Industry segment effects and firm effects on firm performance in single industry firms

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Abstract

The purpose of the paper is to identify the sources of variation in firm performance. This is one of the cornerstones of strategy research, i.e. the relative importance of industry and firm level effects on firm performance. Multilevel analysis is well suited to analyze variance in performance when the data are hierarchically structured (industry segments consist of firms, firms operate within the context of industry segments). The Belgian industry studied is a service industry that consists of about 25 electrical wholesalers. Data were collected from 20 firms during the period 1998-2003 from responses to a questionnaire sent to all the firms in the market. The sample in the data set covers more than 95 percent of the market (in sales), as the missing firms were just fringe competitors. The results show that firm effects explain most of the variance in four performance variables. That bears out the importance of each firm having its own specific, idiosyncratic resources and competences. The explanatory power of firm effects varies by about 30 to 40 percent while the intra-industry effect explains around 10 percent of the variance. Even though firm effects are dominant, intra-industry effects explain a significant portion of the variance in firm level performance. The firm effect is smaller than in previous studies. The firm effect varies across the performance measures: firm effects are higher for returns on assets than for profit margins. The industry segment effect (or intra-industry effect) is more independent of the dependent variable. The industry segment effect is in line with previous studies on the strategic group effect. Top managers should carefully choose and monitor the intra-industry domain they are in.

Key words: firm effect vs. industry effect, electrical wholesale sector, performance differences, multilevel analysis

1. Introduction

Identifying the sources of variation in firm performance is one of the cornerstones of strategy research, i.e. the relative importance of year, country, industry, strategic group, corporate, and firm level effects. The literature focuses on comparing the relative importance of industry and firm effects on performance heterogeneity. The confrontation of these two effects is then interpreted as an empirical test of the practical relevance of the two fundamental research streams that aim to explain differences in firm performance: perspectives that highlight firm characteristics as the key determinant of firm performance - e.g. the resource based view (RBV) (Wernerfelt, 1984; Barney, 1986, 1991), the competence-based view (CBV) (Sanchez, 1997; Sanchez & Heene, 1997) or the dynamic capabilities view (DCV) (Teece, Pisano and Shuen, 1997; Teece, 2010), and perspectives that emphasize the impact of the environment - e.g. industrial organization (IO) (Porter, 1979, 1980, 1981) and population ecology theory (Hannan and Freeman; Nelson and Winter, 1982).

This paper starts with a conceptualization of the different effects studied in previous research and positions the industry segment effect amidst the other effects studied in this research stream. A third section provides a review of past studies on the topic of the relative importance of the different drivers of firm performance. A fourth section presents the research setting. The fifth section discusses the research method. Section six presents and discusses the results.

2. Explaining heterogeneity in firm performance - theoretical background

2.1. Firm effects and industry effects

The main focus of interest in the literature on explaining performance differentials is the industry versus the firm effect. The continuing debate in the literature about the relative weight of the industry versus the firm (or business unit) reflects a debate between the importance of looking through the window (the industry or market) vs. looking in the mirror (the company itself) (Bowman and Helfat, 2001)

The **industry effect** captures the effect of the structural characteristics of industries on firm performance. This effect has strong theoretical foundations in the IO tradition. The IO approach, emerging from the early works of Mason (1939) and Bain (1951, 1956), specifies that the contextual factors associated with the industry in which a firm competes, have a determining influence on the firm's performance. This approach places little emphasis on the influence of firm-specific traits or managerial choices (with the exception of market share). In IO, firms are mostly homogeneous while contexts (industries) differ (e.g. in structure, timing, costs, demand, etc). The IO view explains firm performance differences through the relative attractiveness of forces in a firm's industry (Porter, 1979, 1980, 1981). According to the IO-view, the industry

affects firm performance independently of the firm itself (Arend, 2009). Industry-level determinants studied consist of concentration, economies of scale, entry and exit barriers.

The IO framework was challenged in the 1980s by the incipient RBV, which modeled the firm as a unique collection of resources and competences which forms the main driver of firm performance. **Firm effects** capture the influence of firm-specific factors such as heterogeneity in resources and competences and also the differences in corporate and competitive strategies. According to the RBV, internal firm-specific factors are of central concern because these internal factors drive performance, not external industry forces (Barney, 1991). Wernerfelt (1984:172) defines a resource as “anything which could be thought of as a strength or a weakness”. In more recent work, a distinction is made between a wide variety of tangible and intangible assets and competences (Hall, 1994; Hunt, 2000). Scholars in the RBV literature theorize that firms possessing resources that are valuable, rare, inimitable, and nonsubstitutable can achieve sustainable competitive advantage by implementing fresh value-creating strategies that are difficult for competitors to duplicate (Barney, 2002; Wu, 2010). Examples include intellectual property, process know-how, customer relationships, and the knowledge possessed by groups of especially skilled employees. Within RBV, competitive advantage can flow at one particular moment from ownership of scarce but relevant and difficult-to-imitate assets, especially knowhow. But in fast-moving business environments open to global competition, sustainable advantage requires more than the ownership of difficult-to-replicate (knowledge) assets (Teece, 2007). Scholars of the CBV and the DCV are extending RBV to dynamic markets. The CBV and DCV can be seen as more actionable versions of the RBV, with more emphasis on the sources of competitive advantage in the firm over time. The CBV shifts the focus from the specific content of the firm as an open system at a given point in time to the dynamic processes by which a firm identifies and develops strategic resources on an ongoing basis (Sanchez, 1997). Thus the competence perspective analyzes processes in organizations in terms of making sense in a changing environment, for developing new internal resources and capabilities, for accessing new external resources, for defining new organizational goals, and for coordinating available resources and capabilities in the pursuit of an evolving set of strategic goals. As such there is a strong link with organizational learning theory. The dynamic capabilities are the skills, procedures, organizational structures, and decision rules that firms utilize to create and capture value (Teece, 2010). Dynamic capabilities can be disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the enterprise’s intangible and tangible assets (Teece, 2007). Though DCV emphasizes more organizational agility, cognition and entrepreneurship whereas CBM calls attention to strategic flexibility, the CBV and the DCV frameworks are complementary.

2.2. Incorporating intra-industry effects

The persistent observation of shared similarities in the endowment of resources among (strategic) groups of firms in the same industry reinforced the need to consider intra-industry effects which affect subgroups of firms within the industry. Firm effects would be overestimated if intra-industry differences and similarities were not accounted for. The existence of significant intra-industry effects may stimulate practicing managers to align the firm's corporate strategy within the industry context. Unfortunately, only a few studies have taken into account these intra-industry effects of firm heterogeneity on performance variation. According to Hawawini, Subramanian, and Verdin (2003), industry effects and firm effects may vary between different classes of firms within the same industry - for example, if the industry is made up of distinct strategic groups. This argument is generalizable to form the hypothesis that industry effects and firm effects may vary if different intra-industry segments exist. If this is the case, then it follows that in a single industry research design, firm effects will be lower than estimates in previous studies, because these studies decompose performance variation between firms without taking intra-industry effects into account. Even when industry is defined at the four digit level, a large variation in firm level performance is usually found, as is the case in this paper. Trying to explain these large variations calls for consideration of intra-industry structural differences which can give rise to an "industry segment effect" or "intra-industry effect", and this in turn may reduce significantly the influence of firm effects on performance.

The existence of industry segments may trigger practicing managers to align their corporate strategy with this intra-industry context. Even when CEOs face the same general external environment (e.g. the industry), they will react differently to the threats and opportunities perceived *within* that context. This study is one of the few addressing the performance differentials which can be attributed to an industry segment effect. This is correlated with the effect of corporate level scale and scope decisions but must not be confused with the 'corporate effect' as this is usually conceptualized. The notion of **corporate effect** means the effect on profitability in multi-industry firms in relation to factors associated with the common membership of multiple businesses within an individual corporation (Bowman and Helfat, 2001). Corporate strategy in a multi-industry firm deals with the ways in which a corporation manages a set of businesses as a whole. Firms differ in the way they deploy corporate-level resources and this is likely to result in performance heterogeneity across firms. In single industry firms, corporate level decisions comprise three different strategic areas, which, together, define the intra-industry segment or intra-industry domain which the firm operates in. These three basic dimensions are (Cool and Schendel, 1987, 1988; Porter, 1986; Martens, 1988, 1989; McGee and Segal-Horn, 1990):

- Buyer scope: what types of buyers are targeted?
- Product scope: how broad is the variety of products commercialized?
- Geographical scope: what is our geographical reach?

Industry segment effects would capture the heterogeneity of firm performance that derives from factors internal to the firm at the corporate level (e.g. scale and scope decisions, (re)structuring the organization) (Adner and Helfat, 2003). This paper focuses primarily on scale and scope decisions. Hence the following research question: do corporate level decisions differ across firms *within* an industry, and, if so, does it matter? In this study, the industry effect is let aside because the present sample considers a single industry, the electrical wholesale sector. The intra-industry domain is a three-dimensional (cf. *infra*) "strategic space" constituting the arena within which firms position themselves in order to compete successfully. Variation in any of these three dimensions significantly affects a firm's structural position in the industry. We hypothesize that the variation has relevant performance implications. We use multilevel analysis to answer the question of whether heterogeneity in corporate level decisions accounts for a portion of heterogeneity in performance.

3. Empirical literature review

Since the seminal empirical research of Schmalensee (1985) more than 25 studies have contributed to the assessment of the relative importance of various different drivers of heterogeneity in firm performance. Table 1 summarizes the research setting and the main results of the most influential papers published in the academic literature. This list is based on, and extends, the reviews by Bowman and Helfat (2001); Brush, Bromiley, and Hendrickx (1999); Chen and Lin (2006); Misangyi, Helms, Greckhamer, and Lepine (2006) and Arend (2009). Most of the studies are based on US data and just a few of them analyze information concerning European firms. The recent contribution of Goddard, Tavakoli, and Wilson (2009) uses European data from the Amadeus database. This paper adds to previous literature through an analysis of a country effect that is considered together with firm and industry effects. Almost all the papers reported in the Appendix rely on published financial performance data. Only Powell (1996) and, more recently, Galbreath and Galvin (2008) use subjective performance data with US and Australian data respectively.

The great majority of the studies focus on the relative importance of industry (market) versus firm (resources) characteristics, adjusting for time effects. Industry effects vary from 4 to 20 percent when indicators of financial performance are used as dependent variables. The two studies that use subjective measures of perceived performance also report industry effects around the same range of values, which suggests that reported and perceived performance measures contain similar information. By way of contrast, when indicators of strategic decisions are the dependent variables (Mauri and Michaels, 1998), the industry effects rise to 69 percent. Using sales or sales growth also leads to large industry effects. Two studies use Tobin's *q* as the dependent variable with industry effects varying from 20 to 41 percent. To sum up, most studies found firm effects to be dominant. The relative importance of firm effects ranges from twice the importance of industry effects (Hansen and Wernerfelt, 1989) to more than ten times (Rumelt,

1991). In the ongoing debate about the drivers of firm performance heterogeneity, these results are often interpreted as evidence in favor of RBV, CBV or DCV arguments (Galbreath and Galvin, 2008).

However, firm and industry effects are not the only drivers of heterogeneity in firm performance. Corporate effects have been estimated in ten studies and the results suggest an explanatory power for this effect that ranges from 3 to 13 percent. Sample selection can explain some of the wide differences in the assessment of corporate effects. The results of studies of the corporate effect which excluded single industry firms from the sample differ from those which included both diversified and single industry firms. In addition, the effects of intra-industry variety on firm performance remain largely unexplored. González and Ventura (2002) were the first to jointly estimate a strategic group effect together with firm and industry effects in a sample of Spanish firms. Their estimation of the strategic group effect ranges from 11 to 15 percent. These results are consistent with the estimations in Short, Ketchen, Palmer, and Hult (2007) which range from 12 to 24 percent. Adner and Helfat (2003) analyze the effect of intra-industry segments, estimating an explanatory power of 6 percent. Finally, interaction effects have also been taken into account in some of the studies, although their incidence was found to be rather small (Eriksen and Knudsen, 2003).

The paper here does not aim to contribute to the debate about the relative importance of firm versus industry effects. Instead, the focus is on the debate about intra-industry effects. The study focuses on a single industry sample, which makes it unnecessary to control for industry effects. This is the second single industry study on the topic of decomposing firm performance variance, Adner and Helfat (2003) being the first. Another notable difference from previous studies is that this study analyzes a services sector, the Belgian electrical wholesale sector. Almost all the papers in Table 1 use data from manufacturing firms and most of them focus on US firms. The data for the present study come from a survey designed to collect objective financial performance data at the business unit (firm) level and also information about corporate strategy. The study estimates intra-industry effects and compares them with firm effects in a single industry dataset using information about different measures of performance and variables of corporate strategy.

4. Empirical setting

The single-industry setting of this empirical research facilitates testing the proposition that heterogeneity in the managerial decisions adopted at the corporate level is associated with heterogeneity in firm performance. The Belgian industry studied is a service industry that consists of about 25 electrical wholesalers and the research conducted was actively supported by the union of electrical wholesalers. Data were collected from 20 firms during the period 1998-2003 from responses to a questionnaire sent to all the firms in the market. The sample in the data set covers more than 95 percent of the market (in sales), as the missing firms were just fringe competitors. All the firms in the data set are family-owned private firms, with sales varying from EUR 4 million

(25th percentile) to more than EUR 28 million (75th percentile) with a median of EUR 8 million. Employment figures range from 14 (25th percentile) to 78 (75th percentile) with a median of 28 employees (see **Table 1**).

Table 1: some descriptives of the Belgian electrical wholesale sector

	Percentiles		
	25	50 (median)	75
Employment (in units)	14	28	78
Total net profits (in EUR)	2735.95	130,024.58	348,797.43
Total Assets (in EUR)	2159754.25	4236412.91	10646924.00
Inventories (in EUR)	657604.72	1062911.75	2422405.29
Sales (in EUR)	4537066.16	8737122.75	28753382.00

The questionnaire was carefully prepared with the participation of members of the wholesalers' union, who also did the mailing in order to assure a high response rate. Questionnaires were returned directly to the first author, guaranteeing full discretion concerning the data provided, which in turn helped boost the response rate. Great attention was paid to the correct wording of the questions and to the comprehensiveness of the questionnaire. The response rate was high due to the active support of the wholesalers' union. The wholesalers are well aware of the potential threats posed to their sector and this increases their interest in the results of this research project. Manufacturers of electrical material have the potential to sell directly to business clients and installers and, therefore, the wholesalers might get squeezed between producers and final customers and retailers. To create value in the industry chain and neutralize these threats, the largest wholesalers have built various warehouses that are located across the territory. Some wholesalers also try to stress distinctive features by specializing in a specific combination of products aimed at specific segments of the market.

5. Methods

5.1. Measures used in this study

Survey data were collected on the scale and scope strategic dimensions of single industry firms. In particular, three decision variables were considered. Performance is measured with four variables. An overview of the measures used and their modus operandi can be found in **Table 2** and some descriptive statistics of the sample in **Table 3**.

Table 2: Operationalization of variables

<i>Corporate Strategy Variables</i>	<i>Operational definition</i>
Market scope (buyer types)	% sales business clients % sales electricians (installers)
Product scope (product types)	% sales installation material % sales lighting material
Geographical reach	size [log (sales)]
<i>Performance Variables</i>	<i>Operational definition</i>
Gross return on business assets (gROBA)	Gross operating profit per business assets
Net return on business assets (nROBA)	Net operating profit per business assets
Gross profit margin (gPM)	Gross operating profit per sales
Net profit margin (nPM)	Net operating profit per sales

Table 3: descriptive statistics of the sample on the corporate strategy variables: rank correlations, minimum, maximum and quartiles

<i>Rank correlations</i>	(A)	(B)	(C)	(D)		
% sales to business clients (A)	1.00					
% sales to electricians (B)	-.77	1.00				
% sales of installation material (C)	.52	-.46	1.00			
% sales of lighting material (D)	-.40	.20	-.43	1.00		
size (E)	-.16	.30	-.11	-.21		
<i>Minimum, maximum and quartiles</i>	<i>N</i>	<i>Min</i>	<i>Percentiles</i>			
			<i>25th</i>	<i>(Median)</i>	<i>75th</i>	<i>Max</i>
				<i>50th</i>		
% sales to business clients	20	5	18.88	25.23	35.75	69
% sales to electricians	20	19	45.00	57.00	65.00	95
% sales of installation material	20	35	42.18	53.43	59.74	73
% sales of lighting material	20	8	18.62	21.75	25.66	44
Size	20	5.26	5.88	6.16	6.60	7.39

Scale and scope variables The competitive arena in which a firm operates can be defined by three dimensions: buyer scope, product scope, and geographical scope. Buyer scope is operationalized using two measures: percentage of sales to business clients and percentage of sales to electricians. Product scope is measured through two measures: the percentage of sales of lighting material and the percentage

of sales of installation material. Geographical reach is measured using the proxy firm size and operationalized as the log of sales (Martens 1988, 1989; Houthoofd, Desmidt & Gonzalez, 2009; Houthoofd, 2011).

Performance Measurement Performance is measured in terms of gross return on business assets (gROBA), net return on business assets (nROBA), gross profit margin (gPM), and net profit margin (nPM). A commonly used profitability measure is return on assets (ROA). Here, the focus is on the *intrinsic* profitability (or intrinsic health) of operating activities (in a broad sense, but to exclude purely financial or exceptional activities), and thus the ROBA is preferred. ROBA is also computed in such a way as to avoid the potential influence of participations in other firms. Business assets are non-financial assets (used here as an accounting term) and are composed of formation expenses, intangible assets, tangible assets, stocks and contracts in progress, amounts receivable within one year and deferred charges and accrued income. The larger this measure, the healthier the firm concerned is supposed to be. ROBA is a performance measure calculated before taxes and debt charges, so tax policy considerations and potential differences in tax rates are excluded. ROBA is computed (1) before debt charges to cope with differences in capital structure, (2) before depreciation charges (gROBA) and (3) after depreciation charges (nROBA). The profit margin is the ratio of operating profits to sales and is also calculated before (gPM) and after depreciation charges (nPM).

5.2. Measurement of different effects on firm performance

Two main statistical techniques are used to estimate the relative importance of different drivers of firm performance heterogeneity, such as firm, industry or intra-industry effects (Goddard, Tavakoli, and Wilson, 2009): (1) sequential (or nested) analysis of variance, also called fixed effects ANOVA, which is equivalent to a series of least square dummy variables regressions (LSDV); and (2) variance components analysis (VCA), also known as random effects ANOVA.

Nested ANOVA needs no prior assumption about the distribution of the fixed effects. In (nested) fixed effects models, interaction effects cannot be measured (see for example Hawawini et al., 2003). A fixed effects model is often chosen because it allows for distribution-free effects, non-negative effects, and a statistical test for the significance of each set of effects. However, the nested effects have to enter in precise order from top (industry) to bottom (firm).

VCA assumes that the effects are randomly drawn from a theoretical population with a specific distribution. In VCA, the ordering of the random effects is unimportant because the underlying assumption is that each set of effects is independent. Therefore, all the effects can be estimated at once even if they are nested. However, Brush and Bromiley (1997) show that different samples drawn from the same underlying distribution of effects end up with very different estimates. They also point to the fact that for accurate estimation of the different effects adjustment for the number of industries, the number of corporations per industry and the number of businesses per corporation are all required for each sample of data. But in our study, a random effects model

would make little theoretical sense, since the present sample nearly matches the whole population of firms in the industry. The limitations of the main methods used to estimate the different effects on performance lead us to the use of multilevel estimation. Hough (2006) and Misangyi et al. (2006) sum up the advantages of multilevel methods over traditional methods, like nested ANOVA or VCA. Analysis of the kind reported here should simultaneously take account of all the relevant scales of variation, otherwise models are wrongly specified with consequent errors of inference. Certainly there are interaction effects to deal with (e.g. a business of high performing firms may affect an individual firm's performance in addition to – and in interaction with – the firm's own characteristics). Businesses (or groups of firms) are rarely formed at random but rather on the basis of some similarity. Once established, the group members (firms within the same business) may interact with each other – deliberately or covertly or not - to create even greater similarity, and thus respondents within the same business are more likely to have similar characteristics than a sample drawn from the entire population at random. Working at a single level is likely to lead to a distorted representation of reality.

5.3. Multilevel estimation

Multilevel methods use the natural structure in the data. Firstly, the following random intercepts null model, with only a constant term, is estimated.

$$Y_{it} = \alpha_i + e_{it}$$

whereby

$$e_{it} \sim N(0, \sigma_e^2)$$

Y_{it} is the performance of firm i in year t

e_{it} = year specific error

α_i = random intercept

σ_e^2 = variance within a firm

$$\alpha_i = \alpha + u_i,$$

whereby

$$u_i \sim N(0, \sigma_u^2)$$

α = general intercept

u_i = firm specific error

σ_u^2 = variance between firms

The parameter α_i is the random intercept and can be seen as the mean performance of firm i across the years. In the second equation, this random intercept is written as the sum of the grand mean α , which is the mean performance across all years and all firms, and a firm specific error u_i , which expresses how much the mean performance of firm i deviates from the overall mean. We

assume that the u_i is normally distributed with a mean of 0 and a variance of σ_u^2 , so this variance expresses the between-firm variance. The time specific error term e_{it} expresses how much the performance of firm i in year t deviates from the mean performance of that firm across the years. The model assumes that e_{it} is distributed normally with a mean of 0 and a variance of σ_e^2 , and is independent of u_i . So σ_e^2 can be interpreted as the variance within the firms across time. This null model is used to estimate the total variance in the data and to calculate how much of this variance is due to variance between firms and within firms.

Secondly, year dummies are added to the model (Year 1 is the reference category):

$$Y_{it} = \alpha_i + \beta_1 \text{Year2}_i + \beta_2 \text{Year3}_i + \beta_3 \text{Year4}_i + \beta_4 \text{Year5}_i + \beta_5 \text{Year6}_i + e_{it},$$

whereby

$$e_{it} = \text{year specific error}$$

$$\alpha_i = \alpha + u_i.$$

whereby

$$u_i = \text{firm specific error}$$

This will make it possible to see how much of the total variance can be eliminated by the year effects.

Finally, a segment dummy is added to the model, since each firm belongs to one of two segments, as will be explained later.

$$Y_{it} = \alpha_i + \beta_1 \text{Year2}_i + \beta_2 \text{Year3}_i + \beta_3 \text{Year4}_i + \beta_4 \text{Year5}_i + \beta_5 \text{Year6}_i + \beta_6 \text{Segment}_i + e_{it},$$

$$\alpha_i = \alpha + u_i.$$

whereby

$$e_{it} = \text{year specific error}$$

$$u_i = \text{firm specific error}$$

As already stated, this will make it possible to calculate how much of the total variance can be removed by adding the segment dummy to the model.

6. Research results

6.1. Delineating intra-industry domains

The first part of the research question, “Do corporate level decisions differ across firms, and, if so, does it matter?” is answered by testing the existence of separate intra-industry segments given the business positioning of the different firms within the industry according to their corporate level strategic decisions. Cluster analysis (CA) is the most widely-used technique for investigating whether different domains are present within a single industry defined at four-digit level. But cluster analysis can be distorted by multicollinearity. For instance, as market scope and product scope are measured as a percentage of sales, the variables themselves are anyhow *not* independent. Therefore, a factor analysis, in particular a principal components analysis with orthogonal varimax rotation, was carried out beforehand on the corporate strategy variables. This preliminary step reduces the number of variables to a manageable and intelligible number of factors, which will be uncorrelated and therefore removes the problem of multicollinearity. Using the stopping rule that the eigenvalue exceeds 1, the factor analysis showed a 2-factor solution which **Table 4** illustrates. The two factors can be identified as 'Product-Market-combination' (factor 1) and 'Scale' (factor 2); see **Table 5**.

Table 4: Factor analysis of the corporate strategy variables: eigenvalues and values explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.453	49.07	49.07	2.45	49.06	49.06
2	1.257	25.15	74.21	1.26	25.15	74.21
3	.614	12.28	86.49			
4	.472	9.44	95.93			
5	.204	4.07	100			

Table 5: Factor matrix of the business definition variables.

	Factor 1 Product market combination	Factor 2 scale
% sales to business clients	.89	
% sales to electricians		.30
% sales of installation material	.77	
size		.84
% sales of lighting material	-.56	-.66

- Notes: 1. Data shown are factor loadings greater than or equal to 0.3
 2. The matrix is sorted
 3. Blanks for loadings smaller than 0.3 to enhance readability

Once the factor scores were computed and stored in the database, hierarchical CA (Ward's method) was performed on them in order to group firms into intra-industry segments. The results of the cluster analysis suggest that two different business domains (clusters) within the industry can be distinguished. The number of clusters was based on a visual inspection of the dendrogram and the pronounced change in the tightness of the clusters as measured by a sharp increase in the error sum of squares (ESS) between two fusions in a hierarchical CA method (Everitt, 1974). The Kruskal-Wallis test confirms that the two clusters obtained are statistically different at the 0.05 significance level for both factors and also for all the original raw measures, except for the % sales of lighting material (**Table 6**). Twelve firms operate within the first domain and eight firms in the second domain.

Table 6: Kruskal-Wallis test on the corporate strategy variables and factors: chi-square statistics

	Chi-Square	df	Asymp. Sig.
% sales to business clients	6.50	1	.011
% sales to electricians	13.46	1	.000
% sales of installation material	7.51	1	.006
% sales of lighting material	.25	1	.616
Size	4.34	1	.037
Factor 1 product-market-combination	9.52	1	.002
Factor 2 scale	6.10	1	.014

The two clusters can be described as follows. Cluster 1: relatively small-sized firms mostly selling to business clients, low level of sales to electricians, above average sales of installation material and lighting material. Cluster 2: relatively large firms with low level of sales to business

clients, high sales to electricians, below average sales of installation material and lighting material.

Firms in cluster 1 constitute industry segment 1 and firms in cluster 2 constitute industry segment two. The question now is whether these two segments differ from each other in average performance and whether those differences are large or small when compared to the differences that may also exist within the segments. **Table 7** indicates that indeed these two clusters of firms are statistically different, at conventional significance levels, for each of the four performance measures. Observe **Table 8** that cluster 1 is more profitable according to any of the four measures. The median of net profit margin in cluster 1 is 1.3 percent higher, gross profit margin is 1.6 percent higher, net ROBA is 3.6 percent higher, and gross ROBA is 5.5 percent higher relative to cluster 2. At first sight this supports the idea that corporate strategy decisions matter and are an important driver of firm performance. The question then is, how important?

Table 7: Kruskal-Wallis test on the performance measures: chi-square statistics

	Chi-Square	df	Asymp. Sig.
average nROBA	3.43	1	.064
average gROBA	5.01	1	.025
average nPM	2.88	1	.090
average gPM	3.43	1	.064

Table 8: intra-industry domains: descriptive statistics of performance measures per domain

Variable	N	Sample	Percentiles				
			min	25	50	75	max
nROBA	12	Cluster 1	-2.35	3.72	7.37	10.57	13.47
	8	Cluster 2	-7.65	.12	2.75	4.49	13.93
gROBA	12	Cluster 1	.25	7.43	11.09	13.61	16.90
	8	Cluster 2	-5.11	2.89	5.56	6.99	15.81
nPM	12	Cluster 1	-2.02	1.67	2.88	5.24	6.79
	8	Cluster 2	-4.55	.07	1.50	2.16	5.97
gPM	12	Cluster 1	-.80	3.08	4.57	6.67	8.78
	8	Cluster 2	-3.10	1.37	2.93	3.37	6.77

6.2. Firm effect versus industry segment effect

The second part of the research question “Do corporate level decisions differ across firms, and, if so, does it matter?” is concerned with the relative importance of the intra-industry corporate

effect. To tackle this issue, the total variance in firm performance has to be decomposed into the sources of variation that can be identified: intra-industry effect, firm effects, and year effects. The results show that firm effects explain most of the variance in four performance variables (see **Table 9**). That has a bearing upon the importance of each firm having its own specific, singular resources and competences. The explanatory power of firm effects varies by about 30 to 40 percent while the intra-industry effect explains around 10 percent of the variance. Even though firm effects are dominant, intra-industry effects explain a significant portion of the variance in firm level performance. The firm effect is smaller than in previous studies using fixed effects or random effects models. It seems that these studies – due to an incorrect specification of the model – overestimate the firm effect. The results presented here are in line with the other two studies using multilevel analysis (see **Table 11**). The firm effect varies across the performance measures: firm effects are higher for returns on assets than for profit margins. The industry segment effect (or intra-industry effect) is more independent of the performance variable used.

Table 9: industry segment effect versus firm effect

Unconditional model (intercept only)	nROBA	gROBA	nPM	gPM
Level 1 variance (across time) (σ_e^2)	24.042	26.605	6.668	7.181
Level 2 variance (between firms) (σ_e^2)	18.741	18.141	3.39	3.288
Total variance	42.783	44.746	10.058	10.469
Model incorporating year effects				
Level 1 variance (across time) (σ_e^2)	24.844	27.289	6.82	7.291
Level 2 variance (between firms) (σ_e^2)	17.315	16.926	3.146	3.084
Total variance	42.159	44.215	9.966	10.375
Model with year and segment effects				
Level 1 variance (across time) (σ_e^2)	20.649	21.537	5.91	6.139
Level 2 variance (between firms) (σ_e^2)	17.288	16.898	3.144	3.082
Total variance	37.937	38.435	9.054	9.221

Unconditional model (intercept only)	nROBA	gROBA	nPM	gPM
% of total variance across time	56.2%	59.5%	66.3%	68.6%
% of total variance between firms	43.8%	40.5%	33.7%	31.4%
Model incorporating year effects				
% of total variance across time	58.1%	61.0%	67.8%	69.6%
% of total variance between firms	40.5%	37.8%	31.3%	29.5%
% of total variance explained by year effects	1.5%	1.2%	0.9%	0.9%
Model with year and segment effects				
% of total variance across time (error)	48.3%	48.1%	58.8%	58.6%
% of total variance between firms (firm effect)	40.4%	37.8%	31.3%	29.4%
% of total variance explained by year effects	1.5%	1.2%	0.9%	0.9%
% of total variance explained by segment effects	9.9%	12.9%	9.1%	11.0%

Table 11: Research results compared

	Misangyi, V., Helms, H., Greckhamer, T. & Lepine, J. (2006)	Hough, J. (2006)	Houthoofd & Hendrickx (nROBA)
Effect	% Var. explained	% Var. explained	% Var. explained
Year effect	0.8		1.5
Industry	7.6	5.3	
Industry segment			9.9
Strategic group			
Corporate	7.2	20.2	
Firm effect	36.6	40.1	40.4
Error		34.5	48.3

A fixed effects model was also used in order to be able to compare the results (Houthoofd, Desmidt & Gonzalez, 2010). A fixed effects sequential analysis of variance includes the year effects first, then the intra-industry segment effects, and finally the firm effects. **Table 12** reports the results of a fixed effects model. The increment of R^2 (with respect to the previous model in which the industry segments are included) reports the firm effects. The F-statistic shows the statistical significance of the different effects. Corroborating the findings of the fixed effects research with the present ML-results, it is obvious that the firm effects, according to the fixed effects model, are substantially higher. The explanatory power of firm effects varies from 55 percent in explaining nROBA and gROBA to 63 percent when explaining nPM and gPM. Intra-industry effects explain from 6.8 to 9.7 percent of the variance in the performance variables. The analysis also shows that all intra-industry segment effects and firm effects are statistically significant at conventional levels. Year effects, however, explain only about 2 percent of the variance and are not statistically significant at conventional levels.

Table 12: industry segment effect versus firm effect with fixed effects model

nROBA					
	<i>DF</i>	<i>R</i> ²	ΔR^2	<i>F-test</i>	<i>Ser. Corr.</i>
YEAR	5	0.024	-	0.52	0.83
INDUSTRY SEGMENT	1	0.072	-	8.52***	0.78
FIRM	19	0.621	0.549	7.93***	0.24
GLOBAL MODEL (FIRM+SEGMENT+YEAR)	24	0.650		6.72***	0.25
ERROR	87	0.350			
TOTAL	111				
gROBA					
	<i>DF</i>	<i>R</i> ²	ΔR^2	<i>F-test</i>	<i>Ser. Corr.</i>
YEAR	5	0.020	-	0.44	0.83
INDUSTRY SEGMENT	1	0.097	-	11.77***	0.78
FIRM	19	0.646	0.549	8.84***	0.22
GLOBAL MODEL (FIRM+SEGMENT+YEAR)	24	0.670		7.35***	0.23
ERROR	87	0.330			
TOTAL	111				
nPM					
	<i>DF</i>	<i>R</i> ²	ΔR^2	<i>F-test</i>	<i>Ser. Corr.</i>
YEAR	5	0.020	-	0.40	0.81
INDUSTRY SEGMENT	1	0.068	-	8.02***	0.76
FIRM	19	0.696	0.628	11.09***	0.03
GLOBAL MODEL (FIRM+SEGMENT+YEAR)	24	0.718		9.22***	0.05
ERROR	87	0.282			
TOTAL	111				
gPM					
	<i>DF</i>	<i>R</i> ²	ΔR^2	<i>F-test</i>	<i>Ser. Corr.</i>
YEAR	5	0.016	-	0.34	0.81
INDUSTRY SEGMENT	1	0.087	-	10.26***	0.76
FIRM	19	0.722	0.635	12.27***	0.01
GLOBAL MODEL (FIRM+SEGMENT+YEAR)	24	0.739		10.02***	0.04
ERROR	85	0.261			
TOTAL	109				

7. Discussion and conclusions

The choice of segment within a single industry does matter. The median of net profit margin in the first industry segment is 1.3 percentage points higher, gross profit margin is 1.6 percentage points higher, net ROBA is 3.6 percentage points higher and gross ROBA is 5,5 percentage points higher relative to the second domain. Industry segments are defined by classifying firms in a

strategic space, which can be thought of as a three-dimensional graph composed of three strategy dimensions (buyer groups, product types, geographical reach). An industry segment includes firms within an industry that define their competitive arena using these three dimensions in a similar way. Industry segment membership explains about 10 percent of the variation in performance between firms within an industry. This finding should urge managers to carefully (re)consider where (and how) they are competing within the industry, i.e. what business segment they want to be in.

By explicitly considering the industry segment targeted, firms may improve their competitor analysis and streamline competitor intelligence. Furthermore, significant threats and opportunities will be detected on a timelier basis, and a more solid basis for formulating the appropriate short-term tactics and long-term strategy will be provided (Sidhu, 2004). Determination of market boundaries is also a necessary prerequisite for determining a firm's market share (Curran and Goodfellow, 1989). Industry segments can affect the perception of strategic choices or options, and ultimately the bottom line of performance.

Moving from one segment to another can be difficult depending on the height of the mobility barriers needed to surmount. These mobility barriers, within the electrical wholesale sector, are product knowledge, trust from buyers, customer loyalty, loyalty to suppliers, specialized knowledge of the needs of buyers, specialized knowledge about products, etc. These resources are all difficult to imitate or to substitute and are highly valuable. Porter's five forces model is useful for explaining performance differences between intra-industry domains. A further analysis of seller power reveals that seller power differs statistically significantly between segments (research results not reported in this paper). Higher profitability occurs in wholesaling firms with fewer suppliers and tight relations with their two largest suppliers.

The firm effect is about 30 to 40 percent, reflecting the critical importance of the particular resources and capabilities of each firm. The resource-based view and its successors or refinements - CBV and DCV - highlight the strategic importance of rare, valuable, non-imitable, non-substitutable resources. Differences in competences will have their counterpart in differences in competitive strategy between firms, even within the same business domain. The firm effect in the study at hand is lower than in previous studies, due to the fact that most of the earlier studies do not consider intra-industry positions. By so doing the firm effect is overstated as it incorporates and absorbs the effect of the tough strategic choices concerning scale and scope (defining the business the firm is in).

But unexplained variance is about 50 to 60 percent, pointing to the fact that more research on this topic is necessary. Introducing specific competitive strategy decisions is a possible route forward. This may reduce the amount of unexplained variance, but such research can also disentangle the firm effect in a competitive strategy effect, which is due to differences in individual or lower level resources (e.g. the number of patents), and a higher level "firm effect" due to the use of bundles of resources, and thereby competences, in order to achieve the firm's objectives.

Nevertheless, readers should interpret the results cautiously. This study relates to one industry and therefore the empirical findings need confirmation in other industries. The sample size is limited to 20 firms, although the study covers more than 95 percent of the industry. While small samples are not unusual in strategic management research, studies of large industries would provide a valuable additional perspective.

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Appendix: summary table with review of the literature

	sample	dependent variable(s)	year	industry	group	corporation	business unit (firm)	error
Schmalense 1985	full sample			19.5			0.6	79.9
Wernerfelt & Montgomery 1988	sample without correction for intangible assets	Tobin's q		19.48		2.61	.94	
Hansen & Wernerfelt 1989	60 large firms with over 300 lines of businesses	ROA		18.5			37.78	
Kessides 1990	1775 observations, 456 firms, 242 manufacturing industries	return on sales		20.1		9.8	27.5	
Rumelt 1991	sample B			4.03		1.64	44.17	44.79
Roquebert et al. 1996	1985-91; manufacturing; Compustat; 16596 observations			10.2		17.9	37.1	32.0
Powell 1996	54 responses from 166 surveys	perceived overall performance		15				
		perceived profitability		10				
		perceived sales growth		19				
McGahan & Porter 1997	full sample		2.39	18.68		4.33	31.71	48.4
Mauri & Michaels 1998	1988-92	R&D intensity		62.2			30.8	7.0
	1978-92	R&D intensity		55.4			30.1	14.5
	1988-92	Advertising intensity		69.3			24.8	5.9

	sample	dependent variable(s)	year	industry	group	corporation	business unit (firm)	error
	1978-92	Advertising intensity		68.2			24.1	7.7
	1988-92	ROA		6.2			36.9	56.9
	1978-92	ROA		5.8			25.4	68.8
Brush, Bromily & Hendrickx 1999	535 firms, 1605 business segments, all industries except finance	ROA		9.67-15.32				
McGahan1999	1981-1994, 31601 observations, 4997 firms, 648 industries	Tobin's q	3,1	41.5			55.2	
		Accounting profit	4,7	29.6			65.7	
		Return on Replacement Sales	7,4	31.6			60.9	
Gonzalez & Ventura 2002	Spanish manufacturing firms, 2059, 1977, 1869 and 1877 firms in 1991-92-93-94 respectively	ROA	0.8	10.4	11.5		38.0	38.5
Hawawini et al. 2003	data provided by the consultancy Stern Stewart, Compustat	EP/CE	1.9	6.5			27.1	60.3
		TMV/CE	1.3	11.4			32.5	51.9
		ROA	1.0	8.1			35.8	52.0
Adner & Helfat 2003	US petroleum industry, 1977-	ROA	1.26	2.05		2.74	19.42	63.86

	sample	dependent variable(s)	year	industry	group	corporation	business unit (firm)	error
	1997, 30 companies							
Ruefli & Wiggins 2003	full sample	ROA	0.01	0.14		7.06	12.33	
Eriksen & Knudsen 2003	Danish SME's, 1991-1995	ROA		11			81	
Misangyi et al. 2006	full sample (HLM-method)	ROA	0.8	7.6		7.2	36.6	47.8
	full sample (square roots of the estimated variances)	ROA	4.6	14.3		13.9	31.3	35.8
Hough 2006	19405 firms (1995-99)	ROA	<1.0	5.3		20.2	40.1	34.5
Short, et al. 2007	1165 firms, 12 industries	ROA		16.9	11.3			
		Tobin's q		5.8	2.3			
		Altman's Z		1.8	2.6			
Galbreath & Galvin 2008	258 Australian firms			3.0			6.7	
Short et al. 2009	new venture sample	sales		14.59			41.31	44.1
		survival		1.36			98.33	
		sales growth	5.51	14.02			52.28	28.19
Short et al. 2009	established firms	sales		21.76			63.22	15.02
		survival		1.16			98.84	
		sales growth	2.65	23.57			64.35	9.52
Arend 2009	1998-2000	ROA		9.56			90.44	
Goddard et al. 2009	1996-2000, sample A,	profit rate		2.92			32.15	

	sample	dependent variable(s)	year	industry	group	corpo- ration	business unit (firm)	error
	independent firms							
	1996-2000, sample A, independent firms	growth rate		1.33			24.30	
	1992-2000, sample B, independent firms	profit rate		2.43			22.35	
	1992-2000, sample B, independent firms	growth rate		0.96			12.02	
	1996-2000, sample A, corporate group members	profit rate		4.65		11.0	17.03	
	1996-2000, sample A, corporate group members	growth rate		2.27		7.04	11.78	
	1992-2000, sample B, corporate group members	profit rate		5.67		8.23	9.25	
	1992-2000, sample B, corporate group members	growth rate		2.10		3.91	4.35	