

Economic fluctuations and Strategy effects on Performance:

Longitudinal evidence from Western Agribusiness.

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Student: Bastiaan Otto Groeneveld BSc
Student number: 880131-281-120
Contact details: +31 (0)6 20 37 88 21; bas.groeneveld@gmail.com
Study program: MSc Management Economics and Consumer studies
Course: BSc. Upgrade, YSS-81812

Supervisors: dr. E.F.M. Wubben, V.S. Materia

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Abstract

This present research project, written in addition to earlier research conducted by this author, examines how economic fluctuations and agribusiness firms' strategies are linked with agribusiness firms' performance, using data on 26 western agribusiness firms. Particular attention is given to firms' strategies. Strategy effects are captured through a modification of Porter's typology. Besides investment strategies are represented using capital and acquisition spending. Although this research is exploratory, it takes into account previous research as well as firm, country and industry specifications. The results obtained provide insights regarding methodological issues as well as important determinants of firm performance. With respect to strategy, results show that hybrid strategies are clearly preferable compared to pure ones and that differentiation strategies outperform cost leadership. In addition, it was found that the higher firms score on strategy, the more positive it is associated with firms' performance. Besides, a comparison of the strategies of low and high performance firms reveals that the strategy variables are all significant for only the high performance firms, indicating that increasing focus on a specific generic strategy is beneficial for firms' performance. Further, it was found that firms overall strategic orientation changes as the economic growth changes, meaning that the higher the economic growth (1) the lower firms' cost leadership orientation, and (2) the higher firms' differentiation orientation. High performance firms' are on average more differentiation oriented compared to low performance firms'. The results indicate that it is less necessary for high performance firms' to shift strategic orientation in periods of economic recession, as their performance seems more stable across the economic fluctuations. While addressing firms' investment strategies, results reveal that (1) capital spending has a positive influence, and acquisition spending is found to have a negative influence on firms' performance. Besides, it was found that (2) investment spending, especially acquisition spending, lags behind economic fluctuations. This comes with cost. Moreover, the findings suggest the necessity of strategic renewal over time. It requires that a firm should respond adequate and quick to fluctuations in the economy in order to remain profitable or improve performance.

Keywords: economic fluctuation, agribusiness strategies, investment strategies, cost leadership, hybrid strategy, differentiation, and agribusiness performance

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1 Introduction

This introductory chapter covers the research background and its design. The research outline is developed on the basis of Verschuren and Doorewaard (2010) and consists of two sections, the conceptual research design and the technical research design in section 1.1 and 1.2 respectively.

1.1 Conceptual research design

The conceptual research design focuses on clarifying the topic that has been analysed and why this research has been worth doing, in order to provide a clear and solid foundation for the research. Paragraph 1.1.1 describes the context of the research. The problem analysis is described in paragraph 1.1.2 in order to isolate a manageable issue from the context. The research objective is described in paragraph 1.1.3. The required steps to realize the research objective are provided in paragraph 1.1.4 by means of a research framework. Finally, paragraph 1.1.5 provides insight in the knowledge required to achieve the objective, by describing research questions.

1.1.1 Research context

This research is written in addition to earlier research conducted by this author in 2014-15, i.e. Groeneveld (2015). The appointed research was conducted to explore how agribusiness firms' strategies and performance were linked to economic fluctuations. The research had a shortage of certain data and methods, and was empirically inadequate, but developed interesting new concepts and propositions. This research aims to advancing that insight by furthering the knowledge, and by improving and extending the earlier selected methods and obtained data. A suitable approach has therefore been selected, data has been improved, and the development of new concepts and propositions has been further extended. First some background on the topic.

The world is in economic crisis; this is something everyone is talking about. We talk about it with each other, face new developments, even fundamental changes. But then, how do companies adapt to these changing circumstances? How do companies' strategies evolve, and what is on the basis for this. Strategy can be defined as "an observable pattern in a stream of actions" (Mintzberg, 1978). The word "pattern" describes the fact that strategies not always follow a deliberately chosen and logical plan, but can emerge in more an ad hoc way (Mintzberg, 2007). A pattern might be recurrent or evolving, but questions arise what is on the basis of strategies.

We face, with all its consequences, economic fluctuations. Economic fluctuations can be defined as "the upward and downward movements of levels of real global GDP" (Madhani, 2010). The economic fluctuations have an impact on e.g. interest rates (Crucini et al., 2011), general employment (Dave & Kelly, 2010), firms' investment behaviour (Justiniano et al., 2010), firms' performance (Mc Gahan & Porter, 1997), but also at consumers spending (Dave & Kelly, 2012). As the influences of economic fluctuations are diverse questions arise how agribusiness strategies and performance link with these influences.

Strategic management literature presents substantiated claims to take either an outside-in approach (i.e. adapting to changing circumstances), or an inside-out approach (i.e. use companies resources and core competencies) to develop strategy. (McKierman, 1997; Stonehouse & Snowdon, 2007). Assessing how a firm adapt to the fluctuations in the economy might provide insight on how companies' strategies and whether firms keep up with general trends in the economy as well as consumers behaviour. The relationships between economic fluctuations, strategies of agribusiness firms' and their performance are complex. It addresses the issue of the "fit" or "aligning" between companies' internal capabilities and its external environment (Shroder & Mavondo, 1994). Examples that addressed the complexity, by providing insight on conceptual and analytical issues involved in empirical investigations of longitudinal strategies are scarce. This research therefore explores the complex issue and discusses and provides an analytical example from an investigation of strategy in the western agribusiness industry.

1.1.2 Problem statement

Because firms differ with respect to both their internal (organizational) and external environments, differing firms adopting widely differing strategies may perform equally well (Schroder & Mavondo, 1994). The complexity of analysing firms' strategies and performance suggests that analytical pitfalls might occur. However, the literature lacks sufficient examples on how to deal with the conceptual and analytical complexity. The main issue this research tries to address is ambiguous: (1) to put forward some knowledge on how to analyse the link between macro-environmental changes, i.e. economic fluctuations, strategies of firms and their performance, and (2) to describe more in detail longitudinal patterns in economic fluctuations, agribusiness firms' strategies and their performance.

1.1.3 Research objective

The objective of this exploratory research is: *“To contribute to strategic management literature, by obtaining knowledge on how to analyse the macro-environment, strategy and performance relationship, by providing an example that analyses the link between economic fluctuations, strategies of agribusiness firms and their performance.”*

1.1.4 Research framework

The phenomenon (object) under study is the macro-environment, strategy and performance relationship. To study the phenomenon, three distinct research steps have been categorized. The first (I) step of the research contains a literature study. The literature study identifies a suitable approach to analyse the macro-environment, strategy and performance relationship. The literature review is used to select in the second (II) step of the research an methodology that will be used to test the link between macro-environmental changes, i.e. economic fluctuations, strategies of agribusiness firms and their performance. An existing dataset will be used and complemented during the second step. Finally, step three contains the overall conclusions on how to analyse the effects of economic fluctuations on agribusiness firms' strategies and their performance (III). An overview of the consecutive steps of the research is represented in the research framework described in figure 1.1 from left to right.

1.1.5 Research questions

A general research question (GRQ) and sub-questions (SQ) were formulated in order to achieve the research objective. The two sub-questions provide information, that when put together, addresses the general research question. More specifically, sub-question 1 covers the literature study, and forms the theoretical foundation for the empirical analysis, which is the topic that has been addressed for in sub-question 2.

GRQ: *What approach suits, and what can we learn from analysing the effects of economic fluctuations on agribusiness firms' strategies and their performance, when complementing and using an existing dataset?*

SQ1: *What approach can be identified to analyse the macro environment, strategy and performance relationship?*

SQ2: *What approach suits and what can we learn from analysing economic fluctuations, strategies of agribusiness firms and their performance?*

1.2 Technical research design

The technical research design focuses on clarifying how and what has to be done to achieve the research objective. Paragraph 1.2.1 describes the research strategy. Paragraph 1.2.2 describes the research material required for this research.

1.2.1 Research Strategy

To understand how the desk research will be carried out, this paragraph focuses on describing the research strategy for the literature study and empirical research. For the literature study it is essential to gain deep understanding at approaches used to analyse the environment, strategy and performance relationship. This implies (1) obtaining more in depth understanding on the complexity of modelling strategy; and (2) obtaining insight on advantages and disadvantages of different approaches used to study the macro-environment, strategy and performance relationship.

Deep understanding and knowledge on the topic will be obtained through the analysis of (recent) scientific literature (articles and books) and secondary data (empirical data). It is essential to minimize uncertainties on the literature in order to provide a solid theoretical basis, which is used to select an approach that test the economic fluctuations, agribusiness firms' strategy and performance relationship empirically.

Since there has been scarce attention in literature for (agri) business firms' strategies, especially regarding the influence of macro-environmental changes on strategies and little empirical research is found on agribusiness firms' strategies, an exploratory approach is used for this research in order to provide some insight on how to analyse the effects of economic fluctuations on agribusiness firms' strategies and their performance.

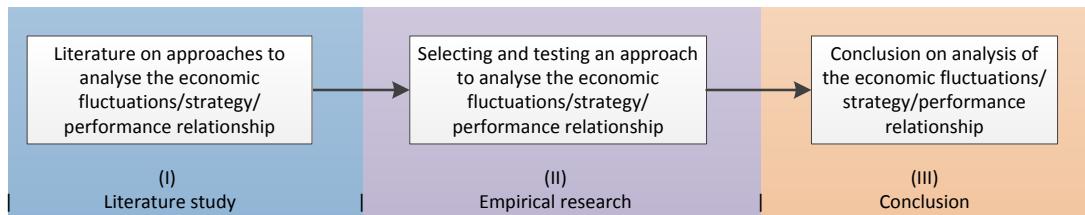


Figure 1.1 Research framework.

1.2.2 Research Material

This paragraph provides understanding on what kind of material is needed and how and where to gather the data to provide insight on how the questions are answered. One can read the information in consecutive steps of the sub-research questions. Note that given the limited time available for this research, this research is mainly based on existing literature and material gathered by others. Besides this research sources from and builds on another report conducted by this author in 2014-15, i.e. Groeneveld (2015).

1. What approach can be identified to analyse the macro-environment, strategy and performance relationship?

For identifying an approach to analyse firms' strategies, performance and their business environment, classic research by Venkatraman & Camillus (1984) and Venkatraman (1989) were mainly used. These studies, still of importance in strategic management literature, provide a conceptual scheme to distinguish between alternative perspectives to study and analyse firm strategy. These studies have been complemented with more recent scientific articles and secondary data on modelling the macro-environment, strategy and performance relationship.

Field of research: journal of information systems, global business management, strategic marketing, project management, strategic management.

2. What approach suits and what can we learn from analysing economic fluctuations, strategies of agribusiness firms and their performance?

For the selection of variables we used earlier literature research by Iwata and Okada (2011) to select suitable performance variables. The study provides an overview of current variables used in literature focused at the analyses of firms' performance, and was useful as a starting point for selecting variables. The selection of macro-environmental and strategy variables is complemented with in particular recent scientific articles. For methodological issues, studies of Barnett & Salamon (2012) and Dezsö & Ross (2012) were mainly used. Available empirical data, earlier collected by the author (Groeneveld, 2015), is further complemented and used to test how economic fluctuations and agribusiness firms' strategies are linked with the performance of agribusiness firms.

1.3 Report structure

The report includes the following content outline, consisting of five chapters. Section 1 introduces the

research project and covers the research design. Section 2 identifies approaches that analyse the effects of macro-environmental changes on firms' strategies and their performance. Section 3 presents the data and research methodology. Section 4 tests different approaches to analyse the effects of economic fluctuations on agribusiness firms' strategies and their performance. Lastly, section 5 draws conclusions and discusses the implications.

2 Literature review

This section covers the literature study and includes one sub-research question. This section selects an approach that can be used to study the macro-environment, firms' strategy and performance relationship.

2.1 Conceptualizing strategy

Most of the strategic decisions are not clear-cut. It addresses the relationship between the firm and its environment. Identifying what approaches can be used to analyse this relationship is a first step to understand what approach suits to analyse the effects of economic fluctuations on agribusiness firms' strategies and their performance. This section covers the research question: "*What approach can be identified to analyse the macro environment, strategy and performance relationship?*" Paragraph 2.1.1 describes different perspectives to study the relationship of strategy. Paragraph 2.1.2 identifies a testing scheme that can be used to explore the macro-environment, strategy and performance relationship.

2.1.1 Studying firms' strategy

It is common for theorists to postulate the relationship between firms and their business environment (hereafter: environment) while using phrases and words such as *matched with*, *consistent with*, and *fit* (Venkatraman, 1989). Precise guidelines and research methods for theorizing these verbal statements and relationships are still little provided (Polites et al., 2012). In much industrial organization research, as well as in strategic management research, theorists generally choose an available or convenient mathematical form, perform their statistical tests, but lack an examination of validity regarding their choice (Venkatraman, 1989; Polites et al., 2012; Boyd et al., 2012). While information on multidimensional constructs and empirical methods in strategic management research has become more accessible, there remain substantial challenges to theorizing about their form and implications (Polites et al., 2012; Boyd et al., 2012).

Analysing strategy postulates generally a probabilistic relationship between strategy, performance and the environment (Shroder and Mavondo, 1994), were performance is modelled as endogenous and strategies and environmental variables as exogenous. In an early work on the concept of 'fit' in strategic management, Venkatraman & Camillus (1984) provided a conceptual scheme, extensively supported with literature, to distinguish between alternative perspectives to study and analyse firm strategy. The scheme is nowadays still widely used in strategic management literature, e.g. Giannakis & Harker (2014); Blackwell & Eppler (2014); Unger et al. (2012). The scheme highlights six perspectives: (1) firm performance is dependent on the characteristics of the environment¹. Hence, it focuses primarily on the fit between strategy and external elements; (2) firm performance is dependent on the alignment of strategy and internal elements. Hence, little focus to the influences external to the organization; (3) firm performance is dependent on strategies that involve both formulation and implementation of organizational and environmental aspects; (4) strategy analysis at the 'collective' level. Firms formulate strategy based not only on the linkage between the organization and its environment, but also in anticipation of competitive responses; (5) performance is dependent on the pattern of coordination among internal elements such as structure, size and technology. Hence, it reflects a conscious managerial choice; and finally, (6) strategy is viewed as an overarching pattern of aligning internal and external elements. Hence, it is an interaction effect of the environment and organizational structure, emphasizing interdependence but not causation.

The scheme is proposed to highlight differences among six schools of thought. It is intended to aid researchers in recognizing the strengths and weaknesses of the various approaches to investigating 'fit' in strategic management. Although the scheme can be used to recognize different perspectives to analyse 'fit', the scheme lacks an explanation of weak points regarding the different perspectives as well as examples on how to model the perspectives. While considering the limitations of the study, we do recognize three perspectives that can be used to analyse the macro-environment, strategy and performance relationship. Perspective (1) aligning strategy with the environmental conditions; (3) strategic management involves formulation and implementation and covering both organizational and environmental decisions; and (6)

strategy is an interaction of organization and environment, without causation, might be suitable.

Although the perspectives have similarities, we recognize also differences. Perspective one considers for formulating strategy particularly the environmental conditions, whereas perspective three and six consider besides the environmental conditions the organizational conditions as well. A difference between perspectives three and six can be found in the description of perspective six, which emphasizes that the environment and organizational structure are interdependent, but there is no causation. Perspective three on the other hand considers that the organizational conditions, and performance is dependent on the environmental conditions. Models that have been used to mathematically display the different schools of thought need to provide more insight in differences among the perspectives.

2.1.2 Investigating fit in strategic management

Testing schemes for the 6 perspectives on strategy are provided by Venkatraman (1989), an old source, but still of importance in strategic management literature. For selecting a testing scheme, two fundamental decisions need to be made: (1) what is the degree of specificity of the theoretical relationship(s); and (2) is the relationship tested while using a particular criterion (e.g. effectiveness) or is there a criterion-free specification, which is more widely applicable. A precise mathematical form of the relationships between the underlying variables cannot be specified for in this study. The degree of specificity is therefore low. We must use multiple criteria to test a series of relationships in order to recognize patterns in firms' strategic behaviour while considering firms' performance and their environment. Classifying 'fit' as 'gestalt' seems according to the classificatory framework of Venkatraman (1989) appropriate for further exploring a testing approach that suits this study. Gestalt can be described as the essence or shape of an entity's complete form (Powell, 2011). To recognize the essence of an entity's complete form, and to distinct differences among entities is it preferable, especially in this exploratory study, to use multiple criteria to test a series of relationships. The 'gestalt' thought of Venkatraman (1989) corresponds with the earlier emphasized perspective six of the conceptual scheme of Venkatraman (1984): strategy is an interaction of organization and environment, emphasizing interdependence but not causation.

There are two major analytical issues regarding fit as gestalts, the descriptive validity of the gestalts

¹ While using the term "environment", we presume Venkatraman & Camillus (1984) embrace it as both the micro- and macro-environment.

and the predictive validity of gestalts (Boyd et al., 2012). First, the descriptive validity address statistical concerns (Boyd et al., 2012). This can be handled by (1) testing the number of gestalts by using formal statistical methodologies, (2) demonstrating cluster stability by validating the results and by (3) describing the gestalts based on the theory that guided the selection of input variables for analysis (Venkatraman, 1989).

Second, the predictive validity of gestalts can be viewed as the fit in terms of the degree of internal coherency among a set of theoretical dimensions. The goal here is to look for frequently recurring patterns of entity's form. The most common methodologies for identifying recurring patterns are cluster analysis and q-factor analysis (Boyd et al., 2012). Identifying sub-samples can help an exploratory research to develop distinct profiles of fit across multiple performance categories, and to assess the possibility of discovering patterns. Venkatraman (1989) argues that the nature of internal congruence among a set of strategic variables can differ across 'high' and 'low' performance firms. As example, one may think of different strategic groups, recognizable by previous appointed characteristics.

The statistical methodology of different studies that address gestalt in order to recognize the essence of an entity's complete form has not changed drastically over the past three decades. Given the scarcity of gestalt studies, Boyd et al. (2012) conducted a content analysis on the configuration of gestalt studies in strategic management journals and emphasized key characteristics of the methodologies. Much of the basis for different studies has historically been inductive, relying on exploratory analysis of variables. In contrast, over time, the basis for different studies have been based increasingly on deductive logic, that is either through connection to a specific theory or review of research connected to a particular industry being studied (Boyd et al., 2012). The studies largely relied on a single clustering algorithm, but the proportion of articles applying method triangulation increased over time (Boyd et al., 2012). This implies that there has been an increasing interest to demonstrate cluster stability. From another point of view, the studies have rarely used techniques to demonstrate cluster stability by validating the models, e.g. split-half reliabilities (based on sample subsets) or holdout samples, used to control the ability of the model to predict the data of the holdout sample and therefore the models ability to predict future scores, which is according to Venkatraman (1989) considered as essential to gestalt development. However, the majority of studies report criterion validity tests, with their results

largely consistent with prediction guided by the theory (Boyd et al., 2012).

Exploring and analysing the environment, strategy and performance relationship, guided by the gestalt theory seems appropriate. It attempts to assess the influence of a large number of variables that collectively define a meaningful and coherent slice of entities form (Wren, 2013). The perspective is less precise in specifying the functional form of fit. This may be appropriate as the research stream is relatively underdeveloped, and we aim to explore new knowledge. If the research stream matures, using a more precise, confirmatory perspective would be more appropriate (Venkatraman, 1989). Note that we recognize the importance of dealing with the analytical and methodological issues. It is the topic that will be handled in Chapter three.

3 Research methodology

So far, this study has identified an approach that can be used to analyse the macro-environment, strategy and performance relationship. The relationship will be evaluated by classifying the relationship as 'gestalt', i.e. describing the essence or shape of an entity's complete form (Powell, 2011). Understanding what variables can be used to analyse the interaction between the organization and the environment is a second step in understanding what approach suits to analyse the effects of economic fluctuations on agribusiness firms' strategies and their performance. This section start answering the research question: "*What approach suits and what can we learn from analysing economic fluctuations, strategies of agribusiness firms and their performance?*" Paragraph 3.1 describes the sample and data that will be used. Paragraph 3.2 specifies the variables that will be used for analysing the effect of economic fluctuations on agribusiness firms' strategies and their performance. Finally, paragraph 3.3 describes the statistical methods that will be used.

3.1 Sample and Data

The quantitative data used for this study were extracted from annual (financial) reports. The obtained annual reports, collected in 2014/2015, provide comprehensive information, for the period 1988-2012, on listed agribusiness firms. The sampling was based on firms' annual sales. We identified firms that (1) are recognized by their sales as the giants (leaders), in the processed food, beverages, meat and dairy industry globally, and (2) firms' head offices are typically located in

advanced economies of western economies². Besides, the sample is composed based on availability of the annual reports via firms' websites and databases ABI/inform and Thomson Research. We test the macro-environment, strategy and performance relationship on an unbalanced panel of 26 companies (appendix two provides company details) across four industries (46.0% in processed food industry, 19.25% in beverage industry, 19.25% in meat industry and 15.5% in the dairy industry) with head offices located in advanced, western economies (54% in America and 46% in Europe). Our sample shows in the period 1988-2012 median annual sales revenues of \$22.2bln in processed food, \$12.6bln in beverages, \$9.5bln in meat, and \$5.7bln in dairy. The industries have in the period 1988-2012 a median of over 105,000 employees in processed food, over 44,000 in beverage, below 49,000 employees in meat and over 12,000 employees in dairy. As we recognize differences among industries median annual sales and employees we correct for this by adding an *Industry* dummy variable. Before analysing the data we specify the variables of analysis.

3.2 Variables for the empirical model

The set of data used for this study allows us to define various variables for our analysis. Each variable provides information on specific aspects. In order to select the most suitable and reliable variables for testing the macro-environment, strategy and performance relationship, we first look at other studies and their selected variables. Thereby, we focus especially on studies in the field of management. We analyse different (dependent) performance variables (section 3.2.1). Consequently, we analyse how to measure economic fluctuations (section 3.2.2) and firms' strategies (section 3.2.3). Finally, we define control variables (section 3.2.4).

3.2.1 Analysing firms performance

One of our empirical aims is to test differences in performance among and within industries. Therefore, this study focuses at a performance variable that can be used as an appropriate index of firms' profitability, so that the impact of strategies, economic fluctuations and other factors on (corporate) financial performance can be tested. Although this study focuses on agribusiness, we consider that there might be inter-industry differences in performance even between the different industries within the agribusiness sector. Despite this consideration, an early work of Rumelt (1991) already reveals that while great efforts have

gone towards explaining inter-industry differences in performance, it can be shown that the dispersion in the performance within industries is five to eight times as large as the variance in performance across industries.

To assess the differences in performance among and within industries we search for a robust variable that assess profitability, i.e. the effectiveness with which funds have been deployed. We therefore search for variables that compare financial inputs (capital invested) with financial outputs (operating profit). Even though the operating profit margin can be low, the performance can be considered high, provided that the capital employed is used productively. The reverse can also occur, that is, high operating margin, but low sales revenue to capital employed. An elaboration on several performance variables introduces the selection of the performance measures used in this thesis.

Existing management studies on the relationship between (dependent) firms' financial performance variables and the selected (independent) variables may provide advantages and disadvantages of different performance variables that are commonly used. Iwata and Okada (2011) provide examples of different financial performance variables used in existing literature, reported in table 3.1. These studies do not provide univocal results while selecting different dependent variables, implying that different firms (dependent) financial performance indicators show various impacts regarding the selected (independent) variables. As a consequence, the influence of firms' behaviours on financial performance changes according to the variable used to proxy the performance itself. As for the financial performance, this paper therefore pays

Performance variables	Variable used by
Tobin's q	Konar and Cohen, 2001; King and Lenox, 2002; Elsayed and Paton, 2005
Tobin's q-1	Konar and Cohen, 2001; Nakao et al., 2007
Return on Sales	Hart and Ahuja, 1996; Wagner et al., 2002; Elsayed and Paton, 2005
Return on Assets	Hart and Ahuja, 1996; King and Lenox, 2002; Elsayed and Paton, 2005; Nakao et al., 2007
Return on Capital Employed	Wagner et al., 2002
Return on Equity	Hart and Ahuja, 1996; Wagner et al., 2002

Table 3.1 Examples of different performance variables, source: Iwata and Okada (2011).

² The selection criteria have been used for the purpose of data availability.

attention to different variables that can be used to express and test the macro-environment, strategy and performance relationship.

Tobin's q is defined as the ratio of the market value of firms' assets to their replacement. The idea is that better firms create more economic value from a given quantity of assets (Dezsö and Ross, 2012). Tobin's q captures the market value of total assets divided by the book value of total assets. One can calculate the market value of assets as the book value of total assets minus the book value of common equity plus the number of common shares outstanding times the stock price, minus deferred taxes (Bebchuk and Cohen, 2005). This measure, and simpler measures of Tobin's q that drop deferred taxes (e.g. Levi et al., 2014), have been regularly used in light of the complexities involved in the more sophisticated measures of Tobin's q and the evidence of a very high correlation between this proxy and those more sophisticated measures (Bebchuk and Cohen, 2005). Tobin's q is a forward looking measure that captures the value of a firm as a whole rather than as the sum of its parts and implicitly includes the expected value of a firm's future cash flows, which are capitalized in the market value of a firm's assets (Dezsö and Ross, 2012). There are some elements that may affect Tobin's q value, namely: market hypes and speculations (reflecting e.g. bid rumours). Besides the contribution of goodwill, knowledge, technology and other intangible assets that a company may have are generally included in the measure, where it is assumed to be important as measure for economic value.

Return on sales (ROS) represents another performance measure that solely focuses at firms' output (i.e. proportional difference between the output price per unit and the marginal cost of producing the unit). Although the measure is not a common index of firms' profitability in management literature, the variable is sometimes used (e.g. Spanos et al., 2004; Wu et al., 2007; Merschmann and Thonemann, 2011). The index of ROS is nowadays, also in agribusiness literature, especially used as an exogenous indicator of influence on firms' endogenous performance variables (e.g. Bozic et al., 2012; Chung & Li, 2013; Datta et al., 2013). One can understand this approach as ROS indicates the ability of firms to create buyer value so that firms can raise prices above industry average, i.e. product market pricing power (Datta et al., 2013), which can be associated with differentiation strategy (Porter, 1991). Because ROS solely considers firms output it does not seem to be an appropriate index of firms' profitability. Therefore, we exclude the use of ROS as a performance variable for this study.

Return on Assets (ROA) is a performance measure that has similarities with ROS, but is essentially different as it also focuses on firms' financial input. The measure focuses at firms' output (net income) divided by firms' input (total assets), whereas net income is defined as firms' earnings, after deducting interest payments, depreciations, amortization and taxes in a given year. It is a widely adopted measure of firms' performance in the field of management (e.g. Barnet and Salomon, 2012; Wagner et al., 2012; Simon-Elorz et al., 2014). A disadvantage of using ROA as a performance measure is that it does not detail how the assets were financed, i.e. it includes all the firms' assets, including short-term liabilities (debts or obligations that are due within one year). For example, firms' receivables are an asset; they are balanced by its payables, a short-term liability. For this reason, ROA is of less interest to shareholders, since they are more interested in return on their own financial input, equity. Profitability depends on a combination of debt and equity financing. We therefore argue for the need to measure more in detail the real capital invested, i.e. share capital plus reserves plus non-current liabilities without focussing on current liabilities. We shall therefore look at ROCE.

Return on Capital Employed (ROCE) is another performance measure, focussed at the relationship between output (profitability) and input (capital employed). ROCE captures in the numerator the earnings of a company pre-interest expense, depreciations, amortization and tax (EBITDA), and in the dominator the capital employed, calculated as shareholder funds plus reserves plus long-term debt (Andersson et al., 2006). The outcome is determined both by the profitability of sales, and by the efficiency in the use of capital (Wagner et al., 2002). The comparison of profitability of sales and the efficiency of capital used is essential in assessing the effectiveness with which funds have been deployed.

Return on equity (ROE) is our last variable to be discussed. The variable is a performance measure that is particularly of interest for shareholders. It is widely used by investors in appraising common stock purchases and by corporate planners in evaluating corporate performance (Acheampong and Epperson, 2002). It calculates the amount of net income returned as a percentage of shareholders equity. One could argue that the variable is influenced by firms' profile. As an example, firms' environmental behaviour is known to have an effect on firms' reputation and market value (Hart and Ahuja, 1996), which is assumed to influence firms' ROE value. ROE has some similarities compared with ROCE but it lacks examination of firms' noncurrent liabilities and reserves. We argue that firms' liabilities influence

firms' performance as well. Combining our insights, ROE measures solely how much profit a company generates with shareholders money, it thereby lacks a full examination of firms' input (capital employed). We therefore assume that ROCE, that measures the long-term debt as well, is in comparison to ROE a more appropriate measure of firms' performance for this study.

After analysing different performance variables we select for testing the macro-environment, strategy and performance relationship two dependent (performance) variables. Selecting two dependent variables is useful to (1) explore differences, to (2) assess robustness and to (3) improve descriptive validity (Boyd et al., 2012). As described, there are several differences among the financial performance variables. Each of them reflects the behaviour and evaluation of various stakeholders with different interests (Iwata and Okada, 2011). ROS indicates the market evaluation by consumers and trading partners, ROA reflect the equity capital contributed by stockholders but also the short and long-term borrowed capital provided by creditors and investors. ROCE includes the stockholders evaluation and performance of the goods market, besides it includes long-term borrowed capital, something that the ROE lacks of. Tobin's q can be interpreted as the intangible assets value of the firms used for investment portfolio assessments (Iwata and Okada, 2011). We exclude Tobin's q as a performance measure as it is not feasible, given the dataset, to obtain the required data. We also exclude for this study ROS as a performance measure, because as mentioned ROS indicates the ability to create buyer value so that firms can elevate prices above industry average, which can be associated with a differentiation strategy. Besides, the variable does not focus at firms' inputs (capital invested), as it solely focus at firms' outputs. Finally, we exclude ROE as a performance measure as it lacks the assessment of liabilities and its influence on firms' performance. Given the objective of this study we select ROCE and ROA as dependent variables for testing the relationship. Thus, agribusiness performance in the period 1988-2012 will be measured as a one-year average of ROCE and ROA. ROCE is specified as:

Return on capital employed

$$= \left(\frac{\text{operating profit}}{\text{share capital} + \text{reserves} + \text{noncurrent liabilities}} \right) \quad (1)$$

whereas ROA is specified as:

Return on assets

$$= \left(\frac{\text{operating profit}}{\text{total assets}} \right) \quad (2)$$

3.2.2 Analysing economic fluctuations

To analyse how economic fluctuations affect the strategies and performance of agribusiness firms' one should first choose how to define the economic fluctuations. We define, similar as Groeneveld (2015), economic fluctuations as the upward and downward movements of levels of real global GDP, i.e. it refers to the period of growth and recession in the level of economic activities around its long-term growth trend (Madhani, 2010). A period of growth can be defined when the global GDP growth is above an average real GDP growth of 3% (IMF, 2008) for at least one year. A period of economic recession can be defined as a period in which the global GDP growth is or has declined below an average real GDP growth of 3% (IMF, 2008) for at least one year. The effect of economic fluctuations is analyzed while using data on the advanced economy GDP, it is obtained from the IMF website (2014) and is presented in appendix one. Consequently economic fluctuations, i.e. periods of economic growth and recession, are identified and recognized in literature (see for further elaboration Groeneveld, 2015). Periods of economic growth (1988-90, 1994-97, 1999-2000, 2003-07, 2010-13) and recession (1991-93, 1998, 2001-02 and 2008-09) are identified.

3.2.3 Defining strategy variables

This research explores the complex issue of the macro-environment, strategy and performance relationship. We follow, in accordance to Groeneveld (2015), Porters' (1980) generic competitive strategy format while analysing firms' strategies. The format defines two dimensions: (1) cost leadership strategy, i.e. becoming the lowest cost producer of a product or service so that above-average profits are earned even though the price charged is not above industry average (Stonehouse and Snowdon, 2007); and (2) differentiation strategy, i.e. creating a customer perception that a product or services is superior to that of other firms, based on brand, quality, and performance, so that a premium price can be charged to customers (Stonehouse and Snowdon, 2007).

Various authors claim, counter to Porter (1989), that firms can follow a third strategic orientation, one that combines cost leadership and differentiation to achieve competitive advantage (Leitner & Güldenberg, 2010). Besides, hybrid strategies are emphasized by e.g. Spanos et al. (2004) and Wu et al (2007) as the more profitable strategy compared to cost leadership and differentiation. Our study allow space for the analysis and recognition of combined strategies by threatening Porters' generic strategies in accordance with Spanos et al. (2004) as dimensions rather than 'either/or' mutually

exclusive categories. This study shall use the notation of 'hybrid strategies' to describe combined strategies. While following this structure, we now focus at the variables used to analyse these three strategies.

First, a cost leadership strategy involves giving consumers value comparable to that offered by rivals but at a lower cost (Spanos et al., 2004). According to Porter, this strategy entails that the firm is constantly improving its ability to produce at costs lower than the competition by emphasizing efficient-scale facilities, vigorous pursuit of cost reductions along the value chain driven by experience, tight cost and overhead control, and cost minimization (Spanos et al., 2004).

We define, in accordance to Spanos et al. (2004) and Wu et al. (2007), the cost leadership-strategy by using a measure of *labor efficiency*. Labor efficiency is measured as average employee productivity, i.e. value added per employee (Spanos et al., 2004). A higher ratio will normally suggest that the employees are being used more efficiently. It is specified as:

$$\text{Labor efficiency} = \left(\frac{\text{sales revenue}}{\text{number of employees}} \right) \quad (3)$$

This research uses a second measure of cost efficiency, expressed in terms of *capital efficiency*, by looking at the total asset turnover. Capital efficiency represents an additional element in Porter's typology, which together with labor efficiency defines a measure of overall efficiency and hence its emphasis towards lowering costs (Hambrick, 1983 according to Spanos et al., 2004). Capital efficiency, i.e. asset turnover, measures how effectively the capital of the business is being used to generate sales revenues. A higher ratio will normally suggest that the capital is being used more efficiently and productively in the generation of revenue and indicate orientation toward cost efficiency. Note that, due to methodological issues, capital efficiency is in this study only used as a descriptive variable of cost efficiency and does not function like labor efficiency to express the cost leadership strategy. It is specified as:

$$\text{Capital efficiency} = \left(\frac{\text{sales revenue}}{\text{total assets}} \right) \quad (4)$$

Next, we focus at Porters' (1980) second dimension to analyze firms' generic competitive strategy, by looking at differentiation strategies. A differentiation strategy aims at creating a product that consumers perceive as unique, and hence allow the firm to

command a premium price that exceeds the accumulation of extra costs (Spanos et al., 2004). Miller (1986, 1988) argued, according to Spanos et al. (2004), that differentiation strategy could broadly be defined by, e.g. advertising, innovation and technology. While taking this into account, we gauged the differentiation by using ROS (see 3.2.1) and operating expenses (OPE). The measure expresses (1) the relationship between gross profit margin in connection to revenues (i.e. identification whether firms' obtain a price premium) and (2) operating expenses (expenses in, e.g., R&D, marketing and staff quality) in connection to revenues. High values on ROS indicate firms' above average ability to create a customer perception that a product or service is superior to that of others, so that a price premium and higher gross profit margin can be achieved. Differentiation allows higher prices, but usually comes at a cost (Porter, 1991): to create a point of valuable differentiation typically involves additional investments. The costs will be higher than those of the average competitor. Therefore OPE, that covers expenditures in e.g. human resources management, firms' infrastructure, R&D and marketing expenses, were used next to ROS to proxy differentiation. But only differentiation that results in a price premium exceeding the extra costs of delivering it results in superior performance (Porter, 1991). Accordingly is our measure of differentiation defined. Differentiation is specified as:

Differentiation

$$= \left(\frac{\text{gross profit}}{\text{sales revenue}} \right) * \left(\frac{\text{operating expenses}}{\text{sales revenue}} \right) \quad (5)$$

Earlier research, i.e. Spanos et al. (2004) and Wu et al. (2007), use R&D and advertising expenditures to proxy differentiation strategy. R&D and particularly advertising expenditure figures were not available for the whole set of firm-years considered. We therefore solely use *R&D spending*, from an explorative view, as a descriptive variable of differentiation. The variable does not function like ROS & OPE to express the differentiation strategy. R&D spending is specified as:

R&D spending

$$= \left(\frac{\text{R&D expenses}}{\text{sales revenue}} \right) \quad (6)$$

After defining the measures of firms strategy dimensions cost leadership and differentiation we are able to identify firms *strategic orientation* as reported in figure 3.1 on the next page. Firms strategic orientation can be defined as the ratio of a measure consistent with one strategy relative to the ratio of another measure, consistent with another strategy (Thornhill & White, 2007). The relative ratio

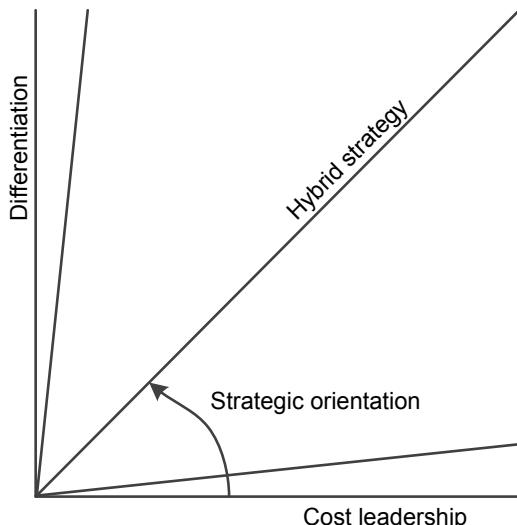


Figure 3.1 Generic strategy and execution form, source: Thornhill & White, 2007.

of the strategic measures is our measure of the strategic orientation. To normalize firms' score on cost leadership, i.e. labor efficiency, and differentiation we identify categories. The size of the categories is determined on the basis of overall firms maximum value on cost leadership minus the minimum value divided by 24 categories. Consequently 24 cost leadership categories arose in which firms' individual score (1=low 24=high) relative to other firms could be expressed. The executional dimension of differentiation is calculated in a similar manner by the coefficient of variation of firms' annual differentiation. By using firms normalized score on differentiation and cost leadership we can calculate the composite or bi-dimensional strategic orientation of each agribusiness firm. Firms' strategic orientation can range from 0-90 degrees and is specified as:

$$\text{Strategic orientation} = \arctan \left(\frac{\text{differentiation}}{\text{cost leadership}} \right) \quad (5)$$

Firms' strategic orientation value determines firms' strategy. As a rule of thumb we state that in the range 0-30 firms occupy a cost leadership strategy, in the range 30-60 firms occupy a hybrid strategy, whereas they occupy in the range 60-90 a differentiation strategy.

Firms' investment behaviour is another interesting aspect we consider. Understanding agribusiness investments, whether it is by internal growth or through acquisitions, can help understanding how the firms follow investment strategies in periods of economic growth and recession and whether and how it influence firms performance. In this exploratory study we measure and test only the

within one year influence of investments³. We might be able to conclude how the expenditures influence firms' performance and how the expenditures relate to economic fluctuations. In order to test the influence we shall test two explicitly different measures of firms' investment behavior. At first we consider *capital spending*. Capital spending is used to improve operational effectiveness and requires the purchase or upgrade of physical assets (Porter, 2008). Capital spending is measured relative to firms their sales. It is specified as:

$$\text{Capital spending} = \left(\frac{\text{capital expenditure}}{\text{sales revenue}} \right) \quad (7)$$

Our second measure of investment behavior is acquisition spending. *Acquisitions spending* is established by the net acquisitions spending of the firm relative to their sales and is specified as:

$$\text{Acquisition spending} = \left(\frac{\text{acquisition expenditure}}{\text{sales revenue}} \right) \quad (8)$$

3.2.4 Defining control variables

Our interest is in whether the economic fluctuations affect agribusiness firms' strategies and their performance. We therefore used a limited set of controls designed only to insure comparability across observations.

First, we include *Leverage* as a control variable. Leverage might influence firms' performance as well as firms' strategies. Leverage can be interpreted as using debt to increase firms expected return on equity. Debt impacts the behaviour of managers. On the one hand debt imposes discipline upon managers and incentivizes them to make decisions that are in the best interest of the firm, while on the other hand, high values of debt might decrease managerial latitude. It can limit the opportunities to explore new business, so that it can impact negatively firms' financial performance (Barnett and Salomon, 2012). Leverage can be measured through several measures, e.g. firms total debt divided by total assets (e.g. Clarkson et al., 2011; Dezsö and Ross, 2012; Simon-Elorz et al., 2014); Book value of debt divided by the total stockholders equity (Black and Kim, 2012); Average of sum of liabilities plus net assets divided by total stockholders equity (Iwata and Okada, 2011); Firms long term debt divided by total assets (Barnet and Salomon, 2012); We take the first definition for

³ In contrast, one could also focus at the lagged influence of firms' investments and how that relates to firms' performance.

leverage as the firms total debt divided by total assets as it is assumed to provide robust and stable values (Simon-Elorz et al., 2014).

Second, we include *Firm size* as control variable. Firm size is a commonly used contextual variable (Spanos et al., 2004). Firm size is used in literature (e.g. Simon-Elorz et al., 2014) as a proxy for earnings volatility. It is assumed that larger firms are generally more diversified and show less volatility. We want to explore the influence of firm size on firms' performance, and include it as a control. Firm size can be reflected through several measures, e.g. natural logarithm of sales revenue (Iwata and Okada, 2011); natural logarithm of the number of employees (Spanos et al., 2004); market value (Biddle et al., 1997); total book assets from the prior year (Dezsö and Ross, 2012). Firm size is found to have positive as well as negative influence on the dependent variables in different studies (Simon-Elorz et al., 2014). Given that the dataset is based on financial statements we choose firms sales revenues as a measure of firm size. We take, in accordance to Iwata and Okada (2011), the natural logarithm of the annual sales. The natural logarithm has been applied to reduce wide-ranging quantities of firms sales revenues to smaller scopes, resulting in improved homogeneity of variance (Field, 2009).

Third, firms' age is another interesting and frequently used contextual variable. Firms their way to deal with the economic fluctuations might be influenced by firms' age. Age is an indirect measurement of the experience of the firms. A positive relationship is expected from the experience provided by age as an indicator for competitive strength (Simon-Elorz et al., 2014). Firms' age can be measured by several measures, e.g. in years, with firms birth determined by the earlier of the firms first year in CompuStat or CRSP (Dezsö and Ross, 2012); number of years from the date of constitution until the year of the analysis (Simon-Elorz et al., 2014); number of years since original listing on Korea Stock Exchange (Black and Kim, 2012). While considering the availability of firms' information, we shall establish *Firm age* in accordance to Simon-Elorz et al. (2014) as the number of years from the date of constitution until the latest year in which firms are analysed, i.e. 2012. Firms occupy a dummy value 2 if the firm is older than 100 year, value 1 if the firm is 50-100 year, and value 0 if the firm is not older than 50 years.

Further, if firms merge during the period under analysis, i.e. two companies combine their sales; a dummy variable is included to measure the influence of the *Merger*. Besides, we use for our different equations two extra dummy variables to

repeat equations by groups in order to identify and report differences. (1) *Industry*, to define group results by industries. Industry is coded 0 if a sample is part of the processed food industry, 1 for the beverage industry, 2 for the meat industry and 3 for the dairy industry; (2) *Country*, to define group results by firms head office location. Country is coded 0 if the head office location of the sample is in Europe and 1 when in America.

The outcomes will be used, as suggested by Venkatraman (1989) to test the predictive validity by identifying sub-samples of *Performance low/high* units to identify profiles within each sub-sample. Further, the model shall be used unravelled to show results for periods of *Economic recession/growth*, so that one is able to compare what strategy is preferable relative to firms' performance for periods of economic recession and growth.

As noted, we test our propositions regarding the effects of economic fluctuations on agribusiness firms' strategies and their performance over time. Many unobservable factors, i.e. social and macroeconomic factors may affect firms' performance as well (Dezsö and Ross, 2012). As an example, changes in government policy can influence firms' performance (Barnett and Salamon, 2012). We are unable to identify and measure all of these previous appointed effects; therefore, there exists potential for a systematic time component to be embedded in the vector of unobservable characteristics (ε). This systematic component will lead to correlations of errors-terms across observations over time, which violates the regression assumptions (Barnett and Salamon, 2012). Conceptually, in accordance to e.g. Barnett and Salamon (2012) and Dezsö and Ross (2012), we can decompose ε into a vector of systematic (fixed) time effects, which we label *year effects* (t), where year effects represent calendar-year effects. Next, the possibility still exists that ε_t will not be independent within firms. This would occur, for instance, if some firms perform systematically differently from others due to long-term, non-transient factors, such as product perishability (i.e. not simply related to persistence in performance from one year to the next) (Barnett and Salamon, 2012). The longitudinal nature of our data allow us to control for these unobservable factors by including (fixed) firm fixed effects which we label *firm effects* (i) in all our regressions (Dezsö and Ross, 2012). By including a separate dummy variable for each firm, and year (e_{it}) our statistical test implicitly compare each firm with itself. Table 3.2 and 3.3 present the selected variables that will be used for the analyses and the descriptive statistics.

While considering the economic fluctuations, causes and effects of economic fluctuations are

Variables	Description	Source
<i>Dependent variables</i>		
ROCE	Return on capital employed, measured as operating profit devided by the share capital+reserves+noncurrent liabilities	Andersson et al. (2006)
ROA	Return on assets, measured as operating profit devided by the total assets	Simon-Elorz et al. (2014)
<i>Causality control</i>		
Lag ROCE	Measured by the prior year ROCE (t-1)	Spanos et al. (2006)
Lag ROA	Measured by the prior year ROA (t-1)	Spanos et al. (2006)
<i>Economical variables</i>		
Economic fluctuation	Measured with annual data on the advanced economy GDP	IMF (2014)
Economic recession/growth	Growth period value 1, if 1988, 89', 90', 94', 95', 96', 97', 99', 2000, 03', 04', 05', 06', 07', 10', 11', 12'; recession period value 0 if 1991, 92' 93', 98', 2001, 02', 08, 09'	IMF (2008)
<i>Firm strategy variables</i>		
Labor efficiency	Measured as sales devided by the number of employees	Wu et al. (2007)
Capital efficiency	Measured as sales devided by the total assets	Spanos et al. (2006)
Differentiation	Measured as gross profit devided by the sales * operating expenses devided by the sales	
R&D spending	Research and development (R&D) expense devided by firms annual sales. Firms with missing data for R&D expense are assumed to have 0 values	Barnet and Salamon (2012)
Strategic orientation	Measured as arctan (differentiation/labor efficiency)	Thornhill and White (2007)
Capital spending	Net capital spending devided by firms' annual sales	
Acquisition spending	Net acquisition spending devided by firms' annual sales	
<i>Firm controls</i>		
Leverage	Measured as the sum of debt in current liabilities plus long-term liabilities devided by the book value of total total assets	Levi et al. (2014)
Firm size	Calculated as firms' annual sales (logarithmized)	Iwata and Okada (2011)
Firm age	Calculated as the number of years since firm foundation. Value 2 if firm >100 year, value 1 if firm 50-100 year, value 0 if firm <50 year	Simon-Elorz et al. (2014)
Merger	A dummy variable (value 1) is included if the firm combines its sales with another firm; value 0 otherwise	
Industry	The statistical test compares each industry by including industry fixed effects	Levi et al. (2014)
Country	The statistical test compares countries to define group results by firms' head office location. Value 1 if head office is located in America, value 0 for Europe	
Performance low/high	Calculated by selecting annually within the dataset the 50% Low and 50% High performing firms. Value 1 for High performance firms, value 0 for Low	
<i>Fixed controls</i>		
Year effects	We use the longitudinal nature of our data to control for unobservable social and economic trends by including year fixed effects	Barnett and Salamon (2012)
Firm effects	The statistical test compares each firm with itself	Barnett and Salamon (2012)

Table 3.2 The selected variables for analyses.

closely related. This study does not explicitly focus on the causes of economic fluctuations, but literature shows that agribusiness firms' performance is impacted by economic fluctuations (for examples see Groeneveld, 2015). On the other hand, theoretical arguments, e.g. Crucini et al., 2011), suggest that economic growth may endogenously depend on firm performance and, thus, that the positive association between firm performance and economic growth may be driven by reverse causality. If this is true, then once we control in accordance to Dezsö and Ross (2012) for prior firm performance (t-1), the positive association between economic growth (t) and firm performance (t) should disappear. Accordingly, as a robustness check we add *Lag performance* (t-1) to the regressions.

In conclusion, to form 'organizational reality' or a 'holistic pattern' about the effects of economic fluctuations on agribusiness firms' strategies and their performance, we have selected (Venkatramans (1989) gestalt perspective (see 2.1.2). The perspective is explorative, and attempts to

assess the influence of a large number of variables in order to define a coherent slice of reality. Accordingly we have selected, justified by means of various literature, a number of variables for analyses. The next section will elaborate on the selected variables by specifying and justifying the empirical equations and methods.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROCE	610	0.169	0.101	-0.423	0.585
Lag ROCE	580	0.170	0.102	-0.423	0.585
ROA	617	0.071	0.049	-0.273	0.355
Lag ROA	587	0.070	0.050	-0.273	0.355
Performance low/high	611	0.544	0.498	0	1
Economic fluctuation	621	2.263	1.554	-3.4	4.1
Economic recession/growth	621	0.669	0.470	0	1
Labor efficiency	573	0.282	0.142	0.057	0.810
Capital efficiency	618	1.310	0.643	0.207	5.338
Differentiation	604	0.111	0.077	-0.000	0.359
R&D expense	621	0.005	0.006	0.000	0.027
Strategic orientation	571	43.373	22.110	6.340	86.423
Capital spending	604	0.046	0.023	0.008	.192
Acquisition spending	585	0.028	0.130	-0.524	2.194
Leverage	614	0.554	0.141	0.009	1.063
Firm size	621	4.059	0.398	2.965	5.041
Firm age	621	1.376	0.696	0	2
Merger	621	0.039	0.195	0	1
Industry	621	0.855	1.054	0	3
Country	621	0.600	0.490	0	1

Table 3.3 Descriptive statistics.

3.3 Statistical methods

In selecting an appropriate multivariate statistical method that can be used to explore the effects of economic fluctuations on agribusiness firms' strategies and their performance, we use two different regression models. Equation 9 specifies the firms' performance as a linear function of the vector X of independent variables for agribusiness firm $i = 1, 2, \dots, 26$ at time-series $t = 1, 2, \dots, 25$, plus an error term, ε_{it} .

$$PEit = \beta_0 + \beta_1 X_{it} + \varepsilon_{it} \quad (9)$$

Given the panel structure of our data with series of observations per firm, the possibility arises that errors (ε_{it}) are correlated per firm across time. Serial correlation applies to macro panels with long time series (over 20-30 years). Such serial correlation of residuals across observations per firm may lead to spurious⁴ regression results (Barnett and Salamon, 2012). A Lagram-Multiplier test for serial correlation⁵ is applied to test for serial correlation (Liana and Noja, 2012). No first order autocorrelation, $F(1,25) = 1.217$, $p > .05$ is found. As the regression results are not degraded with the presence of serial correlation, we do not necessarily need to turn into dynamic longitudinal modeling, but, for one model, do incorporate, as explained in section 3.2.4, as a test a linear autoregressive dynamics with lags of the dependent variable as regressor to control and account for within-firm persistence in performance (Barnett and Salamon, 2012). Thus, in the model we add a one-year lag of the dependent variable as shown in equation 10.

$$PEit = \beta_0 + \beta_1 X_{it} + \beta_2 PEi(t-1) + \varepsilon_{it} \quad (10)$$

Finally we should decide whether to use fixed or random effect models for the analyses. Although we are interested in analyzing the impact of variables that vary over time, we also have reason to believe that differences across entities especially industry and country have some influence on our dependent variables. An advantage of random effects models is that you can include time invariant variables (i.e. industry, country). In the fixed effects model these variables are absorbed by the intercept (Torres-Reyna, 2007). To decide whether these control variables will be incorporated in a random effect model, or will be dropped from a fixed effect model,

⁴ Spurious regression: when the estimation method produces a statistically significant relation between two variables, irrespective of whether such a relation exists or not.

⁵ Serial autocorrelation tests apply to macro panels with long time series (over 20-30 years). Serial correlation causes the standard errors of the coefficients to be smaller than they actually are and higher R-squared (Torres-Reyna, 2007).

we run a Hausman test⁶. The Hausman test basically tests whether the unique errors (U_{it}) are correlated with the regressors. The model did not pass the Hausman test, $Chi2(10) = 10.27$, $p > .05$, thus the data does not confirm the hypothesis that there is systematic difference between the regressors. We must therefore derive that a random effect model suits better than a fixed effect model for analyzing the data.

In summary, we use random effects models to investigate the effects of economic fluctuations on agribusiness firms' strategies and their performance. An advantage of random effects modelling is that one can include time invariant variables into the model. Although our statistical test implicitly compares each firm with itself, the disadvantage is however that we cannot study the causes of changes within the individual firms, as the variation across firms' is assumed to be random and uncorrelated with the predictor or independent variables included in the model. Because our goal is in this exploratory study to control for and not investigate or test these effects, we accept this trade-off.

After elaborating the sample, data and variables we defined two models to explore the macro-environment/strategy/performance relationship. The models are justified and controlled so that we can focus at the results. It is the subject of Chapter four.

4 Results

Table 4.1, at the next page, presents the inter-correlations and significance of all explanatory variables we use to test the relationships. The inter-correlations were examined by using both pairwise correlations and variance inflation factors (VIF). The correlation coefficient, r , is a common measure of the size of an effect. An r -value of 0.10 can be interpreted as a small correlation, whereas an r -value of 0.50 can be interpreted as a large correlation (Field, 2009). R-values close to 1.00 can be an indicator of multi-collinearity, meaning that one variable can be linearly predicted from the other variable. In multiple regressions, multicollinear predictors may influence the validity of the results as multicollinear predictors can influence the results of the individual predictors in the model.

The inter-correlations for all independent variables in the models are less than $r = 0.50$, indicating the non-existence of multicollinearity. Nevertheless r -values > 0.50 can be noticed in the correlation

⁶ See Groeneveld (2015), section 3.4 for explanation on different techniques and models that can be used to analyse panel data.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. ROCE	1																			
2. Lag ROCE	0.767	1																		
3. ROA		0.771	0.564	1																
4. Lag ROA		0.537	0.773	0.566	1															
5. Performance low/high		0.689	0.575	0.544	0.448	1														
6. Economic fluctuation		0.137	0.080	0.094	0.058	-0.003	1													
7. Economic recession/growth		-0.025	-0.085	0.060	-0.023	0.013	0.631	1												
8. Labor efficiency		0.085	0.078	0.094	0.087	0.106	-0.154	0.061	1											
9. Capital efficiency		-0.036	-0.101	-0.177	-0.222	-0.031	0.130	-0.011	0.026	1										
10. Differentiation		0.451	0.470	0.414	0.418	0.335	0.027	-0.009	0.012	-0.545	1									
11. R&D expense		0.203	0.202	0.171	0.172	0.279	-0.097	0.029	0.190	-0.272	0.353	1								
12. Strategic orientation		0.292	0.316	0.247	0.273	0.198	0.125	-0.038	-0.541	-0.529	0.758	0.201	1							
13. Capital spending		0.126	0.155	0.186	0.240	0.051	0.058	-0.006	-0.226	-0.433	0.357	-0.066	0.467	1						
14. Acquisition spending		-0.063	0.060	-0.116	0.106	-0.095	-0.011	-0.065	-0.064	-0.159	0.099	0.014	0.125	0.169	1					
15. Leverage		0.135	-0.010	-0.320	-0.046	-0.021	-0.068	-0.064	0.178	0.076	-0.032	0.015	0.025	-0.060	0.006	1				
16. Firm size		0.121	0.119	0.158	0.164	0.234	-0.183	0.039	0.122	-0.418	0.455	0.485	0.232	-0.025	0.047	0.005	1			
17. Firm age		0.307	0.322	0.266	0.273	0.331	-0.021	0.013	-0.076	-0.289	0.233	0.116	0.247	0.248	0.038	-0.000	0.029	1		
18. Merger		-0.202	-0.201	-0.190	-0.187	-0.169	-0.131	-0.009	0.311	0.081	-0.171	-0.127	-0.273	-0.126	0.022	-0.017	-0.005	-0.279	1	
19. Industry		-0.346	-0.345	-0.338	-0.335	-0.287	-0.007	-0.000	0.286	0.603	-0.590	-0.445	-0.687	-0.291	0.019	0.015	-0.448	-0.272	0.404	1
20. Country		0.256	0.256	0.145	0.142	0.185	0.015	0.004	0.069	0.202	-0.141	-0.195	-0.185	-0.229	0.022	0.051	-0.035	-0.177	-0.080	0.016

Table 4.1 Correlation matrix. In bold, the correlation is significant at the 5% level.

matrix. As an example, the r-value of the relationship *ROCE* and dummy variable *Performance low/high* is 0.68, indicating moderate multicollinearity between these dependent variables. This observation is correct and fortunately observable as this dummy variable is based on the *ROCE* variable. Besides the descriptive statistics demonstrate a substantial within-firm autocorrelation ($r = 0.76$) between *ROCE* in year t and the prior year's *ROCE* (t-1). This is indicative of a substantial persistence in firm performance over time (Barnett and Salamon, 2012). We can conclude that the inter-correlations for all independent variables are below $r = 0.50$. This indicates that the regression estimates are not degraded or reduced in value by presence of multicollinearity.

In addition, we performed another multicollinearity test by performing a VIF test. The calculated VIF value shows whether a predictor has a strong linear relationship with the independent variables, used for the different models. The VIF scores [1.09; 2.97] are far below the value of 10, which is the value at which multicollinearity becomes an issue (Field, 2009). To conclude, both multicollinearity tests suggest that the regression estimates are not degraded by presence of multicollinearity.

With respect to the second dependent variable (ROA), its correlation with our first dependent variable (ROCE) indicate a substantial relationship, $r = .76$. We exercise caution, however, in drawing inferences from these relationships, as it does not control for many other firm, industry, and time effects that we include in the multivariate analyses. Therefore, to better understand the nature of these relationships, we turn to the multivariate regression analysis.

In table 4.2, at the next page, we present results of regression models using the *ROCE* and *ROA* dependent variable. To obtain results we have used for model I and III equation 9, and for model II and IV equation 10. In model I we regress *ROCE* as dependent variable. Consistent with the correlation table, we find a significant positive relationship between firms performance and *Economic fluctuation*, indicating that the higher the economic growth the higher firms performance ($\beta = .003$, $p <.05$). This accounts for each agribusiness industry under analysis (see appendix 3).

Model I also indicates the highly significant score for firms strategies, explaining that the higher firms score on strategy the higher firms performance, as the coefficients for the three strategy variables: (1) *Labor efficiency*, $\beta = .111$, $p <.01$; (2) *Capital efficiency*, $\beta = .059$, $p <.01$; and (3) *Differentiation*, $\beta = .522$, $p <.01$, are all positive and significant,

	Results with ROCE as dependent variable						Results with ROA as dependent variable					
	Model I			Model II			Model III			Model IV		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
<i>Performance variable</i>												
Lag ROCE				0.210	0.040	0.000 ***				0.093	0.036	0.011 **
Lag ROA												
<i>Economy variable</i>												
Economic fluctuation	0.003	0.001	0.039 **	0.004	0.001	0.007 ***	0.001	0.001	0.195	0.002	0.001	0.025 **
<i>Strategy variables</i>												
Labor efficiency	0.111	0.032	0.001 ***	0.033	0.047	0.485	0.077	0.026	0.003 ***	0.061	0.027	0.022 **
Capital efficiency	0.059	0.007	0.000 ***	0.050	0.009	0.000 ***	0.013	0.005	0.008 ***	0.016	0.006	0.012 **
Differentiation	0.522	0.082	0.000 ***	0.195	0.116	0.093 *	0.209	0.049	0.000 ***	0.064	0.071	0.372
R&D spending	0.455	1.002	0.650	-3.130	1.329	0.019 **	0.970	0.657	0.140	1.188	0.853	0.164
Capital spending	0.368	0.173	0.034 **	-0.103	0.191	0.589	0.224	0.085	0.009 ***	0.067	0.110	0.540
Acquisition spending	-0.040	0.022	0.075 *	-0.047	0.021	0.026 **	-0.044	0.022	0.047 **	-0.047	0.012	0.000 ***
<i>Control variables</i>												
Leverage	-0.006	0.027	0.817	0.036	0.035	0.304	-0.091	0.026	0.000 ***	-0.064	0.020	0.002 ***
Firm size	-0.045	0.014	0.002 ***	0.009	0.020	0.634	-0.009	0.007	0.251	-0.009	0.011	0.415
Firm age	0.036	0.009	0.000 ***	-0.007	0.017	0.663	0.017	0.003	0.000 ***	0.006	0.008	0.430
Merger	0.036	0.022	0.114	0.064	0.032	0.048 **	-0.000	0.017	0.977	0.011	0.020	0.573
Industry	-0.038	0.009	0.000 ***	-0.052	0.013	0.000 ***	-0.013	0.004	0.004 ***	-0.027	0.020	0.010 ***
Country	0.063	0.016	0.000 ***	0.035	0.031	0.260	0.032	0.006	0.000 ***	0.002	0.020	0.906
<i>n. observations</i>	524			508			524			510		
<i>n.groups</i>	26			26			26			26		
<i>Wald chi2(13)</i>	204.51			140.23			237.11			89.37		
<i>Prob > chi2</i>	0.000			0.000			0.000			0.000		
<i>rho</i>	0.241						0.061					
<i>R squared</i>	0.508						0.441					

* p < 0.10; ** p < 0.05; *** p < 0.01

Table 4.2. Results of regression analysis

indicating that their impact on performance is confirmed. If we draw conclusions on firms' strategies we can state that a stronger focus on strategy merely correlates with, or pays off in terms of increasing performance.

We cannot confirm that firms *R&D spending* has a significant influence on firms' performance ($\beta = .455$, $p >.05$). Note that while looking at the standard error of the R&D spending variable, which is an indicator of the standard deviation of the sampling distribution, most commonly of the mean, we conclude that the sample mean is not an accurate reflection of the actual population mean. We deduce from this that there is a large variety in how much firms spend on R&D, as such we are not able to conclude accurately how it influences firms performance⁷. Looking at firms investment strategies we find a positive and significant link between *Capital spending*, an indicator for firms spending related to operational effectiveness, and firms performance ($\beta = .368$, $p <.05$). Firms' *Acquisition spending* shows a slightly significant, negative coefficient in relation with firms performance ($\beta = .040$, $p <.10$).

Among the control variables, results show that (1) *Firm size*, $\beta = -.045$, $p <.01$; (2) *Firm age*, $\beta = .036$,

$p <.01$; (3) *Industry*, $\beta = -.038$, $p <.01$; and (4) *Country*, $\beta = .063$, $p <.01$ have a significant influence on firms performance. When we interpret the results we conclude that the smaller firms on average outperform the larger firms. Besides, on average, the older firms outperform the younger firms. When we evaluate industry differently by adding a dummy for each industry we conclude that the performance of the beverage industry does not deviate significantly from the processed food industry ($\beta = -.016$, $p >.05$). On the other hand, the meat industry ($\beta = -.104$, $p <.01$), and the dairy industry ($\beta = -.100$, $p <.01$), significantly underperform the processed food industry (see appendix 5). Looking at country differences we learn that firms with their head office located in America significantly outperform the firms from which their head office is located in Europe ($\beta = .063$, $p <.01$).

For more insights, especially on the robustness of the dependent variables, we turn to results with ROA as the dependent variable (Model III). Similar to the results of Model I, the results indicate that the coefficients for the three strategy variables *Labor efficiency*, *Capital efficiency* and *Differentiations* are highly (1%) significant. Besides the influence of firms investment strategies are significant for both variables in the analysis: whereas firms *Acquisition spending* shows a significant negative coefficient in

⁷ In another model we dropped *R&D spending* to control how the variable influences Model I. The overall results were similar to those reported herein.

	Results with ROCE as dependent variable						Results with ROA as dependent variable					
	Model V			Model VI			Model VII			VIII		
	Low performance		High performance		Low performance		High performance		Low performance		High performance	
	Coef.	Std. Err.	P>z	Sig.	Coef.	Std. Err.	P>z	Sig.	Coef.	Std. Err.	P>z	Sig.
<i>Economy variable</i>												
Economic fluctuation	0.005	0.002	0.018	**	0.004	0.002	0.026	**	0.003	0.001	0.017	**
<i>Strategy variables</i>												
Labor efficiency	-0.083	0.040	0.041	**	0.148	0.035	0.000	***	0.012	0.029	0.673	0.077
Capital efficiency	0.002	0.008	0.744		0.082	0.010	0.000	***	-0.008	0.006	0.211	0.020
Differentiation	0.017	0.093	0.850		0.452	0.078	0.000	***	-0.053	0.067	0.429	0.197
R&D spending	0.873	1.073	0.416		-0.946	1.030	0.359		0.541	0.786	0.491	0.246
Capital spending	0.305	0.172	0.077	*	0.809	0.243	0.001	***	0.154	0.129	0.234	0.402
Acquisition spending	-0.011	0.020	0.557		-0.047	0.058	0.419		-0.017	0.015	0.236	-0.150
<i>Control variables</i>												
Leverage	-0.068	0.032	0.033	**	0.089	0.031	0.005	***	-0.084	0.023	0.000	***
Firm size	0.011	0.013	0.384		-0.048	0.019	0.014	**	-0.007	0.009	0.474	0.006
Firm age	0.004	0.007	0.529		0.021	0.010	0.033	**	0.001	0.005	0.732	0.008
Merger	0.012	0.017	0.495		0.010	0.040	0.802		-0.004	0.012	0.748	-0.016
Industry	-0.002	0.006	0.664		-0.042	0.010	0.000	***	-0.008	0.004	0.057	*
Country	0.007	0.010	0.500		0.039	0.017	0.026	**	0.004	0.007	0.538	0.035
<i>n. observations</i>	244		280		243		280					
<i>avg n.groups</i>	10,6		12,2		10,6		12,2					
<i>Wald chi2(13)</i>	40.68		233.49		66.63		205.60					
<i>Prob > chi2</i>	0.000		0.000		0.000		0.000					
<i>rho</i>	0.014		0.242		0.000		0.051					
<i>R squared</i>	0.159		0.498		0.225		0.510					

* p < 0.10; ** p < 0.05; *** p < 0.01

Table 4.3. Low/High performance regression results.

relation to firms performance ($\beta = -.044$, $p < .01$). In contrast with Model I, leverage is significant in this model ($\beta = -.091$, $p < .01$). On the other hand, neither firm size ($\beta = -.009$, $p > .10$) nor economic fluctuations ($\beta = .001$, $p > .05$) are slightly significant in relation to performance for this model.

The result for economic fluctuations in Model III (dependent variable ROA) contrasts with Model I (dependent variable ROCE) where economic fluctuations are significantly related to firms' performance. However, after including Lag ROA in Model IV, the coefficient of Economic fluctuation increases (just as occurred while comparing Model I and II with dependent variable ROCE), and becomes significantly related to firms' performance. This might suggest that the effects of economic fluctuations become significantly noticeable over time.

The divergence in significance and coefficients across dependent variables is not altogether surprising and hints at a specific measurement difference between ROCE and ROA. ROCE compares inputs (capital invested) with outputs (operating profit). The capital invested is measured by the average long-term capital employed. Herein is found a difference with ROA, which measures the total invested capital, including short-term capital invested. While looking at firms' variation in R&D spending it appears that firms' account their R&D

spending as current investments. A similar argument counts for Leverage, which is calculated as total debt divided by total assets, which in turn is more related to ROA than to ROCE.

Results of the extended models, Model II and Model IV, clearly show that, for a substantial part performance variance must be attributed to *Lag ROCE* in Model II and *Lag ROA* in Model IV. At a more general level, however, the effects of economic fluctuations and strategy variables are qualitatively similar, albeit not identical, to those obtained with the base models I and III. Dezsö and Ross (2012) conclude that adding the lagged value of the dependent variable to a panel data regression can give rise to problems with autocorrelation. We therefore use the lagged value of performance only to check robustness, and do not further use the variable for other regressions as well. More in detail discussing of the findings obtained with the extended model will be postponed until the discussion section where we consider specifically the role of lagged performance⁸.

We further check the reliability of our findings using stricter tests, namely by repeating the regression analysis for groups of low and high performance⁹ firms. The performance low/high units can be used,

⁸ See Spanos et al., 2004 for detailed interpretations on the role of lagged performance.

⁹ We use ROCE to measure and select firms their annual performance status as the variable has compared to ROA more explanatory power to draw conclusions.

as already suggested by Venkatraman (1989) to identify profiles within each sub-sample. Due to the longitudinal nature of our data, firms received the low or high performance status annually. The *annual Mean* is used to distinct between firms Low or High performance status. The regression results show that there are large differences and clear patterns within the two sub-samples of low and high performance firms.

While looking at ROCE as dependent variable, both low and high performance firms show a significant positive relationship between firms' performance and *Economic fluctuation*, indicating the higher the economic growth, the higher firms performance. Note that, although detailed interpretation of the coefficients is tricky in random effects modelling¹⁰, the Economic fluctuation variable has a stronger explanatory power in relation to low performing firms, $\beta = .005$ $p < .05$ compared to high performing firms, $\beta = .004$ $p < .05$. It seems in comparison to the high performance firms that the performance of the low performance firms is more influenced by fluctuations in the economy. While looking at ROA as dependent variable, only the low performance firms show a significant relationship between firms' performance and economic fluctuations. Overall, it seems that the low performance firms are more affected by the economic fluctuations and score worse on strategy variables. In addition, the

high performance firms are in contrast with low performance firms, better able to convert their strategy into increasing performance as the coefficients for the three strategy variables: (1) *Labor efficiency*; (2) *Capital efficiency* and (3) *Differentiation* are all positive and significant regardless of which dependent variable is selected. Besides *Capital spending*, spending used by a company to acquire or upgrade physical assets such as property, buildings or equipment, results in significant increase in performance for the high performance firms, where this is for the low performance firms substantial lower. The results of *Acquisition spending* are not unequivocal and warrant caution with respect to interpretation. Therefore, more in detail interpretations on this will be postponed until the discussion section where we combine our insights. With respect to the control variables, we did not find striking new insights.

Figure 4.1 reveals the interaction effect of firms' strategies on economic fluctuation¹¹. Plot I reveals firms strategic orientation. It reveals that as the economic growth increases, firms become on average more differentiation oriented and less cost leadership oriented. The slope is clearly more positive for low performance firms compared to high performance firms, suggesting that low performance firms changes in strategic orientation

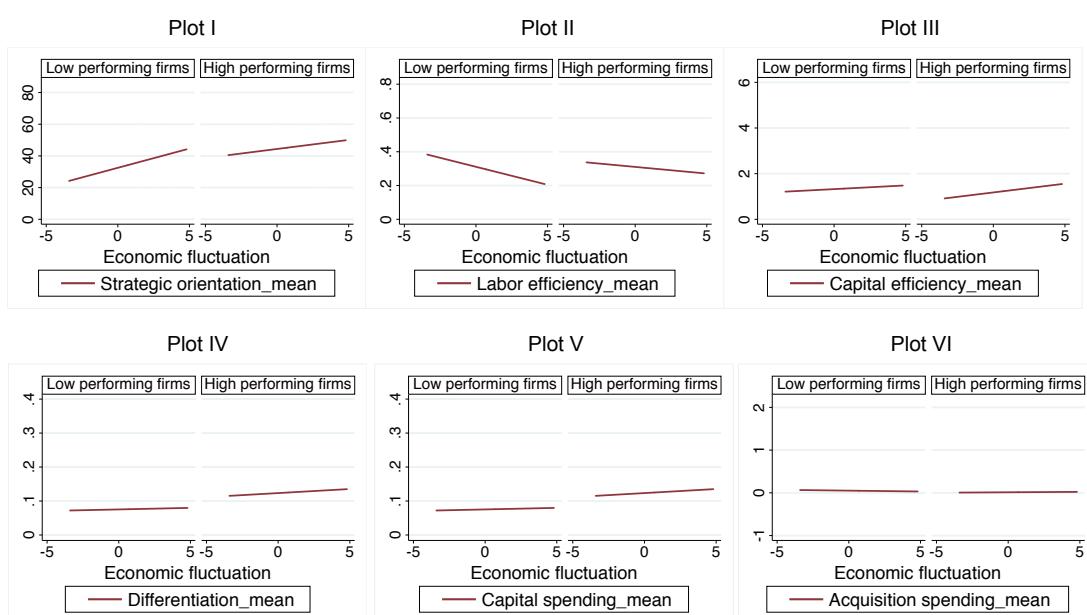


Figure 4.1 Plot of Economic fluctuation and firms strategies^{10, 11}.

¹⁰ Since the coefficients in random effects modelling include both the within-entity and between entity effects, interpretation of the coefficients is tricky.

¹¹ The real GDP data, in the period 1988-2012, is used to scale Economic fluctuation, see appendix 1 for the data.

Dependent variable: ROCE (1988-2012)							Results with ROA as dependent variable						
	Model IX			Model X			Model XI			XII			
	Economic recession		Economic growth	Economic recession		Economic growth	Economic recession		Economic growth	Economic recession		Economic growth	
<i>Economy variable</i>													
Economic fluctuation	0.009	0.003	0.002 ***	0.021	0.005	0.000 ***	0.002	0.001	0.185	0.006	0.003	0.055 *	
<i>Strategy variables</i>													
Labor efficiency	0.130	0.052	0.013 **	0.166	0.039	0.000 ***	0.100	0.024	0.000 ***	0.081	0.019	0.000 ***	
Capital efficiency	0.061	0.011	0.000 ***	0.055	0.010	0.000 ***	0.018	0.005	0.001 ***	0.011	0.005	0.044 **	
Differentiation	0.541	0.119	0.000 ***	0.482	0.092	0.000 ***	0.223	0.048	0.000 ***	0.197	0.042	0.000 ***	
R&D spending	0.551	1.501	0.713	1.014	1.096	0.355	0.404	0.592	0.495	0.759	0.493	0.124	
Capital spending	0.495	0.307	0.107	0.353	0.206	0.087 *	0.255	0.149	0.088 *	0.180	0.111	0.106	
Acquisition spending	-0.070	0.027	0.012 **	-0.008	0.042	0.838	-0.034	0.014	0.020 **	-0.081	0.024	0.001 ***	
<i>Control variables</i>													
Leverage	-0.006	0.044	0.881	-0.030	0.033	0.361	-0.064	0.021	0.002 ***	-0.110	0.017	0.000 ***	
Firm size	-0.006	0.021	0.749	-0.018	0.017	0.275	0.001	0.008	0.880	-0.004	0.007	0.590	
Firm age	0.045	0.012	0.000 ***	0.043	0.010	0.000 ***	0.014	0.004	0.002 ***	0.018	0.004	0.000 ***	
Merger	0.056	0.034	0.102	0.019	0.026	0.460	0.006	0.016	0.685	-0.009	0.013	0.513	
Industry	-0.030	0.011	0.007 ***	-0.034	0.009	0.000 ***	-0.012	0.004	0.004 ***	-0.014	0.003	0.000 ***	
Country	0.070	0.018	0.000 ***	0.067	0.015	0.000 ***	0.035	0.006	0.000 ***	0.028	0.005	0.000 ***	
<i>n. observations</i>	170			354			170			354			
<i>avg n.groups</i>	6,5			13,6			6,5			13,6			
<i>Wald chi2(13)</i>	135.81			175.49			156.77			204.6			
<i>Prob > chi2</i>	0.000			0.000			0.000			0.000			
<i>rho</i>	0.226			0.181			0.002			0.040			
<i>R squared</i>	0.590			0.539			0.504			0.447			

* p < 0.10; ** p < 0.05; *** p < 0.01

Table 4.4. Economic recession/growth regression results¹².

keep more in pace with economic fluctuations compared to high performance firms. The plots also show that low performance firms' change in strategic orientation is mainly due to changes in labor efficiency (Plot II), as the slope for differentiation (Plot IV) is nearly flat. In contrast, changes in strategic orientation of high performance firms are caused by changes in firms labor efficiency as well as changes in differentiation orientation¹³. Plot IV reveals that high performance firms score on average higher on differentiation orientation compared to low performance firms. Appendix 4 reveals the interaction effect of firms' strategies on economic fluctuation among the different industries under analysis. It reveals that particularly the processed food and meat industry change their strategic orientation in periods of economic recession and growth, i.e. the higher the economic growth, the more firms are differentiation oriented. The plot in appendix 4 also reveals that on average beverage and dairy firms are more inclined to stick to their strategy despite economic fluctuations.

Notwithstanding that figure 4.1 reveals the interaction effects of capital efficiency (Plot III), capital spending (Plot V), and acquisition spending (Plot IV) with economic fluctuation, it does not bring

remarkable new insights. While looking at firms' capital and acquisition spending we notice a low connection between higher economic growth, and higher firms investments. The low connection can be especially dedicated to the fact that firms' investments seem to lag behind economic fluctuations; for this, see figure 4.2. Finally, plot V reveals that high performance firms have on average a higher capital spending compared to low performance firms.

Table 4.4 presents results regressing ROCE and ROA on the independent variables of interest, plus dividing the dataset in sub-samples of years by selecting periods of economic recession, i.e. 1991-93, 1998, 2001-02 and 2008-09 and periods of economic growth, i.e. 1988-90, 1994-97, 1999-2000, 2003-07, 2010-13. Interestingly, while looking at models IX and X: the influence of economic fluctuations on firms performance is stronger for periods of economic growth, $\beta = .021$ p <.01, than for periods of economic recession, $\beta = .009$ p<.01¹⁴. It seems firms benefit more from periods of economic growth than that they suffer from periods of economic recession. Besides, R square is higher for these models compared to the original models I and II. The latter shows that periods of economic recession and growth have substantial influence on firms' performance. One can conclude that we can

¹² Because there are less periods of economic recession than growth the observations are much lower.

¹³ Firms' strategic orientation = arc tan (differentiation / labor efficiency)

¹⁴ Similar can be concluded while looking at model XI and XII

clarify more in detail firms' strategies and performance on the basis of periods of economic recession and growth, as there are clear significant differences between the periods.

Although we have divided the observations in two sub-samples, overall the presented models in table 4.4 do not bring major insights regarding firms' strategies in periods of economic recession and growth, especially since the results are somewhat divided while comparing the results of the two dependent variables. The results therefore warrant caution with respect to interpretation. While looking at the control variables we note that *Firm age*, *Industry* and *Country* are clearly significant in the models presented in table 4.4, suggesting that for periods of economic recession and growth the variables have similar explanatory power regarding the dependent variable.

Figure 4.2 plots the mean changes for the strategy variables in the period under analysis. Interestingly one can notice some clear developments in the strategy variables that seem to link with the economic fluctuations, but are unfortunately not deducible from the statistical models represented in the tables. At first, the 2001-02 'developed economies recession' seems to have had large influence on firms' strategies as one can notice major changes around 2001: the trend concerning firms differentiation orientation (plot X) turned drastically, firms capital and acquisition (plot XI and XII) spending decreased (to recover later), and firms overall increase in labor efficiency (plot VIII) and decrease in capital efficiency (plot IX).

Second, firms' investment strategies seem to link, with the economic fluctuations. In 2008 firms' capital and acquisition spending increases and experienced a large peak, after which the spending decreases drastically in the subsequent years. Although it must be said that firms' investment strategies seem to lag behind economic fluctuations, there seems to be a clear connection between firms' investment strategies and economic fluctuations.

Third, across the decades firms have clearly increased labor efficiency, and decreased capital efficiency in the period under analysis. It seems firms have reduced staff and have invested in assets. Finally, overall firms have become more cost leadership oriented as the overall trend in strategic orientation is towards cost leadership (Plot VII).

The results and assumptions on firms' performance and strategies need to be analysed critically and warrant caution with respect to interpretation. We therefore analyze the results critically and discuss the results in Chapter 5.

5 Discussion and conclusions

The basic definition of competitive advantage is straightforward. If your business can produce at a lower cost than can competitors, or if it can deliver more perceived value than can competitors, or a mix of the two, then you have a competitive advantage (Rumelt, 2012 p.163). Yet it is not so stagnated.

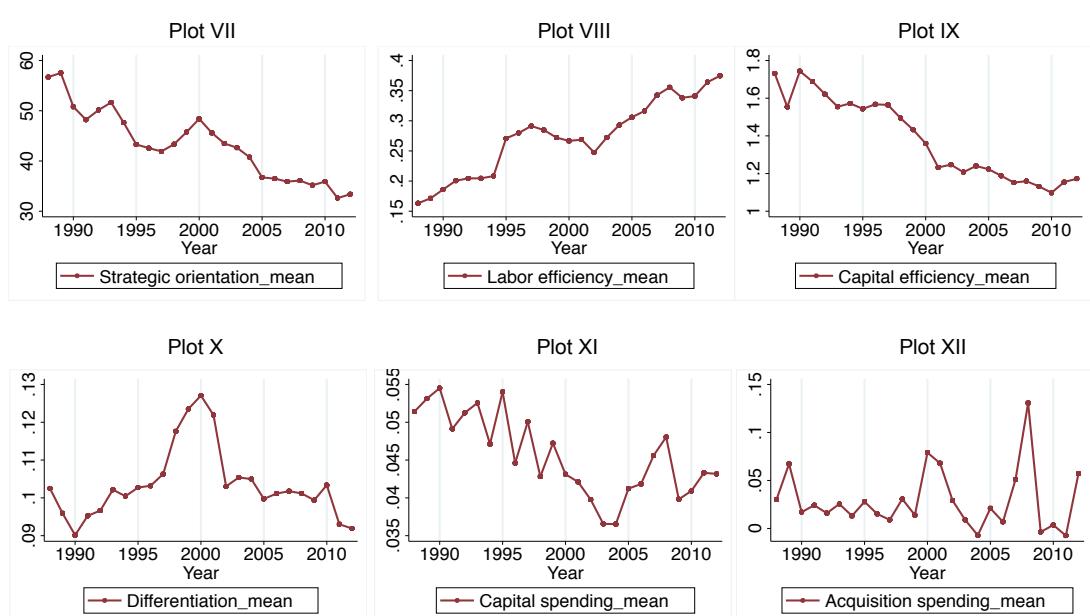


Figure 4.2. Plot of mean changes in the period 1988-2012 for the strategic variables.

straightforward as customers marginal benefit perceived from buying food products change during economic fluctuations (Pruitt & Raper, 2010). Our findings reveal that firms historically have been urged to deal with the economic fluctuations as it influences their performance.

The aim of this study is (1) to find and select a suitable approach for analysing the effects of economic fluctuations on agribusiness firms' strategies and their performance, and (2) to get academic and managerial understanding of how agribusiness firms strategies and performance is influenced by the economic fluctuations. In this study we therefore developed different models to explore, explain and test what approach suits to analyse the effects of economic fluctuations on agribusiness firms' strategies and their performance. We explored the issue while using 25 years of data on large agribusiness firms.

5.1 Results and contribution

The results of this study show that economic fluctuations have a clear influence on firms' performance, i.e. the higher the economic growth, the higher firms' performance. This relation applies more for low performing firms than it applies for high performance firms. This may be explained by various reasons. A reason might be that high performance firms are better able to meet the needs of customers in periods of economic growth as well as in periods of economic recession, and do so efficiently. We conclude that high performers perform more stable across fluctuations than low performers (see model V and VI in table 4.3; and see plot I in figure 4.1).

We controlled in this study whether economic growth endogenously depends on firms performance. Debate in literature, e.g. explained by Justiniano et al. (2010), can be found about what is the source of economic fluctuations. Theoretical arguments suggest that economic fluctuations may endogenously depend on recent firm performance and, thus, that e.g. the positive association between economic growth and firm performance may be driven by reverse causality. If so, then once there is controlled for prior firm performance (t-1), the positive association between economic growth and firm performance should disappear. Accordingly, as a robustness check, we have added the lagged value of performance to the regression in Model II and IV. Even in this demanding specification, the positive link between economic growth and firms performance remained significant. We therefore

conclude that there is no proven reverse causality¹⁵ between economic growth and firms performance¹⁵.

We find that the higher firms score on strategy, the more positive it is associated with firms' performance. We can support this statement as the coefficients for the three strategy variables, i.e. labor efficiency, capital efficiency and differentiation, are all positive and significant, indicating that their impact on firms performance is confirmed. Besides as we compare low and high performance firms' strategies we find that the three selected strategy variables are all significant for high performance firms, whereas for low performing firms only one strategy variable is significantly related to firms' performance. We conclude that firms' performance is influenced by the selected strategies. Besides a higher firms score on strategy is beneficial for firms' performance. This knowledge is useful as one of the major goals in current strategic management research is according to Spanos (2004) to identify the sources and determinants of profitability differences among firms.

We also address firms' investment strategies and find that on average firms capital spending has a positive direct influence on firms' performance, whereas acquisition spending has a negative direct influence on firms' performance. Note, we mention direct influence since we test solely how the variables directly influence firms' performance. It could be that acquisition spending in the first instance has a negative influence on firms' performance, but might change in a positive influence after a few years. This has not been tested for in this exploratory study because the relevant time-lag is not clear; this needs more in depth study regarding methodological issues. Overall it seems that within the dataset, the agribusiness firms' acquisitions are initiated in waves. Duchin and Schmidt (2013) revealed in earlier research that acquisitions initiated during periods of high M&A activities are accompanied by poorer quality of analysts forecasts, greater uncertainty, and weaker CEO turnover-performance sensitivity, which could lead to worse acquisitions. They found that the average long-term performance of acquisitions initiated during periods of high acquisitions is significantly worse. As mentioned earlier we notice acquisition waves and periods of high acquisition spending within the dataset. It seems that the waves can be connected to our study results, i.e. acquisition spending has a negative direct influence on firms' performance.

¹⁵ The methodology to control for reverse causality is in accordance to Dezsö & Ross (2012).

While looking at firms overall strategic orientation (see figure 4.1 on p22) we conclude that as the economic growth changes on average agribusiness firms strategic orientation changes. It means that the higher the economic growth (1) the lower firms cost leadership orientation and (2) the higher firms differentiation orientation. The shift in strategic focus applies somewhat more for low performance firms than for high performance firms and is mainly due to a shift in focus of firms cost leadership orientation. Across all economic circumstances, the high performance firms are on average more differentiation oriented compared to low performance firms.

Wu et al. (2007) found that differentiation oriented firms under performed cost leadership oriented firms while singular measuring the recession period 2001-02¹⁶. Besides Wu et al. (2007) conclude that firms that run a hybrid strategy outperform those with a pure focus at cost leadership or differentiation strategy. We conclude similar on the latter, an add from our broader and longitudinal analysed perspective of periods of recession and growth, that firms following a hybrid strategy outperform in periods of economic recession and in periods of economic growth, firms that run a cost leadership or differentiation strategy (see appendix 6). In contrast to Wu et al. (2007) we found that firms that run a differentiation strategy outperform firms that have a cost leadership strategy in periods of economic recession¹⁷.

For the strong performance firms that run a differentiation strategy (see figure 4.1) does it seem, in comparison to firms that run a cost leadership strategy, less necessary to shift strategy in periods of economic recession. We note, as earlier concluded (see table 4.3) that low performance firms have more difficulties to cope with economic fluctuations, because they are more affected by economic fluctuations. Although the more focussed firms (firms following a differentiation and those following a cost leadership strategy), shift focus in periods of economic recession and growth, the need seems less relevant for firms following a more differentiation focussed strategy, as this strategy provides on average stronger performance, despite economic fluctuations, compared to firms following a more

cost leadership focussed strategy (see plot I, II, and V in figure 4.1). We conclude, in accordance to propositions made by Groeneveld (2015), that agribusiness firms deal with the economic fluctuations by shifting their strategic focus. This implies that as the economic growth increases (1) agribusiness firms cost leadership orientation decreases, and (2) agribusiness firms' differentiation orientation increases.

We note, however with caution, that, within the dataset, the meat and dairy industry are on average more cost leadership oriented (see appendix 4) and underperform the processed food and beverage industry (see appendix 5). The processed food and beverage industry are in comparison on average more differentiation oriented. While considering that the processed food and beverage industry are on average more differentiation oriented, we have difficulties in understanding both industries different strategic behaviour in relation to the economic fluctuations. The processed food and meat industry become more differentiation oriented in periods of economic growth, whereas the beverage and dairy industry make less strategic moves as the economic growth increases.

While using ROA as a dependent variable (see table 4.2), the economic fluctuations only have a significant influence on firms' performance if we add lag ROA in the model as well (Model III and IV). An explanation can be found in the measurement of ROA. ROA measures in contrast to ROCE next to long-term capital invested also the short-term capital invested. It seems that short-term capital investments provide for short-term interruptions. On the other hand, the impact of economic fluctuations cannot be overcome in the long term with changes in short-term investments, as the economic fluctuations become significant of influence on firms performance if we add lag ROA. Let us therefore focus in more detail on how firms deal with economic fluctuations.

As an example we take the 2001-02 recession. The recession had wide and major consequences. The global real GDP growth declined during 2001 to an annual growth level of 2,3% compared to an annual growth level of 4,7% in 2000 (IMF, 2014). Manufacturing and trade sales fell during the first quarter of 2001. After September 2001 an atmosphere of uncertainty brought about by the combined effect of geopolitical tensions especially in the Middle East, which led to higher oil prices, less attractive markets. This undermined confidence and led to an on going weakness in recovery (Commission of the European communities, 2004). While looking at how agribusiness firms dealt with this recession we note that on average, after years of increase in

¹⁶ Wu et al. (2007) used the same variable as this study does to proxy cost leadership. The firms' under analysis were active across 32 industries (77.2% in manufacturing industries and the other in service industries) in 30 countries (24.1% in America, 63.5% in Europe, and the rest in Asia and Australia).

¹⁷ The latter highlight that firms' do become more cost oriented in periods of economic recession. Yet, firms' that are more differentiation oriented outperform the firms' that are more cost leadership oriented.

differentiation orientation and decrease in cost leadership orientation, firms in 2001 abruptly decrease their differentiation orientation and increased their cost leadership orientation. Besides, firms abruptly increased their capital efficiency, and decreased although slightly later capital and acquisition spending.

After a few years of low capital and acquisition spending, firms started increasing their capital and acquisition spending again, while their capital efficiency remained at the same level. It suggests that the invested capital was used efficiently. Besides firms remained increasing their cost leadership orientation while their differentiation orientation remained at a same level. There was a clear shift; firms did become after 2001-02 in an era of uncertainty on average more cost leadership oriented to deliver perceived customer value. It is clear that a shift in strategic focus does not come with each economic fluctuation, but the economic fluctuations have certainly consequences for agribusiness firms' strategic orientation.

Our findings complement the theory that strategy can be viewed as an overarching pattern of aligning internal and external elements (Venkatraman & Camillus, 1984). Hence, it is an interaction effect of the environment and organizational structure. Yet while the importance seems to be recognized of addressing associated challenges, academic and managerial understanding of how organizations manage these challenges remains limited (Ben-Menahem et al., 2013). This study aimed to contribute to understanding of firm-environment co-alignments from a knowledge-based perspective. In line with this perspective, we presented firms response to economic fluctuations. We argue for the necessity of strategic renewal over time. It requires that a firm should respond adequate and quick to fluctuations in the economy in order to remain or improve performance.

5.2 Limitations and further research

We aimed to analyse firms 'shape' or entity's 'complete form'. This comes with some statistical concerns. We handled this by providing a clear description on the theory that guided the selection of input variables for the analysis and by providing cluster stability, i.e. we have validate the results in several manners. Besides we have used formal statistical methods for the analysis.

The validation of the results has been carried out by using (1) two different dependent variables, i.e. ROCE and ROA, by using (2) lagged values of firms' performance in the regression models, by using (3) Low/High performance firms, and by using (4) periods of economic recession and growth to

show the results. First mentioned validation has been helpful to gain more in depth insight on the influence of e.g. short-term investments on firms' performance. The second mentioned validation helped to control whether economic growth endogenously depends on firms' performance, we have concluded that there is no reverse causality between economic growth and firms' performance. The third validation helped to develop distinct profiles of 'fit' and to assess the possibility of discovering patterns, something that clearly has emerged regarding differences in patterns among low and high performance firms. The latter mentioned validation brought fewer insights than expected, but contributed to the research, i.e. in combination with the figures we were able to better distinct patterns for periods of recession and growth, which makes the story line more reliable and convincing.

A second limitation relates to the use of periods of economic recession and growth. Table 4.4, that has a focus on these periods, didn't bring new insights. This is mainly due to the fact that the influence of the economic fluctuations is significantly noticeable, but that firms' strategic response might be lagging (see figure 4.2). The results therefore vary and are not necessarily reliable in the sense that one cannot be sure whether firms have responded due to the economic fluctuations or that firms changing behaviour is the result of other internal and/or external elements. If one looks at firms acquisition spending, we notice a large peak in the year 2008, which is defined as a year of economic recession. After 2008 firms decrease their acquisition spending drastically. Due to the fact that firms do respond on the economic recession, but only at a moment that it seems too late, it is hard to draw clear-cut conclusions.

A third limitation relates to our measures. Our measures capture relative differences in performance across firms at a given point in time. Although our econometric specification helps explain how differences among firms relate to performance, our study does not explicitly examine how firms may alter their strategies and how that relates to performance. Our research design does not allow us to measure e.g. the ability of a low performance firm to become a high performance firm in time, or to determine the most efficient way to make such a move in periods of economic recession or growth, should it decide to do so. Future research would therefore be well served to re-examine our results using alternative measures, e.g. lagged endogenous variables that better capture the dynamic nature of the variables.

Obtaining insight on how firms differentiate did come with difficulties. While we were interested

how firms R&D spending relates to firms performance, we were not able to obtain reliable results for the R&D spending variable. The sample mean did not show to be an accurate reflection of the actual population mean. Due to the large variety in how much firms spend on R&D we could not obtain clear results. Notwithstanding, our approach was comparable to that of others, i.e. Barnett and Salomon (2012)¹⁸.

The selection of return on sales, i.e. relation between gross profit margin in connection to revenues, and the selection of operating expenses, e.g. investments in human resources management, firms infrastructure, R&D and marketing expenses, to proxy differentiation was satisfactory, although we need to criticize the differentiation variable. As earlier mentioned, differentiation allows higher prices, but usually comes at a cost (Porter, 1991). Costs can be attributed, as earlier appointed, to different purposes. We are not able to distinguish herein. Future research would benefit from more in depth analysis on how to proxy differentiation otherwise.

Further, we would encourage future research to improve insight on firms organization, and how that relates to firms performance, e.g. how many brands do firms have, how many market do they serve, in how many countries, and does this quantitative information relate to firms cost leadership or differentiation orientation. Besides, does firms' organization influence the way firms are dealing with the economic fluctuations, and what is the influence of different agribusiness industries regarding their dealing with economic fluctuations.

Finally, we would welcome additional research on consumers' historic spending behavior at food. Shifts in the consumption of e.g. meat products occur due to changes in household budget constraints and relative prices of the products themselves. The choices become more evident in economic downturns as consumers' budgets tighten and consumers modify their spending. These changes reflect a desire of consumers to provide food for their household as cost effectively as possible (Pruitt & Raper, 2010). Additional research on this topic can support our story line, as it is assumed to relate to firms behaviour.

¹⁸ While looking at the descriptive statistics on R&D spending in the study of Barnett and Salomon (2012), there seem to be a large variety among firms' in R&D spending as well. Nevertheless their results show, while using just like this study ROA as dependent variable, a significant influence on firms' performance. Although their standard error is not shown, it could be due to differences in data, and the selection of variables that there are differences in the outcomes.

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Appendix 1 Real GDP data

Appendix one provides the data used to define global economic fluctuations. The list is obtained from the IMF website (IMF, 2014).

Real GDP growth (annual % change)	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Advanced economies	4,8	4,1	3,2	1,5	2,3	1,5	3,4	2,9	3	3,6	2,6	3,6	4,1
Emerging market and developing economies	4,1	3,5	3,4	3,7	2,4	3,3	3,4	4,1	5,2	5,1	2,6	3,6	5,7
Global economy (world)	4,6	3,9	3,3	2,2	2,3	2,2	3,4	3,3	3,8	4,1	2,6	3,6	4,7
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	1,4	1,7	2,1	3,2	2,8	3	2,7	0,1	-3,4	3	1,7	1,5	1,2
	3,9	4,6	6,4	7,7	7,3	8,3	8,7	5,8	3,1	7,5	6,2	4,9	4,5
	2,3	2,8	3,8	5,1	4,7	5,2	5,3	2,7	-0,4	5,2	3,9	3,2	2,9

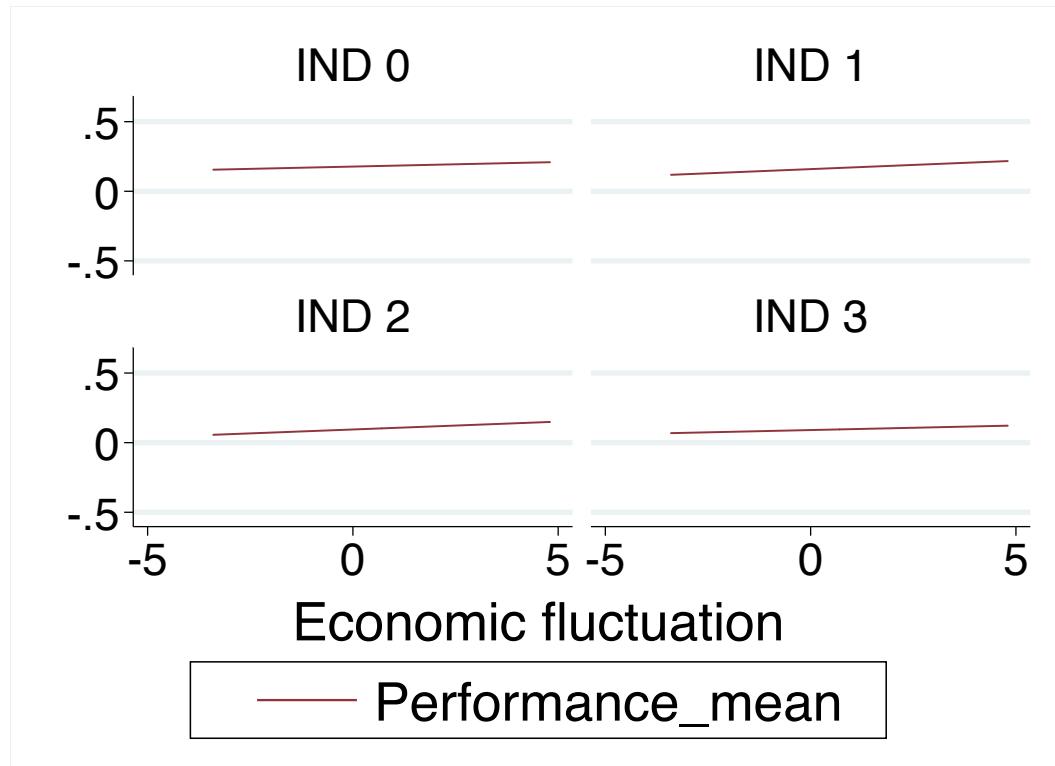
Appendix 2 Company details

Appendix two provides the company details. The order is, when possible, based on firms' sales in 2012. Nestle tops the list.

Firm	Head office	Industry
1. Nestle	Europe	Processed foods
2. Pepsico	USA	Processed foods
3. Kraft Foods	USA	Processed foods
4. Coca-Cola company	USA	Beverages
5. Unilever	Europe	Processed foods
6. Anheuser-Busch InBev	Europe	Beverages
7. Tyson Foods	USA	Red meat
8. Heineken	Europe	Beverages
9. Danone	Europe	Processed foods
10. SAB miller	Europe	Beverages
11. General Mills	USA	Processed foods
12. Kellogg's	USA	Processed foods
13. Associated British Foods	Europe	Processed foods
14. ConAgraFoods	USA	Red meat
15. Campina/FrieslandCampina	Europe	Dairy
16. Smithfield	USA	Red meat
17. Heinz	USA	Processed foods
18. Carlsberg	Europe	Beverages
19. Dean Foods	USA	Dairy
20. MD Foods/Arla	Europe	Dairy
21. Orkla	Europe	Processed foods
22. Sara Lee	USA	Processed foods
23. Pilgrims pride-JBS	USA	Red meat
24. Hormel Foods	USA	Red meat
25. Campbells	USA	Processed foods
26. Friesland foods	Europe	Dairy

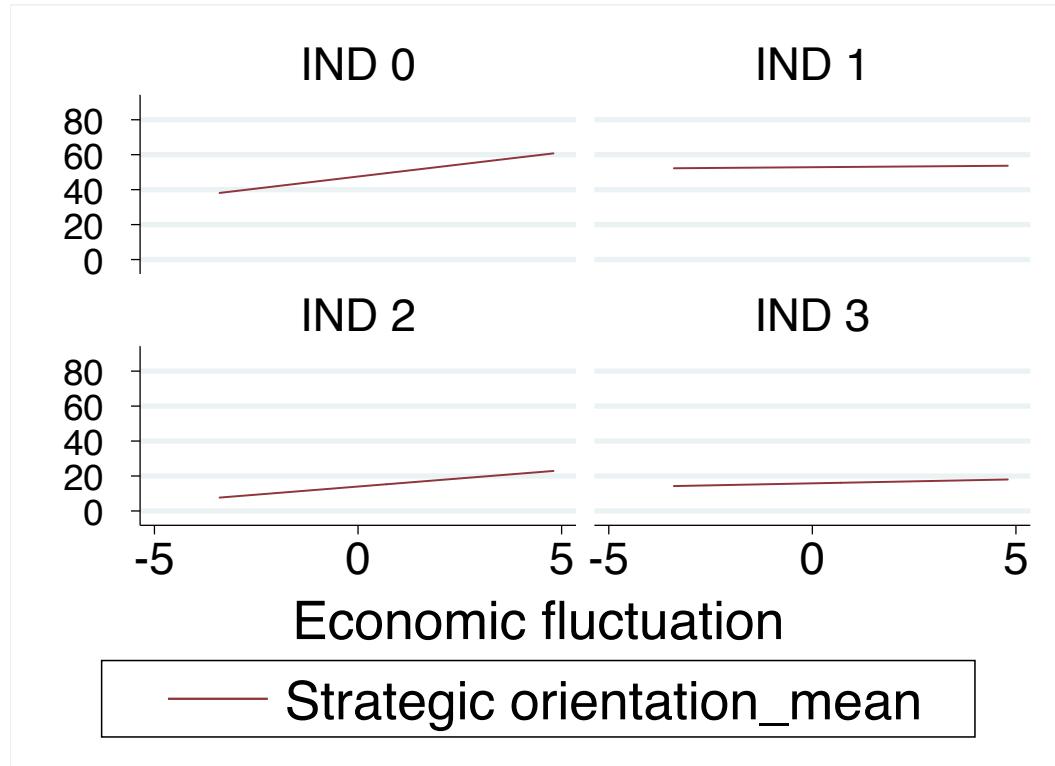
Appendix 3 Industry, performance and economic fluctuations

Appendix three provides additional information on the influence of industry on firms' performance. Besides it takes into account the economic fluctuations. The real GDP data, in the period 1988-2012, is used to scale economic fluctuation, see appendix 1 for the data.



Appendix 4 Strategic orientation and economic fluctuations

Appendix four provides additional information on the influence of industry on firms' strategic orientation. Besides, it takes into account the economic fluctuations. The real GDP data, in the period 1988-2012, is used to scale economic fluctuation, see appendix 1 for the data. Strategic orientation ranges from 0-90 degrees. In the range 0-30 firms' occupy a cost leadership strategy, in the range 30-60 firms' occupy a hybrid strategy, whereas they occupy in the range 60-90 a differentiation strategy.



Appendix 5 Industry and firms' performance

Appendix five provides additional information on the influence of industry on firms' performance.

Dependent variable: ROCE (1988-2012)					
	Model XIII				
	Coef.	Std. Err.	P>z	Sig	
<i>Economy variable</i>					
Economic fluctuation	0.004	0.001	0.034	**	
<i>Strategy variables</i>					
Labor efficiency	0.099	0.032	0.003	***	
Capital efficiency	0.063	0.008	0.000	***	
Differentiation	0.495	0.082	0.000	***	
R&D spending	0.886	0.994	0.373		
Capital spending	0.300	0.180	0.096		
Acquisition spending	-0.039	0.022	0.079	*	
<i>Control variables</i>					
Leverage	-0.010	0.027	0.703		
Firm size	-0.039	0.014	0.005	***	
Firm age	0.035	0.009	0.000	***	
Merger	0.032	0.022	0.150		
Industry					
Industry 1	-0.016	0.021	0.442		
Industry 2	-0.104	0.023	0.000	***	
Industry 3	-0.100	0.027	0.000	***	
Country	0.076	0.015	0.000	***	
<i>n. observations</i>	524				
<i>avg n.groups</i>	26				
<i>Wald chi2(13)</i>	233.11				
<i>Prob > chi2</i>	0.000				
<i>rho</i>	0.176				
<i>R squared</i>	0.528				

* p < 0.10; ** p < 0.05; *** p < 0.01

R squared

* p < 0.10; ** p < 0.05; *** p < 0.01

Appendix 6 Strategy and firms' performance

Appendix six provides insight on preferred strategies relative to firms' performance. The hybrid and differentiation strategy are compared relative to firms' that run a cost leadership strategy.

Dependent variable: ROCE (1988-2012)							Results with ROA as dependent variable									
	Model IX				Model X				Model XI				XII			
	Economic recession				Economic growth				Economic recession				Economic growth			
	Coef.	Std. Err.	P>z	Sig.	Coef.	Std. Err.	P>z	Sig.	Coef.	Std. Err.	P>z	Sig.	Coef.	Std. Err.	P>z	Sig.
<i>Strategic orientation</i>																
Cost leadership																
Hybrid	0.063	0.018	0.001	***	0.046	0.013	0.001	***	0.019	0.008	0.033	**	0.017	0.007	0.016	**
Differentiation	0.052	0.022	0.019	**	0.028	0.015	0.068	*	0.011	0.010	0.259		0.007	0.008	0.386	
<i>n. observations</i>	185				380				186				383			
<i>avg n.groups</i>	7,1				14,6				7,2				14,7			
<i>Wald chi2(2)</i>	11.30				11.97				4.58				6.74			
<i>Prob > chi2</i>	0.003				0.002				0.101				0.034			
<i>rho</i>	0.442				0.414				0.334				0.265			
<i>R squared</i>	0.154				0.148				0.112				0.108			

* p < 0.10; ** p < 0.05; *** p < 0.01