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IS PROFITABILITY DRIVEN BY INDUSTRY- OR FIRM-SPECIFIC FACTORS? A NEW LOOK AT THE EVIDENCE

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2000/80/FIN

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Printed at INSEAD, Fontainebleau, France.

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INDUSTRY- OR FIRM-SPECIFIC FACTORS?

A NEW LOOK AT THE EVIDENCE

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Key Words: **Industry, Firm, Value Creation, Value Destruction**

The authors acknowledge financial support from **REL Consultants**,
the **Belgian Prime Minister’s Fund for Scientific Research** and the **Solvay Doctoral Fellowship**.

Abstract

In this study we revisit the question of whether firms' profitability (usually measured as return on assets or ROA) is driven primarily by industry- or firm-specific factors. Recent studies that examine the relative impact of industry and firm factors on ROA provide evidence of a dominant firm-specific effect. We re-examine the question from a number of perspectives. Firstly, we test for alternative measures of performance such as economic profit per dollar of capital employed and market-to-book value. Secondly, we use a new and richer data set. Thirdly, we implement a different statistical approach for testing the significance of independent effects, in contrast to the fixed effects ANOVA of previous studies. We show that alternative measures of performance, a new data set and a finer statistical approach do not alter the conclusion of the majority of recent studies which found that firm-specific factors were more dominant than industry effects in explaining firms' profitability.

But our study uncovers an important phenomenon that is in large part responsible for the reported strong firm-effect. We show that a significant proportion of the absolute estimates of the variance of firm-specific factors in our study is due to the presence of a few exceptional firms in an industry: the *two* firms that outperform their industry and the *two* that under-perform in comparison to the rest. In other words, only for a few dominant value creators (leaders) and destroyers (losers) do firm-specific assets matter more than industry factors. *For most firms, i.e. for those that are not notable leaders or losers in their industry, the industry effect turns out to be more important for performance than firm-specific factors.* A possible explanation of this phenomenon is that superior (or poor) management leads to superior (or poor) firm performance irrespective of industry structure, which matters only for firms "stuck in the middle", i.e. for firms with average managerial capabilities and performance.

INTRODUCTION

In many industries, from wireless communications to aluminum, a few and sometimes a single firm often outperform the rest. Firms in the top 20 percent of *Fortune*'s rankings in terms market value added (market value less book value of capital) enjoy double the shareholder returns of the other firms in their industries.[1] A hundred US dollars invested in Nokia stock in 1996 was worth over $15,000 in 1999 compared to an average of around $800 for its competitors. Over the same period, one hundred US dollars invested in Alcoa was worth over $400, compared to an average of approximately $150 for its competitors.

Can industry factors fully explain this phenomenon? The telecommunications firm Nokia is a typical 'new economy' company, while Alcoa is a typical 'old economy' firm. It seems that while industries vary in their environment and structural characteristics, there are also significant differences in performance among firms within the *same* industry. This phenomenon was reported in a number of studies which showed that differential profit rates persist under similar external contexts (Jacobsen, 1988). Recently, researchers in strategic management have shown increasing interest in the relative importance of firm and industry factors for firm profitability - as data availability, statistical techniques and computing power have improved. Past findings generally concluded that firm-specific factors were relatively more important than industry effects. A second point is that of late, management researchers have increasingly noted the possibility that one or a few firms may dominate value creation within their industries.[2] The present study seeks to explore the possibility that the presence of these few exceptional firms within an industry does indeed influence the firm-specific effects found in past studies.

[1] See Jonash and Sommerlatte, (1999).
[2] For a discussion on how companies can dominate their industry's value creation, see Kim and Mauborgne, (1996); Gadiesh and Gilbert, (1998); and Jonash and Sommerlatte, (1999).

This paper also attempts to build on past research in other ways. Firstly, we test the effect of industry- and firm-specific factors on alternative measures of performance such as economic profit per dollar of capital employed and market-to-book value. Secondly, we use a new and richer data set and thirdly, we implement a different and improved statistical approach for testing the significance of the independent effects.

The rest of the paper is organized as follows. In the next section we provide a brief review of the relevant literature. In section 3 we look at the problem of industry definition and its possible impact on the research findings. In section 4 we discuss performance measures. The data set and methodology are discussed in sections 5 and 6, respectively. In section 7 we define and identify value leaders and value losers, and in sections 8 and 9 we report and interpret our empirical results. Concluding remarks are found in section 10.

REVIEW OF THE LITERATURE

In the early days, studies in the economics of industrial organization dominated the strategic management field. Most argued that the structural characteristics of particular industries were a central determinant of profitability.[3] Several studies investigated factors explaining the consistent differences in performance between industries.[4] The industrial organization economists' favored theoretical framework was the structure-conduct-performance (SCP) model, which proposes the existence of a deterministic relationship between market structure and profitability. The structural characteristics of an industry inevitably constrained the behavior (i.e. the conduct or strategies) of its component firms, which in turn led to industry-specific performance differentials between firms (Mason, 1939). In this framework, the industry structure in which a firm operates is the main reason offered to explain variations in firms' profitability. Scherer (1970) points out that such a framework was simplistic and

[3] Within strategic management, Oster (1990) and Porter (1980) are major contributors from industrial organization.
[4] For reviews, see Scherer (1980).

deterministic, concluding that the existence of interdependencies between the three elements of the SCP framework was a more realistic proposition.

An important line of research concerned the role of firm size as a factor explaining differences in profitability (Baumol, 1967; Hall and Weiss, 1967). Size was a source of competitive advantage because bigger firms are presumed to be relatively more efficient than smaller ones. However, the causal relationships between size and profitability have been widely tested, with ambiguous results.[5]

In the 1980s there were major shifts in the strategic management field regarding the unit of analysis. In industrial organization economics, industry is the main unit of analysis, whereas strategic management focuses increasingly on the firm itself to explain profitability differentials. The main reason for this shift is the inability of the industrial organization tradition to provide a rigorous explanation for intra-industry heterogeneity in performance. If firms within an industry faced identical conditions of supply and demand and operated under the same market structure, then why did some firms within the same industry still perform better than others? Nelson (1991) argues that traditional economic theory, with its focus on industry factors, ignores the fact that firms can make discretionary choices. He further points out that not all firms within an industry face identical sets of known choices.

An important attempt to understand intra-industry heterogeneity came with the concept of strategic groups, which classified firms based on dimensions of competition.[6] Profit differentials between groups were sustained due to the presence of conditions that created barriers to mobility between groups, (i.e. mobility barriers).[7] Asymmetries among firms within industries act to limit the expansion of differentials and the equalization of profit rates (Caves and Porter, 1977).

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[5] For a review see Prescott, Kohli and Varadarajan (1986).

[6] For a review of the strategic group literature, see McGee, J. and H. Thomas (1986); Thomas, H. and N. Venkataraman (1988).

[7] See Caves and Porter (1977) for a discussion.

Another significant attempt to understand intra-industry performance differences was the resource-based view of the firm according to which firm-specific idiosyncrasies, in the accumulation and leverage of unique and durable resources, are a source of sustainable competitive advantage. Firms were not seen as identical "black boxes" in a given market structure, but as dynamic collections of specific capabilities, which were the source of performance differences. Company strategies and organizational structures differ between firms within an industry, and organizations evolve in different ways. In the process, the bundle of capabilities that each organization possesses comes to differ (Nelson, 1991). The resource-based view focuses on failure in factor markets due to factor market imperfections. Rent-producing resources determine the profit level of firms; for profits to be sustainable, the resources have to be scarce, difficult to copy or substitute, and difficult to trade in factor markets (Wernerfelt, 1984; Barney, 1986, 1991; Dierickx and Cool, 1989; Amit and Schoemaker, 1993).

As a result, there has been much debate about the correct emphasis when analyzing a firm's strategy: should strategy be examined in the context of an industry's structural characteristics, or an individual firm's resources and capabilities? Schmalensee's study (1985) was a first attempt to analyze empirically the contribution of industry and firm-specific factors to overall profitability, taking market share as the measure of heterogeneity between firms, following the industrial organization assumption that intra-industry heterogeneity is uniquely due to differences in firms' size. Using 1975 FTC LB data and return on assets (ROA) as a performance measure, the study reported that industry membership accounted for around 20 percent of observed variance in business-unit returns while market share accounted for a negligible amount. The study concluded that industry effects played a central role in determining profitability. In comparison, firm-specific factors were insignificant.

However, Schmalensee's 1985 study left 80 percent of the total variance in business-unit returns unexplained. Rumelt's study (1991) attempted to clarify this large degree of error. One reason was the use of market-share as a proxy for firm-specific factors, which probably left the research model under-specified. With a data set covering just one year, Schmalensee was constrained from specifying a composite firm factor that accounted for the effects of all firm-level factors. Rumelt's study used data from four years, allowing the inclusion of a composite term to measure firm effects. The study also extended Schmalensee's descriptive statistical model by including additional terms to measure the inter-temporal persistence in industry effects, 'year effects', corporate effects and effects arising from corporate/industry interaction.[8]

Rumelt (1991) reported that industry membership explained around 9 percent of the variance in business unit returns, of which only half of this proportion was stable from year to year. Firm-specific effects, on the other hand, accounted for more than 44 percent of business-unit variations in profits. The study also reported low year effects, and negligible corporate and corporate/industry interaction effects. The results were rich in interpretation. Not surprisingly, the study ignited a debate on the relevance of industry, firm-specific factors and diversification for profitability.

The debate has been encouraged by further empirical studies along the lines of Rumelt's work: McGahan and Porter, 1997; Mauri and Michaels, 1998; Powell, 1996; Roquebert, Phillips and Westfall, 1996; Brush, Bromiley and Hendrickx, 1999. These studies confirmed the dominance of firm-specific effects. While using similar methodology, they differed from Schmalensee and Rumelt's work inasmuch as they used the Compustat database, which allowed service industries to be included in the analysis (the FTC data set

[8] Corporate effects are also known as conglomerate effects. They reflect the value added to the business due to its membership of a multi-business corporation. For a discussion on ways in which corporate management can add value to its individual business see Goold, Campbell and Alexander (1996)).

contained only manufacturing industries).[9] Table 1 summarizes the results reported in three major studies.

With such robust support, it would be safe to conclude that industry membership does not matter *much* for a firm's profitability. There would be little value in another study seeking to measure the impact of industry- and firm-specific effects if not for at least three reasons. First, is the general conclusion (that firm-specific effects are relatively more important than industry effects) equally valid for *all* firms? Industry and firm effects may vary for different classes of firms within the same industry and this might arise, for instance, if the industry is made up of distinct strategic groups. From the broad, case-based evidence, it seems that one or a few firms often outperform the rest of the industry and could be in large part responsible for the intra-industry variations. The obvious question is whether or not these few firms influence the reported strong firm-specific effect and consequently whether there is anything to be said about the importance of industry and firm-specific factors for the other firms in the same industry.

The second reason concerns the use of return on assets (ROA) as a performance measure in past research. Are the findings sensitive to the specific performance measure used or is performance really driven by firm-specific factors? The third reason relates to the relatively large amount of error reported in past studies from around 45 percent (Rumelt, 1991) to 80 percent (Schmalanesee, 1985). Firm-specific effects only dominate the *explained* variations in performance. In fact, a significant proportion of the performance variations observed are due to as yet completely *unexplained* factors.

This study will chiefly address the first two issues and speculate on the third. As pointed out earlier, we also build on the past research in other important ways. We use a new and richer data set and implement a different and improved statistical approach for testing the significance of the independent effects.

[9] Powell (1996) uses a survey methodology that uses executives' perceptions.

INDUSTRY DEFINITION

The appropriate definition of an industry is a subject of some debate in strategic management. In the context of studies such as the present paper, a narrow definition would lead to a strong industry effect while a broad definition would demonstrate a much less significant industry effect.

Past research has classified industries according to the US SIC system, which is also the traditional and most frequently-used taxonomy when assigning firms to particular industry groups. The SIC system classifies companies based on their production processes; however this supply-side orientation ignores other dimensions - such as different customer segments on the demand side - that may be relevant to the proper classification of industries. As a result, the SIC system in some cases does not identify strategically relevant industries (McGahan and Porter, 1997). Other problems include insufficient classification categories in the system.

The fact that industry definition is a subject of debate implies that the results and, importantly, the conclusion that firm-specific effects are dominant, are to be interpreted with some caution. If one cannot properly define industries then estimates of the degree of industry effects on performance, irrespective of how it is measured, will not be completely reliable. However, since few options are available that do not suffer from similar or other problems, researchers have to depend on the SIC system for industry classification. Our research objective here is to study the firm and industry effects with different data sets and measures, and to examine the reasons for the strong firm-specific effect within the framework suggested by past research.

MEASURES OF FIRMS' PERFORMANCE

Previous studies have used return on total assets (net income divided by total assets) as their exclusive performance measure. Accounting measures similar to ROA suffer from some well-known conceptual disadvantages that arise from accounting conventions. Accounting ratios do not measure cash flows, and returns are not adjusted for risk. Often, asset values are quoted at historic cost and not at their true replacement values. As a result of such conceptual shortcomings, accounting ratios could not provide information either on past *economic* profitability or on the firm's future profitability.

Moreover, the existence of different accounting policies and conventions, and management's power to choose between them, means that accounting measures can be obtained by alternative but equally acceptable methods. Some authors such as Harcourt (1965) and Fisher and McGowan (1983) argue strongly against the use of accounting ratios as proxies for economic profitability.[10] However, data on value-based measures of performance for a large number of companies and over a long time period were not available until recently. This might explain why past research has traditionally relied on accounting measures of performance.

In this paper we test for two value-based measures of firm performance as an alternative to ROA. These are *economic profit per dollar of capital employed* and *total market value per dollar of capital employed* (defined below), where capital employed is the sum of equity capital and debt capital.

Strategy is about sustainable value creation, which occurs when the firm's activities deliver a return on invested capital (ROIC) over time that exceeds its weighted average cost of capital (WACC)[11]. Thus, the difference between a firm's ROIC and its WACC measures

[10] For instance, Harcourt (1965) concludes that 'the accountant's rate of profit is greatly influenced by irrelevant factors, even under ideal conditions'. Similarly, Fisher and McGowan (1983) view that 'there is no way in which one can look at accounting rates of return and infer anything about relative economic profitability…'.
[11] See Hawawini and Viallet (1999).

the amount of economic profit (EP) the firm has generated per dollar of capital employed (CE)[12]:

$$\mathbf{EP/CE = ROIC - WACC} \quad (1)$$

If ROIC is greater than WACC, economic profit per dollar of capital employed is positive and the firm creates value. The opposite is true when ROIC is smaller than WACC.

The second measure of value-based performance used in this paper is the firm's total market value (TMV) per dollar of capital employed, where TMV is the sum of the firm's market capitalization (market value of equity) and the market value of its debt. This reflects the market's expectation of the firm's future economic profitability. Note that the ratio TMV/CE is similar to Tobin's q ratio, which is expressed as the ratio of the market value of equity to the book value of equity. The difference between Tobin's q and TMV/CE is that the latter includes debt capital.

DATA AND SAMPLE

With the exception of Schmalensee (1985), Rumelt (1991) and Powell (1996), past research is based on data drawn from the Compustat database. In this study we use the Stern Stewart data set, which contains data on EP, TMV and CE adjusted to remove distortions caused by accounting conventions (see footnote 13). The data covers 1,000 US companies for periods of up to 21 years. The firms are classified into industries following the SIC system at the 3-digit level, and the data retains many of the advantages of the Compustat data set. It is recent, covers a long period of time and has a broad range of industries in both manufacturing and services.

[12] A number of major adjustments must be made to accounting numbers to calculate EP/CE and TMV/CE. The reason for these adjustments is that a number of items, which for accounting purposes are charged to the income statement (such as deferred taxes, R&D and marketing expenses and goodwill) are actually part of the balance sheet. This leads to the situation where the invested capital is understated while income is misstated. See Hawawini and Viallet (1999).

A disadvantage of the data set, however, is that it contains only the 1,000 best-performing companies and is dominated by large companies. This bias is accounted for by scaling EP and TMV for size, by dividing both measures by the amount of capital a company employs. A second bias is the survivor bias that is inherent in this as well as past studies. The data set only contains firms that survived during the time period. However, the assumption of random industries within the economy, and random firms within the industries, means that the results, in principle, could be generalized if the effects were found to be significant.

While the data set is composed of 1,000 firms over up to 21 years, the sample set covers the 10-year period from 1987 to 1996. This period represents a full economic cycle in the US: growth in the late 1980s followed by recession in the early 1990s and growth again in the later 1990s. The sample was screened in various ways. We dropped firms that did not contain a primary SIC designation, or were identified by SIC as 'not elsewhere classified'. Further, firms that reported results with missing values were also discarded. The data was also screened to identify firms that were not reported to be active in the same industry classification over the 10-year period. The final sample contains 5,620 observations for 562 firms across 55 industry classifications with an average of over 10 firms per industry. Table 2 shows the number of firms in each industry on each of the performance measures used. Additional statistics describing the sample are reported in Table 3. We use the Compustat database for data on ROA for the firms included in the EP/CE and TMV/CE sample.

Table 4 shows the correlation coefficients between EP/CE, TMV/CE and ROA. The correlation between the two measures of operating performance (EP/CE and ROA) is relatively high (0.80), while that between the measures of operating performance and market value is also strong (0.53, on average). Whether this could mean that the level and the relative importance of firm and industry effects would be similar across the three measures is a subject of investigation for this paper.

MODEL AND METHODOLOGY

The model we use to examine the effects of industry, firm-specific and 'year' factors largely follows the descriptive model used in past research. We have taken the variance components procedure used in past research as our statistical methodology for the estimation of the proportions explained by each independent variable in the variation of the dependent variable (performance measure). However, we have improved on the procedure for testing the significance of the independent effects.

Our analysis is based on the following descriptive model, which is similar to Schmalensee (1985) and Rumelt (1991).

$$\mathbf{r_{ijt} = \mu_{...} + \alpha_i + \beta_j + \gamma_t + (\alpha\gamma)_{it} + \varepsilon_{ijt}} \qquad (2)$$

where $\mu_{...}$ is a constant equal to the overall mean (the three dots indicate that it is an average over the i, j and t index); α_i is a random industry effect where i = 1…r denotes any one industry as i; β_j is a random firm effect where j = 1…n_i denotes any one firm as j; n_i is the number of firms within industry i where i denotes any one industry as i; γ_t is a random year effects where t denotes any one year as t; $(\alpha\gamma)_{it}$[13] is a random industry-year interaction effects; and ε_{ijt} is a random error term.

The main effects (α_i, β_j and γ_t) and the interaction effect $(\alpha\gamma)_{it}$ follow a normal random distribution with mean zero and variance σ^2_α, σ^2_β, σ^2_γ and $\sigma^2_{\alpha\gamma}$, i.e. ε (0, σ^2). The random independent effects specified in the above model are generated by random processes that are independent of each other, i.e. each of the main effects is an independent random solution from an underlying population that is normally-distributed.

[13] $(\alpha\gamma)_{it}$ is not a product of two variables, α and γ. It simply indicates the interaction between two main effects α and γ.

Our model specifies for five sources of variation in business returns: stable and transient industry factors, stable firm-specific effects, the effects of yearly macroeconomic fluctuations, and random error. Firm effects comprise all firm-specific factors such as heterogeneity among firms in tangible and intangible assets due to differences in reputation, operational effectiveness, organizational processes and managerial skills. Stable industry effects reflect the influence of structural characteristics of industries on the performance of firms while the transient component of industry effects measures the sensitivity of profitability to the impact of business cycles on the industry. The impact of factors with broader economic significance is captured by the year effect.

The differences between our model and those of Rumelt (1991) and others are that the notion of 'corporate effect' has been discarded. Schmalensee (1985), Rumelt (1991) and McGahan and Porter (1997) all reported low corporate effects, hence we assume that the exclusion of corporate effects would not have a significant impact the model's specification. We follow Wernerfelt and Montgomery's (1988) approach: when using Tobin's q as a performance measure, similar specificity is sacrificed for the sake of better value measures.

The variance components procedure used here is similar to the one employed in past research. The equation for the estimation of variance components is developed based on the descriptive statistical model of equation (2), by decomposing the total variance in the dependent variable (profitability measure) into its components as follows:

$$\sigma^2_{\mathbf{r}} = \sigma^2_{\alpha} + \sigma^2_{\beta} + \sigma^2_{\gamma} + \sigma^2_{\alpha\gamma} + \sigma^2_{\varepsilon} \qquad (3)$$

The dependent variable r_{ijt} in the above model has constant variance and is normally distributed because they are linear combinations of independent normal random variables. We use the VARCOMP procedure in SAS software to estimate the different variance components. The variance components estimation is particularly suited to studies such as the present paper since it does not require a data set covering the whole population, while at the same time allowing the results to be generalized. This is useful since it is impossible to construct a data set that covers all industries and all firms in each industry.

One inherent disadvantage of the variance components estimation is that the procedure does not provide reliable tests for the significance of the independent effects. Since the independent effects are assumed to be generated by an independent random draw from an underlying population of the class of the effects, the null hypothesis that some of the variance parameters are zero lies on the boundary of the parameter space. This characteristic presents a non-standard problem for producing significance statistics.[14] Roquebert, Phillips and Westfall (1996) produce the standard errors along with variance components estimates. While acknowledging the limitations, they argue that the magnitude of the parameter, expressed as a percentage of the total variance explained, can be used as an indicator of the likelihood that the underlying value of the parameter is nonzero.

Schmalensee (1985), Rumelt (1991) and McGahan and Porter (1997) solve this situation by using nested ANOVA techniques that consider the effects to be fixed. The ANOVA approach generates F-statistics for the presence of the independent effects. While the fixed effects transformation resolves the significance testing problem of the variance components procedure, it restricts the critical assumption of randomness of the independent effects. An important characteristic of the assumption of randomness is that results regarding both the presence and the importance of the various independent effects can be generalized over the population as a whole. In choosing the fixed effects ANOVA approach for significance testing, Schmalansee (1985), Rumelt (1991) and McGahan and Porter (1997) argue that an ANOVA test for significance is not a pre-requisite to variance components

[14] The MIXED procedure in SAS can also be used to specify a pure random effects model. The MIXED procedure can generate Wald Z-test of significance statistics, but their usefulness is doubtful due to the non-standard nature of testing for significance of random effects. See Verbeke and Molenberghs (1997) for a discussion on the issue of testing for significance in random effects models.

estimation, since their main interest lies in estimating the relative magnitudes of the different effects, and significance results are only of secondary importance.

We approach this problem by using a random effects ANOVA model. The random effects ANOVA model assumes that all the independent effects specified in the model are generated by random processes, consistent with the variance components assumptions. The random ANOVA model departs from its fixed effect version only in the expected mean squares and the consequent test statistic. Since this procedure has not been employed in the past research, we provide a simple illustration of the design of such models and the calculation of F-statistics.

Let us assume that our model consists of two exogenous factors A (say, industry) and B (say, year). In a random-effects version of ANOVA for a two-factor study, we assume that both factor-A main effects $\alpha_{i,}$ and factor-B main effects $\beta_{j,}$ are independent random variables. Further, we assume that the interaction effects $(\alpha\beta)_{ij}$ are independent random variables. The random-effects version of ANOVA for a two-factor study with equal sample sizes n is:

$$\mathbf{Y}_{ij} = \mu_{..} + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \varepsilon_{ij}\ , \qquad (4)$$

where $\mu_{..}$ is a constant (the two dots indicate that it is an average over the i and j index); α_i, β_j, $(\alpha\beta)_{ij}$ are independent random variables with expectations zero and variances σ^2_{α}, σ^2_{β}, $\sigma^2_{\alpha\beta}$; i equals 1, …, a; j = 1, …, b.

Such a two-factor random model differs from its fixed-version counterpart in the expected mean squares. These expected mean squares are shown in Table 5 where the expressions for the expected mean squares can be derived using the usual expectation theorems as shown in Neter, Kutner, Nachtsheim and Wasserman (1996).

To test, for instance, for the presence of factor A effects in the random ANOVA model, we make the following hypothesis:

$$H_0: \sigma^2_\alpha = 0; H_a: \sigma^2_\alpha > 0$$

If we examine the expressions for MSA and MSAB, we see that if σ^2_α equals zero, then MSA equals MSAB. This means that MSA will be greater than MSAB, if and only if factor-A effects are present. We use this characteristic to generate a test statistic.

$$F^* = MSA / MSAB$$

By using the usual significance levels, one can determine whether the result provided by F^* is statistically significant. The difference between the above illustration and the present study is that there is a third factor (firm) which is nested within another factor (industry). However, the basic intuition remains the same in testing for the presence of the different effects.

VALUE LEADERS, LOSERS AND THE AVERAGE

In many industries, it has been observed that a few firms tend to outperform the rest. Canon’s market capitalization in the period 1996-1999 increased by a factor of over 2.5 while the increase for its competitors is around 1.7. During the same period, Chrysler increased its market capitalization more than tenfold, compared to a doubling (on average) for other automobile manufacturers.[15] When we look at our data set, we observe a similar trend. In industries such as discount retailing, software and beverages, one firm’s performance (respectively, Wal-Mart, Microsoft and Coke) substantially and persistently differs from that of the others in its industry.

It has also been observed that industries feature 'abnormal' value losers as well as value leaders. In terms of shareholder value, firms in the bottom 20 percent report returns that amount to less than one third of those gleaned by their average competitors (Jonash and Sommerlatte, 1999). If sustainable competitive advantage is taken as the basis for sustained superior performance then, by analogy, firms at the bottom of the industry are at a significant competitive disadvantage. The few firms that deviate strongly from the rest of their industry could influence the general result, which itself may or may not apply to the rest of the industry. Firm-specific factors drive relatively superior or inferior performance (relative to the industry) but this does not help determine the performance drivers of firms that are 'stuck in the middle'. In other words, we are interested in two issues. Does the performance of a few firms influence the relative importance of firm-specific and industry effects? And what is the relative magnitude of these effects for firms that are 'stuck in the middle'?

We make a rough attempt to identify an industry's value leaders and losers. Exact definitions of a value leader or loser are debatable, but our purpose here is to give some preliminary attention to the influence of such 'outliers' on firm-specific and industry effects, and to the importance of these effects on firms in the middle. The following procedure is used to identify value leaders and losers in an industry. To be identified as a value leader in its industry a firm must meet two criteria. First, its performance must be the highest in its industry for at least six of the ten years studied. Second, the firm must have the biggest cumulative value over the ten-year period. The same logic is applied to the identification of an industry's value loser. A firm with the consistently worst performance vis-à-vis the industry average, i.e. for at least six of the ten years in the data set and which also has the lowest cumulative value over the same period is identified as an industry's value loser. We apply the descriptive statistical model (equation (2)) and the varcomp procedure firstly to the

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[15] See Jonash and Sommerlatte, 1999.

full sample that includes all the firms, and secondly to a reduced sample that excludes the *top two* value leaders and *bottom two* value losers in the industry.

EMPIRICAL RESULTS

Prior to examining the impact of leading and losing firms on the level of firm and industry effects, we first test whether the magnitude of firm and industry effects are sensitive to the performance measure. Table 6 gives the variance components estimates of the independent variables that add up to the variation in the dependent variable (EVA/CE, TMV/CE and ROA). Table 7 gives the percentages of the total variance of the dependent variable explained by the independent effects of the model. All estimates were evaluated at 5 percent level by the random ANOVA procedure for statistical significance.

From the results, it is evident that firm effects dominate long-term performance irrespective of whether performance is measured by EP/CE, TMV/CE or ROA. Stable firm effects explain considerably more variance in the dependent variable than total industry effects, which are the sum of the stable and transient components. Total industry effects for EP/CE, TMV/CE and ROA are 10.7 percent, 14.3 percent and 11.2 percent, respectively (the sum of industry and industry-year effects in Table 7). In comparison, the corresponding figures for stable firm effects are 27.1 percent, 32.5 percent and 35.8 percent.

The dominance of firm-specific effects is even more pronounced when we compare stable firm-specific effects with stable industry effects. In the case of EP/CE and ROA, stable firm-specific effects dominate stable industry effects by a factor of more than four, while in the case of TMV/CE the amount of variance explained by stable firm effects is approximately three times more than that of stable industry effects. Year effects are smaller than firm-specific and industry effects, ranging from 1.0 percent for ROA to 1.9 percent for

EP/CE. Table 8 contains the comparable figures from Schmalensee (1985), Rumelt (1991) and McGahan and Porter (1997) on the various effects.

The present paper's use of alternative measures of performance and a different data set does not alter the conclusion of recent studies which found that firm-specific effects dominated industry effects when seeking to explain profitability. Furthermore, the random effects ANOVA approach indicates that the hypothesized independent effects are significant – the same conclusion was reached by past studies using the fixed-effects ANOVA approach.

One reason for the consistency of the results across the three measures could be that, in large cross-sectional and longitudinal studies of the present type, discrepancies resulting from different accounting measurements might even out over a period of time (Kay, 1976).[16] A second reason could be that while the results are similar, the processes that lead to the results might vary. The results indicate only that firm-level factors are relatively more important across the three performance measures. We cannot say what these firm-level factors are, or whether the firm-level factors that drive performance in terms of ROA, EP/CE and TMV/CE are the same. Even though the current sample is smaller than some of those employed in similar comparative studies, it is nevertheless homogeneous in terms of firm size, it has estimates that are statistically significant, and its results are in line with those reported in past studies.

VALUE LEADERS AND LOSERS AND THE INDUSTRY EFFECT

We now examine the impact of value 'leaders' and 'losers' on the levels of firm and industry effects. The modified sample, which excludes the two industry leaders and losers, is subjected to the same variance components estimation model and procedure as the full

[16] 'The accountant's rate of profit, measured over a period of years, will be an acceptable indicator of the true rate of return: it is over a single year that it may prove seriously misleading' (Kay, 1976).

sample that we analyzed earlier. The independent effects are tested for statistical significance at the 5 percent level through the random ANOVA procedure.

Table 9 reports the estimated variance-covariance components for the modified sample and Table 10 shows the proportion of variance in performance explained by firm, industry and year effects, as well as by the effects of industry/year interaction. The results shown in Tables 9 and 10 provide evidence on the impact of the outliers on the level of firm effect. In terms of variance component estimates, the firm factor contributes less across all three measures of performance, while industry factors increase for ROA and TMV/CE, while remaining almost the same for EP/CE. Table 10 indicates that in terms of relative proportions of variation explained industry factors are more important than firm-level factors in explaining firm profitability. *When profitability is measured with TMV/CE, industry effects (industry plus industry-year effects) explain 35.2 percent in variation compared to only 17.0 percent for firm-specific effects. In the case of EP/CE it is 18.2 percent for industry effects versus 17.6 percent for firm-specific effects and for ROA it is 20.1 percent against 16.7 percent. In general, industry effects seem to dominate firm effects in explaining the variation in profitability.*

The findings indicate that a significant proportion of the absolute estimates of the variance of firm-specific factors in our study is due to the presence of a few firms that consistently deviate from the rest of their industry. The implication is that for value leaders and losers, firm factors matter more than industry effects. In other words, only for the few dominant value creators/leaders and destroyers/losers do firm-specific assets matter more than industry factors. To the vast majority of firms, i.e. for firms that are neither industry leaders nor losers, the industry effect turns out to be more important for performance than firm-specific factors. A possible explanation of this phenomenon is that superior (or poor) management leads to superior (or poor) firm performance irrespective of industry structure, which matters only for firms 'stuck in the middle', i.e. for firms with average managerial capabilities and performance.

We mentioned earlier that this study makes only a rough attempt to examine whether firm factors are equally important for all firms, and whether industry effects really matter to firms that are 'stuck in the middle', i.e. firms that do not possess unique competencies that can be leveraged successfully in product market competition. Our approach, discarding only the two best- and the two worst-performing firms per industry, provides an extreme test of our proposition. Had we decided to discard, say, the top and bottom quartile of each industry in terms of performance, the results would have been even more pronounced.

CONCLUDING REMARKS

The main focus of this study was twofold. Firstly, we wanted to test whether past findings are sensitive to some specific characteristics such as performance measure, data set and statistical methodology. Secondly, we wanted to examine whether the strong firm-specific effects reported in earlier studies are in fact driven by only a few firms. In corollary, we hoped to examine the impact of firm-specific and industry factors on those firms that do not outperform or under-perform in relation to the rest of their industry.

The results suggest that industry-specific factors matter more than firm-specific factors for the 'also-ran' firms. It is only for the industry leaders and losers that firm-factors dominate. However, we could argue that even if industry factors are not statistically important for these firms, it is unlikely that they could ignore their industry's economics. Indeed, value leaders tend to build their success on their deep understanding of their industry, and use this knowledge to create and capture most of the industry value.

A third related question was the large amount of unexplained variance in studies such as the present paper. Here, we risk some speculation as to the additional effects that could be included in the model in order to add to its explanatory power. We consider in particular two additional concepts, namely the firm/year interaction effect and the industry/firm interaction effect. Rumelt suggests that some of the error might reflect the transient effects of firm-level factors. Even though this can be easily modeled, the calculation seems difficult because of computing power limitations, even with current standards of computing power. The industry/firm interaction is more interesting, however. It reflects the importance of the interdependency between firm capabilities and the industry environment. However, with the current model we cannot estimate this interaction because the firm factor is nested within the industry. Interaction between a main factor (i.e. industry) and a factor nested within it cannot be estimated.

Our study is no exception and it contains some potential problems. Since the results are based on a sample that was taken from a data set containing the 1,000 largest and publicly-listed firms, we should be cautious when seeking to generalize the results. We address the problem by scaling the variables for size and assuming the randomness of industries and firms. A second problem is that our study does not directly address the problem of survivor-bias, i.e. it would obviously not detect the level of industry and firm-specific effects for firms that have disappeared and hence been removed from the sample. However, our basic thesis (that industry losers should blame themselves more than the dynamics of their industry) implies that firm-specific factors would indeed dominate for firms exiting the industry due to performance problems.

To improve generalization, such studies could be replicated for other countries, wherever large longitudinal and cross-sectional data are available. This could reveal country effects that drive performance, and might allow for the testing of assertions regarding the competitive advantage of nations. The study implies that significant performance difference persist between different classes of firms in the same industry. Further research is justified into whether this also implies the presence of strategic groups composed of such firms. The question of exactly what constitutes industry- and firm-level factors also merits further investigation.

Table 1

Firm, industry and other effects on performance identified in past research

Percentage of variance explained of the dependent variable (ROA)

	Schmalensee (1985)	Rumelt* (1991)		McGahan and Porter (1997)
		Sample A	Sample B	
Firm Effects	0.6 %	46.4 %	44.2 %	31.7 %
Industry Effects	19.6 %	8.3 %	4.0 %	18.7 %
Year Effects	N/A	N/A	N/A	2.4 %
Industry/Year Effects	N/A	7.8 %	5.4 %	N/A
Corporate Effects	N/A	0.8 %	1.6 %	4.3 %
Error	80.4 %	36.9 %	44.8 %	48.4 %

*Rumelt uses two samples, naming them Sample A and Sample B. Sample A is similar to Schmalensee and Sample B covers a larger set of firms than sample A.

Table 4

Correlation between EP/CE, TMV/CE and ROA

(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

	EP/CE	TMV/CE	ROA
EP/CE	1.00	0.57	0.80
TMV/CE		1.00	0.48
ROA			1.00

Table 5

Expected mean squares for two-factor ANOVA models

Mean Square	Degrees of Freedom	Expected Mean Squares
MSA	a-1	$\sigma_e^2 + nb\sigma^2_\alpha + n\sigma^2_{\alpha\beta}$
MSB	b-1	$\sigma_e^2 + na\sigma^2_\beta + n\sigma^2_{\alpha\beta}$
MSAB	(a-1)(b-1)	$\sigma_e^2 + n\sigma^2_{\alpha\beta}$
MSE	(n-1)ab	σ_e^2

Table 2

Number of firms by industry and performance measure

(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Industry Name	EP/CE	TMV/CE	ROA
Aerospace & Defence	14	14	11
Cars & Trucks	5	5	4
Car Parts & Equipment	13	13	10
Chemicals	24	24	23
Plastics and Products	4	4	3
Apparel	9	9	6
Appliances & Home Furnishing	15	15	12
Beverages	8	8	8
Personal Care	9	9	7
Tobacco	4	4	4
Paper & Products	20	20	20
Discount Retailing	14	14	11
Fashion Retailing	11	11	8
Electrical Products	6	6	6
Electronics	9	9	5
Instruments	7	7	7
Semiconductors & Components	20	20	18
Food Processing	24	24	20
Food Distribution	3	3	-
Food Retailing	9	9	9
Oil & Gas	30	30	26
Petroleum Services	12	12	10
Drugs & Research	23	23	21
Drug Distribution	8	8	8
Medical Products	15	15	11
Healthcare Services	7	7	5
Building Materials	11	11	10
Construction & Engineering	3	3	-
Eating Places	6	6	6
Entertainment	7	7	7
Hotel & Motel	5	5	-
Games & Toys	4	4	-
General Engineering	21	21	7
Machine & Hand Tools	5	5	5
Machinery	6	6	-
Packaging	3	3	3
Textiles	3	3	3
Aluminium	5	5	-
Steel	9	9	9
Metals	7	7	-
Business Machine & Services	8	8	7
Computers & Peripherals	24	24	19
Computer Software & Services	15	15	14
IT Consulting Services	8	8	6
Broadcasting & Publishing	19	19	16
Printing & Advertising	5	5	4
Industrial Distribution	7	7	4
Pollution Control	3	3	-
Personnel Supply Services	3	3	-
Telephone Equipment & Services	6	6	5
Telephone Companies	16	16	16
Cable Television	6	6	5
Airlines	9	9	8
Railroads	5	5	5
Transportation Services	10	10	9
Total	**562**	**562**	**441**

Table 3

Mean EP/CE, TMV/CE and ROA by industry for the period 1987-1996

(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Industry Name	EP/CE	TMV/CE	ROA
Aerospace & Defence	-0.0331	1.3982	4.8390
Cars & Trucks	-0.0150	0.9473	2.1660
Car Parts & Equipment	-0.0003	1.5767	4.5989
Chemicals	0.0029	1.8195	7.9589
Plastics & Products	-0.0261	1.8394	5.3089
Apparel	0.0106	2.0114	10.6866
Appliances & Home Furnishing	-0.0191	1.5416	5.8016
Beverages	0.0018	2.1688	5.5960
Personal Care	0.0281	2.8700	8.005
Tobacco	0.0936	3.2314	14.3979
Paper & Products	-0.0149	1.2902	5.2342
Discount Retailing	-0.0126	1.7803	6.3501
Fashion Retailing	-0.0039	1.9829	9.2833
Electrical Products	-0.0327	1.3056	4.6276
Electronics	-0.0921	1.6542	3.4505
Instruments	-0.0415	1.5443	5.1271
Semiconductors & Components	-0.0126	2.0560	5.9906
Food Processing	0.0251	1.7090	8.5306
Food Distribution	-0.0056	2.3515	-
Food Retailing	0.0248	1.9880	6.5234
Oil & Gas	-0.0461	1.3604	2.5455
Petroleum Services	-0.0980	1.7189	-0.5861
Drugs & Research	0.0065	3.3807	7.6439
Drug Distribution	-0.0067	1.6614	5.5325
Medical Products	0.0276	3.0987	9.5384
Healthcare Services	-0.0169	2.4681	3.2672
Building Materials	-0.0056	1.5521	5.6250
Construction & Engineering	-0.0458	1.6749	-
Eating Places	0.0014	2.3246	6.8867
Entertainment	0.0442	2.8240	8.4403
Hotel & Motel	-0.0362	0.5391	-
Games & Toys	0.0083	2.3755	-
General Engineering	-0.0303	1.7353	5.1617
Machine & Hand Tools	-0.0174	1.4356	6.0154
Machinery	-0.0406	1.0974	-
Packaging	0.0075	1.7197	4.9736
Textiles	-0.0012	1.9392	7.4093
Aluminium	-0.0128	1.4844	-
Steel	-0.0647	1.2967	2.2646
Metals	-0.0101	1.7447	-
Business Machine & Services	0.0149	2.0492	8.2812
Computers & Peripherals	-0.0306	1.7332	3.1143
Computer Software & Services	0.0590	4.0331	10.3530
IT Consulting Services	0.0206	2.7136	6.5260
Broadcasting & Publishing	-0.0149	1.8042	6.0059
Printing & Advertising	-0.0196	1.5565	2.3386
Industrial Distribution	0.0012	2.5401	5.3783
Pollution Control	-0.0140	1.7691	-
Personnel-Supply Services	0.0402	2.8095	-
Telephone Equipment & Services	-0.0206	2.0647	7.0432
Telephone Companies	-0.0124	1.3680	4.6181
Cable Television	-0.0720	1.6966	-3.2513
Airlines	-0.0416	1.1676	0.9866
Railroads	-0.0340	1.0257	3.7780
Transportation Services	-0.0195	1.5836	3.1847
Mean	-0.0110	1.8930	5.5989
Standard deviation	0.0335	0.6550	3.0364

Table 6

Absolute values of the variance contributed by independent variables for years 1986-1997

(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Variance Component	Variance Estimate for Variable		
	EP/CE	TMV/CE	ROA
Firm	0.002650	1.095386	20.643661
Industry	0.000633	0.382606	4.700882
Year	0.000184	0.043188	0.555360
Industry-Year	0.000411	0.097929	1.810961
Error	0.005916	1.751753	30.036681

Table 7

Firm and industry effects in percentage of total variance of the dependent variable for years 1986-1997 based on the data reported in Table 6

(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Variance Component	EP/CE	TMV/CE	ROA
Firm effect	27.1 %	32.5 %	35.8 %
Industry effect	6.5 %	11.4 %	8.1 %
Year effect	1.9 %	1.3 %	1.0 %
Industry-Year effect	4.2 %	2.9 %	3.1 %
Error	60.3 %	51.9 %	52.0 %

Table 8

Comparison of results in percentage of total variance of the dependent variable

(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Variance Component	Schmalensee (1985)	Rumelt* (1991)	McGahan & Porter (1997)	This study (see Table 7)		
				EP/CE	TMV/CE	ROA
Firm effect	0.6 %	44.2 %	31.7 %	27.1 %	32.5 %	35.8 %
Industry effect	19.6 %	4.0 %	18.7 %	6.5 %	11.4 %	8.1 %
Year effect	N/A	N/A	2.4 %	1.9 %	1.3 %	1.0 %
Industry-Year	N/A	5.4 %	N/A	4.2 %	2.9 %	3.1 %
Corporate effect	N/A	1.6 %	4.3 %	N/A	N/A	N/A
Error	80.4 %	44.8 %	48.4 %	60.3 %	51.9 %	52.0 %

*Only the results of sample B of Rumelt's (1991) study are reproduced here.

Table 9

Absolute values of the variance contributed by the independent variables
for the modified* sample for years 1986-1997
(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Variance Component	Variance Estimate for Variable		
	EP/CE	TMV/CE	ROA
Firm effect	0.000820	0.232559	5.697587
Industry effect	0.000578	0.412727	5.413565
Year effect	0.000148	0.033736	0.384852
Industry-Year effect	0.000271	0.067775	1.409289
Error	0.002839	0.619511	21.149261

*The modified sample is smaller than the full sample and *excludes* each industry's top *two* leaders and bottom *two* losers according to the performance measure used (EP/CE, TMV/CE and ROA). See section 7 in text for details.

Table 10

Firm and industry effects for the modified* and full samples
in percentage of total variance for years 1986-1997, based on Tables 9 and 7
(EP = Economic Profit; CE = Capital Employed; TMV = Total Market Value - See section 4)

Variance Component	EP/CE		TMV/CE		ROA	
	Modified*	Full	Modified*	Full	Modified*	Full
Firm effect	17.6 %	27.1 %	17.0%	32.5 %	16.7 %	35.8 %
Industry effect	12.4 %	6.5 %	30.2 %	11.4 %	16.0 %	8.1 %
Year effect	3.2 %	1.9 %	2.5 %	1.3 %	1.1 %	1.0 %
Industry-Year effect	5.8 %	4.2 %	5.0 %	2.9 %	4.1 %	3.1 %
Error	61.0 %	60.3 %	45.3 %	51.9 %	62.1 %	52.0 %

*The modified sample is smaller than the full sample and *excludes* each industry's top *two* leaders and bottom *two* losers according to the performance measure used (EP/CE, TMV/CE and ROA). See section 7 in text for details.

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