

Determinants of Responsibility Centre Choices – An Empirical Study at the Managerial Level

Martijn Schoute*

Abstract

This paper provides empirical evidence on the determinants of firms' responsibility centre choices at the management level directly below headquarters, focusing in particular on their usage of profit and/or investment centres at this level. Survey and archival data are used to investigate the relationship between usage of profit and/or investment centres (i.e., delegation of investment responsibility) and four firm characteristics: firms' investment opportunity set, size, diversification and capital intensity. The results show that usage of investment centres (as opposed to profit centres) is positively associated with the size and capital intensity of the studied firms, and negatively with their market-to-book ratio, i.e., their growth opportunities. These results differ somewhat between manufacturing and non-manufacturing firms, however.

Keywords

**Responsibility Centres
Usage
Determinants**

Introduction

The question of centralisation versus decentralisation is one of the fundamental issues in the organisation of firms. In practice, especially large firms are generally organised into multiple business units, whose managers are delegated different degrees of decision making authority and responsibility. Although some firms retain both authority and responsibility for all major decisions at the centre, most create some form of responsibility centre for their business unit managers. Four basic types of responsibility centres are generally distinguished: revenue, cost, profit and investment centres. Despite their importance, only little empirical evidence exists on the extent to which these four types of responsibility centres (or any variations) are used in practice (Reece and Cool, 1978), and even less is known about the determinants of their usage.

This paper provides empirical evidence on the determinants of firms' responsibility centre choices at the management level directly below headquarters, focusing in particular on their usage of profit and/or investment centres at this level. In order to conduct this study, some results from a survey study on performance measurement and evaluation of business units among Dutch listed firms are combined with archival data on various characteristics of these firms. In particular, the relationship between usage of profit and/or investment centres (i.e., delegation of investment responsibility) and four firm characteristics is investigated: firms' investment opportunity set (proxied by R&D intensity and market-to-book ratio), size, (geographic and industry) diversification, and capital intensity. The results show that usage of investment centres (as opposed to profit centres) is positively associated with the size and capital intensity of the studied firms, and negatively with their market-to-book ratio, i.e., their perceived growth opportunities.

The author would like to thank Elbert de With and Aagtje Dijkman for providing him the survey data that make this study possible, and Eelke Wiersma for his helpful comments on an earlier version of the paper.

* Vrije Universiteit Amsterdam

These results differ somewhat between manufacturing and non-manufacturing firms, however.

The remainder of this paper is structured as follows. The next section reviews the literature on responsibility centre usage and its determinants. This is followed by a section that describes the research methods used. The section that follows presents and discusses the results, and the final section concludes and discusses limitations.

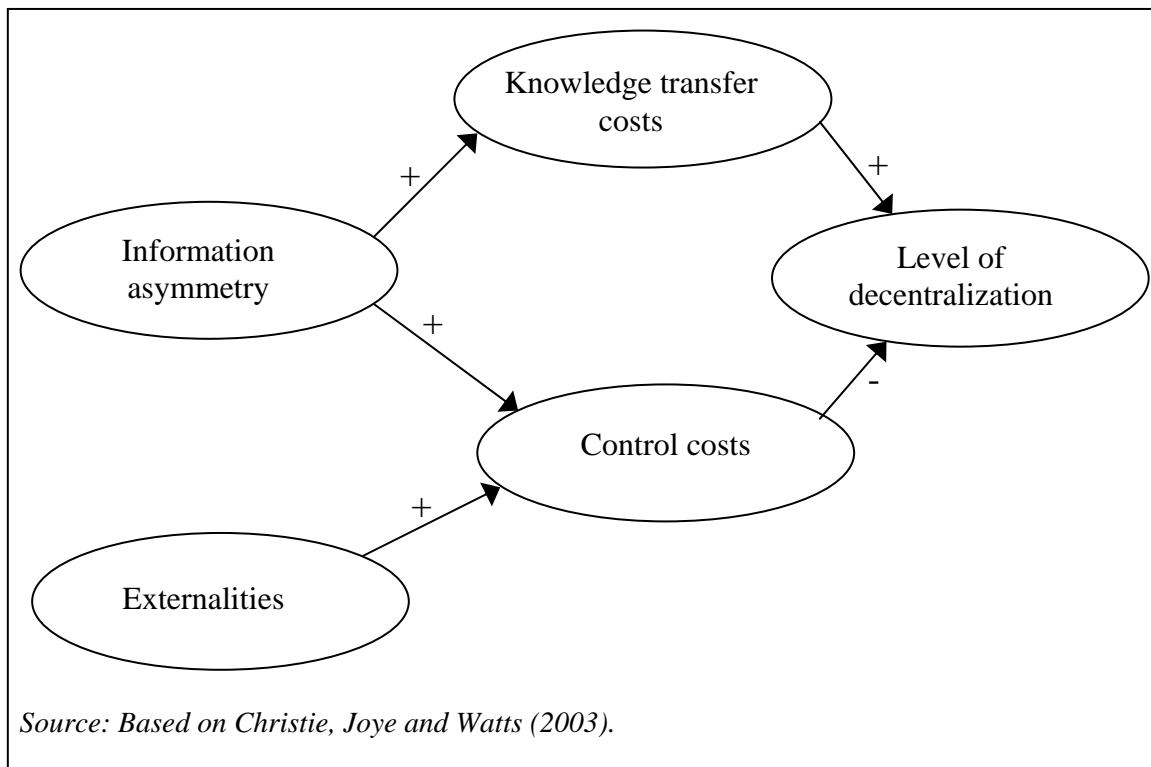
Responsibility Centre Usage and Its Determinants

A responsibility centre is an organisational unit that is headed by a manager who is responsible for its activities. Such centres define the apportioning of accountability for financial results within an organisation. Based on the nature of the financial in- and/or output that are measured for control purposes, four basic types of responsibility centres, *Revenue, Cost, Profit and Investment*, are generally distinguished (Anthony and Govindarajan, 2004). For revenue centres only the output is measured in financial terms, for cost centres only the input, and for profit centres (the difference between) input and output. For investment centres also (the difference between) input and output is measured, but this is also related to the invested total assets. This last aspect is therefore the main distinguishing difference between profit and investment centres.

Jensen and Meckling (1999) have presented the outlines of a theory that attempts to explain in which circumstances each of the four types of responsibility centres is likely to be the most efficient. Central in their theory is the supposition that each of the types can be seen as providing an alternative way of aligning decision making authority with valuable "specific knowledge" inside an organisation. Such knowledge can be transferred to others only at high costs and is not easily observable by others (especially managers higher in the organisational hierarchy). For optimal decision making in an organisation, specific knowledge that is valuable for a certain decision needs to be transferred to the

person with the decision making authority, or the authority to make the decision needs to be transferred to the person with the knowledge. The first approach generates knowledge transfer costs (for example, costs resulting from delays in decision making), while the second approach generates control costs (for example, costs of performance measurement and reward systems). When determining the optimal level of decentralisation, there is always a trade-off between these two types of costs (Jensen and Meckling, 1995). Extending these arguments, Jensen and Meckling (1999) argue that revenue and cost centres work best in circumstances in which headquarters has complete and reliable information about cost and demand functions, product quality, and investment opportunities, or can easily obtain this information. In circumstances in which managers of business units have significant informational advantages over headquarters (information asymmetry), profit and investment centres seem to work best. With regard to choices between profit and investment centres, Jensen and Meckling (1999) argue that the latter tend to be more desirable when activities are capital intensive and/or when it is difficult for headquarters to identify optimal divisional asset investments.

Christie, Joye and Watts (2003) have extended and empirically tested the above theory on decentralisation. According to these researchers, firms' level of decentralisation mainly depends on two issues: (1) the extent to which knowledge in different layers of the firm is specific (information asymmetry), and (2) the extent to which there are interdependencies between activities of different business units (externalities). The higher the level of information asymmetry, the higher are both knowledge transfer costs and control costs. The higher the level of externalities, also the higher the control costs. Theory then argues that the level of decentralisation is positively associated with the level of knowledge transfer costs, and negatively with the level of control costs (see Figure One).

Figure One: Factors that Determine the Optimal Level of Decentralisation

Christie, et al. (2003) use survey and archival data of 121 U.S. firms to test this theory. They operationalise the level of decentralisation as the relative use of cost and profit centres at the management level directly below headquarters. Revenue and cost centres are explicitly considered as one, and the same (implicitly) applies to profit and investment centres. In other words, in their study the level of decentralisation is actually operationalised as delegation of profit responsibility. The researchers use the following firm characteristics as indicator of the level of information asymmetry: two (new) industry classification based measures of the level of specific knowledge in the investigated firms, their growth opportunities (proxied by their market-to-book ratio), the level of uncertainty the firms are confronted with, and their size. The extent to which the firms are diversified is used as indicator of the level of externalities, assuming that in less diversified firms the level of interdependency between activities of different business units is higher than in more diversified firms.

Consistent with the researchers' expectations, the results of the study

indicate that more decentralized firms generate more specific knowledge, have higher growth opportunities and greater uncertainty about the firms' returns, and are larger than more centralized firms. As all these indicators of the level of information asymmetry are positively associated with the level of decentralisation, these results imply that, on average, firms' level of decentralisation is determined relatively more by knowledge transfer costs than by control costs. As also expected by Christie, et al., (2003), more decentralized firms are more diversified than more centralized firms. However, it is not entirely clear whether (as argued by the researchers) externalities are the only cause of this finding, as it seems likely that a high (low) level of diversification is also associated with a high (low) level of information asymmetry (cf., Vancil, 1979), which may also cause the effect found.

This present study aims to extend the empirical work of Christie, et al. (2003). Using a similar research approach, this study investigates the relationship between usage of profit and/or investment centres (i.e., delegation of investment responsibility) and four firm characteristics:

firms' investment opportunity set (proxied by R&D intensity and market-to-book ratio), size, (geographic and industry) diversification, and capital intensity. These characteristics are considered to be relevant for this study because they are either directly (capital intensity) or indirectly (the other firm characteristics) related to the circumstances in which usage of investment centres (as opposed to profit centres) (according to Jensen and Meckling, 1999) is desirable. The 'indirect' characteristics are assumed to cause either information asymmetry (firms' investment opportunity set and size) or externalities (diversification). Based on the findings of Christie, et al.(2003) that firms' level of decentralisation is determined relatively more by knowledge transfer costs than by control costs, the researcher expected all firm characteristics to be positively associated with usage of investment centres (as opposed to profit centres).

Research Method

A combination of survey and archival data is used for the empirical analyses presented in this paper. This section first describes the research design and next the measurement instruments used to collect the data.

Research Design

In Fall 2004, a survey study was conducted on aspects of performance measurement and evaluation of business units among Dutch manufacturing, trade and service firms that are listed on the Amsterdam Stock Exchange (see De With and Dijkman, 2005). Because financial services firms (banks, investment companies and insurance companies) have a different orientation with regard to performance measurement and evaluation, they were left out of the study. In total, the chief financial officers (CFOs) of 125 firms were sent a six-page questionnaire, a personalized cover letter, and a stamped return envelope. CFOs were chosen as informants as they are most knowledgeable about performance measurement and evaluation of their firm's business units. Four weeks later, the non-respondents were sent a reminder with a new questionnaire. The number of returned questionnaires that were usable for the analyses that are reported in this paper is 43 (34.4%). To investigate the possibility of non-response bias, the researcher compared the firms in the final sample to the other firms in the sampling frame in terms of firm size (net sales) and industry representation (see Table One).

Table One: Distribution of Respondents across Industries

Industry	Sampling frame		Final sample	
	<i>n</i>	%	<i>n</i>	%
Manufacturing	57	45.6%	20	46.5%
Construction	6	4.8%	2	4.7%
Trade	17	13.6%	7	16.3%
Transportation, warehousing and communication	15	12.0%	5	11.6%
Professional services	30	24.0%	9	20.9%
Total	125	100.0%	43	100.0%

Note: Industry Classification based on the Dutch Central Bureau of Statistics.

The results show that, on average, the firms in the final sample are somewhat larger but from similar industries than the other firms in the sampling frame, suggesting some caution is called for when generalizing the results of this study.¹

The questionnaire contained questions about many aspects of performance

sample ($M = 6.609, SD = 2.200$) and the other firms in the sampling frame ($M = 5.774, SD = 2.392$) in (the natural log of) net sales ($t(123) = -1.904, p = .059$). A one-sample Chi Square test shows no significant difference between the two groups of firms in industry representation ($\chi^2(4, 43) = .319, p = .989$).

¹ A t-test for two independent samples shows a significant difference between the firms in the final

measurement and evaluation of business units. It did not contain any questions about firm characteristics, however, which would make it possible to test whether such characteristics are associated with firms' choices concerning (elements of) their management control system. Therefore, in order to enable such testing in a second stage, data were gathered from the annual reports of the studied firms on a number of characteristics considered to be relevant for the purposes of this study.

Measurement Instruments

The data concerning *responsibility centre choices*, i.e., the investigated firms' usage of profit and/or investment centres, were from the survey study. Respondents were asked which type of responsibility centres are used at the management level directly below headquarters (e.g. divisions and business units). All studied firms used profit and/or investment centres: 12 (27.9%; coded '0') firms only used profit centres, 27 (62.8%) used a combination of profit and investment centres ('mixed'; coded '.5'), and 4 (9.3%; coded '1') only used investment centres.² As a reliability check, the given answers were checked for consistency with the answers given to another question which asked about the financial performance measures that are used to measure and evaluate the performance of the business units. All firms that claimed to use investment centres, used Return on Investment (ROI), Residual Income (RI) and/or Economic Value Added (EVA®) as financial performance measures, while none of the firms that claimed not to use investment centres did, providing the researcher confidence in the respondents' answers to both questions.

The firm characteristics were measured as follows. Because the inherent nature of a firm's *investment opportunity set* is that it is not directly observable, two widely-used proxies were used to measure it. The first, R&D intensity, is an investment-based proxy, and relies on the idea that a high level of investment activity is positively

related to the investment opportunity set of the firm (Kallapur and Trombley, 1999). It was measured as the ratio of R&D expenditures to net sales over 2004.

The second, market-to-book ratio, is a price-based proxy, and relies on the idea that if growth prospects of the firm are at least partially impounded in stock prices, then growth firms will have higher market values relative to assets in place (Kallapur and Trombley, 1999). It was measured as the ratio of the market value to the book value of equity of the firms at the end of 2004. Several studies have empirically evaluated the performance of proxies for firms' investment opportunity set. Among others, these studies have found the overwhelming majority of proxies to be positively and significantly inter-correlated (Burton, 2003), and using association with realized growth as the benchmark, especially the market-to-book ratio to be a valid growth proxy (Kallapur and Trombley, 1999).

The measure selected for *size* was net sales over 2004. As the distribution of this variable was highly skewed, its natural log was taken. Following other studies that use the extent to which firms are diversified as indicator of the level of externalities (e.g., Bushman et al., 1995), two dimensions of *diversification* were measured, geographic and industry diversification. Geographic diversification was measured using a Herfindahl-index of net sales over 2004 (e.g., Hendricks and Singhal, 2001). A Herfindahl-index is the sum of the squares of the net sales as obtained in a certain geographic continent as a percentage of the total net sales of the firm. The value of this index ranges between 0 and 1, where a higher value indicates that the net sales is obtained more (geographically) concentrated. The value used in this study (1 minus this index) therefore is a measure of the extent to which a firm's net sales is obtained more (geographically) diversified. Because data on sales per segment were not available (as there is no obligation to report and disclose them in the Netherlands), the researcher used the number of BIK codes (which are similar to SIC codes) as a proxy

² Most studied firms also used revenue and/or cost centres (for details, see De With and Dijkman (2005)), but this is irrelevant for the present study.

for industry diversification (e.g., Denis, et al., 1997).

Finally, *capital intensity* was measured as the ratio of net fixed assets reported in the balance sheet to the number of employees of the firm at the end of 2004 (e.g., Hendricks and Singhal, 2001). Similar to size, the natural log was taken as the distribution of this variable was highly skewed.

Results

This section first presents and discusses descriptive statistics and regression analysis results for the association between the firm characteristics and firms' responsibility centre choices. Next, it presents and discusses the results of exploratory analyses on potential differences between manufacturing and non-manufacturing firms in their usage of profit and/or

investment centres, and the determinants of this usage.

Descriptive Statistics

Table Two provides the descriptive statistics for, and the Pearson correlations among, the variables used in the analysis. Market-to-book ratio is negatively and significantly associated with responsibility centre choices (i.e., with usage of investment centres as opposed to profit centres), while size, industry diversification and capital intensity are positively and significantly associated with such choices. In other words, firms that use investment centres as opposed to profit centres, on average, have less growth opportunities, are larger, more diversified in terms of industries and more capital intensive. Overall, except for the negative effect for market-to-book ratio, these associations are consistent with the researcher's expectations.

Table Two: Descriptive Statistics and Pearson Correlations

Variables	Mean	SD	1.	2.	3.	4.	5.	6.
1. Responsibility centre choices	-	-						
2. R&D intensity	.010	.028	.113					
3. Market-to-book ratio	2.196	1.378	-.337**	.102				
4. Size	13.524	2.169	.376**	.303**	.145			
5. Geographic diversification	.270	.262	.206	.347**	-.002	.262*		
6. Industry diversification	3.674	2.570	.416***	.057	-.303**	.465***	.020	
7. Capital intensity	3.059	1.145	.503***	.205	-.198	.183	.253	.189

Note: ***, **, * indicates significance at the .01, .05 and .10 level (two-tailed), respectively. (N = 43)

The Pearson correlations among the firm characteristics show that size is positively and significantly associated with R&D intensity, and with geographic and industry diversification. Also, geographic diversification is positively and significantly associated with R&D intensity, while industry diversification is negatively and significantly associated with market-to-book ratio. These results indicate that, on average, larger firms are more R&D intensive, and more diversified in terms of both geographical regions and industries. Also, firms that are more diversified in terms of geographical regions are more R&D intensive, while firms that

are more diversified in terms of industries have less growth opportunities.

Determinants of Responsibility Centre Choices

Table Three presents the results of testing the relationship between the firm characteristics and firms' responsibility centre choices, i.e., their usage of profit and/or investment centres.³

³ The researcher checked the robustness of the results by using several alternative estimation methods (weighted least squares, rank-based regression), which all showed very similar results. Also, the researcher conducted a series of specification tests, which identified no problems with the assumptions underlying OLS regression.

Table Three: Ordinary Least Squares (OLS) Regression Analysis Results for the Association between the Firm Characteristics and Responsibility Centre Choices

<i>Independent variables</i>	<i>Model 1</i>	<i>Model 2</i>
Intercept	-.350 (.261) -	-.314 (.278) -
Investment opportunity set		
- R&D intensity	-.505 (1.454) -.048	-.248 (1.594) -.024
- Market-to-book ratio	-.055* (.030) -.257	-.056* (.031) -.262
Size	.038* (.022) .282	.035 (.023) .260
Diversification		
- Geographic diversification	.058 (.156) .051	.071 (.161) .063
- Industry diversification	.016 (.018) .139	.016 (.018) .144
Capital intensity	.095*** (.035) .371	.101** (.038) .394
Sector		-.039 (.094) -.067
R^2_{adj}	.349	.334
F	4.753***	4.006***

*Notes: Cell statistics are unstandardised coefficients, standard errors and standardized coefficients. ***, **, * indicates significance at the .01, .05 and .10 level (two-tailed), respectively. (N = 43)*

As shown in Table Three, the model ('Model 1') is significant and three of the independent variables are significantly associated with responsibility centre choices. Consistent with the correlation coefficients presented earlier, the effect of only one of the two proxies for firms' investment opportunity set, market-to-book ratio, is statistically significant. The sign of this effect is negative, however, and therefore opposite to expectations: the higher their market-to-book ratio, the less firms use investment centres (as opposed to profit centres). The market-to-book ratio is

generally used to characterize the value of the growth and/or investment opportunities of firms compared to their current assets. It is argued to capture the expected future consequences of current actions and decisions of management that are reflected in the market value of the firm but not (yet) in its accounting numbers. An explanation for this finding could therefore be the difficulty of accurately determining the performance of an investment centre and its management in situations characterised by high growth opportunities, as in such situations traditional financial performance

measures (such as ROI and RI) will be noisy measures of the business unit management’s contribution to firm value. This is caused by the fact that in situations characterized by high growth opportunities, not only the net income generated by the centre will generally provide an inaccurate picture of its ‘true’ value, but this also applies to the total assets invested in the centre to which this net income is related when measuring and evaluating the performance of the investment centre. As Christie, et al. (2003) found a positive association between firms’ market-to-book ratio and their level of decentralisation, these findings suggest that the effect of this variable may depend on the specific decision making content of the delegated responsibility, i.e., delegation of profit versus investment responsibility.

The effect of size, measured as net sales, is positive and significant: larger firms decentralize investment responsibility more often than smaller firms. This is consistent with the underlying theory, and with the results of prior studies. Next to the fact that larger firms, on average, by definition have more invested total assets than smaller firms, the level of complexity of the

activities (and therefore probably of the investment decisions) will also generally be higher in larger firms. Even though a positive and significant correlation coefficient was found for responsibility centre choices and industry diversification, in the regression analysis the effect of neither of the two dimensions of diversification is significant. This suggests that externalities do not seem to play a major role in profit versus investment centre choices in the investigated firms. Finally, the effect of capital intensity is positive and significant. This implies that relatively capital-intensive firms use investment centres (as opposed to profit centres) to a higher extent than relatively capital-extensive firms, which is consistent with the underlying theory.

Manufacturing versus Non-Manufacturing Firms

As presented earlier in Table One, almost half of the sample used in this study consists of manufacturing firms. In order to explore whether the determinants of firms’ responsibility centre choices differ between manufacturing and non-manufacturing (i.e., trade and service) firms, the researcher conducted some additional analyses. The first test was the association between firms’ usage of profit and/or investment centres and the sector they mainly operate in.

Table Four: Responsibility Centre Choices and Sector of Firms

Sector	Responsibility centre choices						
	Only profit centres		Combination of centres (‘mixed’)		Only investment centres		Total
Manufacturing firms	3	(15.0%)	16	(80.0%)	1	(5.0%)	
Non-manufacturing firms	9	(39.1%)	11	(47.8%)	3	(13.0%)	23
Total (N = 43)	12	(27.9%)	27	(62.8%)	4	(9.3%)	43

As shown in Table Four, comparatively manufacturing firms use a combination of centres more, whereas non-manufacturing firms use only profit or investment centres more. This association is statistically significant ($\chi^2(2) = 4.740, p = .093$). The next test was whether manufacturing firms differ from non-manufacturing firms in their level of the studied firm characteristics

and/or whether the associations among the firm characteristics differ for the manufacturing and non-manufacturing firms.

Table Five: Descriptive Statistics and Pearson Correlations for Manufacturing and Non-Manufacturing Firms

<i>Variables</i>	Manufacturing firms (n = 20)		Non-manufacturing firms (n = 23)		1.	2.	3.	4.	5.	6.	7.
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>							
1. Responsibility centre choices	-	-	-	-	-	.083	-.468**	.353*	.170	.405*	.573***
2. R&D intensity	.022**	.038	.000	.001	.124	-	-.030	-.226	-.170	.119	-.084
3. Market-to-book ratio	1.934	1.277	2.423	1.449	-.031	.299	-	.017	-.174	-.403*	-.200
4. Size	13.307	2.409	13.712	1.971	.503**	.497**	.257	-	.387*	.218	.365*
5. Geographic diversification	.354**	.252	.197	.252	.191	.387*	.357	.232	-	-.112	.210
6. Industry diversification	3.750	2.653	3.609	2.554	.466**	.071	-.180	.702***	.151	-	.269
7. Capital intensity	3.579***	.628	2.606	1.304	.228	.116	.017	.094	.012	.067	-

Notes: ***, **, * indicates significance at the .01, .05 and .10 level (two-tailed), respectively. The Pearson correlations for the manufacturing firms are presented below the diagonal; the Pearson correlations for the non-manufacturing firms are presented above the diagonal. (N = 43)

As shown in Table Five, the level of R&D intensity, geographic diversification and capital intensity are all significantly higher in manufacturing firms than in non-manufacturing firms. Also, for the manufacturing firms the Pearson correlations among the firm characteristics show that size is positively and significantly associated with both R&D intensity and industry diversification, while geographic diversification is positively and significantly associated with R&D intensity. On the other hand, for the non-manufacturing firms the Pearson correlations show that industry diversification is negatively and significantly associated with market-to-book ratio, while size is positively and significantly associated with both geographic diversification and capital intensity. Together, the above results suggest that the sector a firm mainly operates in is associated with both their usage of profit and/or investment centres, and with the studied firm characteristics, and therefore may influence the results of this study.

A standard way to deal with this situation is by including a dummy variable for a sector⁴ in the regression analysis (see 'Model 2' in Table Three). Doing so hardly changes the relationship between the firm characteristics and firms' responsibility centre choices, although the effect of size is no longer significant ($p = .139$), possibly as a result of the loss in statistical power. The effect of the sector variable also is not significant ($p = .678$) in this analysis. Given the significant differences in the level of and associations among the firm characteristics between manufacturing and non-manufacturing firms, however, a more informative way to handle this situation is by subgroup analysis, i.e., by conducting an analysis per sector. Unfortunately, the subgroup sample sizes are too small for meaningful multivariate (regression) analysis. The Pearson correlations between firms' responsibility centre choices and the firm characteristics presented in Table Five, however, show several differences between

manufacturing and non-manufacturing firms. For the manufacturing firms only size and industry diversification are significantly (positively) associated with responsibility centre choices (i.e., with usage of investment centres as opposed to profit centres), whereas for the non-manufacturing firms in addition also capital intensity (positively) and market-to-book ratio (negatively) are associated with such choices. Combining these results with the results of the overall analysis presented earlier suggests that *especially for non-manufacturing firms* usage of investment centres (as opposed to profit centres) is positively associated with the capital intensity of the studied firms, and negatively with their market-to-book ratio, i.e., their growth opportunities. Note, however, that this difference in associations may partly be due to the rather limited variance in responsibility centre choices for the manufacturing firms.

Summary and Conclusions

This paper provides empirical evidence on the determinants of firms' responsibility centre choices at the management level directly below headquarters, focusing in particular on their usage of profit and/or investment centres at this level. Survey and archival data were used to investigate the relationship between usage of profit and/or investment centres (i.e., delegation of investment responsibility) and four firm characteristics: firms' investment opportunity set (proxied by R&D intensity and market-to-book ratio), size, (geographic and industry) diversification, and capital intensity. Based on the underlying theory and the results of prior empirical research, the researcher expected all studied firm characteristics to be positively associated with usage of investment centres (as opposed to profit centres). The results indicate that this is only the case for size and capital intensity, however. Contrary to expectations, the effect of firms' growth opportunities, as proxied by their market-to-book ratio, was negative, which implies that the higher firms' growth opportunities, the less firms use investment centres (as opposed to profit centres). An explanation for this finding could be the difficulty of

⁴ With manufacturing firms coded '1', and non-manufacturing firms coded '0'.

accurately determining the performance of an investment centre and its management in situations characterized by high growth opportunities, which could make firms decide to prefer using profit centres in such situations instead. As the direction of the effect of market-to-book ratio is contrary to the direction found by Christie, et al. (2003), these findings suggest that profit and investment centres should not be combined in future research, as the effect of this firm characteristic may depend on the specific decision making content of the delegated responsibility. The effect of the other studied proxy for firms' opportunity set, R&D intensity, was not significant, as was also the case for the two studied dimensions of diversification. If any effect would have been found for diversification, its explanation would have been unclear, however, as diversification is not only related to externalities, but also likely to information asymmetry. Exploratory analyses on potential differences between manufacturing and non-manufacturing firms in their usage of profit and/or investment centres, and the determinants of this usage, suggest that the sector a firm mainly operates in may have some influence on the overall results of this study. Specifically, they imply that comparatively manufacturing firms use a combination of centres more, whereas non-manufacturing firms use only profit or investment centres more. Also, they suggest that especially for non-manufacturing firms usage of investment centres (as opposed to profit centres) is positively associated with the capital intensity of the studied firms, and negatively with their market-to-book ratio, i.e., their growth opportunities.

As with any study, the findings of this study are subject to a number of potential limitations. First, the presented analysis cannot fully rule out issues of endogeneity and causality among variables, which is important as the underlying theory argues that responsibility centre choices, or more generally decentralisation decisions, are actually endogenous choices. Another issue is the level of analysis at which this study is conducted, which is the firm as a whole. The choices that firms make concerning organising their activities as profit or

investment centre(s), however, are taken for each business unit individually, based on its own specific, contextual characteristics. This also follows from the finding that most of the investigated firms use a mix of profit and investment centres. Based on the available data, it is impossible to get more insight into the association between the firm characteristics and the decisions of these firms to organise part of their activities as profit centre(s), and another part as investment centre(s). The researcher will leave it for future research to examine whether the characteristics that were examined in this paper are significantly associated with these decisions. It is very well possible, however, that where this study focuses on the variation *between* the investigated firms, there is a large variation in terms of, for example, capital intensity and size of the business units *within* these firms. A third issue that may potentially influence the findings is measurement error. This especially applies to the measurement of R&D intensity and geographic diversification, as there is some variation in the way in which firms handle and/or report R&D expenditures and geographically segmented net sales in their annual report. Finally, the sample size is rather small, and as a consequence the statistical power of the tests is relatively low.

Despite these potential limitations, this study has important implications for both practice in and research on responsibility centre choices. For practitioners, this paper provides some insight into the theory behind and the actual responsibility centre choices made by a sample of firms, and how these choices are associated with relevant characteristics of these firms. This may provide some guidance to their own responsibility centre choices, i.e., their usage of profit and/or investment centres. For researchers, this study adds to our limited knowledge in this important, but clearly under-researched area. Future research is needed, however, to confirm and extend the results of this study.

References

- Anthony, R.N. and Govindarajan, V. (2004), *Management Control Systems* (11th edition), McGraw-Hill/Irwin, New York, NY.
- Burton, B.M. (2003), "Evidence on the Extent of Relationships among Investment Opportunity Set Proxies", *Applied Economics Letters*, 10, pp. 437-441.
- Bushman, R.M., Indjejikian, R.J. and Smith, A.J. (1995), "Aggregate Performance Measures in Business Unit Compensation: The Role of Intrafirm Interdependencies", *Journal of Accounting Research*, 33 (Suppl.), pp. 101-128.
- Christie, A.A., Joye, M.P. and Watts, R.L. (2003), "Decentralisation of the Firm: Theory and Evidence", *Journal of Corporate Finance*, 9 (1), pp. 3-36.
- Denis, D.J., Denis, D.K. and Sarin, A. (1997), "Agency Problems, Equity Ownership, and Corporate Diversification", *Journal of Finance*, 52 (1), pp. 135-160.
- Hendricks, K.B. and Singhal, V.R. (2001), "Firm Characteristics, Total Quality Management, and Financial Performance", *Journal of Operations Management*, 19 (3), pp. 269-285.
- Jensen, M.C. and Meckling, W.H. (1995), "Specific and General Knowledge, and Organisational Structure", *Journal of Applied Corporate Finance*, 8 (2), pp. 4-18.
- Jensen, M.C. and Meckling, W.H. (1999), "Specific Knowledge and Divisional Performance Measurement", *Journal of Applied Corporate Finance*, 12 (2), pp. 8-17.
- Kallapur, S. and Trombley, M.A. (1999), "The Association Between Investment Opportunity Set Proxies and Realized Growth", *Journal of Business Finance and Accounting*, 26 (3&4), pp. 505-519.
- Reece, J.S. and Cool, W.R. (1978), "Measuring Investment Centre Performance", *Harvard Business Review*, May-June, pp. 28-46, 174-176.
- Vancil, R.F. (1979), *Decentralisation: Managerial Ambiguity by Design*. Dow Jones-Irwin, Homewood, IL.
- With, E. de and Dijkman, A. (2005), *Prestatiemeting en –beoordeling bij Nederlandse beursgenoteerde ondernemingen*. In *Handboek Management Accounting*, edited by L. Traas and E. de With, Kluwer, Deventer, D1805: pp. 1-34.