001). In contrast to these findings Cobb et al. (1995) see that changed priorities hinder management accounting improvement. Because a changing organizational structure needs management capacities and is also followed by changed priorities, we see in these

changes a barrier to management accounting change. The existing management accounting system must be adapted to the new organizational form and an improvement of methods or technology is hindered.

Hypothesis 10: The less important an organizational change in the bank, the more positive the attitude towards improving management accounting.

2.3.11 Environment

Contingency theory specifies that a more complex environment demands more complex organizational structures, e.g. a greater number of divisions, sophisticated reporting systems (Lawrence and Lorsch, 1969). In their framework Burns and Scapens (2000) described how (major) external changes can cause revolutionary management accounting changes. There are a few studies that have suggested several environmental factors which drive management accounting change.

Some empirical evidence for a link between environmental and management accounting change was given by Yakhou and Dorweiler (1995). Al-Omiri and Drury (2007) found support for a relationship between the intensity of the competitive environment and more sophisticated cost systems. Several studies identified competition and/or increased uncertainty in the economic environment as important causes of management accounting change (e.g. Helliard et al., 2002; Hussain and Hoque, 2002; Luther and Longden, 2001; Waweru et al., 2004). Additionally, in the study of Libby and Waterhouse (1996) the most frequently given reasons for management accounting changes related to competitive factors. The analyses showed that changes and competitive factors were positively but not significantly correlated. Similarly, Williams and Seaman (2001) found a significant, positive relation between competition factors and changes in the planning component of service organizations. A significant, positive

correlation between task uncertainty and the level of management accounting systems change was shown by Williams and Seaman (2002). In their case studies Cobb et al. (1995) and Innes and Mitchell (1990) recognized several changes in the external environment (e.g. globalization, lower operating costs for competitors) as motivators for management accounting change. Also Laitinen (2001) found that changes in the environment measured by ‘tightening of the competition’ and ‘expansion of the market’ are acceleration factors for change-oriented companies, where management accounting change happens quickly. We combine these findings in the following hypothesis:

Hypothesis 11: The higher the pressure of the environment, the stronger the intention to improve management accounting.

2.3.12 Behavioral control

Ajzen’s behavioral control addressed variation in a person’s ability to control their behavior (Ajzen, 1985, 1987, 1991). In other words, behavioral control measures a person’s perception of the ease or difficulty entailed by behaving in a certain way. It reflects aspects of the person, such as her or his level of efficacy, and aspects of the behavior, such as the necessity of obtaining the co-operation of others to accomplish it (Cordano and Frieze, 2000).

As mentioned above, leaders play a crucial role in management accounting change processes (Cobb et al., 1995). The leaders have to be convinced that the management accounting enhancement is advantageous and must involve themselves in the change. This engagement is needed to overcome potential barriers such as staff having a negative attitude to change (Cobb et al., 1995). The power of a strong individual personality of individuals can accelerate management accounting change (Burns and Scapens, 2000). Thus, we follow the theory of reasoned action by testing whether the

responsible manager for management accounting has the behavioral control to enforce the change.

Hypothesis 12: The better the appreciation of behavioral control, the stronger the intention to improve management accounting.

2.3.13 Attitude

According to the theory of reasoned action (Ajzen, 1985), attitude is an important contributor to the actual decision to change, when this is the intention of the manager. Several studies have shown that attitude is a reliable predictor of intention (e.g. Agarwal and Prasad, 1999; Cohen et al., 1994; Hartwick and Barki, 1994). Following Ajzen's theory we therefore hypothesize:

Hypothesis 13: The more positive the attitude towards improving management accounting, the stronger the intention to improve management accounting.

Based on the literature review, we use for our study the research model presented in figure 1.

2.4 Financial vs. non-financial measures

When analyzing drivers of and barriers to management accounting change we have to ask if banks with different requirements respond differently to these factors. Earlier studies compared differences between change factors using case studies (e.g. Innes and Mitchell, 1990; Waweru et al., 2004) or field studies (e.g. Laitinen, 2001; Luther and Longden, 2001; Shields, 1995). While Luther and Longden (2001) looked for differences between countries, Laitinen (2001) and Shields (1995) used factor analysis to form groups of companies with similar change factors. Another method is to analyze

differences in changes due to differences in management accounting systems. Williams and Seaman (2001) presented differences in change factors due to differences in the components of management accounting (e.g. planning system, costing system). Some previous studies explicitly differentiated between the adoption of financial and non-financial measures in management accounting (e.g. Hussain and Hoque, 2002; Vaivio, 1999).

In this paper we analyze the role of the design of the existing management accounting systems. More precisely, we test whether drivers of and barriers to management accounting change differ between banks which make greater use of a broad set of non-financial measures and banks which are focused on sophisticated financial measures. The first group we name qualitative-measure banks (QM-banks), the second financial-measure banks (FM-banks). The differentiation is based on the use of non-financial measures dominating the use of sophisticated financial measures and vice versa (see section 4.1). We hypothesize the differences between the two groups for all factors in our model in table 1.

Moreover, we controlled for several distinctive characteristics if there were significant differences in change factors (see section 4.4).

3 Methodology and data collection

Our method follows Shields (1995) who suggested causal models to explain the causes of management accounting systems implementation and proposed structure equation models for empirical testing. This type of methodology allows the cross-evaluation of the factors and the analysis of which factors have a significant influence. Earlier empirical studies used case studies (e.g. Cobb et al., 1995; Helliard et al., 2002; Innes and

Mitchell, 1990) or field studies with mean value analysis (e.g. Luther and Longden, 2001), factor analysis (e.g. Laitinen, 2001) or regressions (e.g. Al-Omiri and Drury, 2007; Beasley et al., 2005; Libby and Waterhouse, 1996; Williams and Seaman, 2001) to examine management accounting change. A similar context is analyzed by Nicolaou et al. (1995) who examined the relationship between a manager's intention to enhance information systems and incremental costs as well as the benefits of this enhancement. They used a structure equation model for the analysis. We adapt this methodology because it allows us to focus on multiple measures as well as to analyze latent variables and it therefore provides more reliable measurement (Shields, 1995).

The data basis of this work is a written survey among all German, Austrian and Swiss banks with total assets of over one billion Euros (based on the end of 2005). Following this criterion we selected 636 banks (Germany: 499, Austria: 68, Switzerland: 69) and conducted the survey in fall 2006. The highest ranking managers responsible for company group financial controlling were asked to answer a total of 40 open and closed questions, some of which requested additional details. In the run-up to this survey the questionnaire was validated extensively in expert workshops and by pre-tests. Six weeks after the questionnaires were sent out each non-responsive bank was contacted by telephone. At the end of the survey phase, 161 completed questionnaires had been returned, which equals a response rate of 25.3 %.

Table 2 and table 3 show the characteristics of the banks in the sample versus the population. Comparing sample and population with Chi-square-test and one-sample-t-test (table 4), we find that German banks are overrepresented and Swiss banks are underrepresented in the sample. Furthermore, our sample includes a lower proportion of

private banks and a larger proportion of co-operative banks compared to the population. In terms of size our sample is representative for the population.

4 Analyses

4.1 Management accounting methods used

Financial goals are the most important overall business objectives for German banks (table 5). Today banks also use financial ratios to describe business units' results (Grimmer, 2003). To compose these ratios several methods of calculating the components (earnings, operating costs, credit losses and cost of capital) are necessary. The use of different methods to calculate these components of the surveyed banks is presented in table 6. However we also asked for the usage of several non-financial measures because our results show that non-financial goals must not be disregarded as business objectives (table 5). We inquired about this usage for two moments: today and in five years.

The medians show that banks want to intensify the use of cash flow oriented revenues, operating costs measures, credit loss measures, costs of economic capital and most non-financial measures.

As described above we classified the banks as qualitative-measure banks (QM-banks) or financial-measure banks (FM-banks). For differentiation we used the methods presented and calculated scores for sophisticated non-financial as well as sophisticated financial measures. As sophisticated measures we defined all measures with a very strong significant difference in mean values (p -value <0.001). Following this selection we identified five financial measures and four non-financial measures (marked in table 6).

Because two credit loss measures matched our criteria, both were combined in one measure with 0.5-weights. The bank groups' scores were calculated by adding up the using-intensity values of the four sophisticated non-financial measures and the resulting four sophisticated financial measures respectively.

On the basis of the scores we classified the banks in our sample as QM- or FM-banks. If the sum of the sophisticated financial measures was higher than the sum of the sophisticated non-financial measures we classified a bank as a FM-bank, otherwise as a QM-bank. These groups represent different configurations in the existing management accounting systems. In our group analysis we want to see if the factors driving management accounting change will differ between these two groups.

4.2 Structural model analysis

This section presents the results of the model test, including the test of the measurement model as well as the structural model. To describe the indicators of our model we present means and standard deviations in table 7 (appendix).

The research model is operationalized and transferred into a structural equation model (SEM) to be analyzed with the PLS approach (Chin, 1998; Wold, 1985). All PLS-calculations are carried out with PLS-Graph Version 3.0 Build 1126 (www.plsgraph.com). Settings are left to default, except the number of bootstrap samples which was increased to 500. PLS is particularly suitable if a more exploratory analysis close to the empirical data is preferred. As there is no strong theoretical foundation to the impact drivers and barriers have on the attitude and intention to change management accounting, an exploratory approach is most appropriate for this

research. Group differences are statistically analyzed using PLS multi-group analysis (Chin, 2000).

4.2.1 Measurement Model

Since only reflective indicators are used in this study, the quality of the measurement model is determined by (1) convergent validity, (2) construct reliability and (3) discriminant validity (Bagozzi, 1979; Bagozzi and Phillips, 1982; Churchill, 1979; Peter, 1981).

Convergent validity is analyzed by indicator reliability and construct reliability (Peter, 1981). Indicator reliability is examined by looking at the construct loadings. In the model tested, all loadings are significant at the 0.01 level and above the recommended 0.7 parameter value except two items that are marked in yellow in table 7 (significance tests were conducted using the bootstrap routine (Chin, 1998) with 500 re-samples). As outlined by Hulland (1999), newly developed constructs may have relatively low indicator loadings but should not be excluded as long as the loadings are above 0.4. As the two indicators have loadings above this threshold, the items have not been eliminated. Construct reliability is tested using two indices: (1) the composite reliability (CR) and (2) the average variance extracted (AVE). Estimated indices are above the threshold of 0.6 for CR (Bagozzi and Yi, 1988) and 0.5 for AVE (Chin, 1998) (see table 7).

Discriminant validity of the construct items can be analyzed by looking at the cross-loadings. They are obtained by correlating the component scores of each latent variable with both the corresponding blocks of indicators and all other items that are included in the model (Chin, 1998). As depicted in table 8, the loading of each indicator is higher for

the corresponding construct than for any other construct. In addition, it is confirmed that each construct loads highest with its own item. Therefore the indicators of different constructs are not related to each other and discriminant validity is shown.

4.2.2 Structural Model

The adequacy of indicators in the measurement model enables us to evaluate the explanatory power of the entire model as well as the predictive power of the independent variables. The explanatory power is examined by looking at the squared multiple correlations (R^2) of the dependent variables. In an empirical example, Chin (1998) regards R^2 -values of 0.67 as substantial, 0.33 as moderate and 0.19 as weak. Figure 2 shows that all dependent variables are at least moderately explained by their independent variables and therefore pass critical examination.

Predictive power is tested by examining the magnitude of the standardized parameter estimates between constructs together with the corresponding t-values that indicate the level of significance. Six path coefficients do not exceed the recommended 0.2 level (Chin, 1998). In particular, boot-strapping revealed strong (at the 0.01 level) or moderate significance (at 0.05 level) of all independent variables except for know-how. Analysis of the overall effect size f^2 (Chin, 1998; Cohen, 2003) reveals (see appendix) that only know-how and IT support do not have at least a moderate effect on their dependent variables. Figure 2 depicts the findings graphically.

The results confirm 11 of our 13 hypotheses. It was only with regard to staff and costs that we could not find supporting evidence for significant impact of on a manager's attitude in this model.

Our findings predict a strong relation between a manager's attitude and intention. Significant impact on intention is also provided by behavioral control and environment. While the environment has only a weak influence on a manager's intention, the impact of behavioral control is very strong.

The impact of drivers and barriers on a manager's attitude is tested by several hypotheses. The driver which has the strongest influence on attitude is board expectations; a second important driver is transparency. The other significant drivers have nearly the same impact on attitude. We identified organizational change as a factor which hinders management accounting change by making a manager's attitude less positive. As reported, cost was not a significant factor.

4.3 Group findings

As outlined earlier, we analyze differences for two groups: QM-banks and FM-banks. We use PLS multi-group analysis (Chin, 2000) to test the differences in paths between groups. Table 10 shows the results.

The results confirm significant differences in 5 of 13 constructs. Transparency as a driver for management accounting change is significantly more important in QM-banks. In FM-banks the more important drivers are profitability, board expectations and personal incentives. Furthermore, organizational change is a more important barrier in QM-banks. These findings confirm our hypothesis that there are differences in factors that drive management accounting change depending on the intensity of systems use. In both groups behavioral control has a similar significant impact on intention.

4.4 Robustness

In order to control for the influence of distinctive characteristics within the sample, bank size, bank type (state and saving banks, co-operative banks, and private banks) and country (German and non-German) are analyzed. The impact of bank size is modeled by including it as an independent variable of the two dependent variables, i.e. attitude and intention. The results revealed that the impact of bank size on attitude ($\beta=-0.04$; $\alpha=0.89$) and on intention ($\beta=0.05$; $\alpha=0.65$) are not significant.

The validity threat arising from bank type and country is analyzed by running bootstrap re-samplings of the various groups and treating the standard error estimates from each re-sampling in a parametric sense via t-tests (Chin, 2000). The results of these operations reveal that no differences are found according to bank type and country respectively.

4.5 Common method bias

To ensure that common methods bias is not a significant problem in our data, we control for the effects of an unmeasured latent method factor (Podsakoff et al., 2003). The average of squared regression coefficients of the unmeasured latent method factor is 0.02, whereas the average of squared regression coefficients of the individual constructs is 0.74. This analysis supports the conclusion that common methods bias did not impair our results.

5 Discussion

This study is focused on drivers and barriers with an impact on management accounting change. The factor with the highest impact on a manager's attitude is board

expectations. The strong impact indicates that management accounting is an important tool for the executive board. Another important driver is transparency. The high loading signals that banks have not achieved sufficient transparency yet. It is interesting that profitability also drives management accounting change because management accounting does not directly affect profitability, in fact it merely enables banks to implement management decisions to improve profitability. Also agency problems have an impact on a manager's attitude to management accounting change. This shows that there is still a long way to go for banks to solve agency problems between business units and overall business objectives. Data quality and IT application support have a similar impact on a manager's attitude. That they drive management accounting change indicates both the high level of automation of management accounting and that there is still a need to automate management accounting across business units. In addition, our results predict a positive relation of personal incentives and a manager's attitude. This finding confirms incentive theory and shows that banks should implement more personal incentives for bank management accountants. In contrast to the results above, a barrier to management accounting change is organizational change. The negative impact on a manager's attitude shows that in the case of an organizational change banks apparently have to adjust their current methods to the changed organization and cannot simultaneously improve management accounting. Cost and staff are factors which do not significantly impact management accounting change. Contrary to our assumption, staff is not a factor which improves manager's attitude, and, interestingly, neither is cost a barrier when banks seriously intend to improve their management accounting (mean score of 6 for intention - table 7).

Moreover, our results show the very strong impact of a manager's attitude on his/her intention. This indicates that management accounting change is so urgent that the manager puts effort into implementing change. A manager's intention is also strongly affected by his/her behavioral control. This finding is important because it reflects the need to collaborate with business unit leaders to improve management accounting change. Finally, a manager's intention is influenced by environment. However, the weak impact of environment shows that management accounting change is more likely to be an internal decision.

In a group analysis we differentiate between banks which make greater use of a broad set of non-financial measures (QM-banks) and banks which are focused on sophisticated financial measures (FM-banks). Factors significantly differing between the two groups are transparency and organizational change (higher impact in QM-banks) as well as profitability, board expectations, and personal incentives (higher impact in FM-banks).

The difference in the factor of transparency between the two groups indicates that it is hard to measure and monitor qualitative factors and that even QM-banks lack transparency. In contrast, management by financial measures aims at profitability.

Interestingly, profitability seems to be unimportant for QM-banks. In this group profitability is not a driver for management accounting change. Board expectations have an important impact on both groups. The difference between the two groups shows that the board is more focused on management by financial measures. Personal incentives are also important in FM-banks and do not affect a manager's attitude in QM-banks.

The result predicts that personal incentive schemes function in a financial measure system but not in a qualitative measure system. In QM-banks management accounting

change is more likely to fail when organizational change occurs, because the management's attention seems to be distracted from accounting change to organizational change. Apparently, the banks have first to regulate financial measures and adjust qualitative measures later.

In both groups behavioral control has a high impact on change. This reflects that a manager's support for implementation is critical for the change process. But while FM-banks are more strongly motivated to implement management accounting change by profitability in connection with strong support from top management and personal incentives, QM-banks want to increase transparency, e.g. in order to solve agency problems.

Our results are similar to some important assumptions of the accounting change model of Cobb et al. (1995). They identified leaders as a critical factor in overcoming barriers to management accounting change. We see an analogy in our finding that behavioral control has a high impact on a manager's intention of managing accounting change. Furthermore, the strong impact of board expectations is equal to their assumption of the significant role of individuals as catalysts. Similar to this change model we present evidence for the impact of IT (measured by application support and data quality), environment and profitability on management accounting change. In contrast to the accounting change model (Cobb et al., 1995) we cannot confirm an impact of staff on a manager's attitude to change. Moreover our findings support the criticism of Cobb et al. (1995) that previous models (e.g. Innes and Mitchell, 1990) did not include barriers. We identified organizational change as a barrier to management accounting change. There was no other significant barrier

Further to the earlier literature, which presents differences in management accounting change factors between industries (e.g. Al-Omiri and Drury, 2007) and countries (e.g. Beasley et al., 2005; Luther and Longden, 2001), we present a group analysis which indicates that change factors can vary within a country's industry. We show that change factors can depend on the design of the existing management accounting systems. This is an improvement on the previous studies, which included changes to different management accounting systems but did not differentiate between basic levels of existing management accounting methods in the samples (e.g. Libby and Waterhouse, 1996).

6 Conclusion

In this paper we present an analysis of management accounting change in German, Austrian and Swiss banks. Based on survey results from 161 banks we test the impact of several hypotheses on managers' intentions to implement management accounting change. Our research model is an adaptation of the theory of planned behavior and reasoned action (Ajzen and Fishbein, 1980). As suggested by Shields (1995), we use a causal model to explain the causes of management accounting systems implementation and apply structure equation models for empirical testing.

We demonstrate that management accounting change is primarily driven by behavioral control and board expectations. Furthermore, we demonstrate a significant positive influence of transparency, profitability, personal incentives, environment, agency problems, data quality, and application support on the manager's intention to adopt sophisticated management accounting methods. Our results also show that organizational change is the main barrier to accounting change. Our findings are similar

to some important assumptions of the accounting change model by Cobb et al. (1995). In contrast to former research, we introduce personal incentives and agency problems as drivers which did not play an important role in previous studies of management accounting change.

In a group analysis, we analyze whether the importance of drivers and barriers differs between banks with a focus on sophisticated financial measures (FM-banks) compared to banks with a focus on a broad set of non-financial measures (QM-banks). We present five factors that diverge significantly between both groups. In both settings behavioral control has a strong impact on a manager's intentions. While in QM-banks transparency achievement is a more important driver, increased profitability is more important in FM-banks. Personal incentives and board expectations also have a higher impact on accounting change in FM-banks. When organizational change occurs an accounting change is more likely to be hindered in QM-banks. The results show that change factors can be heterogeneous within the industry and depend on the design of existing management accounting.

The results of this paper are of particular interest for practice because they identify critical factors for management accounting change processes in banks. Our results should help to design management accounting change processes in banks. The data reveal that all system improvements need strong support by top management and that managers should not initiate change processes when there are organizational changes upcoming.

Future studies should analyze further barriers that hinder management accounting change. Specifically, case study research on delayed or failed change processes could provide interesting insights. In addition, interactions between different factors impacting

on management accounting change, e.g. between board expectations and profitability, should be considered, as some of the drivers and barriers could decrease the effect of others on the intention for change. Finally, other group variables should be of interest in accounting for different context settings.

7 Appendix

7.1 Tables and figures

Figure 1: Research model

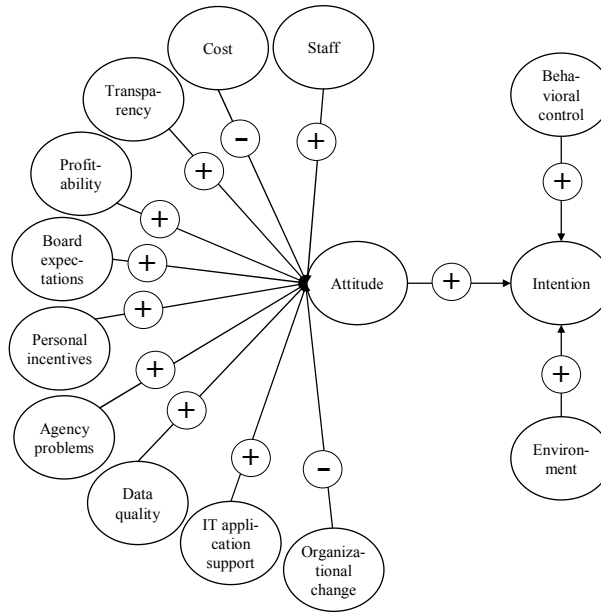


Table 1: Hypotheses for differences in change factors between financial (FM) vs. non-financial (QM) measure banks

Factor	Hypothesis	Reasoning
Staff	The impact of staff on managers' attitudes towards management accounting change is higher for QM-banks than FM-banks.	Management accounting staffs are usually experienced in applying financial methods. However, if it comes to non-financial measures, there is typically less knowledge available within the department. Thus, banks intending to improve non-financial methods need more experienced staff than those envisioning financial methods.
Cost	The impact of cost on managers' attitudes to management accounting change is more negative for QM-banks than FM-banks.	Normally an enhancement of financial methods is connected with a more detailed analysis of, e.g. costumers', costs' or products' data. The costs for this substantial sophistication are more expensive than the costs for the enhancement of non-financial measures, where data collecting processes are less complex. Because the implementation of financial methods is more expensive we expect that managers in FM-banks perceive costs as more serious barriers than managers in QM-banks.
Transparency	The impact of transparency on managers' attitudes towards management accounting change is higher for QM-banks than FM-banks.	Qualitative methods are usually harder to measure. Thus, it will be more important for non-financial banks to increase transparency.
Profitability	The impact of profitability on managers' attitudes towards management accounting change is higher for FM- than QM-banks.	Banks which have to increase profitability concentrate more on financial measures. They want to solve their profitability problems with sophisticated financial methods.
Board expectations	The impact of expectations of the top management on managers' attitudes towards management accounting change is higher for FM-banks than QM-banks.	When one asks for the overall business objective the most common answers are profit and profitability (Grimmer, 2003). Because financial goals dominate other objectives we think that top management's pressure is stronger in order to enhance financial measures to reach business objectives better. These expectations of top management are the reason that financial measures dominate management accounting in FM-banks today. It is still important to enhance existing systems in these banks compared to QM-banks.
Personal incentives	The impact of personal incentives on managers' attitudes to management accounting change is higher for FM- than QM-banks.	In our opinion FM-banks have a more success-oriented culture. In addition to sophisticated financial measures, personal incentives are more common in these banks and have a higher impact on managers' attitudes.
Agency problems	The impact of agency problems on managers' attitudes towards management accounting change is greater for QM-banks than	Because sophisticated financial measures help to reduce agency problems (Rogerson, 1997) we hypothesize that banks where financial measures dominate management accounting have more

Factor	Hypothesis	Reasoning
	FM-banks.	appropriate incentive schemes. In contrast QM-banks lack incentive schemes and are more aware of agency problems as a driver for management accounting enhancement.
Data quality	The impact of data quality on managers' attitudes towards management accounting change is greater for QM-banks than FM-banks.	Data for financial measures is available because of external reporting and supervisory needs. In our opinion managers perceive data availability as high because all contract details are fixed and could be used for the calculation of financial measures. The data of non-financial measures is not usually easily available. A management accounting change process helps to generate this data. Thus data is perceived as a driver for non-financial measures.
IT application support	The impact of IT application support on managers' attitudes towards management accounting change is higher for QM-banks than FM-banks.	IT applications play an important role in a lot of banking processes which are more often industrially designed. While IT applications are always important in financial measurement the importance of IT in creating non-financial measures is increasing. Because the industrial process design and new technology enable banks to generate a higher number of process performance indicators or to survey customer satisfaction more easily the perception of IT application as a driver for management accounting change is higher for QM-banks.
Organizational change	The impact of organizational change on managers' attitudes towards management accounting change is more negative for QM-banks than FM-banks	Sophisticated financial measures are often generated from data filed in a data warehouse. In contrast non-financial measures are often generated from data collected in individual processes. We think that FM-banks can implement organizational change without substantial problems in the data warehouse while QM-banks have to adapt data collecting processes for their non-financial measures.
Environment	The impact of environment on managers' intention towards management accounting change is greater for FM-banks than QM-banks.	One consequence of the highly competitive nature of the banking sector is strong pressure on margins (Helliard et al., 2002). We think that banks which experience greater pressure from the environment are more focused on financial methods.
Behavioral control	The impact of behavioral control on managers' intention towards management accounting change is greater for QM-banks than FM-banks.	Following Cobb et al. (1995) a high level of behavioral control of the manager is necessary to achieve management accounting change. In our opinion managers in QM-banks need a higher level of behavioral control because other managers rarely think about non-financial measures and external accounting draws managers' attention to financial measures.
Attitude	The impact of managers' attitudes on managers' intention towards management accounting change does not differ between QM- and FM-banks	In both groups managers have the positive attitude necessary to achieve management accounting change. We think that there is no difference between the change of financial and non-financial measures in either FM- or QM-banks.

Table 2: Distribution of sample (n=161) and population (n=636) to countries and bank groups

Bank group	Germany				Austria				Switzerland				Total			
	Sample		Population		Sample		Population		Sample		Population		Sample		Population	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
State and saving banks	88	(55)	313	(49)	4	(2)	23	(4)	7	(4)	19	(3)	99	(61)	355	(56)
Co-operative banks	37	(23)	111	(17)	7	(4)	21	(3)	0	(0)	1	(0)	44	(27)	133	(21)
Private banks	9	(6)	66	(10)	1	(1)	19	(3)	2	(1)	48	(8)	12	(7)	133	(21)
Other	5	(3)	9	(1)	1	(1)	5	(1)	0	(0)	1	(0)	6	(4)	15	(2)
Total	139(86)		499 (78)		13 (8)		68 (11)		9 (6)		69 (11)		161(100)		636 (100)	
Response Rate (%)	27.9				19.1				13.0				25.3			

Table 3: Distribution of sample (n=161) and population (n=636) to countries and bank size

Total assets	Germany				Austria				Switzerland				Total			
	Sample		Population		Sample		Population		Sample		Population		Sample		Population	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
< 2 bn EUR	66	(41)	240	(38)	5	(3)	27	(4)	3	(2)	30	(5)	74	(46)	297	(47)
2 – 5 bn EUR	45	(28)	151	(24)	3	(2)	14	(2)	1	(1)	15	(2)	47	(29)	180	(28)
5 – 10 bn EUR	7	(4)	38	(6)	4	(2)	13	(2)	2	(1)	10	(2)	12	(7)	61	(10)
10 – 99 bn EUR	12	(7)	52	(8)	0	(0)	12	(2)	3	(2)	12	(2)	19	(12)	76	(12)
>= 100 bn EUR	9	(6)	18	(3)	0	(0)	2	(0)	0	(0)	2	(0)	9	(6)	22	(3)
Total	139(86)		499 (78)		13 (8)		68 (11)		9 (6)		69 (11)		161(100)		636 (100)	

Table 4: Test statistics for sample and population

	Germany		Austria		Switzerland					
One-sample-T-test (p-value, 2-side)	T=2.886 (0.004)		T=-1.219 (0.225)		T=-2.869 (0.005)					
Chi-square-test (p-value)	T=6.409 (0.041)									
	State and saving banks		Co-operative banks		Private banks		Other			
One-sample-T-test (p-value, 2-side)	T=-1.479 (0.141)		T=1.825 (0.070)		T=-6.476 (0.000)		T=0.886 (0.377)			
Chi-square-test (p-value)	T=19.322 (0.000)									
	< 2 bn EUR		2 – 5 bn EUR		5 – 10 bn EUR		10 – 99 bn EUR		>= 100 bn EUR	
One-sample-T-test (p-value, 2-side)	T=-0.187 (0.852)		T=0.248 (0.804)		T=-1.034 (0.303)		T=-0.039 (0.969)		T=1.151 (0.252)	
Chi-square-test (p-value)	T=2.947 (0.567)									

Table 5: Overall business objectives (N=161)

Methods	μ [1..7] ^a	σ	Median
Volume growth	4.71	1.26	5
Market share	5.10	1.25	5
Profit / profit growth	5.75	0.91	6
Profitability	5.86	1.04	6
Shareholder Value	3.52	1.72	3
Non-financial objectives	4.47	1.54	5

^a Note: The answers are seven-point scaled and describe importance of overall business objectives: 1=very low ... 7=very high

Table 6: Use of management accounting methods (N=161)

Methods	Today			In 5 years			Significance of μ -difference	
	μ [1..4] ^a	Σ	Me- dian	μ [1..4] ^a	σ	Me- dian	<i>T</i>	<i>p</i> - value ^b
<i>Revenues</i>								
Annualized	3.46	0.75	4	3.40	0.85	4	1.180	0.240
Cash flow oriented (<i>fm</i>)	2.45	1.07	3	3.16	1.06	4	-9.005	0.000
<i>Operating costs</i>								
Actual costs	2.67	1.07	3	2.93	1.16	3	-3.148	0.002
Activity-based costing (<i>fm</i>)	2.11	1.13	2	3.04	1.17	4	-10.169	0.000
<i>Credit losses</i>								
Actual credit losses (<i>fm</i> ; 0.5)	3.02	0.81	3	3.24	0.87	3	-4.488	0.000
Standard risk-costs (<i>fm</i> ; 0.5)	2.79	1.01	3	3.50	0.82	4	-9.364	0.000
<i>Cost of Capital</i>								
Cost of regulatory capital	2.71	0.86	3	2.68	1.01	3	0.487	0.627
Cost of economic capital (<i>fm</i>)	2.00	1.02	2	2.86	1.11	3	-10.752	0.000
<i>Non-financial measures</i>								
Volume growth	3.61	0.72	4	3.53	0.84	4	1.764	0.080
market share (<i>qm</i>)	2.43	1.04	2	2.94	1.02	3	-6.854	0.000
customer satisfaction (<i>qm</i>)	2.29	1.04	2	2.81	1.08	3	-7.576	0.000
employee satisfaction (<i>qm</i>)	1.86	1.01	2	2.37	1.08	2	-7.690	0.000
process performance indicators (<i>qm</i>)	1.90	1.10	1	2.78	1.17	3	-10.265	0.000

^a Note: The answers are four-point scaled and describe using-intensity: 1=not calculated; 2=calculated, but not reported; 3=reported to top-management; 4=part of business unit goals

^b *p*-values are two-tailed

fm – sophisticated financial measure; *qm* – sophisticated non-financial measure

Figure 2: Structural Model Findings

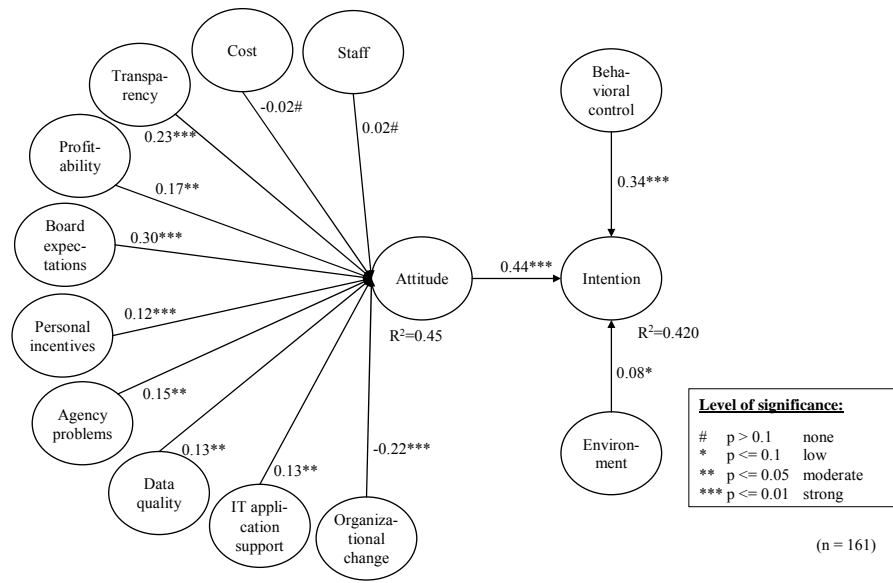


Table 7: Measurement model results

Construct	CR	AVE	Item	Loading	Significance level	μ [1..7]	Σ
Staff	0.94	0.88	a478	0.93	0.01	5.56	1.09
			a479	0.94	0.01	5.51	0.99
Cost	0.87	0.70	a484	0.99	0.01	4.19	1.47
			a485	0.81	0.01	4.29	1.43
			a486	0.69	0.01	5.35	1.65
Profitability	0.85	0.75	a517	0.93	0.01	5.76	1.06
			a518	0.79	0.01	5.48	1.11
Transparency	0.92	0.79	a500	0.82	0.01	5.55	1.06
			a501	0.94	0.01	5.72	0.90
			a502	0.90	0.01	5.81	1.04
Organizational change	0.86	0.76	a566	0.99	0.01	3.02	1.50
			a567	0.73	0.01	3.34	1.68
Data quality	0.78	0.64	a529	0.63	0.01	3.80	1.43
			a530	0.94	0.01	4.98	1.65
Personal incentives	0.90	0.82	a545	0.88	0.01	4.78	1.33
			a546	0.93	0.01	4.93	1.29
IT support	0.77	0.62	a539	0.84	0.01	5.19	1.36
			a540	0.74	0.01	3.89	1.49
Board expectations	0.87	0.78	a551	0.94	0.01	5.53	0.97
			a553	0.81	0.01	5.73	1.23
Agency	0.76	0.63	a563	0.60	0.01	3.99	1.47
			a564	0.95	0.01	4.44	1.49
Attitude	0.80	0.58	a569	0.88	0.01	5.97	0.79
			a570	0.84	0.01	5.34	1.04
			a571	0.51	0.01	4.92	1.50
Intention	0.93	0.82	a572	0.94	0.01	5.98	0.97
			a573	0.94	0.01	6.04	0.93
			a574	0.83	0.01	6.01	0.86
Behavioral control	0.93	0.81	a575	0.93	0.01	5.70	0.91
			a576	0.92	0.01	5.67	0.92
			a577	0.84	0.01	5.24	1.01
Environment	0.82	0.70	a554	0.81	0.01	4.84	1.24
			a555	0.86	0.01	5.40	0.96

Table 8: Cross loadings

Highest construct loadings for each measurement item are marked in yellow

Item	Constructs													
	Staff	Cost	Trans- parency	Profit- ability	Data quality	IT app- lication support	Personal incen- tives	Board expec- tations	Environ- mental	Agency	Org. change	Attitude	Intention	Behaviol control
a478	0.955	0.561	0.059	0.153	-0.033	-0.056	0.393	-0.031	0.184	-0.038	0.321	0.012	0.387	0.438
a479	0.961	0.256	0.102	0.256	-0.068	0.112	0.632	-0.004	0.231	0.033	0.251	-0.030	0.322	0.440
a484	0.234	0.876	0.354	0.276	-0.111	0.222	0.372	0.426	0.076	0.110	0.361	0.157	0.206	0.172
a485	0.213	0.987	0.326	0.263	-0.102	0.110	0.347	0.257	0.004	0.222	0.392	0.196	0.030	0.089
a486	0.299	0.666	0.199	0.287	-0.008	0.102	0.193	0.291	0.149	0.135	0.002	0.058	0.295	0.436
a500	0.122	0.326	0.912	0.306	-0.083	-0.220	-0.095	-0.090	0.274	0.058	0.238	0.296	0.343	0.138
a501	0.048	0.263	0.964	0.492	0.075	-0.081	0.528	0.158	0.569	0.137	0.107	0.451	0.561	0.251
a502	0.054	-0.102	0.933	0.521	0.211	0.008	0.235	0.190	0.622	0.256	0.598	0.478	0.528	0.182
a517	0.167	0.110	0.561	0.976	0.039	0.189	0.170	0.280	0.332	0.240	0.431	0.521	0.636	0.098
a518	0.340	0.347	0.256	0.905	-0.092	0.181	0.277	0.166	0.206	0.082	0.345	0.364	0.477	0.188
a529	-0.155	0.257	0.023	-0.204	0.889	0.551	0.298	0.081	0.233	0.354	0.451	0.190	-0.113	-0.011
a530	0.100	0.004	0.141	0.129	0.986	0.619	0.354	0.393	0.053	0.321	0.478	0.347	0.225	0.025
a539	0.112	0.023	-0.028	-0.004	0.422	0.954	0.361	0.632	0.173	0.251	0.521	0.293	0.194	0.062
a540	-0.131	0.023	0.055	0.245	0.566	0.921	0.392	-0.027	-0.101	0.461	0.364	0.209	-0.068	-0.012
a545	0.125	0.083	-0.005	0.009	0.076	0.222	0.877	-0.068	-0.111	-0.102	0.190	-0.083	0.075	0.211
a546	0.256	0.240	0.082	0.354	0.321	0.251	0.931	0.354	0.276	-0.111	0.222	0.372	0.426	0.521
a551	-0.095	0.528	0.235	0.170	0.277	0.298	0.354	0.990	0.530	0.118	0.158	0.536	0.420	0.164
a553	0.023	0.636	-0.131	0.162	0.096	0.070	0.276	0.940	0.568	0.052	0.190	0.372	0.426	0.076
a554	0.012	0.477	0.125	0.157	0.206	0.172	-0.111	0.464	0.859	0.254	0.280	0.347	0.257	0.004
a555	0.153	-0.113	0.256	0.196	0.030	0.089	0.222	0.523	0.911	0.095	0.536	0.193	0.291	0.149
a563	-0.021	0.225	-0.095	0.141	0.277	0.436	0.372	-0.065	0.044	0.863	0.372	0.077	0.121	-0.083
a564	0.162	0.012	-0.131	-0.028	0.096	0.070	0.426	0.222	0.087	0.984	0.347	0.436	0.204	-0.045
a566	0.157	0.361	0.125	0.055	0.206	0.172	0.076	0.372	0.340	0.347	0.946	0.166	0.461	0.364
a567	0.196	0.392	0.256	-0.005	0.030	0.089	0.110	0.426	-0.155	0.257	0.927	0.081	-0.102	0.190
a569	0.058	0.002	-0.095	0.423	0.277	0.272	0.361	0.076	0.486	0.224	0.048	0.937	0.713	0.309
a570	-0.076	0.420	0.333	0.444	0.326	0.524	0.157	0.537	0.238	0.446	0.054	0.924	0.406	0.217
a571	0.022	0.426	0.142	0.046	0.125	0.153	0.206	0.079	0.107	0.168	0.167	0.771	0.269	0.201
a572	0.349	0.257	0.678	0.493	0.083	-0.021	0.263	0.530	0.598	0.268	0.340	0.629	0.964	0.564
a573	0.344	0.096	0.656	0.438	-0.005	-0.072	-0.102	0.600	0.431	0.234	-0.155	0.631	0.976	0.575
a574	0.319	0.206	0.291	0.386	0.009	0.180	0.110	0.538	0.345	0.043	0.100	0.528	0.908	0.687
a575	0.519	0.030	0.317	0.231	0.076	-0.065	0.347	0.297	0.352	0.099	0.112	0.380	0.670	0.974
a576	0.475	0.295	0.001	0.131	-0.012	0.156	0.257	0.142	0.084	0.058	-0.131	0.279	0.564	0.964
a577	0.602	0.368	-0.025	-0.034	0.051	-0.007	-0.021	0.174	0.199	-0.215	0.125	0.268	0.378	0.936

Table 9: Overall effect size f^2

Construct	Calculation		
	R ² incl.	R ² excl.	f ²
Staff	0.446	0.442	0.007*
Profitability	0.446	0.422	0.043**
Transparency	0.446	0.404	0.076**
Data quality	0.446	0.434	0.022**
Cost	0.446	0.443	0.005*
Organizational change	0.446	0.403	0.078**
Personal incentives	0.446	0.433	0.023**
IT application support	0.446	0.434	0.022**
Board expectations	0.446	0.36	0.155***
Agency	0.446	0.429	0.031**
Attitude	0.417	0.248	0.29***
Behavioral control	0.417	0.306	0.19***
Environment	0.417	0.41	0.012*

***=strong impact, **=moderate impact, *=weak impact

Table 10: Path differences between QM-banks (N=64) and FM-banks (N=97)

Construct	Dependant	Path QM	Path FM	Difference	t-value	p-value
Staff	Attitude	0.14	0.09	0.05	0.27	0.393
Cost	Attitude	0.05	-0.01	0.06	0.44	0.331
Transparency	Attitude	0.35***	0.15**	0.20	1.63*	0.052
Profitability	Attitude	-0.02	0.22***	-0.24	-1.76**	0.040
Board expectations	Attitude	0.22**	0.39***	-0.17	-1.35*	0.089
Personal incentives	Attitude	-0.07	0.19**	-0.27	-1.67**	0.049
Agency problems	Attitude	0.24**	0.08	0.16	1.01	0.157
Data quality	Attitude	0.21**	0.05	0.17	0.99	0.162
Application support	Attitude	0.18**	0.13	0.05	0.31	0.380
Organizational change	Attitude	-0.32***	-0.09	-0.23	-1.55*	0.060
Environment	Intention	0.02	0.11*	-0.09	-0.75	0.227
Behavioral control	Intention	0.37***	0.34***	0.03	0.27	0.395
Attitude	Intention	0.53***	0.39***	0.14	1.03	0.152

*** p<=0.01; ** p<=0.05; * p<=0.1;

7.2 Questions of research instrument

Please evaluate the importance of the following overall business objectives for your bank:	<i>Scale</i>
Volume growth	1=very low ... 7=very high
Market share	1=very low ... 7=very high
Profit / profit growth	1=very low ... 7=very high
Profitability	1=very low ... 7=very high
Shareholder Value	1=very low ... 7=very high
Non-financial objectives	1=very low ... 7=very high

Please indicate how revenues and costs are used to manage (most of the) bank's business units today and what is expected in 5 years. Please also mark the numbers when they are components of superior ratios (e.g. RoE, RaRoC, EVA, contribution margin).

Please mark two answers in every row, one for "today" and another for "in 5 years". For example, if you mark "part of business unit goals" this assumes calculation and reporting to top-management. If you don't indicate an answer for one category we assume the number is "not calculated" (*value = 1*) for this category.

Methods	Today			In 5 years		
	calculated, but not reported	reported to top-management	part of business unit goals	calculated, but not reported	reported to top-management	part of business unit goals
<i>Revenues</i>						
Annualized	2	3	4	2	3	4
Cash flow oriented	2	3	4	2	3	4
<i>Operating costs</i>						
Actual costs	2	3	4	2	3	4
Activity-based costing	2	3	4	2	3	4
<i>Credit losses</i>						
Actual credit losses	2	3	4	2	3	4
Standard risk-costs	2	3	4	2	3	4
<i>Cost of Capital</i>						
Cost of regulatory capital	2	3	4	2	3	4
Cost of economic capital	2	3	4	2	3	4
<i>Non-financial measures</i>						
Volume growth	2	3	4	2	3	4
Market share	2	3	4	2	3	4
customer satisfaction	2	3	4	2	3	4
employee satisfaction	2	3	4	2	3	4
process performance indicators	2	3	4	2	3	4

Item	Question	Strongly agree	predominantly agree	rather agree	indifferent	rather disagree	predominantly disagree	strongly disagree
a478	In our bank very substantial know-how of management accounting enhancement is available.	7	6	5	4	3	2	1
a479	In our bank very substantial know-how of functional and technical issues in bank management accounting are available.	7	6	5	4	3	2	1
a484	The costs of bank management accounting enhancement require a fundamental increase in our budget.	7	6	5	4	3	2	1
a485	The costs of bank management accounting enhancement are very high.	7	6	5	4	3	2	1
a486	The costs of bank management accounting enhancement are negligible.	1	2	3	4	5	6	7
a517	If we enhance our bank management accounting, we can better differ between value-creating respectively value-decreasing business units.	7	6	5	4	3	2	1
a518	If we enhance our bank management accounting, we can better allocate capital to our business units.	7	6	5	4	3	2	1
a500	If we enhance our bank management accounting, a better monitoring of business units' results is possible.	7	6	5	4	3	2	1
a501	If we enhance our bank management accounting, a more detailed observation of business units' results is possible.	7	6	5	4	3	2	1
a502	If we enhance our bank management accounting, we can achieve a higher transparency of business units' results.	7	6	5	4	3	2	1
a566	Due to a change of management organisation (e.g. more flat hierarchies, matrix-organisation) an enhancement of our bank management accounting is necessary.	7	6	5	4	3	2	1
a567	Due to a change of profit responsibilities (e.g. decentralization) an enhancement of our bank management accounting is necessary.	7	6	5	4	3	2	1
a529	The existing IT-systems for management accounting are not user-friendly and because of that limited in usefulness.	7	6	5	4	3	2	1
a530	We can enhance our bank management accounting due to a more central storage of the required data (e.g. in a data warehouse).	7	6	5	4	3	2	1
a545	A bank management accounting enhancement affects my occupational situation positively.	7	6	5	4	3	2	1
a546	A bank management accounting enhancement affects me personally positively.	7	6	5	4	3	2	1
a539	The high number of IT-interfaces hinders bank management accounting.	7	6	5	4	3	2	1
a540	The requirements of bank management accounting are inadequately considered by the IT strategy of our bank.	7	6	5	4	3	2	1
a551	The executive board / the board of directors expect bank management accounting enhancement.	7	6	5	4	3	2	1
a553	The executive board / the board of directors see no need to enhance bank management accounting.	1	2	3	4	5	6	7
a563	Enhancement of bank management accounting is necessary because business units try to represent better results as they have.	7	6	5	4	3	2	1
a564	Enhancement of bank management accounting is necessary because we can't measure business units' results in the right way.	7	6	5	4	3	2	1

Item	Question	Strongly agree	predominantly agree	rather agree	indifferent	rather disagree	predominantly disagree	strongly disagree
a569	Enhancement of bank management accounting is very advantageous for our bank.	7	6	5	4	3	2	1
a570	Enhancement of bank management accounting is essential for our bank.	7	6	5	4	3	2	1
a571	Benefits of bank management accounting enhancement exceed affiliated expenditures.	7	6	5	4	3	2	1
a572	I intend to engage myself for the implementation of sophisticated bank management accounting.	7	6	5	4	3	2	1
a573	I intend to engage myself for using sophisticated bank management accounting.	7	6	5	4	3	2	1
a574	I intend to engage myself for enhancement of methods, processes and IT systems of bank management accounting.	7	6	5	4	3	2	1
a575	If I engage myself, enhancement of bank management accounting will take place.	7	6	5	4	3	2	1
a576	If I engage myself, new methods respectively concepts of bank management accounting will be implemented.	7	6	5	4	3	2	1
a577	If I engage myself, resources and budget for bank management accounting enhancement will be provided.	7	6	5	4	3	2	1
a554	The executive board / the board of directors expect bank management accounting enhancement in order to keep up better with our competitors.	7	6	5	4	3	2	1
a555	The executive board / the board of directors expect bank management accounting enhancement in order to face an increased uncertainty of future business development.	7	6	5	4	3	2	1

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