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The effect of organizational life cycle stage on the use of activity-based costing

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Abstract

This paper investigates if the use of an activity-based cost-accounting system differs among firms in different organizational life cycle stages. We apply the Miller and Friesen [Miller, D., Friesen, P.H., 1983. Successful and unsuccessful phases of the corporate life cycle. Organ. Stud. 4 (3), 339–356; Miller, D., Friesen, P.H., 1984. A longitudinal study of the corporate life cycle. Manage. Sci. 30 (10), 1161–1183] life cycle model according to which the internal characteristics of firms and the external contexts in which the firms operate differ across firms depending on their stages of development. Based on the organizational life cycle theories we hypothesize that the use of the activity-based costing is more common among firms in maturity and revival phases than among firms in a growth phase. Our empirical analyses based on a questionnaire to 105 Finnish firms operating in various industries and in different life cycle stages support our hypothesis. We conduct various robustness checks of the results using several control variables and checking the effect of potential non-response bias. Our results remain essentially the same.

JEL classification: M41

Keywords: Activity-based costing system; Organizational life cycle; Management accounting

1. Introduction

In a growth stage, firms are characterized by a rapid sales growth and an expansion of activities and products (Miller and Friesen, 1984). In a maturity stage, the sales of the firm level off, more formal and bureaucratic organization structures are established and innovation declines. In the revival stage, firms adopt divisionalized structures for the first time to cope with more complex and heterogeneous markets (Miller and Friesen, 1984). These life cycle stages of the firm are described in organizational life cycle theories according to which the internal characteristics of firms and the external contexts in which the firms operate differ across firms depending on the stage of development (e.g. Greiner, 1972; Miller and Friesen, 1983, 1984; Merchant, 1997).

A firm's life cycle stage is a contingency to which organizational responses have to be matched (e.g. Miller and Friesen, 1983, 1984). This implies that the use of management accounting systems differs across the stages of organizational life cycle as different systems are needed in different stages. Firms' need for formal management accounting and control systems is notably greater in the later life cycle stages than it is in the early stages. However, as Md. Auzair and Langfield-Smith (2005) point out, organizational life cycle is a fairly recent variable in the empirical management

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accounting system literature, and life cycle stage has not been linked to most of the management control dimensions. In a few existing empirical studies, it has been reported that the life cycle stage is an important driver of the emergence of management control systems (Miller and Friesen, 1984; Moores and Yuen, 2001; Davila, 2005; Md. Auzair and Langfield-Smith, 2005; Granlund and Taipaleenmäki, 2005). For instance, Miller and Friesen (1984) report that firms in the maturity and revival phases put significantly more emphasis on formal cost controls than do firms in the growth stage. Md. Auzair and Langfield-Smith (2005) use a self-categorization measure based on the firm's own assessment of its life cycle stage and report that organizational life cycle, among other contingent variables, has a significant effect on the design of a firm's management control systems.

In this paper, we investigate if the use of the activity-based cost-accounting system differs across life cycle stages of the firm.[1] The life cycle literature (e.g. Miller and Friesen, 1983, 1984) reports that increased competition and diversification in products and markets cause firms in the maturity and revival phases to put significantly more emphasis on formal cost controls and performance as opposed to firms in the growth phase. In addition, mature and revival firms have greater resources for experimenting with advanced management accounting systems and they have more complex, more formal and more bureaucratic organizational structures creating a need for these systems compared to growth firms. These differences in the internal characteristics of the firm and the environments in which the firms operate lead to more widespread use of advanced costing systems, such as activity-based costing, among mature and revival firms than among growth firms. The paper contributes to the management accounting literature by exploring if the life cycle of the firm has a role of its own apart from that of the size of the firm in the use of activity-based costing. Although firms in the maturity and revival phases are often larger than firms in a growth phase, not all mature or revival firms are necessarily large in size. In other words, even small firms are likely to use activity-based costing if they have a managerial need for an advanced cost-accounting system due to their life cycle stage. We therefore expand the earlier studies investigating the effect of the size of the firm on the use of activity-based costing without considering the life cycle stage of the firm. Such earlier studies include Drury and Tayles (1994), Innes and Mitchell (1995), Bjornenak (1997), Chenhall and Langfield-Smith (1998), Malmi (1999) and Al-Omir and Drury (in press).

We feel that this study has important implications for the practice of management accounting research; it sheds light on whether the actual underlying organizational need indicated by the life cycle stage of the firm rather than simply the size of the firm drives the firms' use of an activity-based costing. In addition, although activity-based costing has been scrutinised for almost two decades, it continues to be actively investigated (e.g. Al-Omir and Drury, in press). One reason for this is that implementations of ERP (enterprise resource planning) systems allowing firms to integrate advanced cost accounting such as activity-based costing software with ERP systems, have increased remarkably in recent years (e.g. Dechow and Mouritsen, 2004; Granlund and Malmi, 2002; Granlund, 2007).

Our empirical analyses based on the cross-sectional survey data of 105 firms operating in several industries and in different life cycle stages, support our hypothesis. The results indicate that the characteristics of the firm reported in the life cycle literature to affect the use of advanced cost-accounting systems differ across life cycle phases, i.e. firms in the maturity and revival phases have a greater organizational size, lower profitability, a more diversified product/service range and have more often gained a stock market listing as opposed to firms in the growth phase. More importantly, we find that the use of activity-based costing is significantly more common among firms in maturity and revival phases than it is among firms in a growth phase. In addition, we find that it is the life cycle stage rather than the size or age of the firm which is decisive in explaining the use of the activity-based costing among firms. These results remain essentially the same after several control variables and checking the effect of potential non-response bias have been applied.

We divide the remainder of the body of this paper into four sections. In Section 2 we review the relevant literature and develop our hypothesis. We describe the survey data and research method in Section 3 and report the results of preliminary data analyses. In Section 4, we report the empirical results including the corresponding robustness tests and present concluding remarks in Section 5.

[1] Hilton (2005, p. 786) describes activity-based cost accounting system as 'a two-stage procedure used to assign overhead costs to products and services produced. In the first stage, significant activities are identified, and overhead costs are assigned to activity cost pools in accordance with the way the resources are consumed by the activities. In the second stage, the overhead costs are allocated from each activity cost pool to each product line in proportion to the amount of the cost driver consumed by the product line'. In addition, Bjornenak and Mitchell (2002) provide an excellent review of the activity-based costing journal literature and Lukka and Granlund (2002) that of activity-based costing research genres.

2. Theory and hypothesis development

2.1. Characteristics of firms in different organizational life cycles stages

Organizational life cycle theories suggest that the characteristics of organizations change according to the life cycle stages (e.g. Greiner, 1972; Churchill and Lewis, 1983; Miller and Friesen, 1983, 1984; Merchant, 1997; Moores and Yuen, 2001). In the birth stage, the prime distinguishing feature of the firms is that they are young, dominated by their owners, and have simple and informal organizational structures (Miller and Friesen, 1984). For this reason, the birth stage is also referred to as an 'entrepreneurial stage'. The founders of these firms are technically or entrepreneurially oriented, preferring to keep management activities to a minimum. They prefer to devote their efforts to developing and selling new products, and they rely on a minimal amount of information in decision-making. The growth stage occurs once the firm has established its distinctive competences and has achieved some initial product-market success (Miller and Friesen, 1984). In the growth stage, firms are characterized by rapid sales growth. Growth firms rely more on formal rules and procedures to ensure organizational and administrative efficiency. This is due to the expansion of activities and products and increasingly centralized structures. Some authority is delegated to middle-managers who devote greater effort to collecting and processing information needed in decision-making. Growth firms extend their product ranges, but this results in a more complex array of products for a given market rather than positions on widely differing markets (Miller and Friesen, 1984).

The maturity stage follows the growth stage as the sales levels stabilize and the level of innovations falls (Miller and Friesen, 1984). In the maturity stage, the administrative task of the firm becomes more complex, which in turn leads to formal and bureaucratic structures. In fact, Quinn and Cameron (1983) define this stage as the 'formalization and control stage'. Mature firms place more emphasis on efficiency and profitability and on strategies replacing innovations. Decision-making is dominated by a few key managers and structures remain centralized. In the revival stage, firms adopt divisionalized structures for the first time to cope with the more complex and heterogeneous markets (Miller and Friesen, 1984). Revival firms focus their strategies on diversification and expansion of product-market scope to achieve turnaround and attain new growth (e.g. Miller and Friesen, 1984; Gupta and Chin, 1990; Merchant, 1997). They also emphasise more sophisticated control and planning systems. Table 1 summarises the characteristics of the firms in different life cycle stages.

A few recent studies have applied the Miller and Friesen typology to the life cycle stages of the firm in connection with management accounting. Md. Auzair and Langfield-Smith (2005) measure the life cycle stage of the firm using a self-categorization measure proposed by Kazanjian and Drazin (1990), and report that organizational life cycle, among other contingent variables, has a significant effect on the design of a firm's management control systems. Davila (2005)

Table 1
Characteristics describing firms in different life cycle stages

	Growth	Maturity	Revival
Environment	More competitive and heterogeneous	Still more competitive and heterogeneous	Very heterogeneous, competitive and dynamic environment
Organization	Some formalization of structure Functional basis of organization Increasing differentiation Somewhat less centralized	Formal, bureaucratic structure Functional basis of organization Moderate differentiation Moderate centralization	 Divisional basis of organization High differentiation Sophisticated controls, more formal analysis in decision-making
Strategy	Broadening of product market scope into closely related areas Incremental innovation in product lines Rapid growth	Consolidation of product market strategy Focus on efficiently supplying a well-defined market	Strategy of product market diversification, movement into some unrelated markets High level of risk taking and planning Substantial innovation

Notes: The table is based on Miller and Friesen (1983, 1984).

reports that the size and age of the firm, the replacement of the founder as CEO and the existence of outside investors are drivers of the emergence of management control systems. Finally, Moores and Yuen (2001) explore the use of management accounting systems at different life cycle stages and find that the formality of the management accounting systems varies across life cycle stages.

2.2. The use of activity-based costing in different organizational life cycle stages

The life cycle literature implies that there are several reasons why the use of advanced management accounting systems such as activity-based costing is greater among firms in the maturity and revival phases than among firms in the growth phase. These reasons are due to differences in the administrative task, business environment, strategies and organization structures between firms in different life cycle phases. First, as a result of a more complex, more challenging and more competitive business environment, the *administrative task* of mature and revival firms is more complex than that of growth firms (Miller and Friesen, 1983; Chandler, 1962). This creates a need for a more sophisticated decision-making approach utilizing sophisticated management accounting systems such as activity-based costing. Second, firms in the growth phase put emphasis on growth and on expanding their market shares, whereas firms in the maturity and revival phases put clearly more emphasis on minimizing production costs in mature, highly competitive markets rather than on growth. This is because increased competition decreases the *profitability* of the firms in the maturity and revival stages. Therefore, cost-effectiveness and profitability are more important in the maturity and revival phases than they are in the growth phase. Consequently, firms in the maturity and revival phases put more emphasis on formal controls, such as formal cost controls, as they need to produce products efficiently and earn adequate profit margins on a more competitive market (Miller and Friesen, 1984).

Third, maturity and revival firms experience *increased diversification* in their products and markets (Miller and Friesen, 1984). Increased diversification in products and markets together with increased competition cause firms in the maturity and revival phases to put more emphasis on reducing, controlling and understanding factors driving their costs as opposed to firms in a growth phase (e.g. Miller and Friesen, 1984; Gupta and Chin, 1990; Merchant, 1997; Moores and Yuen, 2001; Md. Auzair and Langfield-Smith, 2005). Therefore, mature and revival firms especially can be expected to use activity-based costing, as activity-based costing should help managers to understand cost hierarchies, to identify relevant revenues and costs (e.g. Jones and Dugdale, 2002), and to achieve a better financial performance (e.g. Kennedy and Affleck-Graves, 2001).

Fourth, the life cycle literature suggests that the *organizational size* of the firms is greater in maturity and revival phases than it is in the growth phase. As Chenhall and Langfield-Smith (1998) point out, greater organizational size leads to greater complexity of tasks, which requires more division of labour. The specialization of tasks leads to more extensive differentiation, i.e. similar tasks are grouped within common units (Chenhall and Langfield-Smith, 1998; Blau et al., 1976). As a result, it becomes more difficult to ensure that organizational subunits are acting towards the achievement of a common purpose (Lawrence and Lorsch, 1967). More sophisticated integrative mechanisms such as information systems are then developed to coordinate the activities of subunits (Chandler, 1962). Management accounting innovations such as activity-based costing are examples of such information systems (Chenhall and Langfield-Smith, 1998). In addition, firms in the maturity and revival stages as result of greater organizational size have greater resources to experiment with administrative innovations such as advanced management accounting systems. In sum, greater organizational size and greater resources can be expected to lead to more widespread use of activity-based costing among firms in the maturity and revival stages as opposed to firms in the growth stage.

Fifth, the life cycle literature suggests that firms in the mature and revival stages have more centralized, more formal and more bureaucratic *organization structures* as opposed to firms in the growth stage (e.g. Miller and Friesen, 1984; Quinn and Cameron, 1983; Moores and Yuen, 2001). Gosselin (1997) reports that among organizations that adopt activity-based costing more centralized and more formal organizations are more associated with the implementation of activity-based costing in comparison to decentralized and less formal organizations. He also finds that organizations that adopt and implement activity-based costing are bureaucracies. It follows from these results that the use of the activity-based costing should also be more common among firms in the maturity and revival phase than among firms in a growth phase due to the more centralized, more formal and more bureaucratic organization structures of the mature and revival firms.

The literature discussed above leads us to the following hypothesis on the use of activity-based costing in different life cycle stages of the firm[2]:

Hypothesis 1. The use of activity-based costing is greater among firms in maturity and revival phases than among firms in a growth phase.

While firms may use activity-based costing for different reasons (see Section 2.3), the life cycle theories imply that the life cycle stage of the firm should affect *the reasons* for using activity-based costing in the same way as it affects the actual use of activity-based costing. In other words, the reasons for using activity-based costing in different life cycle phases should reflect the differences in the managerial need for using it in each life cycle phase, as suggested by life cycle theories. As noted earlier, the life cycle theories suggest that the use of activity-based costing should be more widespread among mature and revival firms, because these firms are less profitable and they have to put more emphasis on reducing, controlling and understanding the factors driving their costs as opposed to firms in a growth phase. Hence, the need to reduce, control and understand factors driving the costs should also be a more important reason for using activity-based costing among the firms in the maturity and revival phases than among firms a growth phase. Similarly, life cycle theories imply that the administrative task of mature and revival firms is more complex than that of growth firms, necessitating more sophisticated management accounting system such as activity-based costing. Therefore, a need to improve and modernize decision-making by using activity-based costing should be a more important reason for using activity-based costing among mature and revival firms than among growth firms. In sum, we propose the following hypothesis on the reasons for using of activity-based costing at different life cycle stages of the firm:

Hypothesis 2. A need to reduce and control the costs, a need to understand the factors driving the costs and a need to improve and modernize decision-making should be more important reasons for using an activity-based costing among firms in maturity and revival phases than among firms in a growth phase.

2.3. Other characteristics of the firm affecting the use of activity-based costing

There are also other characteristics of the firm that need to be controlled for when investigating the use of the activity-based costing at different organizational life cycle stages. Some of these characteristics and those describing the life cycle stage of the firm are partly inter-related (e.g. the size, age, product/service diversity and stock market listing of the firm). Earlier studies (e.g. Davila, 2005) have used the size and age of the firm as measures of the life cycle stage. However, our aim is to isolate the role of the life cycle of the firm from that of the other characteristics of the firm by using the self-categorization measure proposed by Md. Auzair and Langfield-Smith (2005) and Kazanjian and Drazin (1990). Therefore, in our analyses we control for the effect of the other characteristics of the firm on the use of activity-based cost accounting.

First, the earlier literature reports that the use of activity-based costing increases as the size of the firm increases (e.g. Drury and Tayles, 1994; Moores and Chenhall, 1994; Innes and Mitchell, 1995; Bjornenak, 1997; Chenhall and Langfield-Smith, 1998; Baird et al., 2004). Second, the earlier literature reports that the use of formal management control systems increases as the firm grows older (e.g. Davila, 2005). Third, the use of activity-based costing has been reported to be more common among firms having high product/service diversity (e.g. Bjornenak, 1997; Malmi, 1999). Fourth, as Cooper and Kaplan (1988) points out, firms having a complex production process tend to use more sophisticated cost-accounting systems compared to other firms. Fifth, the educational level of the CEO of the firm has been reported to be positively related the use of formal management accounting systems (e.g. Graham and Harvey, 2001; Davila, 2005). Sixth, as Davila (2005) and Granlund and Taipaleenmäki (2005) report, firms have to meet the expectations of venture capital investors when developing their management control systems. Therefore, venture capital investors may require firms to use advanced management accounting systems such as activity-based costing. Seventh, firms listed on a stock exchange have been reported to use advanced management accounting systems (Granlund and Taipaleenmäki, 2005; O'Connor et al., 2004). Finally, earlier studies report that the use of activity-based costing differs

[2] We emphasize that we propose a hypothesis on how widespread the use of activity-based costing is in different life cycle stages. We do not hypothesize when firms begin to use activity-based costing in their life cycle.

between manufacturing and service firms, because service firms may have fewer activities for cost allocation (Lukka and Granlund, 1996; Hussain et al., 1998). In the empirical analyses, we control for the effect of all the above-mentioned factors on the use of activity-based costing of firms. Section 3 describes the empirical measures of these factors.

3. Research method

3.1. Sample and survey procedure

The data used in the study were collected by a survey questionnaire (Dillman, 1999; Van der Stede et al., 2005). The final questionnaire was mailed to 500 Finnish firms randomly selected from a database of firms located in the Helsinki area. The database is maintained by Statistics Finland. The firms are of different sizes and they operate in various industries, because we want to test our hypotheses on the effect of the life cycle stage of the firm on the use of activity-based costing such that the results can be generalized to firms with different sizes and operating in different industries. Pilot tests were undertaken with groups of chief accountants, financial directors and academics to refine the design and focus the content. We received some advice on survey design and formulation to make the survey more explicit and easier to answer. A respondent who was typically a financial director, chief accountant, senior management accountant or chief executive, was the most eligible person within each firm to complete the survey. The survey package included a covering letter explaining the purpose of the research and a link to the web site where respondents could also complete the questionnaire. Respondents answered anonymously using the Internet questionnaire or by mail. A reminder was mailed 3 weeks later which gave us 16 further responses. All in all, we received 105 responses out of the 500 recipients giving a response rate of 21%. In addition, five respondents phoned us to indicate that they did not have enough time to participate. We received 15 responses via the Internet and 90 responses via mail. Table 2 reports the summary statistics of the sample firms.

As Van der Stede et al. (2005) suggest, non-response bias tests are needed to ensure the representativeness of the sample. We test the potential effect of non-response bias on our results by comparing the mean values of the survey items of the earliest 20% of responses received to the mean values of variables of the latest 20% of responses received. In addition, we also compare the mean values of the variables of the postal and Internet responses. There were no significant differences, which provides some evidence for absence of response bias. In addition, a chi-square test indicates that the respondents appeared to represent the broader sample frame with no significant differences in industry between responding and non-responding firms.

3.2. Measures

The wording of items in the questionnaire is provided in Appendix A. The questionnaire includes items measuring the organizational life cycle stage, the use of activity-based costing, reasons for using activity-based costing and other characteristics of the firm that are likely to affect the use of activity-based costing. The questionnaire was designed to use survey items used in earlier studies to reduce response error, if respondents do not fully understand questions (e.g. Dillman, 1999; Van der Stede et al., 2005). In this section, we describe the survey items in details.

3.2.1. Measure of the organizational life cycle stage of the firm

Our measure for the organizational life cycle stage is based on a well-known life cycle model proposed by Miller and Friesen (1983, 1984) in which firms go through different phases in which the strategies, organizational structures and decision-making styles of the firm vary across life cycles. Since the Miller and Friesen life cycle model is based on common life cycle indicators, it can be applied to firms of different sizes operating in different industries. In addition, the Miller–Friesen model has been tested in many empirical studies (e.g. Miller and Friesen, 1984; Moores and Yuen, 2001; Davila, 2005). Following Kazanjian and Drazin (1990) and Md. Auzair and Langfield-Smith (2005) we use a self-categorization measure to identify the life cycle stage of the firm, i.e. we asked firms to define their current life cycle stage (survey item 13 in Appendix A).[3] Life cycle stages are defined as in Miller and Friesen (1983), i.e. firms

[3] We emphasize that this methodology for analysing the use of a specific management accounting system is not ours, but it is used in the life cycle literature cited in this paper. We also recognise that any research methodology has its limitations. As we have discussed earlier, we empirically test a hypothesis on how widespread the use of activity-based costing is in different life cycle stages.

Table 2
Summary statistics of the sample firms

	N
Panel A: Size	
Number of employees (survey item 4)	
1–50	21
51–100	15
101–250	24
251–500	14
501–1000	10
1001–1500	4
1501–	17
Total	105
Net sales (M€) (survey item 3)	
1–5	13
6–10	14
11–50	28
51–100	11
101–500	25
501–1000	7
1001–	7
Total	105
Panel B: Industry (survey item 9)	
Category	
Banks and finance	3
Insurance	2
Investment	2
Transport	4
Trade	20
Other services	26
Metal industry	11
Forest industry	3
Multi-business	1
Energy	2
Food industry	1
Construction	7
Telecommunication and electronics	8
Chemicals	1
Media and publishing	8
Other industries	6
Total	105

were asked to state whether they were in the birth, growth, maturity, revival or decline life cycle stage. However, only one firm chose birth stage and another one chose decline stage. We classify the birth firm as a growth firm and the decline firm as a revival firm. In empirical analyses, we re-estimate all the regression such that these two observations were excluded, but the results remain the same.

Table 3 reports summary statistics of the characteristics of the firms in different life cycle stages based on the self-categorization measure. The results confirm that the characteristics of the firms differ across life cycle phases as reported in the life cycle literature (e.g. Miller and Friesen, 1983, 1984). More importantly, the characteristics of the firm that life cycle literature has reported to affect the use of advanced cost-accounting systems differ across life cycle phases. The results reported in Table 3 indicate that, in comparison to firms in the growth phase, firms in the maturity and revival phases have larger organizational size, lower profitability and a more diversified product/service range. Also, the proportion of firms having stock market listing is greater in the maturity and revival phases than it is in the growth phase. Because gaining a stock market listing has been reported to increase the complexity of the administrative task and the formality of the organizational structure (e.g. Granlund and Taipaleenmäki, 2005; Megginson and Netter,

Table 3
Characteristics of the sample firms across life cycle stages

	Growth	Maturity	Revival
Number of firms proportion of which listed on a stock exchange (survey item 2)	22 (9%)	54 (13%)	29 (28%)
Net sales (M€) (survey item 3)	95 [12]	3230 [51]	3910 [66]
Growth in net sales (%) (survey item 6)	27.6 [10.0]	4.0 [3.5]	5.7 [5.0]
Number of employees (survey item 4)	409 [138]	1177 [170]	4259 [341]
Net income margin (%) (survey item 7)	8.5 [6.0]	6.3 [5.0]	5.1 [3.0]
Age of the firm (in years) (survey item 1)	13.1 [10.0]	48.7 [45.0]	68.4 [64.0]
Number of products/services (survey item 12)	2.68	2.89	3.00
Proportion of different cost items as a percentage of total costs (survey item 14)			
Material	28.8 [20.0]	37.3 [40.0]	29.6 [24.0]
Direct labour	37.0 [32.5]	27.3 [20.0]	35.4 [35.6]
Other variable manufacturing costs	8.7 [5.5]	9.6 [5.0]	11.6 [5.0]
Fixed manufacturing cost	8.7 [5.5]	7.9 [4.0]	7.0 [6.5]
Other fixed costs	15.9 [12.5]	12.1 [10.0]	15.9 [10.5]

Notes: The table presents the mean [median] values of each variable at different life cycle stages.

2001), this result provides some evidence that maturity and revival firms have more complex administrative tasks and more formal organizational structures compared to firms in the growth phase. Finally, Table 3 reports the cost structures of the sample firms across life cycle stages (survey item 14), because differences in the cost structures of firms may explain their use of activity-based costing (e.g. Lukka and Granlund, 1996). This measure is based on Lukka and Granlund (1996). However, the results indicate no differences in the cost structures of firms in the growth phase versus the maturity and revival phases.

3.2.2. Measure of the use activity-based costing and measures of the reasons for using activity-based costing

Following earlier surveys on the use of activity-based costing (e.g. Chenhall and Langfield-Smith, 1998), respondents were asked to respond 'Yes' or 'No' to the question of whether their firm was using an activity-based costing system[4] (survey item 15). In our sample, 28% of the respondents answered that they were currently using activity-based costing method, which is a reasonably high rate if compared to that reported in earlier studies. It also indicates that the extent of the use of activity-based costing among Finnish firms has increased. Earlier studies report that 6% of respondents used activity-based costing in 1992 (Lukka and Granlund, 1996), 11% in 1993 (Laitinen, 1995) and 27% in 1999 (Hyvönen, 2003). The measures of the specific reasons for using activity-based costing described in Section 2.2 were based on earlier surveys on the benefits of activity-based costing (e.g. Shields, 1995; Hussain et al., 1998). These measures reflect the following reasons for using activity-based costing mentioned in Hypothesis 2: a need to reduce and control the costs (survey items 16b and 16h), a need to understand factors driving the costs (survey items 16f and 16g) and a need to improve and modernize decision-making (survey items 16a, 16c, 16e and 16d). For these measures, we used a five-point Likert scale ranging from (1) 'Not important' to (5) 'Very important'. The respondents were asked to choose the alternative that best described the benefits of activity-based costing in their firm.

Table 4 reports the mean values of the firms' responses to the questions on their use of an activity-based costing system and the reasons for using it across life cycle stages. Table 4 also reports the *p*-values for testing whether the

[4] Although activity-based costing has been well known among practitioners for almost two decades, it is possible that different respondents may have different views regarding the concept of activity-based costing. For instance, earlier studies report that employees may have different views on the definition of activity-based costing (e.g. Cobb et al., 1992; Innes and Mitchell, 1993, 1998; Malmi, 1997; Major and Hopper, 2005). We have mitigated the influence of this potential bias in two ways. First, we have chosen the same measure of the use of the activity-based costing that has been used in earlier studies (e.g. Chenhall and Langfield-Smith, 1998; Gosselin, 1997; Bjornenak, 1997; Malmi, 1999) to reduce potential response error described by Dillman (1999). Activity-based costing has been actively discussed in the Finnish business literature and the media since it was originally suggested, and it is as commonly known in Finland as it is in other countries, where this measure has been used. Second, our questionnaire includes several questions on the reasons for using activity-based costing (survey item 16). These questions also serve the purpose of validating our findings on the role of the life cycle of the firm in the use of activity-based costing, In other words, if respondents have understood the question on the use of activity-based costing correctly, the life cycle stage of the firm should affect the reasons for using activity-based costing in the same way as it affects the use of activity-based costing.

Table 4
F-Test statistics for testing whether the use of activity-based costing and the reasons for using it differ across life cycle stages

	Growth	Maturity	Revival	*F*-Test
Panel A: Does your firm use activity-based cost accounting system?	**1.09 (0.000)**	**1.32 (0.008)**	1.41 (0.362)	**3.039 (0.052)**
Panel B: If your firm is using activity-based costing, what are the reasons for using it?				
'Understand real product cost'	3.00 (1.000)	**4.64 (0.000)**	**4.22 (0.023)**	2.542 (0.102)
'Decrease product cost'	2.50 (0.795)	3.29 (0.263)	**4.13 (0.002)**	**3.322 (0.056)**
'Improve decision-making based on comparison of costs'	2.33 (0.423)	**3.81 (0.001)**	**3.78 (0.088)**	**3.182 (0.059)**
'Modernize cost-accounting system to meet reality'	2.67 (0.742)	**4.06 (0.000)**	3.13 (0.785)	**4.418 (0.023)**
'Allocate indirect costs more accurately'	3.00 (1.000)	**3.75 (0.009)**	**4.11 (0.007)**	1.098 (0.350)
'Identify factors that drive costs'	3.50 (0.500)	**4.13 (0.000)**	**4.50 (0.000)**	1.665 (0.210)
'Identify activity costs'	2.50 (0.500)	**4.31 (0.000)**	**4.33 (0.000)**	**4.621 (0.020)**
'Control and decrease indirect costs'	2.50 (0.500)	**3.47 (0.048)**	**4.11 (0.003)**	**3.826 (0.037)**

Notes: The table shows the mean values and the *p*-values of testing whether the means are different *from zero* in each of the three life cycle stages. Panel A reports the mean values of overall usage of ABC on a two-point Likert scale ranging from (1) "No" to (2) "Yes" (survey item 15 in Appendix A). A *t*-test is used to test whether the sample mean of a response is statistically different from 1.5. In Panel B, a five-point Likert scale ranging from (1) "Not important" to (5) "Very important" is used to obtain the respondents' views. A *t*-test is used to test whether the sample mean of a response is statistically different from three, which reflects respondent's neutral opinion. The *F*-test indicates differences in management accounting practices across the life cycle stages. *p*-Values printed in bold are significant at 0.1 level.

means are significantly different from three and the *F*-test for testing whether the use of activity-based costing differs across life cycle stages. The results indicate that mature firms and especially revival firms use activity-based costing system more frequently than growth firms. The results also indicate that growth firms do not consider any of the reasons for using activity-based costing to be relevant for them, whereas maturity and revival firms regard these reasons as relevant. These results are in line with those reported in earlier life cycle studies, i.e. the use of formal cost-accounting methods such as activity-based costing is more common among firms in the later life cycle stages than it is among firms in the early life cycle stages.

3.2.3. Measures of other characteristics of the firm affecting the use of activity-based costing

As discussed in Section 2.3, there are other characteristics of the firm that are likely to affect the use of activity-based costing. Therefore, the survey questionnaire included several items identifying these characteristics. We construct the following measures based on these items:

1. *Sales*: Size of the firm measured by logarithmic net sales (survey item 3).
2. *Employee*: Size of the firm measured by the logarithmic number of employees (survey item 4).
3. *Age*: Age of the firm in years (survey item 1).
4. *Diversity*: Product/service diversity (survey item 12).
5. *Standard*: Complexity of the production process (survey item 11).
6. *Education*: Educational level of the CEO of the firm (survey item 8).
7. *Investor*: Venture capital investors (survey item 5).
8. *Public*: Stock market listing (survey item 2).
9. *Manufact*: Manufacturing versus service firm (survey item 10).

Following earlier studies (e.g. Davila, 2005; Gosselin, 1997), the size of the firm was measured by logarithmic net sales (Sales) and by the logarithmic number of employees (Employee). Following Malmi (1999), product/service diversity (Diversity) was measured by asking respondents to choose a value of one if they have only one product/service, a value of two if they have several products/services and a value of three if they have numerous products/services. The complexity of the production process (Standard) was measured by asking respondents to choose the value one if the products are fully standardized, a value of two if the products are fully standardized but specializations are available, a value of three if the products are mainly customized and a value of four if the firm has only customized products. This survey item is partly based on Malmi (1999). The measure of the education level of the CEO of the firm (Education) was taken from Graham and Harvey (2001), i.e. respondents were asked to choose a value of one if

the CEO of the firm has completed basic compulsory education, a value of two if the CEO of the firm has vocational qualifications examination, a value of three if the CEO of the firm has a college-level diploma, a value of four if the CEO of the firm has a university degree and a value of five if the CEO of the firm has a licentiate or doctoral degree. Following Davila (2005), respondents were asked to indicate the number of venture capital investors investing in their firm. This survey item was used to construct a dummy variable having a value of one if the firm has venture capital investors, otherwise zero (Investor). Respondents were also asked to choose the value one if the firm was listed on a stock exchange, otherwise zero (Public). Finally, the survey contained an item to identify whether the firm was a manufacturing or service firm. Respondents were asked to choose a value of one if the firm was a manufacturing firm, and zero if it was a service firm (Manufact).

3.3. Correlations between the measures

Table 5 reports the correlation coefficients between the survey measures. Though none of the pair-wise correlations among the measures is high enough to suggest the existence of a multi-collinearity problem, some of them are significant. The use of activity-based costing is significantly positively correlated with the life cycle stage of the firm, which is in accordance with the life cycle literature, i.e. the use of formal cost-accounting methods such as activity-based costing is more common among firms in the later life cycle stages than it is among firms in the early life cycle stages. The use of activity-based costing is also positively correlated with the size of the firm measured by the number of employees. This result is in line with earlier studies (e.g. Drury and Tayles, 1994; Innes and Mitchell, 1995; Bjornenak, 1997; Chenhall and Langfield-Smith, 1998). Correlations between the self-categorized measure of the life cycle stage of the firm and both measures of the size of the firm are significantly positive, but their magnitudes are relatively low. This supports our view that the life cycle stage of the firm has its own role apart from the size of the firm.[5] This is also illustrated in Fig. 1, showing the number of sample firms across life cycle stages and size categories.[6] Each of the three life cycle stages contains firms of all sizes.

Table 5 also reports the correlations between the other measures in the survey. Significant correlations are reported between most of the control variables. Life cycle stage of the firm especially is significantly positively correlated with the variables Public and Diversity, i.e. firms in the later life cycle stages have gained stock listing and they have a diverse product/service range. These results are in accordance with those reported in Table 3, i.e. firms in the maturity and revival stages are large enough to achieve stock market listing and they experience diversification in their products and markets.

4. Empirical results and discussion

We test our hypotheses by estimating the following logistic regression model from our data:

$$Y_i = \alpha + \beta_1\, Maturity_i + \beta_2\, Revival_i + \beta_3\, Age_i + \beta_4\, Sales_i + \beta_5\, Employee_i + \beta_6\, Investor_i + \beta_7\, Standard_i + \beta_8\, Education_i + \beta_9\, Public_i + \beta_{10}\, Manufact_i + \beta_{11}\, Diversity_i + \varepsilon_i \quad (1)$$

where Y_i is a dummy variable having a value of one if the ith firm's is using activity-based costing system, otherwise zero (survey item 15); $Maturity_i$ and $Revival_i$ are dummy variables having a value of one if the ith firm belongs to the

[5] Statistically, the squared correlation coefficient between two variables is equal to the explanatory power (R^2) in univariate regression in which one variable is regressed on the other variable. The correlation coefficient between the measure of the life cycle stage and the number of employees reported in Table 5 is equal to 0.304. In other words, the explanatory power of a regression model with the life cycle stage of the firm as a dependent variable and the number of employees as an independent variable is equal to 9.2% (0.304×0.304). This means that 9.2% of the information in the measure of the life cycle stage of the firm can be explained by this measure of the size of the firm, and 90.8% of the information remains unexplained and is not associated with the size of the firm. The corresponding figures for the sales of the firm are 6.4% (0.253×0.253) and 93.6%. In other words, there is only a very limited amount of information that is common to the measure of the life cycle stage of the firm and the two measures of the size of the firm.

[6] The total sample is first divided into three sub-samples based on the life cycle stage of the firm. Each of these sub-samples is then divided into seven size categories. The size category 'Small' includes firms with logarithmic sales less than 2, size category '2' includes firms with the logarithmic sales greater than 2 and less than 3, size category '3' includes firms with logarithmic sales greater than 3 and less than 4, size category '4' includes firms with logarithmic sales greater than 4 and less than 5, size category '5' contains firms with logarithmic sales greater than 5 and less than 6, and size category 'Large' includes firms with logarithmic sales greater than 6.

Table 5
Correlation coefficients between the measures

	Life cycle	Age	Sales	Employee	Investor	Standard	Education	Public	Manufact	Diversity
Use of ABC (survey item 15)	**0.223 (0.023)**	0.158 (0.118)	0.092 (0.357)	**0.210 (0.033)**	−0.015 (0.882)	−0.002 (0.982)	0.084 (0.406)	0.074 (0.472)	−0.080 (0.431)	0.047 (0.640)
Life cycle (survey item 13)		**0.500 (0.000)**	**0.253 (0.010)**	**0.304 (0.002)**	−0.035 (0.719)	**0.166 (0.094)**	0.086 (0.387)	**0.213 (0.034)**	−0.064 (0.527)	**0.302 (0.002)**
Age (survey item 1)			**0.206 (0.041)**	**0.347 (0.000)**	−0.112 (0.268)	−0.145 (0.153)	0.108 (0.288)	0.164 (0.111)	**−0.292 (0.004)**	**0.168 (0.094)**
Sales (survey item 3)				**0.729 (0.000)**	0.010 (0.922)	**−0.276 (0.005)**	0.155 (0.120)	**0.235 (0.020)**	−0.013 (0.901)	**0.212 (0.031)**
Employee (survey item 4)					−0.019 (0.850)	−0.106 (0.285)	**0.287 (0.003)**	**0.390 (0.000)**	**−0.264 (0.008)**	**0.273 (0.005)**
Investor (survey item 5)						−0.003 (0.977)	0.035 (0.727)	0.060 (0.555)	−0.056 (0.581)	**−0.225 (0.021)**
Standard (survey item 11)							0.035 (0.727)	0.075 (0.466)	0.022 (0.831)	0.123 (0.216)
Education (survey item 8)								0.035 (0.735)	−0.013 (0.896)	0.153 (0.122)
Public (survey item 2)									0.127 (0.214)	−0.090 (0.375)
Manufact (survey item 10)										0.037 (0.718)

Notes: The table shows the Pearson coefficients among the measures. The measures are described in Section 2. *p*-Values printed in bold are significant at the 0.1 level.

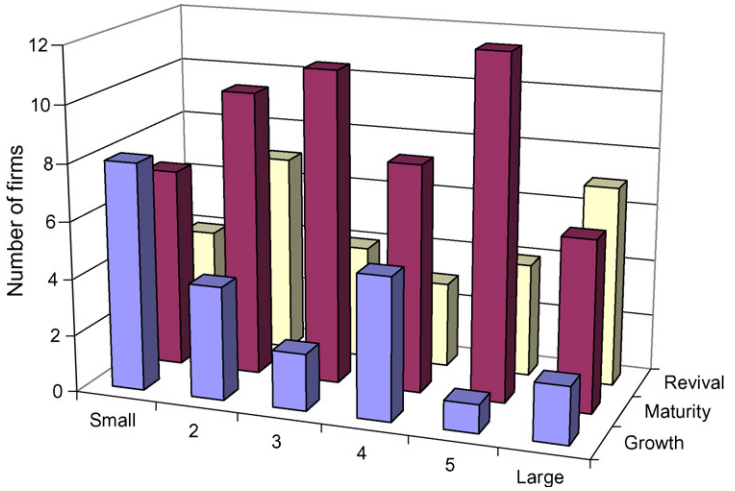

Fig. 1. Distribution of firms across different life cycle stages and size categories. *Notes*: The total sample is first divided into three sub-samples based on the life cycle stage of the firm. Each of these sub-samples is then divided into seven size categories. The size category 'Small' includes firms with logarithmic sales less than 2, size category '2' includes firms with logarithmic sales greater than 2 and less than 3, size category '3' includes firms with the logarithmic sales greater than 3 and less than 4, size category '4' includes firms with logarithmic sales greater than 4 and less than 5, size category '5' contains firms with logarithmic sales greater than 5 and less than 6, and size category 'Large' includes firms with logarithmic sales greater than 6.

maturity or revival stage of the life cycle (survey item 13),[7] otherwise zero; and the other independent variables are as described in Section 3.2.3.

Table 6 reports the results of estimating Model (1). In column 1 of Table 6, the estimated model includes the two dummy variables based on the self-categorization measure of the life cycle stage of the firm and the variables measuring the age and size of the firm. In column 2 of Table 6 we add the other control variables to the model. In both model specifications, the estimated parameters for the variables $Maturity_i$ and $Revival_i$ are significantly positive. The estimated parameters for the control variables have the predicted signs, but are all insignificant except for the parameter for the number of employees. In column 1 of Table 6, insignificant value of the Hosmer–Lemeshow goodness-of-fit test statistic indicates a good fit of the estimated model. For the model containing the other control variables (column 2 of Table 6), the Hosmer–Lemeshow goodness-of-fit test indicates a weaker fit, probably because most of the estimated parameters for the control variables are insignificant. However, the p-value of the Hosmer–Lemeshow test is above 0.05 in column 2 of Table 6. A better fit of the model without the control variables suggests that the life cycle stage of the firm rather than the other characteristics of the firm is related to the use of activity-based costing.

The results reported in Table 6 support our hypothesis, i.e. the use of activity-based costing systems is more common among firms in the mature and revival phases than it is among firms in the growth phase. This result remains unchanged after controlling for the effects of firm size, pressure of venture capital investors, level of standardization of products or services, stock market listing, product/service diversity, industry (manufacturing versus service) and CEO's education. Life cycle theories suggest that firms in the maturity and revival phases make more use of formal management accounting systems, because, in comparison with growth firms, they have a greater organizational size, they need to produce products/services cost-effectively to earn adequate profit margins on highly competitive markets, they experience increased diversification in their products and markets, their administrative task is more complex and more formal and they have more bureaucratic organizational structures (Miller and Friesen, 1984, 1984). In sum, our results support life cycle theories, i.e. firms in the maturity and revival phases put more emphasis on formal management accounting systems such as cost-accounting methods as opposed to firms in the growth phase.

Earlier studies report that the use of activity-based costing increases as the size of the firms increases (e.g. Drury and Tayles, 1994; Moores and Chenhall, 1994; Innes and Mitchell, 1995; Bjornenak, 1997; Gosselin, 1997; Chenhall and Langfield-Smith, 1998; Baird et al., 2004). Our results confirm this finding, but more importantly, our results indicate that the life cycle of the firm has a role of its own apart from that of the size and of the firm when explaining the use of

[7] We use the growth stage as a base life cycle stage.

Table 6
Results of investigating the use of activity-based costing at different life cycle stages of the firm

	Predicted sign	(1)	(2)
Intercept (p-value)		**−3.839 (0.000)**	−4.306 (0.185)
$Maturity_i$ (p-value)	+	**1.677 (0.049)**	**2.039 (0.031)**
$Revival_i$ (p-value)	+	**1.758 (0.062)**	**2.296 (0.036)**
Age_i (p-value)	+	−0.002 (0.804)	−0.004 (0.656)
$Sales_i$ (p-value)	+	−0.189 (0.286)	−0.361 (0.126)
$Employee_i$ (p-value)	+	**0.434 (0.049)**	**0.630 (0.044)**
$Investor_i$ (p-value)	+		0.394 (0.505)
$Standard_i$ (p-value)	−		−0.316 (0.375)
$Education_i$ (p-value)	+		0.133 (0.668)
$Public_i$ (p-value)	+		0.717 (0.395)
$Manufact_i$ (p-value)	−		−0.050 (0.938)
$Diversity_i$ (p-value)	+		−0.468 (0.577)
Log likelihood		107.15	93.51
Hosmer and Lemeshow test		5.87 (0.662)	**15.39 (0.052)**

Notes: The table shows the results of estimating the following logistic regression model:

$$Y_i = \alpha + \beta_1\, Maturity_i + \beta_2\, Revival_i + \beta_3\, Age_i + \beta_4\, Sales_i + \beta_5\, Employee_i + \beta_6\, Investor_i + \beta_7\, Standard_i + \beta_8\, Education_i + \beta_9\, Public_i + \beta_{10}\, Manufact_i + \beta_{11}\, Diversity_i + \varepsilon_i$$

where Y_i is a dummy variable having a value of one if the ith firm's is using activity-based costing system, otherwise zero (survey item 15); $Maturity_i$ and $Revival_i$ are dummy variables having a value of one if the ith firm belongs the maturity or revival stage of the life cycle (survey item 13), otherwise zero; and the other variables are as described in Section 2. p-Values are reported in parentheses. p-Values printed in bold are significant at the 0.1 level.

activity-based costing. This supports the view that not all mature or revival firms are necessarily large in size, but they have a greater need for advanced management accounting systems such as activity-based costing than many larger firms have. In addition, we report that the life cycle of the firm has a role of its own apart from that of the age of the firm when explaining the use of activity-based costing. These results indicate that the self-categorizing measure of the life cycle stage used by Md. Auzair and Langfield-Smith (2005) contains incremental information with respect to the size of the firm.[8]

Table 7 reports the results of testing Hypothesis 2, i.e. how the firms' reasons for using activity-based costing system differ across life cycle stages.[9] In these regressions, we estimate Model (1) as a multinomial logistic regression such

[8] In order to verify that the effect of life cycle stage of firm on the use of activity-based costing is separate from that of the size of the firm, we performed the following additional analyses (these results are not shown in the tables but they are available from the authors on request). First, we estimated Model (1) such that we used likelihood ratio statistics to test whether the estimated parameters for the variables maturity and revival are significantly different between small and large firms. These analyses provide us with a direct statistical test of whether our results on the use of activity-based costing in different life cycle stages are driven by the size of the firm rather than the life cycle stage of the firm. We classified firms in our sample into categories of small and large firms to explore if the use of activity-based costing across life cycle stages is similar for small and large firms. We used both the sales and the number of employees of the firm as the measures of the size of the firm (see panel A of Table 2). Specifically, if the sales of the firm was less than or equal to 100 (greater than 100) a firm was classified as a small (large) firm according to this measure of the size of the firm. Similarly, if the number of employees of the firm was less than or equal to 250 (greater than 250) a firm was classified as a small (large) firm according to this measure of the size of the firm. We obtained the following results from these analyses. When the sales of the firm was used to classify firms into small and large firms, the values of the chi-square statistic to test whether the estimated parameters are different between small and large firms were, respectively, 1.34 ($p = 0.246$) and 0.73 ($p = 0.392$) for the variables maturity and revival. When the number of employees of the firm was used to classify firms into small and large firms, the corresponding values of the chi-square statistic were, respectively, 2.01 ($p = 0.157$) and 1.02 ($p = 0.313$) for the variables maturity and revival. Therefore, these results indicate that the estimated parameters for variables maturity and revival in Model (1) are not significantly different between small and large firms. In other words, our regression results are not driven by the size of the firm. Also, the results did not change, if we divided the sample into three categories, i.e. small, medium-size and large firms. Second, we estimated Model (1) without the firms that belong to the two top size categories reported in panel A of Table 2. These results would reveal if the largest firms in the sample dominate our main results. However, the results of these regressions were similar to those reported in the paper, i.e. the estimated parameters for the variables maturity and revival are significantly positive.

[9] Table 7 does not show the Hosmer and Lemeshow tests, because this test is available only for binary response models and the model estimated in Table 7 is a multinomial regression, i.e. the dependent variable can have values between 1 and 5. However, we also estimated this model as a generalized linear model that allows us to analyze the values of deviance and the Pearson chi-square statistic to assess the goodness of the fit of the

Table 7
Results of investigating reasons for using activity-based cost accounting at different life cycle stages of the firm

	Predicted sign	'Understand real product cost'	'Decrease product cost'	'Improve decision-making based on comparison of costs'	'Modernize cost-accounting system to meet reality'	'Allocate indirect costs more accurately'	'Identify factors that drive costs'	'Identify activity costs'	'Control and decrease indirect costs'
Intercept (p-value)		−4.969 (0.499)	1.033 (0.786)	0.982 (0.761)	4.319 (0.169)	3.434 (0.314)	**−10.664 (0.012)**	**−7.051 (0.049)**	−3.459 (0.320)
$Maturity_i$ (p-value)	+	**3.017 (0.056)**	**2.554 (0.058)**	**2.576 (0.022)**	**1.780 (0.055)**	**2.151 (0.067)**	0.677 (0.545)	**3.016 (0.012)**	0.884 (0.407)
$Revival_i$ (p-value)	+	0.595 (0.591)	**2.565 (0.079)**	**4.375 (0.003)**	0.309 (0.779)	1.710 (0.167)	1.361 (0.277)	**3.157 (0.017)**	2.077 (0.101)
Age_i (p-value)	+	0.183 (0.263)	−0.017 (0.272)	−0.014 (0.239)	0.001 (0.908)	−0.006 (0.565)	0.020 (0.145)	0.006 (0.589)	0.018 (0.129)
$Sales_i$ (p-value)	+	0.360 (0.187)	−0.107 (0.703)	−0.013 (0.962)	0.157 (0.495)	0.243 (0.320)	0.087 (0.754)	−0.032 (0.901)	−0.127 (0.613)
$Employee_i$ (p-value)	+	−0.300 (0.569)	0.272 (0.454)	−0.088 (0.775)	−0.114 (0.687)	−0.354 (0.246)	−0.007 (0.983)	−0.115 (0.716)	0.031 (0.923)
$Investor_i$ (p-value)	+	−0.737 (0.485)	0.764 (0.261)	−0.033 (0.954)	0.153 (0.792)	0.627 (0.289)	−0.081 (0.904)	0.230 (0.714)	0.817 (0.204)
$Standard_i$ (p-value)	−	0.638 (0.263)	0.762 (0.236)	**−1.513 (0.017)**	−0.057 (0.918)	0.847 (0.164)	−0.154 (0.810)	−0.485 (0.465)	0.046 (0.935)
$Education_i$ (p-value)	+	0.367 (0.445)	0.444 (0.225)	−0.137 (0.663)	−0.355 (0.243)	−0.090 (0.774)	**−0.818 (0.029)**	−0.482 (0.158)	−0.563 (0.084)
$Public_i$ (p-value)	+	0.373 (0.884)	0.153 (0.875)	0.997 (0.228)	0.087 (0.910)	−0.121 (0.878)	0.917 (0.312)	1.180 (0.138)	1.098 (0.181)
$Manufact_i$ (p-value)	−	−1.797 (0.187)	**−3.327 (0.008)**	0.093 (0.904)	−0.720 (0.316)	−1.727 (0.033)	**2.212 (0.018)**	**0.773 (0.023)**	**1.290 (0.099)**
$Diversity_i$ (p-value)	+	1.965 (0.044)	0.448 (0.601)	0.698 (0.376)	−0.336 (0.652)	−0.339 (0.684)	**2.611 (0.011)**	**2.158 (0.023)**	0.249 (0.770)
Log likelihood		−16.76	57.46	59.28	65.94	61.65	49.91	55.77	53.35

Notes: The estimated model and the variables are as in Table 6. p-Values printed in bold are significant at the 0.1 level.

that the dependent variable is the value of the *i*th firm's response to a given question (survey item 16). In all cases, the estimated parameters for the variables $Maturity_i$ and $Revival_i$ are positive, although not always significant. 'Understand real product cost', 'Decrease product cost', 'Improve decision-making based on comparison of costs', 'Modernize cost accounting system to meet reality', 'Allocate indirect costs more accurately', 'Identify activity costs', and 'Control and decrease indirect costs' are more important reasons for using an activity-based costing system for mature firms than they are for growth firms. In addition, 'Decrease product cost', 'Improve decision-making based on comparison of costs', and 'Identify activity costs' are more important reasons for using activity-based costing systems for revival firms than they are for growth firms.

The results reported in Table 7 support Hypothesis 2. Specifically, they indicate that the firms' reasons for using an activity-based costing system vary across life cycle stages, as the life cycle literature implies. Cost-effectiveness and profitability are more important for firms in the maturity and revival phases than they are for firms in the growth phase (e.g. Miller and Friesen, 1984). Therefore, mature and revival firms put more emphasis especially on reducing and controlling their costs and improving their decision-making as opposed to firms in a growth phase.

5. Conclusions

Life cycle research suggests that the use of management accounting systems should differ across the stages of organizational life cycle as different systems are needed in different stages (e.g. Miller and Friesen, 1983, 1984). In comparison with growth firms, the administrative task of mature and revival firms is more complex, they need to produce products/services cost-effectively to earn adequate profit margins on highly competitive markets, they experience increased diversification in their products and markets, they have greater organizational size and more formal and more bureaucratic organizational structures (Greiner, 1972; Miller and Friesen, 1983, 1984; Merchant, 1997). Consequently, the use of the advanced cost-accounting systems such as activity-based costing should be more common among mature and revival firms than among growth firms. In this paper, we investigate if the use of activity-based costing varies among firms in different life cycle stages. Following Kazanjian and Drazin (1990) and Md. Auzair and Langfield-Smith (2005) we use a self-categorization variable to measure the life cycle stage of the firm. The paper contributes to the management accounting literature by exploring if the life cycle of the firm has a role of its own apart from that of the size of the firm in the use of activity-based costing. Earlier studies report that the use of activity-based costing increases as the size of the firms increases (e.g. Al-Omir and Drury, in press) but, although firms in the maturity and revival phases are often larger than firms in a growth phase, not all mature or revival firms are necessarily large in size.

Our empirical analyses based on the questionnaire completed by 105 Finnish firms operating in various industries and life cycle stages support our hypothesis derived from life cycle theories. The results indicate that the characteristics of the firm affecting the use of advanced cost-accounting systems differ across life cycle phases as reported in the life cycle literature, i.e. firms in the maturity and revival phases have a greater organizational size, lower profitability, a more diversified product/service range and have more often achieved a stock market listing as opposed to firms in the growth phase. More importantly, we find that the use of activity-based costing is more common among firms in maturity and revival phases than it is among firms in a growth phase, even after controlling for the effects of size of the firm and other relevant control variables. We also find that the firms' reasons for using an activity-based costing system vary across life cycle stages as the life cycle theories predict. Cost-effectiveness and profitability are more important for firms in the maturity and revival phases than they are for firms in the growth phase (e.g. Miller and Friesen, 1984). Consequently, mature and revival firms need to put more emphasis on reducing and controlling their costs and improving their decision-making as opposed to firms in a growth phase.

Concurring with the results reported in earlier studies, we also find that the use of activity-based costing increases as the size of the firms increases (e.g. Drury and Tayles, 1994; Innes and Mitchell, 1995; Bjornenak, 1997; Chenhall and Langfield-Smith, 1998; Malmi, 1999; Al-Omir and Drury, in press). More importantly, our results indicate that the life cycle of the firm has a role of its own apart from that of the size of the firm when explaining the use of activity-based costing. This supports the view that not all mature or revival firms are necessarily large in size, but they have a greater need for advanced management accounting systems such as activity-based costing than many larger firms have.

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model (details not shown in Table 7). In all columns of Table 7, the values of deviance are close to the cut-off value of one, indicating a good fit of the model. In addition, the Pearson chi-square statistics reject the null hypothesis of no fit in the models at any conventional level of significance.

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Appendix A. Survey items

1. Year of founded _____

2. Listed company

Yes
No

3. Net sales (M€) _____

4. Total number of employees _____

5. Number of venture capital investors _____

6. Growth in net sales (%) _____

7. Net income margin (%) _____

8. Education of CEO

Basic compulsory education
Vocational qualifications examination
College-level diploma
University degree
Dr./Licentiate

9. Industry

Banks and Finance	Insurance	Investment
Transport	Trade	Other Services
Metal Industry	Forest Industry	Multi-Business
Energy	Food Industry	Construction
Telecommunication & Electronics	Chemicals	Media & Publishing
Other Industries		

10. Our company is mainly a

Manufacturing firm
Service firm

11. Level of the standardization of the products (services)

Fully-standardized products
Mainly fully-standardized products, but specializations are available
Mainly customized products
Only customized products

12. Number of products/services

Only one
Several
Numerous

13. Organizational life cycle stage

Birth
Growth
Maturity
Revival
Decline

14. Proportion of different cost items as a percentage of total costs

Material	
Direct labour	
Other variable manufacturing costs	
Fixed manufacturing costs	
Other fixed costs	
Total	100

15. Does your firm use activity-based costing?

Yes
No

16. If your firm is using activity-based costing, what are the reasons for using it?

	Not important				Very important
a) Understand real product cost	1	2	3	4	5
b) Decrease product cost	1	2	3	4	5
c) Improve decision-making based on comparison of costs	1	2	3	4	5
d) Modernize cost accounting system to meet reality	1	2	3	4	5
e) Allocate indirect costs more accurately	1	2	3	4	5
f) Identify factors that drive costs	1	2	3	4	5
g) Identify activity costs	1	2	3	4	5
h) Control and decrease indirect costs	1	2	3	4	5

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