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Sustainability and cooperatives: does ownership structure matter?

A study of the impact of ownership structure on sustainability and economic performance: cooperatives versus investor owned firms

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Abstract

In light of the growing attention to the sustainability of companies, the question rises what factors influence the sustainable performance of companies, and how sustainable performance relates to other performance indicators. This study investigates the impact of ownership structure on economic and sustainable performance, specifically the difference between cooperatives and investor owned firms (IOFs). Literature shows that cooperatives and IOFs differ in economic and social performance. About environmental performance differences little is known. Building on three theories that use economic performance as a starting point, this study hypothesizes that cooperatives perform worse than IOFs on sustainable performance, following from an underperformance on economic performance. This is tested by creating a composite indicator with the Data Envelopment Analysis method, which captures indicators for both sustainable and economic performance. Subsequently, a dummy variable for ownership structure is regressed on this composite indicator index. To complete the analysis, 31 European companies, 18 cooperatives and 13 IOFs, were analysed in the period 2010-2013. All companies were agricultural companies, either in the dairy, meat, arable, horticulture or multiple sector. Part of the data was retrieved from Sustainalytics, an international ESG rating company in Amsterdam. The rest of the data was gathered based on the framework of Sustainalytics. The analysis shows that in both cases cooperatives do not perform worse than IOFs. Rather, no difference is found. On the individual economic performance indicators ownership structure has an influence: cooperatives perform worse than IOFs on liquidity and leverage, and better than IOFs on asset efficiency.

Key words: Sustainable performance, Cooperatives, Data Envelopment Analysis

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Acknowledgements

The birth of this thesis has been a long and sometimes challenging process. Now that I write these acknowledgements, it has almost come to an end. Looking back I can see that on the way I learned a lot about doing research, even after five years of academic studies. Some highlights: I learned it is challenging to find a research question that is both interesting to yourself and others, and also adds new knowledge to the existing literature. Perhaps a next time I would just try to join the most interesting, already existing research project that I can find. I learned that doing research is all about the data: when the wrong data is acquired, you can just start all over again. I learned that six months doing 'thesis' is the same as doing subsequently six months of 'reading', 'writing', 'getting data', 'structuring data', 'analysing data', 'drawing conclusions', and 'reflecting on everything you wrote'. This diversity of the activities was much to my relief. I learned that working independently can be a lonely place to be, but also that you get used to it, eventually. And of course I learned a lot about cooperatives, performance indicators of companies, working with statistics programs, and most importantly: the impact of ownership structure on sustainable and economic performance.

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Summary

There is a growing concern for sustainability in the market, which is the reason that sustainable performance of companies has become an important performance indicator for investors and customers to consider. One of the core questions relevant for business is whether sustainable business efforts can be translated into tangible profit: does it pay to be green? The literature remains inconclusive, but increasingly shows that a positive relationship can be realized between sustainable (SP) and economic performance (EP). How the relationship goes, in which direction and with which external factors, is still a topic of debate. This study looks at the impact of ownership structure, specifically cooperatives and investor owned firms (IOF). Arising from their business logic, cooperatives and IOFs differ in performance on the economic and social dimension. On the environmental dimension however, little is known yet.

Chapter two gives an overview of what the literature tells about the relationship between EP and SP, and how ownership structure could possibly influence this relationship. Different theories pose a possible relationship between EP and SP. The Porter hypothesis poses that SP influences EP. SP increases efficiency and reduces costs, because risk management and stakeholder relations are improved, and lower costs for inputs are required. SP increases revenues, as the reputation of the company improves, and better access to capital is obtained. Thus, SP increases competitive advantage, and therefore leads to value for the company. The slack resources hypothesis argues the other way around, that EP influences SP. A relatively better EP 'results in a surplus of resources that provides firms with the financial wherewithal to consider social issues' (Surroca et al., 2010:465). Thirdly, the external factors hypothesis argues that external factors simultaneously influence both, or act as mediators. In line of this thinking, ownership structure is investigated on its influence.

Ownership structure could be a possible impact factor on SP, because empirical literature shows that cooperatives and IOFs differ in their EP, namely that cooperatives perform worse than IOFs for different reasons: the principal agent problem, the horizon problem, the free-rider problem and the portfolio problem, all leading to inefficient decision making. Also cooperatives are more equity bound than IOFs, as all their equity has to come from their members, while IOFs rely on investors that can come from all layers of society. This expresses itself in lower profit, higher leverage and lower liquidity for cooperatives. Therefore, chapter two poses two hypotheses about the SP and EP of cooperatives versus IOFs: (1) that cooperatives have a lower SP than IOFs, and (2) that in a combined performance of EP and SP IOFs perform significantly better than cooperatives. Control variables that are considered are turnover as a proxy for company size, sector to account for industry differences, such as competitiveness, country to account for policy differences and business

environment. Also only agricultural marketing companies are considered, to account for difference between types of cooperatives.

Chapter three introduces the research methodology and data. SP indicators differ for IOFs and cooperatives. The data for IOFs was retrieved from scores from Sustainalytics, an international rating company for SP, located in Amsterdam. Based on their ranking methodology, a separate ranking system was developed for the cooperatives, which were ranked by the researcher. The SP indicator included strategy and management, resource targets, and stakeholder involvement, on which the companies were rated on a scale from 0-100. The EP was evaluated by considering four financial ratios: return on equity for profitability, the solvency ratio for leverage, the current ratio for liquidity and asset turnover for asset efficiency. 18 cooperatives were considered and 13 IOFs, making a total of 31 companies, in the period 2010-2013. All companies are located in the European Union, in the agricultural sector, namely dairy, meat, arable, horticulture and multiple sectors. For testing hypothesis 1, a censored regression was used, with the dependent variable SP, and the independent variables of ownership structure and the control variables. For testing hypothesis 2, a combined performance indicator was developed, for which the Data Envelopment Analysis (DEA) method was used. The DEA method creates a best practice frontier, and then assigns all companies a score from 0 to 1, based on the distance to the frontier. Bootstrapping the DEA scores corrected for possible measurement errors in the DEA method and derived a confidence interval, so that significance could be tested. The resulting index was the dependent variable, on which the independent variable of ownership structure and the control variables were regressed with a truncated regression.

Chapter four reports the results. It is shown that both hypotheses are rejected, meaning that SP does not significantly differ between cooperatives and IOFs, and also the combined performance of cooperatives and IOFs does not significantly differ. Looking at the combined performance more concretely, shows that different EP indicators possibly cancel each other out in the combined performance indicator. Thus cooperatives perform worse than IOFs on leverage and liquidity, but better than IOFs on asset efficiency.

Chapter five shows that this finding confirms literature. However, there are some limitations to the study. Qualitative preliminary research could have improved the understanding of the impact of ownership structure on EP and SP. Furthermore, both EP and SP indicators can be improved. EP indicators because cooperatives add economic value outside their own company, which is not captured by the financial indicators used in this study. For example, they offer better prices to their members. The SP indicator can be improved, because (1) cooperatives possibly also add more

sustainable value outsider their own company scope, like with EP, and (2) the social dimension of sustainability was ignored, while this is an important focus of cooperatives. Contrary to the assumption of this study, a partly negative and partly insignificant relationship between SP and EP was found. The current ratio and solvency ratio negatively relate to SP, and ROE and asset turnover are insignificant. Orlitzky, Schmidt, and Rynes (2003) suggest that the finding of a negative relationship can be caused by stakeholder mismatching, sampling error, and measurement errors. All three errors are possible in this study, as the SP indicators of cooperatives and IOFs slightly differed, the sample was only 31 companies, and the model did not allow for the possibility of a vicious cycle relationship.

Practical implications of the study are that the recent trend that cooperatives transform into IOFs, is not necessarily a threat for their SP, except when it is shown that cooperatives add more sustainable outside their company than IOFs. Also, governments that want to stimulate sustainability, do not have to favour cooperatives over IOFs, like they sometimes do to create better power balance in markets. Instead, the study suggests that the market is an important driver for both cooperatives and IOFs to increase their SP. Thus, by changing the market, also company behaviour can be influenced.

Chapter 6 concludes that the SP and EP of cooperatives and IOFs do not differ, contrary to what can be expected from literature. However, when the study looks more in detail at EP, it is shown that cooperatives perform worse than IOFs on leverage and liquidity, and better than IOFs on asset efficiency, which confirms the literature. These effects possibly cancel each other out in the combined performance indicator.

Chapter 1 Introduction

1.1 Sustainable and economic performance

In the context of growing concerns about sustainability, such as pollution, CO_2 emissions and resource scarcity (Coffee, 2014), the concept of sustainable development has gained a lot of attention (Hopwood, Mellor, & O'Brien, 2005), embodying uncountable initiatives with the purpose of providing 'capacity to endure' (Luo, 2013). Introduced by the Brundtland report 'Our common future' in 1987, sustainable development is defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland, 1987). As the call for sustainability is growing, also on the consumer side, the pressure for companies to become more sustainable is growing (Sarkis, Gonzalez-Torre, & Adenso-Diaz, 2010). For business this creates both a threat and opportunities. Companies that do not move along with the sustainability trend are at risk of losing their reputation and market share. On the other hand, companies that proactively utilize the opportunities that the sustainable development paradigm brings along, can turn it into a competitive advantage that delivers value for the company (Graff, 2005; Sarkis et al., 2010).

This study specifically looks at the entrepreneurial aspect of sustainability. One of the core questions relevant for business is whether sustainable business efforts can be translated into tangible profit: does it pay to be green? A sizable body of literature (further introduced in chapter two) addresses this by investigating the relationship between sustainability performance (SP) of companies and their economic performance (EP). Either sustainable investments pay off in the long run or a trade-off exists between investing in sustainable projects versus selecting projects with a high net present value. Although the literature remains inconclusive, it is increasingly acknowledged that a positive relationship is very likely, suggesting that higher SP is associated with higher EP. This both regards market-based measures for EP, such as firm value (Sinkin, Wright, & Burnett, 2008), and financial ratios, such as return on equity (Guenster, Bauer, Derwall, & Koedijk, 2011).

However, much is still unknown about the direction and nature of the relationship. Different arguments are made. Some scholars find evidence that SP is supporting and enhancing EP, while others argue that the causality is the other way around, or that both are feasible. Again others find evidence for external factors influencing both performance measures or acting as a mediator. For example Surroca, Tribó, and Waddock (2010) show that intangible resources, as understood by the resource-based view (RBV), such as reputation, innovation and human resources, act as mediators between SP and EP, meaning that SP is enhanced by EP through improvement of the intangible resources, and the other way around.

1.2 Objectives of the study

This study tests the impact of the external factor of ownership structure on SP and EP, where owners are members (cooperatives) versus investors (investor-owned firms: IOFs). Therefore the research question is '**What impact does ownership structure have on sustainable and economic performance?**'. The factor ownership structure has been tested before by Darnall and Edwards (2006) when looking at adoption costs of environmental management systems (EMS), but not for the structure of cooperatives. Investigating this alternative ownership structure and its relationship with SP and EP is interesting, because cooperatives differ from other organizations in ways that significantly influence their SP and EP. In contrast to IOFs, whose sole purpose is making profit for their investors, making profit in a cooperative is mainly important because it helps serve the interests of the members, and these interests often relate to other economic and social benefits than profits only. Cooperatives are therefore said to have a fundamentally different business logic than IOFs (Daya & Authar, 2012; Stoll, Poon, & Hamilton, 2014), namely a logic of care for their members. It is an interesting question whether this care extends from the social and economic aspects to also environmental aspects. An even more interesting question is how this relates again to the EP. Different arguments can be made, following from motivational differences, or from efficiency differences caused by organizational characteristics, such as managerial differences (Cook, 1994).

1.3 Sub-objectives and outline

The study follows different steps. First, chapter two provides an overview of the literature, regarding (1) the relationship between sustainable and economic performance, (2) differences between cooperative and IOF structure and its relations with (3) economic and (4) sustainable performance. Following from this, the chapter summarizes the hypotheses on the possible effect of ownership structure on performance.

Chapter three introduces the model which will be used to test the relationship between ownership structure and performance. The goal of this chapter is to create a combined performance score for each company in the sample. This will result in a performance index for the whole sample. Subsequently, this index is related to the different variables reflecting the conceptual framework introduced in chapter two. Sustainability data was partly retrieved from Sustainalytics, an international sustainability rating agency, and partly gathered as primary data. Data on EP was taken from ORBIS.

Chapter four shows the results and different steps taken for the analysis. Chapter five discusses the findings in chapter four and gives some implications for further research and business and government activities regarding sustainability. Chapter six draws conclusions about the research.

Chapter 2 Literature overview

The possible differences in sustainable performance (SP) and economic (EP) performance between firms with different ownership structures, can arise out of several sources. These sources are explained in this chapter. To understand these relationships, more background is needed: about the relation between ownership structure and both performance indicators, about the assumed relationship between SP and EP, and how the hypotheses follow out of this.

2.1 Relationship EP and SP

Since long the relationship between SP and EP has been the topic of discussion in the economic literature. SP builds on the notion of sustainable development, which comprises 'the simultaneous adoption of environmental, economic, and equity principles' and practices (Bansal, 2005). When evaluating SP, each of these three areas, environment, economics and equity, can be taken into account; some scholars only look at the environmental side of sustainability, other scholars take a broader view. The environmental aspect aims to companies' ecological footprint: the impact of the company on the environment (Bansal, 2005). Environmental management systems (EMS) represent the strategy element of the environmental aspect, wherein different standards exist, for example the ISO 14000 series or the European eco-Management and Auditing systems (EMAS) (Schaltegger & Synnestvedt, 2002). Secondly, economic principles determine the amount of value that is created by the firm, understood as the 'production of new and different products that are desired by consumers, lowering the costs of inputs, or realizing production efficiencies' (Bansal, 2005:200). Thirdly, corporate social responsibility (CSR) aims at benefitting not only the financial stakeholders, but also employees, suppliers and customers and the wider community (Freeman, 1983), taking into account their different expectations and viewing those as legitimate. As these three aspects embody a lot of different performance indicators, this study only looks at the environmental aspect of sustainability.

Most studies assume a positive relationship between SP and EP (Al-Tuwaijri, Christensen, & Hughes Ii, 2004; Guenster et al., 2011; Horváthová, 2010; Molina-Azorín, Claver-Cortés, López-Gamero, & Tarí, 2009; Orlitzky, Schmidt, & Rynes, 2003; Sinkin et al., 2008), especially when the time factor is taken into account (Guenster et al., 2011; Horváthová, 2010). Orlitzky et al. (2003) show that the outcomes of previous studies differ because of different measurement strategies and because of sampling and measurement errors. This suggests that the evidence could be more unambiguous than it has been until now. Still, the empirical evidence remains inconclusive (Horváthová, 2010), especially regarding the causality and direction of the relationship and the role of possible mediating and external factors. Literature distinguishes three main lines of thinking.

1.The Porter hypothesis

The Porter hypothesis (or social impact hypothesis (Salzmann, Ionescu-Somers, & Steger, 2005) or good management theory (Waddock & Graves, 1997)) poses that SP enhances EP. There is a win-win situation, where both performances simultaneously increase. Firstly SP improves EP because it increases efficiency and reduces costs. Stefan and Paul (2008) show that this arises from four sources: improved 'risk management and relations with external stakeholders; lower cost of material, energy, and services; lower cost of capital; and lower cost of labour' (Molina-Azorín et al., 2009):1083. On the other hand, SP also increases revenues. This can be because of 'better access to certain markets, differentiating products, and selling pollution-control technology' (Molina-Azorín et al., 2009):1083, or improved reputation leading to increased sales (Graff, 2005; Guenster et al., 2011; Orlitzky et al., 2003; Surroca et al., 2010). Also, SP leads to better stakeholder relations and to better access to capital, because investors and other stakeholders increasingly pay attention to the sustainability aspect (Epstein & Roy, 2001).

In one way or another all above mentioned effects of sustainability efforts create a competitive advantage for the company implementing the more sustainable practices and therefore lead to value for firms (Graff, 2005; Kramer & Porter, 2007; Sarkis et al., 2010).

2. Slack resources hypothesis

The slack resources hypothesis argues that improving EP can also enhance SP (Orlitzky et al., 2003; Salzmann et al., 2005; Waddock & Graves, 1997). This hypothesis poses that a relatively better EP 'results in a surplus of resources that provides firms with the financial wherewithal to consider social issues' (Surroca et al., 2010):465).

3. External factors hypothesis

Besides the above arguments of a direct relationship between SP and EP, it is argued that external factors simultaneously influence both, or act as mediators. Al-Tuwaijri et al. (2004) investigate the possibility that management's overall strategy simultaneously influences environmental performance, environmental disclosure and economic performance. It is suggested that the degree to which sustainability strategies are integrated in the general strategy makes the difference for how economically successful the sustainability strategies are. This is for example the case with 'end-of-pipe' strategies, that only focus on eliminating pollution at the end of the production process, as opposed to integrated pollution prevention (Schaltegger & Synnestvedt, 2002;

Wagner, 2005). Surroca et al. (2010) show that intangible resources as understood by the resource-based view (RBV), such as innovation, corporate culture, human resources and reputation, act as mediators in both directions. In the same line of thinking, Orlitzky et al. (2003) investigate the mediating effects of reputation, and organizational efficiency that is enhanced by managerial competencies and organizational knowledge, which in turn is enhanced by SP. Darnall and Edwards (2006) do the same by investigating the effects of company resources and capabilities on the adoption costs of environmental management systems (EMS). As they show that more internal capabilities reduce costs, they make an interesting extension by providing additional evidence that ownership structure might influence the resources and capabilities of a company. They compare IOFs (or as they call it, publicly traded companies) with privately owned companies and government agencies, and show that of these three organizational forms IOFs have the lowest adoption costs.

The Porter hypothesis, slack resources hypothesis and external factors hypothesis, have in common that they hypothesize that SP and EP are related and influence each other. Based on the differences between the ownership structure of cooperatives and IOFs, the next sections show how cooperatives and IOFs differ in their EP, and how this study hypothesizes that this can be extended to their SP.

2.2 Ownership structure and EP

As the debate about the competitive position of cooperatives in the market is evolving, adequate performance measurement, being 'the ongoing process of assessing progress toward achieving pre-determined objectives' (Bourne, Neely, Mills, & Platts, 2003; Soboh, Oude Lansink, Giesen, & Van Dijk, 2009) is of growing importance (Soboh et al., 2009). Therefore the objectives of the firm have to be clear, before the right performance indicator can be chosen. This paragraph shows why and what performance indicators for EP for cooperatives and IOFs have been used in the literature.

2.2.1 Empirical evidence

Empirical literature mainly views cooperatives as IOFs both as independent enterprises with managers as decision makers and with an objective of making profit. Therefore, the assessment of EP of cooperatives and IOFs has focused on financial ratios (such as profitability, solvency or liquidity), and sometimes efficiency measures (Soboh et al., 2009). Although it differs per performance indicator, the outcomes of these studies often conclude on a lower performance of cooperatives

compared to IOFs. In the case that no difference exists between the two ownership structures[1], then ownership structure is not of significant importance in explaining EP (Darnall & Edwards, 2006; Kyriakopoulos, Meulenberg, & Nilsson, 2004; Soboh et al., 2009). The literature gives different reasons for the difference in EP between cooperatives and IOFs. Cooperatives would suffer from control problems, also called the principal-agent problem[2], leading to poor and inefficient decision making, e.g. higher transaction costs (such as negotiation) and poor innovation strategies. The horizon problem[3] can lead to underinvestment in fixed assets, especially in long term investments such as R&D and marketing. Related to the horizon problem are the free-rider problem[4] and the portfolio problem[5], expecting members to either require higher returns on their investments or to be reluctant to invest in the cooperative (Cook, 1994; Nilsson & Dijk, 1997; Novkovic, 2008; Soboh et al., 2009). Besides the above mentioned problems, gaining extra equity capital is easier for IOFs than for cooperatives (Soboh et al., 2009; Stoll et al., 2014), because all the equity capital of the cooperative has to come from the members, while IOFs have a much broader range of possible investors. This makes cooperatives more equity bound, limiting entrepreneurial activities (Cook, 1994) and flexibility, and making cooperatives more dependent on debt, which expresses itself in higher leverage ratios and lower liquidity and solvency ratios (Nilsson & Dijk, 1997; Soboh et al., 2009).

2.2.2 The multi-objective cooperative

The empirical evidence and the above mentioned explanations in the literature suggest that the cooperative structure is inferior to IOF structure with regard to the EP. However, Soboh et al. (2009) show that a discrepancy exists between the empirical studies using the assumption that cooperatives have a single-objective and testing this with financial ratios, while theoretical studies point out that

[1] Ownership structure represents the ownership and control of a company, defined as (1) the interests and constraints of owners (in case of cooperatives the members, in case of IOFs the shareholders) and managers, including the conflicts among these two; and (2) the abilities of these parties to obtain resources and factor markets, such as capital, management, and technical talent (Darnall & Edwards, 2006:307).

[2] The principal-agent problem occurs when managers have differing objectives than members, or members have conflicting objectives among themselves, resulting in internal conflicts. It can be assumed that the more homogenous the members' objectives, the less conflicts and thus the higher the efficiency of decision making (Nilsson & Dijk, 1997).

[3] The horizon problem arises out of a shorter residual claim of members on assets than the life of those assets. Therefore members have no incentive to invest, as they cannot withdraw the full value upon departure.

[4] The free-rider problem is that members do not bear full costs of their actions (Novkovic, 2008), thus profiting from other members' investments.

[5] As members' 'claims on the assets (share in a co-operative) cannot be freely traded, members are inhibited from diversifying or concentrating their investment portfolio to take account of their personal wealth and their preferences for risk-taking' (Nilsson & Dijk, 1997; Soboh et al., 2009):41).

cooperatives have multiple objectives, thereby suggesting that other performance measures are needed to capture all the economic value that cooperatives add. Not only can cooperatives have other and multiple objectives, the objectives of cooperatives also differ between cooperatives, making the diversity among cooperatives similar to the diversity that exists among IOFs (Soboh et al., 2009).

The multi-objective nature of cooperatives rises out of the core objective of a cooperative: to defend the member interests. This core objective implies that the economic benefits of cooperatives are above all directed at the members. As member interests are diverse, the cooperatives' objectives are as well. (Cook, 1994; Mazzarol, Reboud, Limnios, & Clark, 2014b; Nilsson & Dijk, 1997; Royer, 2014; Soboh et al., 2009). Most importantly the cooperative provides countervailing market power to its members: the members are individually too small to affect market conditions, such as price, and total quantity supplied on the market. (Cook, 1994; Soboh, Oude Lansink, & Van Dijk, 2012). What influence cooperatives exactly have in the market depends on the identity of their members. The members of marketing cooperatives sell their production to the cooperative, while the members of input-supply cooperatives buy their inputs from cooperatives (Royer, 2014). Both forms of organizations bring economic balance in markets, and as the competitive yardstick argues, thereby force other players in the markets (such as IOFs) to become more competitive (Royer, 2014).

To be able to defend the interest of their members, a prerequisite is that the cooperative survives and is financially healthy. However, the survival and thriving of the cooperative is not a goal in itself, but allows the members to reach their objectives for joining the cooperative. The motives for members to join the cooperative differ per situation, implying that members carry out different roles that reflect different relationships with the cooperative. As Mazzarol et al. (2014b) shows, these roles include the roles of patrons, investors, owners and community members.

Patron

Often members' main role is the role of patron, meaning that members use the cooperative as a trading partner. One of the most important performance measures is the price that the cooperative offers to its members, which has to more attractive than the price of IOFs. This includes the volatility of the price, which the cooperative can decrease, thus providing their members with market stability.

Secondly, cooperatives and members sometimes view the success of a cooperative in terms of size and growth, meaning that they aim for maximization of the production (Royer, 2014). Then the quantity that a member sells to the cooperative is another performance measure. When the cooperative and its members agree on a certain

quantity produced beforehand, the cooperative can also provide its members with selling security (Roskam, 2014; Soboh et al., 2012). Thirdly, when the cooperative also functions as a processing company for the member supply, the efficiency with which the cooperative operates is important to keep the price as competitive as possible. Lastly, the added value of the quality of the services of the cooperative should be at least that high that the transaction costs of joining the cooperative are outweighed. This makes the quality of the services another important performance measure.

Investor

Where members are patrons throughout the year, the second role of member as investor is only performed a few times a year. However, for less active members that do not trade with the cooperative (that much), this role becomes more important. The most important performance measure for members as investors is the profitability of the cooperative, for example measured in return on investment (ROI), return on assets (ROA) or return on equity (ROE). Profitability as an objective does not always easily go together with offering attractive prices to members as patrons (i.e. the higher prices you offer, the higher the expenses of the cooperative and therefore the lower the profitability). Therefore these two different roles can lead to internal conflicts, especially when the heterogeneity of the members is high (i.e. there are different groups among the members that perform different roles and therefore have different objectives).

As an investor, profitability is not the only important performance measure, but also the financial situation of the cooperative. When the cooperative is financially healthy, members are not at risk of losing their capital, e.g. in case of a bankruptcy. Therefore financial health, stability and sometimes even growth can be important.

Owner

Thirdly the member is an owner of the cooperative. The most important aspect of this role is the accompanying right to vote as a means of control in the company. This allows members to strengthen their interests within the cooperative and motivates them to be involved in the management of the cooperative. Besides the economic objectives to be involved, this can also be personal, such as a feeling of relatedness with the cooperative because of a common history (J. Birchall & Simmons, 2010). Thus the ownership role of a member adds value by giving the member decision making power in the market it otherwise would not have.

Community member

Fourthly and lastly members are part of the wider community, implying that the cooperative has to take into account the impact that they have on the communities of their members. This mainly regards social benefits. The first important social benefit that the cooperative offers is democratic control and equal voting. Kyriakopoulos et al. (2004) shows that democratic control significantly adds to the value of cooperatives, and without it that a cooperative is less profitable, because of the risk of demutualization (J. K. Birchall, Lou Hammond, 2009).

Another social benefit, which is one of the founding principles of a cooperative, is education and training of members, as well as information sharing and mutual support, both internally and among cooperatives (Mazzarol, Reboud, Limnios, & Clark, 2014a). This provides the members with social capital, understood as reciprocity between members, trust and mutual benefit. 'From the perspective of the market, the role of social capital is to help bridge gaps that might otherwise exist between people and stop the flow of information' (Mazzarol et al., 2014b):32). Thus it addresses the issue of asymmetric information between stakeholders (Cook, 1994), which is eliminated between the members of a cooperative.

The role of community member implies that community support is an extra important aspect of cooperative policies and strategies compared to IOFs, as well as that the company outcomes for the community are taken into account when evaluating the performance of the cooperatives. Although it is hard to translate the social benefits into monetary values, often the social dimension of the cooperative is crucial for survival: they are a requirement for the cooperative to function effectively and are part of their competitive advantage (Kyriakopoulos et al., 2004; Mazzarol et al., 2014a).

In line with these different objectives, Royer (2014) shows theoretically that different objectives lead to different outcomes in the strategy and EP of cooperatives. Royer's theory explains the wide range of structures and strategies that can be observed among cooperatives, making the group of cooperatives far from homogenous (Soboh et al., 2009). Also, Royer's theory makes the single-objective assumption that is applied to IOFs less likely for cooperatives. Therefore it can be concluded that for a cooperative, financial ratios and efficiency measures do not capture all the value that is created, because the value is captured by their members instead of the cooperative itself (Bansal, 2005; Nilsson & Dijk, 1997; Novkovic, 2008; Soboh et al., 2009; Soboh et al., 2012).

2.3 Ownership structure and SP

In the literature little is known about the SP of cooperatives. The only thing that is shown is that the diversity among cooperatives is as high as among IOFs (Stoll et al., 2014). Literature suggests that the important factors for SP of cooperatives are age, size, type (marketing or supplier-cooperative), and the sector in which they operate (Stoll et al., 2014).

A hypothesis about the SP of cooperatives versus IOFs has not yet been tested. Following the combination of the Porter hypothesis, slack resources hypothesis and external factors hypothesis in paragraph 2.1, and the empirical evidence introduced in paragraph 2.2, this study introduces some hypotheses.

Internal factors: Porter Hypothesis

When in paragraph 2.2 it is concluded that cooperatives often have a lower EP than IOFs, the Porter hypothesis explains this as a result of lower SP. There are different arguments for a possible difference of cooperatives and IOFs in SP. Firstly, motivation, and therefore effort and investment, could be a reason for a difference in SP. Agricultural marketing cooperatives generally are more conservative and more averse to change than IOFs (Stoll et al., 2014). A relatively new business concern such as sustainability, could be less relevant for cooperatives. Besides this, cooperatives have more objectives to address than IOFs, as shown in paragraph 2.2. Multiple objectives causes more pressure on management (Cook, 1994). On the other hand literature shows that management commitment is one of the most important factors guaranteeing the success of investments in SP (Graff, 2005; Zutshi & Sohal, 2004). As cooperatives experience more pressure on their management, cooperatives may be less willing and less able to (successfully) address sustainability.

On the other hand, some authors argue that environmental care inherently comes with care for members; as the members are bound to their land, and cooperatives are bound to their members (Gertler, 2006; Stoll et al., 2014), the long term environmental quality is of great importance to the cooperative. Therefore cooperatives will be more motivated to invest in SP, which could lead to higher SP (Novkovic, 2008; Stoll et al., 2014).

Lastly, motivation for SP arises from the market: when the market values sustainability, for example in the form of higher prices or more market share, companies have an extra incentive to invest in sustainability. When the market is one of the most important factors for companies in their strategy, and as the market is the same for cooperatives and IOFs, this would lead to argue that SP of cooperatives and IOFs is the same.

Where Stoll et al. (2014) suggest motivational differences between cooperatives and IOFs, literature also suggests a possible difference in the efficiency with which different ownership structures implement measures that enhance SP. For example, in a study of Darnall and Edwards (2006) adoption costs for EMS differed per ownership structure: IOFs had lower costs than government agencies and private companies, because IOFs implemented the EMS more efficiently, because they have more internal capabilities and resources available. Cooperatives as a different ownership structure were not included in the analysis of Darnall and Edwards (2006), so what can be expected for cooperatives is ambiguous. It could indeed be that for cooperatives implementation of new EMS is more costly, for as Cook (1994) shows, a change in strategy is harder to establish in a member-controlled environment where everybody or the majority has to agree requirements. Also cooperatives already experience more pressure on management resources, because there are multiple objectives in the company (Cook, 1994). However, this argument can be altered by posing that cooperatives have more capabilities available that allow them to deal with multiple objectives. For example, more skills are expected of cooperative managers than of IOF managers, because cooperative managers have to deal with more internal conflicts than IOFs (Cook, 1994). Therefore, implementation of an additional objective of sustainability may require less extra capabilities in cooperatives than in IOFs, leading to lower adoption costs.

The above mentioned motivational and efficiency arguments about the question whether cooperatives perform better or worse than IOFs regarding SP, do not give a real direction. Rather, the arguments contradict each other and either favour or disfavour cooperatives as sustainable. Therefore no hypothesis is formed out of the Porter hypothesis.

Internal factors: Slack resources hypothesis

The slack resources theory argues the other way around than the Porter hypothesis does; the lower EP of cooperatives predicts a lower SP, because cooperatives will have less resources available for additional investments to improve their SP, such as different EMS or more efficient machinery. This thus is not so much a matter of motivation, like with the Porter hypothesis, but rather of possibility. As paragraph 2.2 shows, cooperatives generally have a lower EP than IOFs. Following the slack resources hypothesis, with a lower EP also SP is expected to be lower. Therefore, when taking EP as a starting point, it can be reasoned that SP of cooperatives is lower. Therefore, the first hypothesis of this study is:

$H1_0$: Cooperatives have a lower SP than IOFs.

$H1_a$: There is no difference in SP between cooperatives and IOFs.

However, as paragraph 2.2 also shows, empirical studies might not give a right picture of EP of cooperatives, as they only measure financial ratios, and ignore other indicators for EP, such as price offered to members and the value of social benefits. When it is assumed that the EP of cooperatives is higher than indicated by empirical studies, it could well be that the SP of cooperatives is equal to or better than that of IOFs. This provides a good explanation when the hypothesis is not confirmed.

External factors: ownership structure

When ownership structure is viewed as a purely external factor influencing both factors, a total performance of a company should be considered, combining EP and SP. When both EP and SP are expected to be lower for cooperatives, following the slack resources hypothesis, then also the total performance of companies is expected to be lower for cooperatives. Therefore the second hypothesis of this study is**:**

$H2_0$: In a combined performance of EP and SP IOFs perform significantly better than cooperatives.

$H2_a$: In a combined performance of EP and SP cooperatives and IOFs perform the same.

2.4 Control variables and conceptual framework

The main relationship that will be tested for in this study is between total performance of companies, where ownership is an external factor influencing both EP and SP. To answer hypothesis one and two, SP and EP are also analysed apart from each other. As control variables the study includes firm size (Guenster et al., 2011; Russo & Fouts, 1997; Surroca et al., 2010; Wagner, 2005), sector, and country. Turnover in US dollar is taken as an indication for size of the company. For bigger companies it is easier to invest in sustainability more and more radically than for small companies, as they have more flexibility in resources for investments. Therefore it is expected that bigger companies perform better. The control variable sector controls for differences in market conditions, such as the competitive environment of companies (Kyriakopoulos et al., 2004; Russo & Fouts, 1997; Schaltegger & Synnestvedt, 2002; Surroca et al., 2010). The country control variable controls for differences in government regulations and market conditions in the country (Surroca et al., 2010; Wagner, 2005). Furthermore, to account for cooperative type, only agricultural marketing type cooperatives were included in the analysis (Kyriakopoulos et al., 2004). As some articles suggest, asset turnover and solvability could also be included as control variables to account for capital intensity (Russo & Fouts, 1997; Wagner, 2005). However, in this study these variables were part of the measure for EP of companies, as they also are an indication of the economic performance of a company, regarding leverage and efficiency (activity ratio).

This set of variables leads to the following graphical representation of the conceptual framework. Figure 1 shows hypothesis 1. The main research question, hypothesis 2, is represented in figure 2.

Figure 1: hypothesis 1

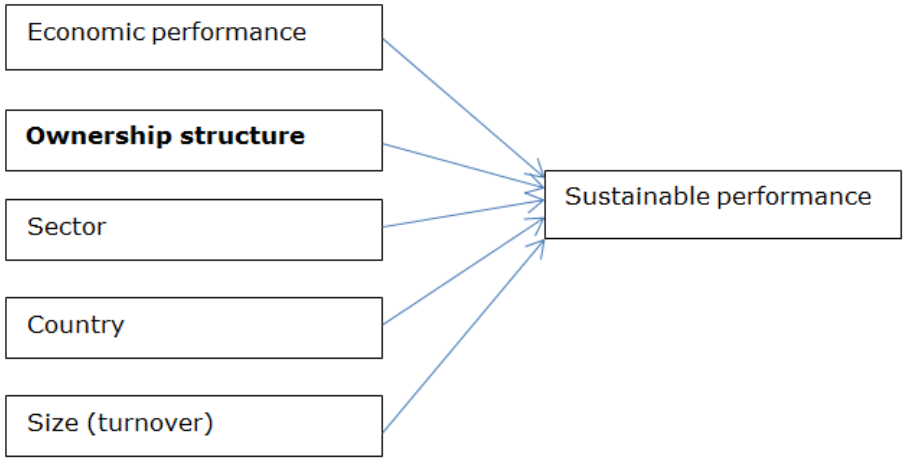
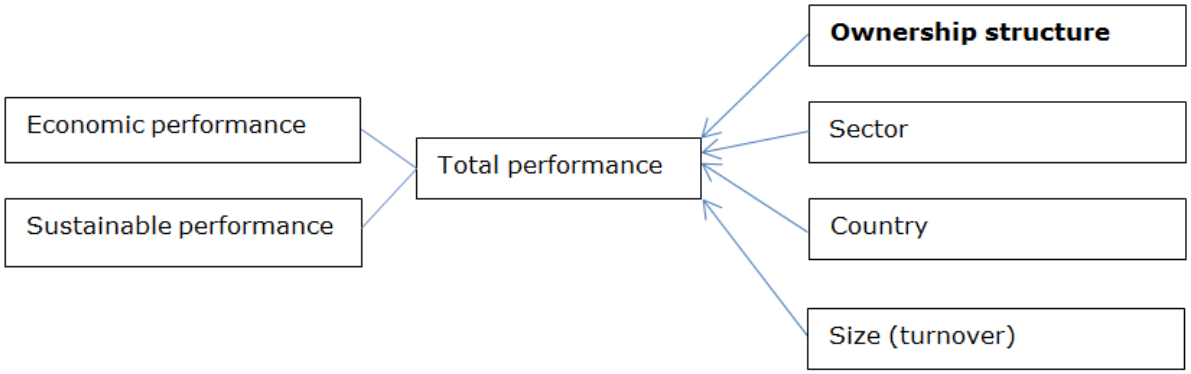


Figure 2: hypothesis 2



The arrows represent an explanatory relationship. The two connections of economic and sustainable performance in figure 2 are not explanatory relationships, but show that total performance is a combined score of these two performance indicators.

Chapter 3 Data and Methods

This chapter explains what indicators were used to measure the SP and EP of the companies, and what the sources of information were. Also it gives background on the sample selection and data characteristics, and how in some cases this was transformed. Thirdly, it introduces the model for testing for hypothesis 1 and 2.

3.1 Performance indicators

3.1.1 Indicators for SP

In the context of estimating the relationship between SP and EP, the measurement strategies for SP have been to look at (1) company disclosures, (2) reputation ratings, (3) social audits, SP processes, and observable outcomes (such as pollution measures), and (4) managerial SP principles and values (Orlitzky et al., 2003). This means that SP has been defined narrowly, e.g. as a quantitative measure of emissions, but also more broadly, taking into account environmental, social and governance issues.

IOFs

The performance indicators that this study uses for SP are based on the rating system of Sustainalytics, a professional rating company for sustainability, that evaluates firm performance of IOFs, to provide more insight for investors (Sustainalytics, 2015). The sources of information that Sustainalytics uses is publicly available information, and thus mainly fall in the category of company disclosures, such as annual reports and specific sustainability reports, and other news channels. Environmental management systems are also considered, such as ISO-certification, falling under managerial SP principles. To a certain extent targets are also considered, falling under observable outcomes. The data is translated in a rating system addressing three dimensions of sustainability: environmental, social and governance. For this study only the environmental dimension is considered. In the environmental dimension, categories are operations, contractors and supply chain, and products and services. Under ‘operations’ the policy and management systems are evaluated, and it is checked whether the company has formulated measurable objectives for the coming years. Other environmental achievements are measured, such as energy and water use and how this develops over time. Under ‘Contractors and Supply Chain’ it is evaluated how a company deals with stakeholders, such as suppliers and customers, in the area of sustainability. For example a company can stimulate, facilitate or even require environmental investments. Under ‘Products and services’ it is evaluated whether the company is involved with development of sustainable products or production processes (DuurzaamAandeel, 2015).

For all three dimensions, different indicators are used, for example the presence of water or energy programs, presence of policy on stakeholder sustainability, or carbon intensity. Depending on how well a company performs, companies obtain a score on a scale of 0-100 for each indicator, where an outstanding good score is 100. The scores for the different indicators then are weighed and averaged in a score for the three dimensions, which subsequently are averaged in one overall performance score (Sustainalytics, 2014).

Cooperatives

To evaluate the SP of the cooperatives, this study used approximately the same indicators as Sustainalytics. Sources of information were similar too, namely CSR reports, annual reports and other policy documents published on the website of companies. Seven indicators were averaged in three main dimensions, strategy and management, resource targets, and stakeholder involvement. Strategy and management regards the management systems and environmental policy. Resource targets evaluates the targets of companies regarding energy, water and waste management, and when no targets are formulated, what and how many activities are undertaken in each resource area. Stakeholder involvement evaluates how the company deals with stakeholders, in this case especially cooperative members. For example whether the cooperative stimulates and helps members to become more sustainable.

To evaluate the valuation of the indicators used for the cooperatives, which were based on the indicators of Sustainalytics, scores of cooperatives measured by Sustainalytics and my own scores of these cooperatives were compared by doing a correlation analysis. The coefficient was 0.87, which shows that the measurement systems are highly correlated, and the SP of IOFs and cooperatives are similar. The fact that the difference in measurement systems probably leads to a measurement bias, is taken into account in the discussion.

3.1.2 Indicators for EP

The measurement strategies for EP in studies estimating the relationship between SP and EP have been market-based, accounting-based and perceptual (survey) measures (Orlitzky et al., 2003). In the specific case of cooperatives, Soboh et al. (2009) show that most studies studying the performance of the agricultural cooperatives mainly use classical financial ratios to account for EP. These ratios generally cover four performance areas, profitability, leverage, liquidity and efficiency. As all dimensions address different performances, this study incorporates all four areas.

Profitability is the most basic indicator for performance: is the company making money for its beneficiaries? One of the most common measures to express profitability is return on equity (ROE),

which indicates the value (return) that the company derives from the investments of their members or investors (equity). The higher the ratio, the better.

$$\text{Return on equity (ROE)} = \frac{\text{Net income}}{\text{Total equity}}$$

Leverage ratios are an indication of the capital structure of a company, namely whether management prefers to use equity capital or debt capital, thus equity (=investments from members or investors), or debt (loans from e.g. banks or other lenders)(McKee, 2008). Leverage is important for the EP of a firm, because of the issue of solvency: whether a company is able to repay its debt when this is needed (Roskam, 2014). One of the solvency ratios is the total equity ratio, an indication of the share of equity in the company versus debt. The higher the ratio, the better:

$$\text{Total equity ratio} = \frac{\text{Total equity}}{\text{Total assets}}$$

The issue of liquidity addresses the ability of the company to fulfil short term obligations, such as current liabilities (Chesnick, 2000). The current ratio shows this as a ratio of current assets, i.e. the assets that can easily be transferred into cash, which can be used to account for the current liabilities. The higher the ratio, the better.

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

Lastly, activity ratios are an indication of a firm's efficiency. Asset turnover for example shows how a firm's assets (i.e. its resources, such as labour and material) are used for production, expressed in sales. Again: the higher the ratio, the better. Based on the dataset that was used, this study did not use total assets for the asset turnover, but instead total assets without current liabilities (so equity + non-current liabilities).

$$\text{Total asset turnover} = \frac{\text{Net sales}}{\text{Total assets} - \text{current liabilities}}$$

Besides Sustainalytics and the company reports where the environmental data was taken from, the financial data of the companies was retrieved from ORBIS, a global database containing almost all the companies in the world.

3.2 Data description

The sample of the study comprises 31 European companies in the food and beverages sector, mainly agricultural companies, such as dairy, meat, horticulture and sugar (arable) companies, among which there are 18 cooperatives and 13 IOFs. The basic company characteristics of the sample, such as

country, sector and size (turnover in US dollars in thousands in 2013), are given in Appendix A. For all companies four years were taken, 2010-2013, giving a total of 124 data points.

The IOFs were taken from the database of Sustainalytics. For some companies all the years were given, for others the score was calculated using the same method as with the cooperatives. Some of the IOFs only recently transformed from a cooperative structure into an IOF structure, such as the Kerry Group and Glanbia.

The cooperatives were selected from a report of Cogeca, the General Committee on Agricultural Cooperation in the European Union (Cogeca, 2014). Cogeca is currently recognized as the main representative body of cooperatives in the EU, and it defends the interests of all European cooperative members. The report gives a list of the development of the top 100 European agricultural cooperatives in size (Cogeca, 2014). From this list all marketing cooperatives were checked. Where information was available for all four years and was linguistically accessible for the researcher, the cooperatives were further considered for their environmental scores. Some of the cooperatives which were initially included, such as VION and DOCkaas, in the end were excluded because information was insufficient in other ways. For example DOCkaas did not have all the financial data and in the case of VION, reorganization in recent years sketched a misleading picture. This selection process led to the sample of 31 companies.

Some of the data had to be transformed before it could be used. Because ROE in some cases was negative, while the model (paragraph 3.3) cannot contain negative values, 30 points were added to all ROE values. Instead of turnover, the natural logarithm of turnover was taken, to correct for extreme outliers in the right tail. Also in some instances, ORBIS did not give the values for the right ratios. In that case the ratios were found in annual reports or calculated from data found in annual reports. In one case, Westfleisch 2013, the current ratio was excessively high, which would give a wrong image of the performance of all the companies in that whole year. To solve the issue, the current assets of 2013 were taken, divided by the current liabilities of 2012, resulting in a normal value 2. Descriptive statistics are given in table 1 and table 2.

Table 1: Data descriptive statistics: continuous variables

Ownership structure	Year	No. of obs.	SP score	Solvency ratio	Current ratio	Asset turnover	ROE +30	Turnover
Cooperatives	2010	72	49.60	34.27	1.32	3.54	40.88	3101
	2011		60.02	34.94	1.34	3.60	39.22	3477
	2012		65.76	34.73	1.26	3.84	40.57	3795
	2013		64.58	35.48	1.29	3.45	35.35	4206
	Total		**59.99**	**34.85**	**1.30**	**3.61**	**39.01**	**3645**
IOFs	2010	52	58.20	45.68	1.65	1.53	50.03	21236
	2011		58.40	46.06	1.62	1.48	43.48	17546
	2012		60.69	45.25	1.53	1.61	41.54	19741
	2013		62.77	48.63	1.71	1.71	43.17	20332
	Total		**60.01**	**46.41**	**1.63**	**1.58**	**44.55**	**19714**

Table 2: Data descriptive statistics, dummy variables

	Dummy nr.	No. of Obs	SP score	Solvency ratio	Current ratio	Asset turnover	ROE +30	Turnover
Sector								
Dairy	0	60	61.76	37.56	1.46	2.85	40.07	5642
Meat	1	28	49.32	39.04	1.54	3.64	44.90	3005
Horticulture	2	4	86.11	16.90	0.68	5.03	25.80	1684
Arable	3	16	57.92	45.97	1.54	1.42	40.23	4664
Multiple	4	16	67.64	48.31	1.27	1.64	44.81	48971
Year								
2010	0	31	53.21	39.05	1.46	2.70	44.71	10706
2011	1	31	59.34	39.61	1.46	2.71	41.00	9377
2012	2	31	63.63	39.14	1.37	2.90	40.98	10482
2013	3	31	63.82	41.00	1.46	2.72	38.63	10968
Countries								
UK	0	20	61.88	40.99	1.34	3.98	40.02	4768
Netherlands	1	20	77.64	37.89	1.34	2.62	38.54	17119
Germany	2	12	55.01	40.73	1.54	5.40	35.60	5592

Belgium	3	4	21.81	27.23	1.29	4.06	34.66	1215
France	4	8	61.36	36.64	0.87	1.03	41.15	14847
Spain	5	4	63.89	50.93	1.34	2.66	33.51	950
Austria	6	4	52.57	45.38	1.52	1.73	41.28	3337
Switzerland	7	8	73.39	52.44	1.46	1.51	47.24	56280
Italy	8	8	48.72	48.00	2.11	1.94	35.30	3894
Denmark	9	12	67.22	28.13	1.37	3.27	54.39	7024
Finland	10	8	51.91	37.10	1.01	2.47	31.73	2510
Ireland	11	12	54.16	37.76	1.55	1.14	47.94	4217
Ukraine	12	4	24.17	44.45	2.78	0.76	54.44	1385

3.3 Model

3.3.1 Hypothesis 1

For the different steps in the analysis, different methods are used. For the first step, to estimate hypothesis 1 (i.e. cooperatives have a lower SP than IOFs), a Tobit censored regression model was used, because the values of the dependent variable, SP, lie between 0 and 100. The variable of interest is ownership structure, which was regressed as a dummy, with value 0 for cooperatives and value 1 for IOFs. The control variables size, a continuous variable, and country, sector and year, dummy variables, were also included, as well as the financial ratios[6].

3.3.2 Hypothesis 2

For the second hypothesis (i.e. in a combined performance indicator of EP and SP, IOFs perform significantly better than cooperatives), a combined performance indicator was calculated using the original performance indicators. Such a composite performance indicator is defined as a mathematical collection of indicators to measure multidimensional concepts that cannot be captured in one single indicator (OECD, 2008). So, instead of using four financial performance indicators and one environmental indicator, one summary performance indicator was used for the estimation of hypothesis 2. The advantage of a composite indicator is that it gives a more complete picture of the overall performance of a company, because it consists of five performance indicators instead of one. This makes the analysis more reliable. A disadvantage is that averaging the data puts a weight on the data that is not necessarily justified, for example when outliers weigh extra heavy. Therefore as a control mechanism, the analysis also included the financial indicator separate regressions.

[6] A list of variables is given in Appendix B.

DEA analysis

As a first step of the creation of the composite indicator index, the Data Envelopment Analysis (DEA) method creates a benchmark for all companies relative to the best performing company, on basis of which it gives all companies a score (Charnes, 1978; Ray, 2004). For this the DEA creates a best-practice frontier, like a production frontier, which was performed in the statistical package R, with the FEAR library developed by Wilson (2008). An example of a simplification with two dimensions is shown in figure 3, where the environmental score and the solvency ratio of 2013 are shown in a scatterplot. The red line represents the best-practice frontier. The scores of all companies are calculated as can be done by the example point in the graph: the length of the green line is divided by the sum of the green and orange line. For the companies on the best-practice frontier, the score will be 1 or close to 1, while the bad performing companies will have a score closer to 0. In the real analysis instead of two dimensions, five dimensions were used.

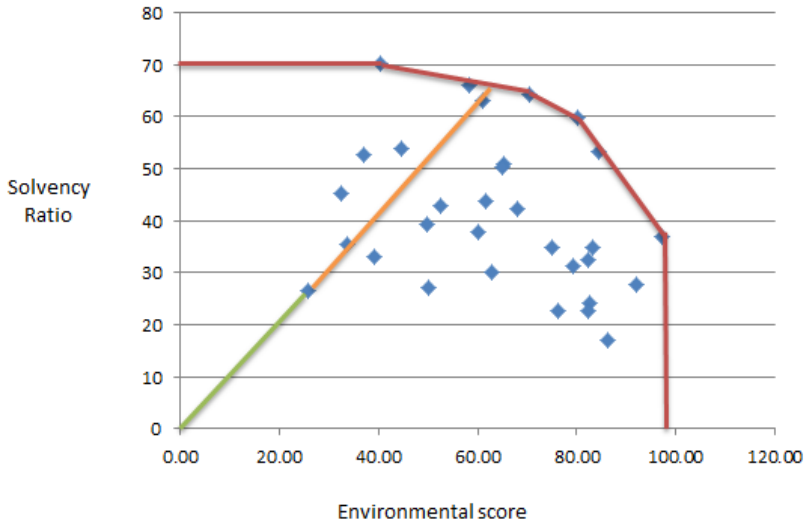


Figure 3: simplification of DEA best-practice frontier.

The DEA method is a linear programming model, which is solved with the model below. The model is taken from Horta, Camanho, and da Costa (2012), who built their model on earlier versions of Farrell (1957), who came with the initial idea, Charnes (1978), who named the method DEA, and first used the DEA method to estimate best-practice frontiers, and Banker, Charnes, and Cooper (1984), who introduced variable returns to scale instead of constant returns to scale (Roskam, 2014).

$$C_{j_0} = \max \sum_{r=1}^{s} u_r y_{rj_0}$$

Subjected to:

$\sum_{r=1}^{s} u_r y_{r_j} \leq 1,$ j = 1,…,n

$u_r \geq 0,$ r = 1,…,s (1)

The composite indicator C_{j0}, with cooperative j $(j = 1, \dots, n)$ and output indicator r $(r = 1, \dots, s)$ corresponds to the value of y_{r_j}. In this study n =31 and s =5. As input for the linear programming model a dummy was used, with for all observations a value of 1. The vector u_r puts a weight on each indicator, which is most beneficial for all companies. This is convenient, as it is difficult to formulate an a priori set of weights with which all companies in the analysis are satisfied. In this method each cooperative selects its own weights, depending on what gives the highest score. Another note is that variable returns to scale (VRS) are used, as the assumption that all firms are operating at an optimal scale is not legitimate due to all kind of possible scale inefficiencies (Coelli, Rao, O'Donnell, & Battese, 2005).

Bootstrapping

A second step in the creation of the composite indicator index, is adjusting the scores that were obtained in the first step for measurement errors and random noise in the data. This is done by bootstrapping (Horta et al., 2012). The possible errors are caused by the deterministic approach of the DEA methods, that assumes that no random factors determine the location of the frontier. With the method developed by Simar and Wilson (1998), the bootstrapping method corrects the scores for the possibility of a measurement error and allows to derive a confidence interval for the scores, which can be used to see whether the scores differ significantly. The steps to arrive at these sample bias-corrected scores, taken from Horta et al. (2012):86, are:

1) Compute the performance estimates $\hat{C}_j$ for each DMU $j = 1, \dots, n$ by solving model (1).
2) Use Kernel density estimation and the reflection method to generate a random sample of size *n* from $\{\hat{C}_j, j = 1, \dots, n\}$, resulting in $\{C^*_{jb}, j = 1, \dots, n\}$.
3) Generate a pseudo dataset $\{(x^*_j, y^*_j), j = 1, \dots, n\}$ in order to form a bootstrap technology.
4) Compute the bootstrap estimate of performance C^*_{jb} of $\hat{C}_j$ for each $j = 1, \dots, n$.
5) Repeat steps 2-4 *B* times $(B = 2000)$ to obtain a set of estimates $\{C^*_{jb}, b = 1, \dots, B\}$.

When the bootstrapped values are computed, the bias of $\hat{C}_j$ is obtained:

$$\widehat{bias}_B(\hat{C}_j) = B^{-1} \sum_{b=1}^{B} \hat{C}^*_{jb} - \hat{C}_j \quad (2)$$

The bias-corrected estimates of C_j then are:

$$\widehat{\hat{C}_j} = \hat{C}_j - \widehat{bias}_B(\hat{C}_j) = 2\hat{C}_j - B^{-1}\sum_{b=1}^{B}\hat{C}_{jb}^{*} \quad (3)$$

To get the confidence intervals for C_j, the values $\left(\hat{C}_{jb}^{*} - \hat{C}_j\right)$ for $b = 1, \dots, B$ need to be sorted in increasing order, and at either end of the sorted array $\left((\alpha/2) \times 100\right)\%$ of the elements need to be deleted. Subsequently, $-\hat{b}_\alpha^*$ and $-\hat{a}_\alpha^*\left(\hat{a}_\alpha^* \leq \hat{b}_\alpha^*\right)$, need to be set equal to the end points of the sorted array. The estimated $(1-\alpha)\%$ confidence interval then is:

$$\hat{C}_j + \hat{a}_\alpha^* \leq C_j \leq \hat{C}_j + \hat{b}_\alpha^* \quad (4)$$

The result of all the steps is a table with subsequently (1) DEA score, (2) bootstrapped DEA score (a bit lower scores than DEA scores), (3) the bias $\widehat{bias}_B(\hat{C}_j)$, (4) the variance, and (5,6) the lower and upper bound of the confidence interval. The bootstrapped DEA scores are used for the final stage of the analysis.

Truncated regression

On the composite indicator index created in step 1 and 2, subsequently the variable of ownership structure and the control variables are regressed to test for hypothesis 2. This time a truncated regression was used, because there can be no values above 1 or below 0. For the companies that were not included in the sample, but that perform better than the companies with score 1, the truncated regression adjusts. The model, taken from Horta et al. (2012) and (Simar & Wilson, 1998), looks the following:

$$C_{jt} = \alpha_0 + z_{jt}\beta + \varepsilon_{jt} \quad (5)$$

'Subscript j represents the j^{th} cooperative $(j = 1, \dots, n)$, subscript t represents the time period $(t = 1, \dots, l)$, α_0 is an intercept, z_{jt} represents the set of regressors previously identified, β denotes the regression coefficients and $\varepsilon_{jt} \sim N(0, \sigma_\varepsilon^2)$ is the error term with a $N(0, \sigma_\varepsilon^2)$ distribution with a truncation at $\left(1 - \alpha_0 - z_{jt}\beta\right)$. Note that C_{jt} corresponds to the performance level of cooperative *j* in year *t*, estimated by using model (1) and the bootstrapping technique' (Horta et al., 2012):87.

Whereas the control variable of year was included with testing hypothesis 1, for the regression on the DEA scores, year was left out. Reason for this was that the DEA scores were obtained in four different analyses, for every year one. As every year has its own characteristics that influence company performance, such as available technology, government regulation, taxes, or interest on the market, year analyses control for these factors. However, a disadvantage of doing separate analyses is that company performance cannot be compared over the years. Therefore the control variable year is left out.

Chapter 4 Results and analysis

4.1 Ownership structure and SP

4.1.1 Hypothesis 1

To test for hypothesis 1, (i.e. cooperatives have a lower SP than IOFs), first the means of the scores were derived and analysed, shown in table 3. The mean of the total sample shows that there is little difference between cooperatives and IOFs. An independent sample t-test is performed on the difference, both for the total score and for the scores per year. The result for the total score is not significant, with a significance of 0.99. The means show that in 2010 cooperatives performed worse than IOFs, while in the following years until 2013 they performed slightly better. Apparently the SP of cooperatives has improved more radically than that of IOFs. However, the t-tests per year are not significant either, so in not one of the years cooperatives or IOFs performed significantly better on SP. Indeed the censored regression on dependent variable SP, including all control variables[7], shows that ownership structure does not significantly relate to SP (table 4). This confirms the finding that the means do not differ. With this finding it then can be concluded that hypothesis $H1_0$, that cooperatives have a lower SP than IOFs, is rejected, which means that the alternative hypothesis $H1_a$, that there is no difference in SP between cooperatives and IOFs, still holds.

Table 3: Means of the SP per ownership structure.

	2010	2011	2012	2013	Total
Cooperatives	49.60	60.02	65.76	64.58	59.99
IOFs	58.20	58.40	60.69	62.77	60.01
t-test	-1.09	0.23	0.68	0.25	-0.01
Significance	0.29	0.82	0.50	0.80	0.99

4.1.2 Control variables

Other noteworthy outcomes of the analysis are the effects of the EP and the control variables. We find that of the financial ratios, not one is significantly related to SP.

Turnover, which indicates the size of the companies, is highly significant, with a size 7.71. As the natural logarithm of turnover was taken, this means that when turnover rises with 1%, the SP score of the companies goes up 7.71 points.

[7] Two regressions were performed, one with the composite indicator for EP vs. the four separate financial ratios; subsequently the model was chosen with the highest chi-squared: with separate financial ratios.

The meat, arable and multiple sector companies all performed significantly worse than dairy companies, with respectively a coefficient of approximately -8,38, -9.08 and -26.73.

Geographical effects were hard to interpret, as for most countries only one or two companies were considered (Belgium, France, Austria, Spain, Switzerland, Italy, Finland, and Ukraine). Therefore, although these variables were included in the regressions, they were not interpreted on their own significance. From the country analysis it turns out that Germany and Ireland perform significantly worse than the UK on SP.

Lastly, over the years the SP clearly goes up. 2011 has a higher score of 5.61 than 2010; 2012 and 2013 are approximately the same, with a higher score of around 9 compared with 2010.

Table 4: Censored regression on SP.

(Control) Variables	**Parameter estimate**	**P-value**
Ownership structure	-2,23	0.41
Turnover (LOG)	**7.71**	**0.00*** **
Financial ratios		
Solvency	-0.15	0.27
Current ratio	-5.04	0.10
Asset Turnover	-1,50	0.12
ROE + 30	-0.03	0.84
Sector effects relative to dairy		
Meat	**-8.38**	**0.10***
Arable	**-9.08**	**0.09***
Multiple	**-26.73**	**0.00*** **
Geographical effects relative to UK		
Netherlands	7.93	0.12
Germany	**-13.11**	**0.03****
Denmark	-6.57	0.33
Ireland	**-22.80**	**0.00*** **
Year effects relative to 2010		
2011	**5.61**	**0.06***
2012	**8.95**	**0.00*** **
2013	**9.35**	**0.00*** **
Model strength Probability > chi-squared)	139.34	0.0000

(Sig. on a 10% confidence interval: *, Sig. on a 5% confidence interval: **, Sig. on a 1% confidence interval: ***)

4.2 Ownership structure and composite performance

4.2.1 Hypothesis 2

To test for hypothesis 2 (i.e. in a combined performance of EP and SP IOFs perform significantly better than cooperatives), again the means are analysed (table 5). Contrary to the analysis of hypothesis 1, now also a 95% confidence interval is given, which provides extra information on the significance of the difference. The significance of the difference between ownership structures is given with a t-test, which is not significant with a value of 0.15 for the total sample.

Table 5: Means of the bootstrapped DEA scores per ownership structure.

	Cooperatives			**IOFs**			**t-test**	**Sig.**
	DEA scores	**Lower Bound**	**Upper Bound**	**DEA scores**	**Lower Bound**	**Upper Bound**		
2010	0.84	0.78	0.90	0.86	0.79	0.93	-0.66	0.51
2011	0.82	0.77	0.89	0.87	0.82	0.94	-1.61	0.12
2012	0.84	0.79	0.90	0.87	0.81	0.93	-0.62	0.54
2013	0.88	0.82	0.92	0.89	0.83	0.94	-0.26	0.80
Total	0.85	0.79	0.90	0.87	0.81	0.93	-1.47	0.15

In the truncated regression, table 6, ownership structure does not significantly relate to the DEA scores. Therefore, we can conclude that hypothesis $H2_0$, that in a combined performance of EP and SP, IOFs perform significantly better than cooperatives, is rejected. This means that the alternative hypothesis, $H2_a$, that in a combined performance of EP and SP cooperatives and IOFs perform the same, still holds.

Other noteworthy findings in table 6 are the effects of the control variables. The natural logarithm of turnover is significant. When turnover rises with 1%, the performance of companies goes up 0,03 on a scale of 0 to 1. Sector effects are that the arable sector performs better than the dairy sector, and the multiple sector worse on the DEA scores. Geographical effects show that Germany and Ireland score significantly worse than the UK on the DEA score.

Table 6: Truncated regression on bootstrapped DEA scores.

Independent Variables	Parameter estimate	P-value
Ownership structure	0.01	0.75
Turnover (LOG)	**0.03**	**0.024****
Sector effects relative to dairy		
Meat	-0.05	0.24
Arable	**0.06**	**0.08***
Multiple	**-0.08**	**0.08***
Geographical effects relative to UK		
Netherlands	-0.03	0.56
Germany	**-0.10**	**0.03****
Denmark	0.01	0.91
Ireland	**-0.15**	**0.000*****
Model strength Probability > chi-squared)	86.88	0.0000

(Significant on a 10% confidence interval: *, Significant on a 5% confidence interval: **, Significant on a 1% confidence interval: ***)

4.2.2 Control regressions

To gain more insight into the influence of ownership structure on EP, control regressions were performed, shown in table 7, analysing the financial ratios apart from each other. An OLS regression was chosen, because the data was not truncated or censored (like in the case of the SP and DEA scores). Table 7 shows that IOFs perform better on the solvency ratio and on the current ratio. Cooperatives perform better on asset turnover. For ROE, ownership structure does not make a significant difference.

The effect of SP on the financial ratios also shows some interesting results: it has a significantly negative relationship with the solvency ratio and the current ratio. Control variables sector and country were included in the regressions, but are not relevant for this study.

Table 7: OLS regressions on EP.

	(1) Solvency ratio		(2) Current ratio	
Variables	**Parameter estimate**	**p-value**	**Parameter estimate**	**p-value**
Ownership structure	**7.57**	**0.01****	**0.40**	**0.00*****
SP	**-0.13**	**0.10***	**-0.01**	**0.02****
Turnover (log)	**2.59**	**0.08***	-0.046	0.47
Sector effects relative to dairy				
Meat	9.68	0.01	-0.03	0.85
Arable	**13.42**	**0.00*****	0.22	0.18
Multiple	-1.46	0.76	**-0.45**	**0.03****
Geographical effects relative to UK				
Netherlands	-0.43	0.92	**0.45**	**0.01****
Germany	-7.61	0.12	0.14	0.5
Denmark	**-14.49**	**0.01*****	0.27	0.21
Ireland	-4.72	0.28	0.06	0.74
Year effects relative to 2010				
2011	1.17	0.66	0.05	0.66
2012	1.02	0.71	-0.00	0.98
2013	2.83	0.3	0.09	0.42
Adjusted R-squared /chi-squared	0.41		0.45	

	(3) Asset turnover		(4) ROE +30	
Variables	**Parameter estimate**	**p-value**	**Parameter estimate**	**p-value**
Ownership structure	**-1.97**	**0.00*****	-0.52	0.82
SP	-0.01	0.26	0.02	0.77
Turnover (log)	**-0.32**	**0.08***	**4.77**	**0.00*****
Sector effects relative to dairy				

Meat	**0.97**	**0.04****	**10.55**	**0.00*****
Arable	**-2.88**	**0.000*****	**-8.64**	**0.09***
Multiple	-0.001	1	-4.01	0.30
Geographical effects relative to UK				
Netherlands	-0.59	0.25	-4.27	0.21
Germany	**1.95**	**0.00*****	**-12.95**	**0.00*****
Denmark	**-2.04**	**0.00*****	4.45	0.28
Ireland	**-2.39**	**0.00*****	**6.4**	**0.07***
Year effects relative to 2010				
2011	0.10	0.75	**-4.14**	**0.06***
2012	0.27	0.27	**-4.69**	**0.03****
2013	0.20	0.55	**-7.17**	**0.00*****
Adjusted R-squared	0.67		0.47	

(Significant on a 10% confidence interval: *, Significant on a 5% confidence interval: **, Significant on a 1% confidence interval: ***).

Chapter 5 Discussion

The goal of this study was to investigate the impact of ownership structure on SP and EP. This was done by testing two hypotheses; hypothesis 1 states that cooperatives have a lower SP than IOFs; and hypothesis 2 that in a combined performance of EP and SP, IOFs perform significantly better than cooperatives. The analysis in chapter four shows that hypothesis 1 is rejected, meaning that the alternative hypothesis, that there is no difference in SP between cooperatives and IOFs, still holds. Hypothesis 2 was also rejected, meaning that the alternative hypothesis, that in a combined performance of EP and SP cooperatives and IOFs perform the same, still holds. The different hypotheses in chapter two can be used to explain the findings in chapter four: the Porter hypothesis, the slack resources hypothesis and the external factor hypothesis.

5.1 Theory discussion

5.1.1 Porter hypothesis

The Porter hypothesis predicts that a difference in SP leads to a difference in EP, with a positive relationship. As no difference in SP and EP was found, the Porter hypothesis could still be rejected or confirmed. Furthermore, paragraph 2.3 mentions some reasons why the SP of cooperatives and IOFs could differ. The argument that predicted an equal performance was that the market is the most important motivation for companies to change their strategy. This line of thinking predicts that no difference between cooperatives and IOFs in SP is found, as the market is the same for cooperatives and IOFs. The finding in chapter four confirms this line of thinking, thus this could indeed be an reasonable explanation.

5.1.2 The slack resources hypothesis

The slack resources hypothesis, on which hypothesis 1 was based, predicts that a difference in EP leads to a difference in SP, with a positive relationship. No difference between cooperatives and IOFs in EP and SP was found. This outcome is possible in the slack resources hypothesis, so the hypothesis is not rejected. However, this outcome neither is a strong confirmation of the slack resources hypothesis, because it does not show what happens with SP when there is a difference in EP.

5.1.3 External factors hypothesis

The finding in chapter four, that ownership structure does not significantly relate to the DEA scores, is contradictory to the literature, which often shows that EP of cooperatives is worse than that of IOFs (Soboh et al., 2009), as explained in paragraph 2.2. The finding in this study can be better understood when also the control regression are considered in table 7, chapter four. In the control regressions it is namely shown that cooperatives perform better on asset turnover and worse on

leverage and liquidity. In generating the composite indicator, it is possible that these effect have cancelled each other out, making the combined performance on EP and SP for IOFs and cooperatives equal. From literature, the finding that leverage and liquidity of cooperatives is worse, and asset turnover of cooperatives is better than that of IOFs, is more defensible than the finding that EP of cooperatives and IOFs is the same.

Leverage, liquidity and asset efficiency

On leverage and liquidity, Nilsson and Dijk (1997) and Soboh et al. (2009) show that it is reasonable that cooperatives perform worse than IOFs. Because all the equity of cooperatives has to come from the members, cooperatives are more equity bound, which makes cooperatives more reliant on debt. The higher dependence of cooperatives on debt also explains the finding that liquidity of IOFs is higher: it is more difficult for cooperatives to quickly convert an asset into cash to meet short term liabilities (Lerman & Parliament, 1989). Hardesty and Salgia (2003) explain the lower liquidity as a result of pressure of cooperatives to redeem member equity.

For asset turnover on the other hand, this study finds that cooperatives perform better than IOFs. Asset turnover measures the amount of sales generated for every asset used, and thus shows the efficiency of the company in putting its assets to work. Literature predicts different things on the effects of ownership structure on asset turnover. Lerman and Parliament (1989) predicted that cooperatives perform lower on efficiency: as a result of moral hazard among members, cooperatives are less discriminating in undertaking investments than IOFs, and therefore tend to overinvest in fixed assets, thus reducing their asset turnover. However, this underinvestment argument is undermined by their eventual finding that US dairy cooperatives have higher asset turnover than IOFs. Hardesty and Salgia (2003) also argue that cooperatives have lower asset turnover. 'Cooperatives are expected to provide a home for their members' product and therefore need to maintain excess capacity.' (Hardesty & Salgia, 2003):14. They find that this does not hold for large cooperatives and dairy cooperatives, which they explain by arguing that 'dairy producers often have consistent production volumes and market their production through only one source, which reduces their cooperative's need for excess capacity.' (Hardesty & Salgia, 2003):14. As in this study the sample consisted of large cooperatives, for a large part dairy companies, the finding in this study, that cooperatives have a better asset turnover than IOFs, does not contradict this literature.

5.2 Methodology discussion

5.2.1 Deductive vs. inductive research methodology

This study has been set up as a quantitative study that focused on using quantitative data and –methods to answer the research question. However, during the process of formulating hypotheses

and setting up the conceptual framework, it became apparent that almost no literature yet exists on possible differences between cooperatives and IOFs in SP. Therefore, in this study the hypotheses on possible effects of ownership structure on SP were derived from different hypotheses using EP as a starting point to predict SP. This was a rather deductive approach, because theory was the starting point and the observations were used to confirm or reject the theory. Instead, as not much literature yet exists on the topic, an inductive approach could be helpful, starting with very general observations, researched with qualitative methods, which would have provided the starting point for creating the theory. The qualitative way of doing research, for example interviewing cooperative and IOF managers, could have provided the researchers with a more thorough understanding of the possible drivers of difference between cooperatives and IOFs, which is a limitation of the study.

5.2.2 Insufficient EP and SP indicators

It was already indicated in paragraph 2.3 that solely using financial indicators as indicators for EP, could be insufficient for capturing all the economic value added by companies. One of the most important objectives of cooperatives besides making profit, is offering good prices to their members (Mazzarol et al., 2014b). The financial indicators do not capture this added value. Therefore, other literature already argued that other financial indicators are needed to appropriately measure the total added value of cooperatives and IOFs (Roskam, 2014; Soboh et al., 2009).

It can be argued that the same holds for SP: that outside their own company, either cooperatives or IOFs are better in stimulating and supporting their partners to become more sustainable. For example, cooperatives can create sustainability by educating and supporting their members to become more sustainable. 'The cooperatives' marketing role and their direct contact with producers may mean that regulations are better explained, environmental controls and certifications are applied faster, and above all, the adoption of environmental practices is more widespread than amongst IOFs, although this remains to be examined' (Galdeano-Gómez, Céspedes-Lorente, & Rodríguez-Rodríguez, 2006):496). Then only measuring the company SP is not enough to cover all the sustainable value that cooperatives add. A total picture of SP can only be sketched when the SP of the members versus the suppliers of the IOFs is involved in the performance evaluation.

Another improvement regarding SP is its definition. This study included the environmental dimension of sustainability in the SP indicator, and economic sustainability in the EP indicator. However, the social dimension of SP has a big influence on sustainability too. As cooperatives have a big social role to play for their members, it would be very interesting to find out how social sustainability of cooperatives and IOFs differs. This then is another recommendation for further research: to include social sustainability in the performance evaluation.

5.3 Negative and insignificant relationship SP and EP

Although this study hypothesizes that the relationship between EP and SP is positive, the control regressions, shown in table 7, show a negative relationship between SP and two EP indicators: the solvency ratio, and the current ratio, and insignificant relationships between SP and two other EP indicators: ROE and asset turnover. A possible explanation for the negative relationship between the current ratio and SP could lie in the investment preferences of companies. When liquidity is highly valued, investments go into liquid assets that raise liquidity. However, investments of SP are rather long term and illiquid investments. For example, think of new EMS, education of members or supplies, water treatment facilities or energy saving facilities. Therefore, it could be that one of the opportunity costs of SP investments is liquidity, which is expressed in a negative relationship in this study. A possible explanation for the negative relationship between SP and the solvency ratio indicating leverage, is that higher debt is a constraint on financial resources. Because investment in SP are typically investments that are financed from surpluses in financial resources (slack resources hypothesis), a lower SP when debt is higher is not surprising. However, as the regression tests for the effect of SP on the solvency ratio, this reasoning would be a case of reversed causality. Another argument could therefore be, that when investments in SP are financed with borrowed money, a higher SP leads to a lower solvency ratio. As investments in SP can be quite substantial (think of new EMS or water/energy saving facilities), it is quite likely that companies use borrowed money to finance the investments.

The finding that ROE and asset turnover are insignificantly related to SP, also contradicts the prediction of a positive relationship. As Horváthová (2010) shows, this is not uncommon: in 19 of the 64 researched observations an insignificant relationship was found. This once again confirms that the direction of the relationship remains inconclusive. A possible explanation of these findings could be what Orlitzky et al. (2003) suggest in their meta-analysis: that variation among all these studies can be explained for 15 percent to 100 percent by among others, sampling errors and measurement errors.

Performance indicator mismatching

That the study contains measurement errors is a likely option. As shown in chapter 3.1.1, the performance indicators for SP and the method with which these were evaluated, differed for IOFs and cooperatives. Although the methods were very similar, with a correlation coefficient of 0.87, this could have led to a measurement error in the analysis. As it is hard to define the exact measurement error, it is also hard to think of possible effects it could have had on the results. Sustainalytics includes a path dependency variable and a benchmark on the total industry mean in calculating the SP of companies. This could have made the IOF data more stable over the years than the cooperative

data. Therefore in the data for the cooperatives higher variances can be expected, which indeed is shown in the independent sample t-tests, where the SP of cooperatives has a standard deviation mean of 271.1, while the standard deviation mean of SP of IOFs is 223.2.

Sampling error

A sample size of 31 companies over different countries in the EU may be too small for an appropriate representation of the EU. Also, as shown in the descriptive statistics in Appendix A, the companies may differ too much in size and purpose to be comparable: the IOFs often were large companies, while the relatively smaller companies were often cooperatives.

Model formulation

The formulation of the model in paragraph 2.4 is a third possibility to explain why no positive relationship was found. In this study only a direct relationship is tested for, as well as ownership structure as a totally external factor. This model does not account for the possibility of a vicious cycle effect, such as investigated by Surroca et al. (2010). Also the control variables that were included could have been insufficient. Mainstream control variables that were not considered in this study were market share (Russo & Fouts, 1997), company age (especially important for cooperatives (Stoll et al., 2014)), R&D intensity and advertising intensity (Russo & Fouts, 1997), and firm riskiness (Guenster et al., 2011; Surroca et al., 2010).

5.4 Recommendations for future research

Following from the discussion above, several recommendations for follow-up research can be given. Two recommendations follow from the methodology discussion in paragraph 5.2. Firstly, it is recommended that in new studies about differences in SP between different ownership structures, a qualitative approach is taken in combination with a quantitative approach. Because so little research has been done about SP differences between cooperatives and IOFs, qualitative research is appropriate, because it allows for a more inductive approach. Secondly, it is recommended that in a comparison between cooperatives and IOFs regarding EP and SP, new EP and SP indicators are included that evaluate the influence of the company on SP and EP of companies upstream the value chain, and also including their social sustainability. This is interesting because the raison d'être of cooperatives is to add value for their members upstream in the value chain. As IOFs do not have this explicit goal, there is reason to believe that there is a difference between the added value of cooperatives and IOFs outside their own company scope. To include this added value the best would be to evaluate each member or supplier by itself on their EP and SP. However, this is also the most demanding option, as all companies have to be evaluated separately, for which probably no good data exists (especially on SP). Another option is to look at the activities and policies of the cooperatives and IOFs regarding their members and suppliers.

For evaluating EP on the other hand, Roskam (2014) used four new indicators that can be used to specifically evaluate member benefits, namely whether a cooperative provides its members with price guarantee, security of sales, security of supply, and transfer pricing. Indeed that study shows a bigger advantage for cooperatives when these indicators were included. In this study, for SP already a dimension was included that evaluated the policy of companies regarding the sustainability of their members and stakeholders. In follow-up studies, this could be done more extensively, for example by also asking the members and stakeholders their experience in a survey.

To solve for the possible errors in paragraph 5.3, recommendations for follow-up studies are threefold. Firstly, the SP of cooperatives and IOFs should be evaluated with exactly the same method, which could solve for the possibility of a measurement error. To solve for sampling errors, a bigger sample should be taken, preferably over the period of a few years, like in this study, to account for developments over time. Thirdly, the model should also take into account the possibility of a vicious cycle and it could add more control variables, such as mentioned above.

5.5 Business and policy implications

The finding that cooperatives and IOFs perform the same on their sustainability, is a new finding to the literature that has some implications for daily business. In the context of the recent trend of cooperatives deciding to turn into an IOF structure (Bijman & Van Dijk, 2009), a comparison of sustainability is relevant: it predicts whether the company transformation might possibly influence the SP of the company. This study shows that this is not necessarily the case, as cooperatives and IOFs do not significantly perform differently in SP. When it turns out that cooperatives add more sustainable value outside their own companies than IOFs, which is not a strange scenario, as cooperatives are more focused on adding value outside their own company for their members, this implication could change.

Generally governments favour cooperatives, for example because cooperatives can bring more economic equality in markets (Royer, 2014) (as the cooperatives provide countervailing power to farmers, and thus help farmers by providing economic and social capital). This study shows that on the sustainability dimension it is not needed for governments to make a distinction between cooperatives and IOFs. Rather this study shows that the market could be an important driver for SP of companies, including actors such as consumers, customers of the companies, and NGO's. Thus, to enhance sustainable development in business, the government could focus on enhancing market developments that foster sustainability. In that sense, the results of this study, that show that over the years SP of companies goes up significantly, are a promising sign for the sustainability movement.

Chapter 6 Conclusions

This study aimed to investigate the impact of ownership structure on economic (EP) and sustainable performance (SP), specifically cooperatives versus investor owned firms (IOFs). The study investigated 31 agricultural marketing companies in the European Union, in the period 2010 - 2013. Two hypotheses were tested: (1) cooperatives have a lower SP than IOFs, and (2) in a combined performance of EP and SP, IOFs perform significantly better than cooperatives. For answering hypothesis 1, a censored regression was used. To create a combined performance indicator for EP and SP for testing hypothesis 2, the DEA method with bootstrapping was used. Subsequently, on this index a truncated regression was performed. SP was defined as environmental performance, based on reporting evidence of companies, and EP was defined as a combination of four financial ratios: the solvency ratio, the current ratio, asset turnover and return on equity. The outcomes of the study are that:

- Hypothesis 1 was rejected. A possible explanation is that the most important motivation for companies to become more sustainable is the market, and as the market is the same for cooperatives and IOFs, no significant difference is found.
- Hypothesis 2 was also rejected:
    - The Porter hypothesis, indicating a direct positive influence of SP on EP, was neither rejected or confirmed by this finding. Besides the market argument mentioned above with hypothesis 1, the arguments that were given to explain whether cooperatives perform better or worse than IOFs, did not explain the findings.
    - The slack resources hypothesis, indicating a direct positive influence of EP on SP, still holds. However, as no difference in EP and SP was found, it is not shown in this analysis whether the relationship also holds when it is found that EP and SP are different.
    - The external factor hypothesis explained the results with the external factor of ownership structure, which was found to be insignificantly related to the composite indicator. However, in the control regressions it was shown that it could be that different financial indicators cancel each other out in the composite indicator, with a worse performance of cooperatives on leverage and liquidity compared to IOFs, and a better performance of cooperatives on asset turnover, compared to IOFs.
- The control variables sector, country, turnover, and when applicable year, all had a significant relationship with company performance.

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Appendix

Appendix A: Company characteristics

Company name	Country	Sector	Legal form	Size 2010	Size 2011	Size 2012	Size 2013
Agrana	Austria	Arable	Cooperative	2735	3039	3511	4062
Arla Foods	Denmark	Dairy	Cooperative	8735	9554	11152	13597
Associated British Foods	United Kingdom	Multiple	IOF	16191	17321	19857	21529
Atria	Finland	Meat	Cooperative	1749	1693	1775	1952
Capsa	Spain	Dairy	Cooperative	1000	942	917	942
Corbion	Netherlands	Multiple	IOF	4003	4027	4375	2750
Cosun	Netherlands	Arable	Cooperative	2489	2444	2684	3056
Cranswick	United Kingdom	Meat	IOF	1122	1220	1314	1323
Dairy Crest	United Kingdom	Dairy	IOF	2494	2582	2425	2089
Danish Crown	Denmark	Meat	Cooperative	8280	9391	9792	10532
Danone	France	Dairy	IOF	22801	25030	27535	29373
DMK	Germany	Dairy	Cooperative	2832	5161	4701	5540
Emmi	Switzerland	Dairy	IOF	2855	2892	3252	3670
First Milk	United Kingdom	Dairy	Cooperative	812	907	912	802
Friesland Campina	Netherlands	Dairy	Cooperative	12021	12481	13621	15778
Glanbia	Ireland	Dairy	IOF	2724	2910	3456	2918
Granarolo	Italy	Dairy	Cooperative	1206	1108	1222	1381
HKScan	Finland	Meat	Cooperative	2833	3235	3375	3469
Irish Dairy Board	Ireland	Dairy	Cooperative	1592	2140	3037	2575
Kerry Group	Ireland	Dairy	IOF	6631	6861	7716	8049
MHP	Ukraine	Meat	IOF	1056	1339	1527	1617
Milcobel	Belgium	Dairy	Cooperative	1120	1166	1176	1399
Nestle	Switzerland	Multiple	IOF	142987	89186	100980	104414
Parmalat	Italy	Dairy	IOF	5982	5863	6949	7442
Suedsucker	Germany	Arable	IOF	7946	8640	9531	10447
Tereos	France	Arable	Cooperative	2887	3564	3789	3798
The Greenery	Netherlands	Horticulture	Cooperative	1689	1421	1842	1782
Tican	Denmark	Meat	Cooperative	733	794	812	915
Unilever	Netherlands	Multiple	IOF	59275	60222	67717	68694
United Dairy Farmers	United Kingdom	Dairy	Cooperative	486	644	700	632
Westfleisch	Germany	Meat	Cooperative	2618	2901	3294	3490

Size: in thousands of US dollars

Appendix B: Variable overview

Variables:	
y1	SP score (average of l9, l10 and l11)
y2	Solvency ratio
y3	Current ratio
y4	Asset turnover
y5	ROE on net income +30 (y7 + 30)
x4	Dummy for ownership structure (0 = cooperative, 1 = IOF)
Control variables:	
x1	Natural logarithm of turnover
x2	Dummy for sector (0=Diary, 1=Meat, 2=Horticulture, 3=Arable, 4=Multiple
x3	Dummy for country (0=UK, 1=Netherlands, 2=Germany, 3=Belgium, 4=France, 5=Spain, 6=Austria, 7=Switzerland, 8=Italy, 9=Denmark, 10=Finland, 11=Ireland, 12=Ukraine)
x5	Dummy for region (0=UK, Ireland, 1=Denmark, Finland, 2=Netherlands, Belgium, 3=Germany, Austria, 4=France, Switzerland, Italy, Spain, 5=Ukraine)
Year	Dummy for year (0=2010, 1=2011, 2=2012, 3=2013)
Invisible variables:	
y7	ROE on net income
l1	Sustainalytics score
l2	Environmental score 1.1
l3	Environmental score 1.2
l4	Environmental score 2.1
l5	Environmental score 2.2
l6	Environmental score 2.3
l7	Environmental score 3.1
l8	Environmental score 3.2
l9	Environmental score average 1
l10	Environmental score average 2
l11	Environmental score average 3