

# An economic comparison between cooperatives and Investor owned firms in the European dairy industry

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## **PREFACE**

In this research cooperatives and IOFs in the European dairy industry are compared with each other. It is an interesting research field, because cooperatives are an extraordinary organization form. In the research field of cooperatives much research is done, but important aspects have to be investigated in order to understand all the aspects related to cooperatives. An important point in the field of cooperatives is whether they perform economically better or worse than IOFs. This research makes a contribution to this research field by indicating important aspects to which cooperatives and IOFs should pay attention in order to be successful. This can be useful for the managers of dairy firms and for farmers who have to decide to which organization they want to deliver.

The research is carried out for my master business economics and it appealed to me for several reasons. The first reason has to do with my home situation where we have a mixed feed company. In the mixed feed industry 50% of our competitors are cooperatives and 50% are IOFs. This makes it interesting to delve deeper in the economic performance of both groups. The second reason is that the research will look to the economic performance of both groups. This will give me the opportunity to actually work with balance sheets, profit and loss accounts and different ratios which measure economic performance. This will enhance my understanding of financial statements. The third reason has to do with the fact that cooperatives and IOFs are compared in a quantitative way. A database from the business economics group is available. Although quantitative research does not appeal to me I find it important to be able to carry out a quantitative research.

This research came about with the help of Gerard Giesen, my supervisor from the business economic group at the University of Wageningen. Gerard Giesen steered me in the right direction, debating the different solutions for different problems and with writing this thesis. I would like to say thanks to Eric ten Pierick of the research institute LEI for his help regarding the database. Without his help it would have been impossible to give a fair judgement about the database used in this research. At last I would like to thank Rafat Ewaidasoboh with his advice on the difficult process of writing a master thesis.



# CONTEXT

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## **Summary**

In this research the main objective was to make an economic comparison between cooperatives and IOFs (investment oriented firms) in the European dairy industry. By means of developing and executing a ratio analysis an economic performance comparison between cooperatives and IOFs is performed for the year 2003. This economic comparison is beneficial for the managers of cooperatives and IOFs while it gives them information about factors important for being competitive. The benefit for farmers is that it can give them a better understanding of cooperatives and IOFs which can help them in the decision to deliver to cooperatives and IOFs. The literature provides information on how to compare cooperatives and IOFs on an economic basis. In this research a comparison is made based on the property rights point of view, since the difference between cooperatives and IOFs lies in the ownership structure.

In this research the database Amadeus is used which contains information about balance sheets, profits and loss accounts and different ratios. A description is given in the way Amadeus handles the different accounting systems, different balance post, the calculation of the different ratios and the way the information is gathered. The database is analysed in order to come to a valid conclusion on whether to use the database or not. To reach this conclusion the financial information of annual reports of Friesland Foods, Campina, Molkerei Ammerland, Glanbia and Belgomilk are compared with the information from the database. The conclusion of this research is that Amadeus cannot be used for such an analysis. For educational purposes the research was still carried out with the Amadeus database.

To analyse the performance of cooperatives and IOFs a conceptual model is formulated. In the model a multiple regression analysis is the first step in analysing the performance of cooperatives and IOFs. By means of this regression analysis the influence of the independent variables (e.g. turnover quick ratio, inventory turnover, receivables turnover, total asset turnover and debt-to-equity) on the dependent variable (operating profit/loss including raw materials) is estimated. The choice for the dependent variable is made due to the fact that cooperatives pay a part of their profits in the form of higher milk prices. The regression analysis is carried out for the whole dairy sector, the cooperatives and IOFs. By means of an independent t-test the means of the used variables are compared of the cooperatives and IOFs. The results of the independent t-test give an indication whether or not the cooperatives and IOFs significantly differ in organizational structure, strategy and economic behaviour.

The model developed is suitable in twofold for comparing cooperatives and IOFs. First of all managers can use the model in order to monitor the performance of their company in comparison with other dairy companies in Europe. Secondly, the model gives insight into the differences between both organization forms. From the model it can be seen that stock turnover and liquidity have a negative impact on the profitability of cooperatives, while revenue has a significant positive influence. From this it can be said that cooperatives should have a focus on increasing their revenue while maintaining a stable liquidity position. Revenue and stock turnover also play a significant role on the profitability of IOFs. Liquidity does not have a significant impact on the performance by IOFs. Compared to cooperatives, IOFs have therefore more freedom in their liquidity ratio. The other variables used in the model did not show a significant impact. Based on these results a cautious prediction can be made that looking at their revenue, cooperative firms like Arla Foods, Friesland Foods and Campina have a bright future.



# INTRODUCTION

## 1.1. Background

Around 1800 the first cooperatives were founded. Cooperatives were established in order to protect members against the large commercial and/or industrial companies which are often in a monopolistic or oligopolistic position (Szabó, 2006). This was/is also the case for the European dairy sector. However, knowing why cooperatives are created does not give insight in the specific characteristics of cooperatives which distinguishes cooperatives from other economic organizations like Investor Owned Firms (IOFs). There are different cooperatives in the world each having their own objectives. This makes it difficult to come with a single definition. The Dutch cooperative council (NCR) gives the following definition for a cooperative (NCR, 1993):

*An economic organisation in which farmers collaborate permanently and put together parts of their economic activity (in general the market function), at joint risk and on joint account, in order to make the economic activity concerned as profitable as possible, while maintaining the self supporting nature of the other functions of the agricultural enterprise.*

From this definition it becomes clear that the economic aspects of the cooperatives are important. When a cooperative does not give a positive contribution to its members there is no reason for its existence. Farmers will resign their membership and go to another cooperative or IOF (van Dijk and Klep, 2005). Two important benefits of cooperatives for its members are (Van Dijk, 1994):

1. The continuity of the market position of farmers: *the cooperative is standing between the market and farmer and in this way the cooperative is protecting its members from aggressive up-stream players*
2. The return on the capital invested by the farmer-members:
  - In the farms: *the milk price*
  - In the co-operative firm as well: *growth of the cooperative itself, dividends and membership shares*

Other benefits of a cooperative for its members are: countervailing power, market access, market transparency, risk management, scale advantages, professionalizing, chain development and community value (van Dijk and Klep, 2005).

However, while a farmer only remains a member of a cooperative when there is an advantage for his agribusiness it becomes important to compare the economic performance of cooperatives and IOFs with each other. Different researchers used the ratio analysis for this. The problem with the ratios analysis carried out in earlier research for comparing the European dairy sector were the definitions of the ratios. The same definitions that are normally used for IOFs were also used for cooperatives. However, the definitions of the IOF ratio analysis do not take into account that cooperatives are different. Especially, cooperatives have a different goal and are financed in a different way than an IOF. So to use a ratio analysis the ratios have to be adapted for comparing the cooperative with the IOF.

## **1.2. *Research objective***

1. To make a ratio analysis model in order to compare the economic performance of the cooperatives and IOFs in the European dairy sector.
2. To make an economic comparison of the cooperatives and IOFs in the European dairy sector for the year 2003.

## **1.3. *Research questions***

1. What does the literature state about comparing cooperatives and IOFs?
2. Which data are available for the economic comparison of cooperatives and IOFs in the European dairy sector?
3. Which conceptual model should be used for comparing cooperatives and IOFs, holding in mind the available data?
4. What are the economic performances of the cooperatives and IOFs in the European dairy sector?

## **1.4. *Outline of the report***

In the research the research questions are answered. By answering the research questions the objectives of this research can be reached. In chapter 2 the literature about comparing cooperatives and IOFs is discussed. The literature gives insight into the different ways of comparing IOFs and cooperatives. Also different performance indicators in relationship with cooperatives and IOFs are described. In chapter 3 the database is analysed in order to make a weighted judgment on whether the database can be used to compare IOFs and cooperatives with each other. In chapter 4 the conceptual model is presented that is used for the comparison between cooperatives and IOFs. The results of the conceptual model are presented in chapter 5. Based on the results of chapter 5 a conclusion is drawn and a discussion is presented in chapter 6.

## 2. LITERATURE STUDY

It is difficult to define a cooperative. There are a lot of theoretical studies that try to describe a cooperative and its distinct features in comparison with an IOF. All theories capture a part of the essence of a cooperative, but no theory is generally accepted. This chapter gives an overview about research done in the field of comparing cooperatives and IOFs. First two methods of comparing are given. Second, several performance indicators are discussed. At last three researches in the field of comparing cooperatives and IOFs are discussed.

### 2.1. *Methods of comparing a cooperative and an IOF*

A cooperative and IOF can be compared by describing the unique characteristics of a cooperative and an IOF (Oestapassidis et al., 1998). The unique characteristics of cooperatives and IOFs are described and discussed extensively in “Als de markt faalt” (Dijk and Klep, 2005). This approach may seem useful for assessing the performance of cooperatives and IOFs, but describing the unique characteristics of a cooperative and IOF will not answer the question of performance. If one can assess the value of the unique characteristics of a cooperative and IOF by surveys and interview this approach could be interesting. This research is not going into that direction, but describing the unique characteristics of cooperatives and IOFs is an important research field in cooperative literature.

Another approach in comparing the economic performance of cooperatives and IOFs is to look to cooperatives and IOFs from a property rights point of view (Fulton, 1995). Property right is a right of ownership of a property. The reason to examine cooperatives and IOFs from this point of view is that cooperatives differ from IOFs in that the owners of a cooperative are also its users (user-owned firms). In an IOF the owners (shareholders) are not necessary its users. IOFs are investor-owned firms. This creates the following problems which are related to the property rights of cooperative farmers (Cook, 1995; Oestapassidis et al., 1998): Free rider problem, horizon problem, non transferability (portfolio problem) and control problem.

1. Free rider problem refers to the fact that non-members can benefit from the work that a cooperative is performing. For example: a cooperative pays a higher price for raw materials. An IOF will have to follow in order to be able to purchase the raw material; milk. The suppliers of the IOF are in that case benefiting from the work of the cooperative, without having to contribute to the cooperative.
2. The horizon problem can be explained as follows: a member of a cooperative who is 63 years old, is not willing to invest in a new product line, but wants the money paid out as a dividend. The reason is that an older cooperative member does not benefit from higher profits in the future. A member of a cooperative, who is 25 years old, does want to invest in the new product line, because in the future he will benefit from a higher milk price.
3. Non transferability refers to the problem that a member cannot trade its membership papers on the market like in the case of shareholders in an IOF trading shares on the stock exchange. This non transferability creates the portfolio problem which will be discussed in the section about diversification.
4. The control problem is the problem of separating management from ownership, a principal-agent problem (Douma and Schreuder, 1991).

In the field of comparing cooperatives and IOFs the property rights view is often used. Research done in this field focused on specific performance indicators of firms like efficiency, liquidity, asset turnover and ROE (return on equity). Appendix A provides an overview of scientific research done in the field of comparing cooperatives and IOFs. In the next section these specific performance indicators will be discussed.

## ***2.2. Performance indicators in relationship with the property rights point of view.***

In this section individual performance indicators and their relationship with cooperatives and IOFs are discussed from a property rights point of view. It will give insight in the differences between cooperatives and IOFs.

### *Profit*

Cooperatives and IOFs have different objectives regarding profit. The reason is that a cooperative is a user-owned firm and an IOF is an investor owned firm. Members of a cooperative expect to gain benefits like higher milk prices, market access, etc by doing direct business with a cooperative (user-owned). Return on investment is less important (Lerman and Parliament, 1993). An IOF will strive to maximize its profit, to satisfy its investors. Investors are interested in high profits, because this leads to a good stock return.

### *Leverage*

Leverage presents information about the firm's financial structure and sources of investment funds (Oestapassidis et al., 1998). Leverage ratios indicate the proportion of outside finance vs equity capital. A high level of leverage indicates that a firm is highly debt financed. In the case of bankruptcy this means there is a high probability that not all debt can be repaid to the creditors. The risk for debt providers is high in such a case. The value maximization theory suggests the existence of an optimal level of leverage (Parliament et al., 1990). It is difficult to determine the optimum level of leverage. Moreover, the optimum level of leverage differs per company.

Cooperatives are viewed as "equity-bound" and are expected to be more leveraged than proprietary firms (Chaddad et al., 2005). This results from the property rights view and the non transferability of membership papers. Investors of an IOF can trade their stock on the stock exchange where members of a cooperative can not trade their rights (membership papers) in the cooperative on a stock exchange. The cooperative is therefore dependent on their members' ability and willingness to invest in their own cooperative. As a result of this equity restraint the conclusion of researchers is that cooperatives rely more on debt capital (Lerman and Parliament, 1990). However, cooperatives face difficulties on the debt capital market as well. According to Lerman and Parliament commercial banks have difficulties with the ownership concept of cooperatives and this restrains banks in providing the necessary funds to cooperatives. Another problem that providers of debt capital face when dealing with a cooperative is the restriction on residual claims (Hartman and Moore, 1996). Normally, shareholders come last in the case of bankruptcy. However, in the case of cooperatives the suppliers of debt capital come second after cooperatives members in the case of bankruptcy. The reason is that cooperatives in need can pay out higher prices for raw material when facing bankruptcy. A cooperative is after all an user-owned firm.

The "equity-bound" restraint and the debt capital restraint are tested by Lerman and Parliament in several studies. The results indicated that cooperatives do not differ from an

IOF in the level of leverage. The explanation for this result can be found in that cooperatives rely on retained earnings for their means of finance and that cooperatives raises short-time debt rather than long term debts (Lerman and Parliament, 1990).

### *Liquidity*

Liquidity refers to the firm's capacity to generate sufficient cash to meet its financial commitments as they become due (Barry et al., 2000). Accounting liquidity refers to the ease and quickness to convert an asset into cash without losing the value of that asset (Ross et al., 2002). A firm who cannot pay its current liabilities walks the risk of default. Liquidity is something different than liquidities which represent the asset cash and bank. Cash and bank are also important for a firm, because of the following reasons (Blommaert et al., 2000):

1. Transaction motive

*Firms hold liquidities, so that the firm can pay the salaries of employees, rents and resources. Firms can also hold additional liquidities in order to do a take over. This can be an important reason for firms to hold more cash and bank than strictly necessary. A take over is seen as a transaction motive.*

2. Precaution principle

*Planned budgets are never entirely certain. Expenses could be higher or revenues could be lower. Firms therefore hold more liquids than is strictly necessary. This is the precaution principle.*

3. Speculation motive

*When firms think that the interest level is about to be raised they will hold liquidity in cash in order to speculate on the interest rates to rise. When firms expect interest rate to drop in the nearby future firms will wait with getting short term loans. This tendency of firms to adjust their liquids to market conditions is called liquidity motive.*

The above reasons for holding liquidities (cash and bank) suggest that a high liquidity rate is preferred by firms, because of safety reasons, speculation and investment opportunities. There is a strong indication that there exist a positive relationship between liquidity rates and profit (Oestapassidis et al., 1998). Theory suggests that cooperatives tend to have lower levels of liquidity, because of two reasons. The first reason is related to the problem that cooperatives tend to have difficulties with attracting equity capital and debt capital. Retained earnings are therefore used by cooperatives for financing growth. This suggests lower levels of liquidity (Oestapassidis et al., 1998). The second reason is that cooperatives stand under pressure to redeem member equity capital (Shermain et al., 2004)

### *Efficiency*

Efficiency is important for a firm in order to be competitive. The assumptions about the efficiency level of a cooperative in perspective with an IOF differ. The bank of cooperatives found that "successful cooperatives have operating costs that are below average for the industry" (Snider, 1989). With the industry is mend cooperatives and IOFs in the dairy sector. The result of the bank of cooperatives seems to be an open door, because a firm who is efficient is in 90% of the time successful. However, it shows us that cooperatives can be efficient. Most research in the field of cooperative efficiency suggest that cooperatives are less efficient then its counterpart the IOF (Akridge and Hertel, 1992; Schroeder, 1992). The reason is that cooperatives tend to have over capacity. This is related to the diversification problem described in next section about business development / effectiveness.

### *Business development / effectiveness*

In every firm strategic management is important. Strategy can determine success or failure. The strategic direction of a firm is decided by the management of the firm and its shareholders and in the case of a cooperative its members. The management of a firm is responsible for the development and the implementation of the strategy. The shareholders/members can vote against or for the strategy developed by the management. The difference between a cooperative and an IOF, is that an cooperative has members and an IOF has shareholders. In both organizational structures, the shareholders respectively the members, authorize management to run the business.

While the shareholders of an IOF and members of a cooperative normally do not manage the firm themselves they have to control the management. In the principal-agent theory the problems with exercising this control is discussed. However, it is argued that controlling the management in a cooperative firm is more severe in comparison to an IOF, because of the free rider problem, horizon problem and non transferability already described. Controlling management increases monitoring cost in relationship to the number of members (Porter and Scully, 1984). In this debate there is no unambiguous answer found in the literature.

Another point often discussed in the literature is the voting rights in cooperatives. In an IOF firm voting rights are coupled to the amount of shares that a shareholder possesses. In a cooperative every cooperative member is equal and has the same voting right. According to the economic theory this is not efficient. The economic theory states that votes should be distributed according to economic size (Grossman and Hart's, 1988). For farmers this could mean one cow one vote. The one cow, one voting right is followed up by a part of the cooperative world. Effects of the one cow, one vote right over the simple majority rules on investment were examined by Alboek and Schultz (1997). The researchers could not conclude that the one cow, one vote was better or worse.

A firm can choose to diversify its business. Reasons for diversification are to reduce risks and to shift capital to those markets with the highest profitability. The problem is called the portfolio problem (Jensen and Meckling, 1979). When a cooperative is changing its business focus, because it diversifies, it is difficult for a member to adapt to the circumstance. The members of a dairy cooperative cannot easily switch from producing milk to producing eggs or switch to producing both types of goods. The members will therefore force the cooperative, to stick to its core business. The portfolio problem is also related to members with different risk/reward incentives. Not all the members of a cooperative have the same risk/reward ratio. It is therefore more difficult to invest for a cooperative. This can cause large inefficiencies, because the cooperative cannot grab the business opportunities that occur. On the other hand a highly diversified firm can have difficulties with grasping economies of scale (Akridge and Hertel, 1992). The problem is that it is difficult for managers to estimate where the economies of scale exist and how to achieve them (Schroeder, 1992). This problem can lead to inefficiencies in the production process. According to Schroeder (1992) it is not clear what the optimum level of diversification is.

The theory about cooperatives states that cooperatives face difficulties with being market oriented. The problem of not being market oriented has to do with the specific cooperative problems mentioned previously: free rider behavior, horizon problem and portfolio problem (Knoeber and Baumer, 1983; Cook and Iliopoulos, 2000; Kyriakopolos, 1998). A firm who is not market oriented faces the risk of not producing what the consumer wants and while consumers have the power in the chain this is a severe problem for cooperatives. A possible

indicator for market orientation is advertisements. Sexton, (1997) expected that cooperative advertise less then IOFs.

In the literature there are multiple sources who are handling the topics discussed above, but there is no exclusive evidence about whether cooperatives perform economically better or worse then IOFs. Looking to the separate indications of performance like liquidity, efficiency, leverage, etc is also not an option. Researchers do not agree on the optimum level of each performance field.

### **2.3. *Research done to the overall performance of cooperatives and IOFs***

In the literature about performance a distinction can be made between research done to separate performance indicators of cooperatives and IOFs and to the overall performance of cooperatives and IOFs. This research tries to make a comparison between the performance of cooperatives and IOFs, based on all of the performance indicators discussed in section 2.2. Therefore different approaches to measure the overall performance of cooperatives will be discussed here.

The first research discussed is that of Babb and Boynton (1981), “Comparative performance of cooperative and private cheese plants in Wisconsin”. In this research the performance of cooperatives vs IOFs is measured from three different points of view: farmer-based measures, investor based measures and social- and consumer based measures. Here the investor based measures will be discussed, because the goal of this research is to compare the performance of cooperatives and IOFs. Data from this research include accountancy reports, personal interviews and questionnaires from 56 plants. The research looked to financial measures, efficiency measures and cost of cheese produced measures. The means of these different measures where compared on a 5 percent significance level of probability in order to assess whether cooperatives and IOFs performed differently. The researchers conclude that a major drawback of this research is that comparative performance analysis does not lend itself particular well to the derivation of conclusions. The reason is that there are no standards available for particular performance indicators. Conclusions that where made: Performance varied considerable between firms. Some IOFs clearly performed better than cooperatives.

Another interesting research is that of Oestapassidis et al. (1998), “Growth of investor owned and cooperative firms in Greek dairy industry”. This research had data available from 25 IOFs and 5 cooperatives in the Greek dairy industry which is relatively small for a regression analysis. In this research performance is analyzed using a regression analyses. Performance is measured on the basis of annual grows which is the dependent variable in the regression model. The independent variables profitability, size, diversification, advertisement, leverage, liquidity, ratio of sales over fixed assets and ratios of sales over inventories are the independent variables in the model. These independent variables where found in the literature. The regression model will look as follows:

$$\text{Growth} = b_1\text{profitability} + b_2\text{size} + b_3\text{diversification} + b_4\text{advertisement} + b_5\text{leverage} + b_6\text{liquidity} + b_7\text{ratio of sales over fixed assets} + b_8\text{ratios of sales over inventories}.$$

$b_1$ ,  $b_2$ , etc, indicate the effect that each variable has on growth. A regression analysis was carried out in order to estimate  $b_1$ ,  $b_2$ , etc,. The regression analysis was carried out separately

for each group in order to see in which way the behavior of cooperatives differ from IOFs. The conclusion of the authors was that cooperatives do not use advertising and diversification strategies as much as IOFs. On the other hand the regression analysis for each group indicates that advertising and diversification strategies do not have a large impact on the growth of cooperatives and IOFs.

The last research that will be discussed here is that of “prestatievergelijking Europese zuivelcoöperaties” (Dorresteijn and Wouters, 2004). It is a MSc thesis of two students from Wageningen University. They compared the annual performance of 8 cooperatives on the basis of a model which is shown in figure 2.1.

| Focus Target           | Aspects                                      | Indicators                    |
|------------------------|--|-------------------------------|
| Financial              | Profit                                       | Return on shareholders equity |
|                        |  | Corrected profit              |
|                        | Risk   | Solvability                   |
|                        |  | Reserves                      |
| Market                 | Added value                                  | Gross profit margin           |
|                        | Market developments                          | Turnover developments         |
| Process                | Efficiency                                   | Cost added value              |
| Innovation and renewal | Product – Process innovation and acquisition | Cost/turnover                 |
|                        | Organization renewal                         | Cost (reorganizations)        |

**Figure 2.1 Performance model.**

Source: Dorresteijn and Wouters, (2004)

In the model the focus targets (financial, market, process and innovation and renewal) are determined after examining the balance score card, Skandia navigator, excellence model and the performance prism. Indicating the important focus targets of performance is not enough to measure performance. To measure the performance of the cooperatives the focus targets are made concrete by splitting it into aspects and later on into indicators of performance. In this research a method is developed to compare profit figures between a cooperative and IOF. Profit in a cooperative can be paid out in the form of dividends or a higher milk price. The research used the following solution for this problem. The average milk price of the 8 cooperatives was calculated and this was considered the norm milk price. The difference between the norm milk price and the milk price that each individual cooperative paid out to its members was added up to the profit of each company by multiplying the difference with the total volume of milk that each cooperative processed. Especially in the case of comparing cooperatives with IOFs this approach is useful. Most researchers neglect the problem that cooperatives pay out their profit in the form of higher milk prices and IOFs who do not do that.

### **3. DATABASE**

Generally, performance analysis in the field of accounting is dependent on data/input. The data are provided by commercial companies who gather an enormous amount of data. The data companies even try to sort the data and make them more accessible for researchers. With several database companies it becomes important to choose the best database. The question that one needs to answer is: which database offers the best quality of data? This question is difficult to answer and very time consuming. Juan et al., (2006) have tried to answer this question in a more general context. Their objective was to find out whether database choice had a significantly impact on the outcome of a model. Their results indicate that every database generates a different result for the same model.

This research makes use of the commercial database of Amadeus. The database is analyzed in order to assess its quality and to know its pitfalls. In this chapter the database will be analyzed quantitatively and qualitatively. First the database will be described.

#### ***3.1. Description of the database***

The database of Amadeus contains information (balance sheet and profit and loss account) from about 8.5 million companies from about 41 countries for the years 1995-2005. Every company in the database is given a specific code which specifies in which sectors it is active. By searching on a specific code every dairy company in Europe can be selected. After selecting all dairy companies in Europe a further specification can be made by searching on country, time, etc. This selection process was carried out by a Phd-student. This specific selection from this Phd-student is available for this research and will be examined more closely. The selection of the Phd-student contained 168 companies from the dairy industry from Ireland, The Netherlands, Belgium, Germany, France And Denmark or better said divisions. A big corporation like Campina, Nestle and Danone have for example division in the Netherlands, France and Germany. Every single division is incorporated in the database. The problem with this approach is that the divisions are not independent. The divisions rely on the mother company for strategic plans and budget. For this reason 19 divisions were deleted from the database, leaving 149 dairy companies. Also Milo was deleted from the database, because this company was taken over by Belgomilk. Leaving questions about how up-to-date the database really is. Furthermore, although 8.5 million companies is a lot, the information in the database is not complete, in that not every company is included, data from the balance sheet or profit and loss account are missing and not every year between 1995-2005 is available in the database.

First the process of how the information is gathered will be described. The information, available in the database is coming from the different chambers of commerce in every country. In the Netherlands the medium and large sized companies have the duty to deliver the chamber of commerce its financial data. This is not the case for every country in Europe and the control on this obligation differs between European countries. In appendix B a summary of this situation is given. This information will not be discussed here. It is meant as background information. Erick ten Pierick from the LEI has added comments.

A second point worth mentioning are the different accounting systems in Europe while they could have an impact on the interpretation of the data. Basically there are two accounting

systems: the Anglo-Saxon and the continental system. The goal of the Anglo-Saxon system is to provide existing and potential shareholders a true and fair view of the company. In the continental countries this is not the case. The goal of the continental system of accounting is to provide the tax authorities with reliable data and to protect its creditors. Banks who provide credits to the companies could demand access to the financial reports whenever they want. Table 3.1 gives an overview of which country uses which accounting system.

**Table 3.1: Accounting system per country**

| <b>System</b>                     | <b>Countries</b>         |
|-----------------------------------|--------------------------|
| Anglo-Saxon                       | UK, Ireland              |
| Continental                       | France, Belgium, Germany |
| Related to the Anglo-Saxon system | The Netherlands, Denmark |

Source: database Amadeus

### **3.2. *Problems related to the different accounting systems***

The accounting systems have an impact on the way data are collected, processed and shown in the annual reports. The main differences will concern the posts of depreciation, stock, profit, assets, extraordinary exceptional items, research and development, deferred tax, accounting of goodwill and financial leases.

#### **Valuation method**

The value of an asset on a balance sheet is determined by the valuation method and the depreciation method. First the valuation method will be discussed. There are two methods to value an asset: the historical cost system and the current value method (replacement cost method). The historical cost system starts from the original purchase price and extracts depreciation. The current value method starts from the price that one currently has to pay for the assets and extracts depreciation. In the case of the current value method the assets are valued higher, because prices increase over the years (inflation). Belgium, France, the UK and the Netherlands allow companies to use the current value method. Germany however forbids the use of the current value method.

#### **Depreciation**

There are three methods of depreciation: straight-line, units- of production and declining balance method. The straight-line depreciation method is depreciating each year the same amount over the economic life time of an asset. In the units- of production method annual depreciation is based on the amount of units produced each year. The assumption here is that production determines the economic life time of an asset. In the declining balance method the annual depreciation is a fixed percentage of the book value. The method is depreciating a lot in the first years of an asset, so it assumes that an asset has a higher performance in the first years of its life time.

While in continental Europe the declining balance method is used one would suggest that the assets have a lower value then that would be the case with the straight-line or units- of production method in the beginning of an assets lifetime. In large companies this effect is diminished, because the large companies have a lot of assets in different stages of their economic life. In smaller companies this is not the case and the depreciation method has a bigger influence on the value of assets.

The choice for a method of depreciation is partly caused, by differences in tax depreciation rules in the different countries. Both in continental countries and in the Anglo-Saxon countries depreciation is tax deductible. However, in the Anglo-Saxon countries the government determines a fiscal depreciation rate for calculating profit which is independent from the accountant based depreciation rate. This implies that the companies in the Anglo-Saxon countries do not have an incentive to overestimate the depreciation rate in order to lower the tax burden. The governments in continental countries let the companies decide how to depreciate, off course in the margin of accounting rules, and use this depreciation rate for calculating profit. Companies in continental Europe have the incentive to depreciate a lot (declining balance method) in the first years of an asset as to lower the tax burden.

#### Inventory

How the value of inventory should be determined is not prescribed by the different accounting systems. It is however important to mention the different inventory valuation systems, because with each valuation method the value of a stock is represented in a different way. There are three inventory valuation methods Fifo (first in first out), Lifo (last in first out) and average buying price. When inflation rates are low and stock turnover is high the choice of a valuation method does not have much impact on the inventory valuation. Currently the inflation rates are low and inventory turnover in the dairy sector is high. The consequence is that inventory is comparable even when not the same valuation methods are used.

#### Profit

The profit of a company is influenced by the two posts mentioned above. While the continental companies overestimate their depreciation in order to lower their taxable income, the profit is expected to be lower. The method of stock valuation also has an impact on profit, because stock changes are included in the profit and loss account. But while stock turnover is high in the dairy sector and the inflation low this will not have a significant influence on the profit.

#### Extraordinary and exceptional items

Extraordinary and exceptional items are for example: restructuring cost. This is the case for both continental Europe and in the Anglo-Saxon countries. There is a difference between the two accounting systems. In the Anglo-Saxon system extraordinary items are entered on the profit and loss account that cannot be related to the core activity of the company. In continental Europe the decrease in revenue from the failure of a big client is also considered an extraordinary loss while this is not the case in the Anglo-Saxon countries. This difference in accounting gives a disturbance in the comparison of the profit and loss of a company. The consequence of these approaches is that revenue and expenses in continental Europe tend to be higher than in the Anglo-Saxon countries, because the extraordinary loss is counter booked by a higher turnover/revenue. This difference is rather profound and must be taken serious.

#### Research and development

In most countries research and development expenses are booked as an investment under intangible assets. Next, these intangible assets are depreciated. In Germany research and development expenses are not activated on the balance sheet and are therefore not depreciated. The development expenses are entered on the profit and loss account as an expense. The consequences for the profit and loss are rather severe (Schilbach, 1997).

#### Deferred taxes

In the Anglo-Saxon countries the tax system is not brought into line with accounting practices. In the Anglo-Saxon countries the government determines the tax that a company has to pay. The tax that a company has to pay in an Anglo-Saxon country can differ from what the company expected based on accounting practices. This difference can be rather severe and is called deferred tax. It is accounted as a long term debt.

#### Accounting of purchased goodwill

Purchased goodwill is mostly put on the balance sheet as an intangible asset and is depreciated. There is however another method that is allowed in Germany, the Netherlands and the UK. This method extracts goodwill directly from the consolidated shareholders funds. So goodwill will not be activated on the balance sheet. This will cause a difference in the total value of assets. The first method is preferred by most companies. Therefore, the conclusion is drawn that goodwill will not have a huge impact on this research.

#### Financial lease

In the Anglo-Saxon countries the companies report financial lease on the balance sheet under fixed assets and under current and non-current liabilities. The lease payments are capitalized and then depreciated over a number of years. In continental Europe companies do not report leasing on the balance sheet, but enter it on the profit and loss account as an expense. The consequences are that the assets of continental Europe companies are valued lower, because of financial lease.

### **3.3. *Analysis of the database***

#### **3.3.1. The data**

The analysis of the database is based on a comparison between countries and a comparison between five annual reports in the database. The first remark about the comparison between the annual reports and the Amadeus database is that the database is reporting its financial numbers in the currency as reported in the annual reports. This means that while the Scandinavian countries do not have the Euro as currency the financial numbers in Scandinavia have the unity of for example the Norwegian Crown. The Scandinavian countries (Glanbia) are therefore excluded from the database. Another problem for the comparison are the multinationals (Danone, North Kerry Group). In the database the different divisions of the multinationals are mentioned separately. The holdings of the multinationals are sometimes given sometimes only the different divisions are mentioned. A comparison of the annual reports is then impossible while the annual reports only give data about the company as a whole. This means that only the annual reports from companies from The Netherlands, Belgium, Germany and Ireland will be compared with Amadeus.

Table 3.2 shows from which companies annual reports were requested, which companies actually have given their annual reports and which annual reports are used for the comparison.

**Table 3.2: Annual reports available for comparison**

| <b>Companies from which annual reports were requested:</b>   | <b>Companies who did send their annual report and who were inserted in the database:</b>  | <b>Annual reports that were used for the comparison with the database</b>                        |
|--|---|--|
| Molkerei Ammerland<br>Nordmilch<br>Humana<br>Arla Foods<br>Belgomilk<br>Walhorn<br>Groupe Lactalis<br>Entremont<br>Danone SA<br>Sodiaal<br>North Kerry Milk<br>Glanbia<br>Friesland Foods<br>Campina | Molkerei Ammerland<br><br>Arla Foods<br>Belgomilk<br><br>Danone SA<br><br>North Kerry Milk<br>Glanbia<br>Friesland Foods<br>Campina | Molkerei Ammerland<br><br><br>Belgomilk<br><br><br><br><br>Glanbia<br>Friesland Foods<br>Campina |

### **3.3.2. The analysis**

Below, the regular text is about the comparison between countries, based on the information provided by Amadeus, see appendix C. The Italic text is are about the comparison between the database and the five annual reports.

Balance sheet

1. Fixed assets are given by 5 of the six countries. Only Germany includes balancing assistances. A definition is not found. The annual report of Molkerei Ammerland is not detailed enough in order to find out what balancing assistances are. Humana and North-Milch did not give their annual report.

*The sum of 2 + 3 + 4*

2. Intangible assets are found in 4 of the 6 countries. Belgium includes or mentions formation expenses separately. Germany is again including balancing assistances.

*With formation expenses Belgomilk (Belgium) means foundation expenses. The post is relatively small and do not have an impact on our analyses. The other companies follow the definitions of their countries as given by Amadeus.*

3. Tangible fixed assets are for all the 6 companies the same.

*There are no comments on this post.*

4. Other fixed assets are defined by the six countries as financial fixed assets. The British (Ireland) however gives a slightly different definition: investments and other fixed assets. The Netherlands mention other fixed assets as financial fixed assets + other fixed assets.

*The financial assets of Glanbia (Ireland), investments in joint ventures, share of gross assets, share of gross liabilities, investments in associates and other investments are located under the heading of other fixed assets. The other companies of the different countries do the same, but while this was not mentioned in the definitions given by Amadeus for the different countries this had to be checked.*

The post fixed assets is more or less defined in the same way in the six countries. There are small differences, but this will probably not lead to huge differences.

*There are no problems after examining and comparing the annual reports with the definitions given by Amadeus. The problem of financial lease, mentioned as a problem of different accounting systems, does not come forward in the table of Amadeus. All countries report financial lease under fixed assets/current assets and depreciate on this post.*

5. Current assets are defined by 4 countries in the same way. France and Germany are given an elaborated definition, see table.

*The sum of 6 + 7 + 8*

6. Stocks are defined in the same way in Britain (Ireland), Denmark, The Netherlands and Germany. France is reporting stocks as inventory, but this is probably the same as stock. Belgium also ads contracts in progress.

*Belgomilk does not mention contracts in progress. The conclusion is that contracts in progress do not have an impact on the post contracts. The other annual reports follow the definitions given by Amadeus.*

7. Debtors are defined in the same way in four countries. Belgium states trade debtors (after one year + within one year) and the Netherlands states receivables (trade debtors + group companies + participations + capital called on + accrued assets + other receivables). The consequence is that the countries are difficult to compare for the post debtors.

*In the Netherlands Friesland Foods and Campina include receivables from joint-ventures, group participations, return on tax, etc. These post are headed by Belgomilk, Glanbia and Molkerei Ammerland under other current assets. The post debtors is there fore not suitable for comparisons.*

8. The definitions of other current assets (incl. invest & Cash) differ in all six countries. All definitions however do mention cash at bank & in hand or it is stated as liquid means. The specific problems are that Belgium, Ireland (British) and the Netherlands are mentioning other amount receivables and other current assets. The specific definition of these post do not become clear. France and Germany have specific problems by mentioning post like assets conversion adjustments and assets between

fixed and current assets. This can influence the Amadeus post of other current assets (incl. invest. & cash) significantly.

*The same applies for debtors.*

9. The post cash and cash equivalent are defined differently by the six countries. However the definitions do not give the impression that they represent cash and cash equivalent in such different ways that a comparison between the six countries would be impossible.

*Amadeus states that in Belgium also the post other investments & deposits can be traced back, but this cannot be seen in the annual report of Belgomilk. The conclusion is therefore drawn that other investments & deposits will not form a problem for the analyses.*

The post current assets is calculated by adding up stocks, debtors and other current assets. The post stocks and debtors are the same for all the six countries. Only the Netherlands defines debtors in a different way. Another serious question mark can be raised about the post other current assets. The problems with this post is already discussed above.

*The overall post of current assets is suitable for comparison. The reason is that the overall post of current assets is defined in the same way. The problems occur with the post debtors and other current assets. The post debtors cannot be used for a comparison between companies.*

10. Total assets are the same for five countries. Germany extracts from total assets subscribed capital unpaid and loss not covered by capital. The problems that could come forward with this definition are not clear.

*The sum of 1 + 5. This does not give any problems, because the post fixed assets and current assets did not give any problems.*

11. Ireland (British), Denmark and the Netherlands uses the definition of total shareholders funds + total minority interest. Belgium uses capital + reserve, it is leaving minority interest out of the picture. France and Germany are including minority interest, but subtract subscribed capital unpaid. The post shareholders funds can not be compared easily, because of these different definition. The post subscribed capital unpaid can be substantial and the same applies for minority interest. Comparing these post between companies could be difficult.

*The sum of 12 + 13*

12. The post capital is defined in four countries as capital or issued share capital. France and Germany take into account subscribed capital unpaid. The same problems occur as mentioned with shareholders funds.

*With the post capital Belgomilk is referring to share capital – uncalled share capital. This is the same definition as Amadeus is given for France. The post is not in line with the definition of Amadeus for Belgium. The Amadeus table does not mention uncalled share capital. Campina does not give financial numbers about capital and other shareholders*

*funds, but is just reporting it as shareholders funds. Again, this is not in line with the accounting system given in the table. The same applies for Friesland Foods. Although Amadeus gives numbers for capital and other shareholders funds this cannot be traced back in the annual report of Friesland Foods. Glanbia reports in line with the table. The specification given in the table for Germany cannot be traced back in the annual report of Molkerei Ammerland. Molkerei Ammerland is only reporting other shareholders funds which is thus the same as shareholders funds. The database does not take into account the specific position of cooperatives in the case of share capital. Membership share are for example not mentioned in the database.*

13. Other shareholders funds is difficult to explain. The definitions are not straightforward. Denmark and France calculate other shareholders funds by using shareholders funds and extracting the post capital.

*See point 12*

Shareholders funds has some specific problems (minority interest, capital unpaid). The problems will have to be taken into account when using this post for a comparison.

*The post shareholders funds can be used for the comparison between companies. The post capital and other shareholders funds however cannot be used for the comparison. The reason is that the definitions given in the Amadeus table cannot be traced back in the companies annual reports.*

14. The problem with non current liabilities lies with the specifications given. Ireland (British) and Denmark just state: long term liabilities. The other countries give a more precise definition of non current liabilities. A note worth mentioning is that Ireland (British) is specifically mentioning that non-current liabilities is long term liabilities without minority interest. It was already mentioned that other shareholders funds could be defined as reserves + minority interest. Probably in Britain the companies report non-current liabilities and are adding minority interest to this post.

*The sum of 15 + 16*

15. The problems with long term debt are the Netherlands that defines it as convertible loans + private loans/bonds + credit institutions + lease liabilities. Only France is also mentioning convertible loans, the other countries mention long term debt and that's it. Credit institutions + lease liabilities is only mentioned by the Netherlands indicating that it will be difficult to compare this post with each other.

*Long term debt is given by Belgomilk as financial debt. Amadeus however multiplies the financial debt of Belgomilk by two and then inserts it into the database. Probably a small mistake. This means that the post long term debt, but also non-current liabilities and other non current liabilities (incl. provisions) is represented in the wrong way in the case of Belgium by Amadeus. Long term debt is given by Glanbia under the post borrowings. This matches the number given by Amadeus. The numbers given by Amadeus for long term debt cannot be traced back for Friesland Foods in the annual report. It is therefore not possible to make comments on the posts non-current liabilities, long term debt and other non current liabilities for Friesland Foods. The long term debt post of Campina matches with the post of "achtergestelde obligatie lening" in Campina annual report. The*

*definition given by Amadeus for the Netherlands however is not correct when compared with Friesland Foods and Campina. The definition given by Amadeus for Germany is simple liabilities – liabilities, due within 1 year. The post of current liabilities will have to be checked for Germany in order to determine whether long term debt can be used safely.*

16. The differences in the post other non current liabilities is plenty fold. Belgium is reporting trade debts where the other countries do not mention this post. Ireland (British) is mentioning that minority interest should be subtracted from other long term liabilities. Ireland (British) like Denmark does not give a specifications of this other long term liabilities. The Netherlands is again mentioning credit institutions + lease liabilities, this was already done for the post long term debt, the differences between the two are not clear. Germany mentions: passive differed taxes.

*Other non current liabilities (incl. provisions) faces the same problems as long term debt. The definitions of Amadeus do not match or the numbers cannot be traced back in the annual reports of the different companies.*

The post non-current liabilities withhold a number of “problems”. The question of how serious these problems are for the overall post of non current liabilities is difficult to answer. Estimation is made that the overall post of non-current liabilities is comparable between countries. The reason is that the posts that differ per country are relatively small in comparison with the overall long term debt.

*The post non current liabilities can probably be used safely for the comparison. The problem of leasing, in the relationship of different accounting systems, cannot be found back in the annual reports. Campina, Friesland Foods, Belgomilk and Glanbia are reporting leasing under fixed asset and as a non-current liability. For Danone it is also checked. Danone is also reporting financial lease under fixed asset and as a non-current liability. This depends on the post current liabilities. Non-current liabilities can be determined by liabilities – current liabilities, so when current liabilities is not facing any problems non-current liabilities will also not cause any problems. The post long term debt and other non current liabilities (incl. provisions) cannot be used for the comparisons, because of the problems described above.*

17. Current liabilities are not defined clearly. Ireland (British) and Denmark define it as total current liabilities. Belgium also adds up accrued charges and deferred income. The Netherlands ads up current liabilities + other liabilities. France and Germany are again rather specific in its definition.

*The sum of 18 + 19 + 20*

18. A remark can be made about loans in the sense that the Netherlands and Germany include credit institutions. This is a problem, because the other countries could have included the post under loans, but do not mention them or the other countries did not include them.

*The annual report of Belgomilk matches with the definitions given by Amadeus. The annual report of Glanbia also matches with the definition given by Amadeus. The same applies for Campina. The numbers given by Amadeus for Friesland Foods however do not match or cannot traced back to the annual report of Friesland Foods. Amadeus only gives*

*the financial number for Verbindlichkeiten aus Lieferungen und Leistungen in the case of Molkerei Ammerland. Total current liabilities is not given by Amadeus in the case of Molkerei Ammerland. The conclusion is not straightforward, because Belgomilk, Glanbia and Campina matches with Amadeus. Friesland Food does not match at all with Amadeus and for Molkerei Ammerland there are no data available.*

19. Creditors are in all the six countries the same.

*The same applies as for loans.*

20. Other current liabilities. In the definition of Belgium taxes, rem. and social security are mentioned. Ireland (British) only mentions it as other current liabilities. Denmark is calculating other current liabilities from total current liabilities – loans – creditors. The Netherlands does not include credit institutions while that was posted under loans. The same applies for Germany. France and Germany both report taxes as other current liabilities, but do not mention social security as is done in Belgium.

*The same applies as for loans in the sense for data availability. The problem that occurs is that the annual reports do not give so much data as the definitions given in the Amadeus table in the different countries. The other current liabilities post really is a balancing item. All the other post of current liabilities are headed under other current liabilities when it cannot be stated under loans, creditors, long term debt and other non current liabilities.*

The post current liabilities is questionable in the sense that it will be difficult to compare between countries. Differences in definitions like including taxes and social security into a post like other current liabilities can influence the amount of current liabilities.

*The overall conclusion is that current liabilities can be used for the comparison. This means that the post non-current liabilities can also be used for the comparison. There are problems with the definitions given by the Amadeus table when compared with the annual reports of different companies, but while all the other posts so far were more or less correct this post will also not give real problems.*

21. 11+14+17

22. 6+7-19

23. Only Germany gives the definition for number of employees.

Profit and loss account

24. Operating revenue/turnover is reported in Britain (Ireland) and Denmark as turnover. Belgium reports it as operating income and France as total operating revenue. Germany takes into account, stock movements, capitalized own costs + other operating income. The consequences are not clear for this post. It is possible that they all mean the same (turnover), but it is more likely that there are differences in the way turnover is reported. For example: with operating income it is possible that sales + inventory change is meant, but it can also mean turnover without inventory change.

*Belgomilk does not follow the definition given by Amadeus for Belgium. The problem is that the turnover of Belgomilk with a correction for inventory and other revenues is inserted in the database of Amadeus and not just turnover. The definition given in the*

*table by Amadeus is wrong. The turnover of Glanbia without the turnover of a joint venture is published in the table of Amadeus. This means that the turnover will be lower in comparison with other companies. This is not in line with the definition given by the Amadeus table for British (Ireland). The turnovers of Campina and Friesland food matches with the database and the definition given in the Amadeus table. The numbers given by the annual report of Molkerei Ammerland matches the numbers in the Amadeus database and it also matches the definition of Germany.*

25. Sales is reported as turnover in Belgium, France and Germany. In the Netherlands as net sales and for Ireland (Britain) and Denmark this is not applicable/known.

*The database only gives the sales of Molkerei Ammerland, Campina and Friesland foods. The reason is that the definitions for these post are the same. This matches with the table of Amadeus.*

26. Belgium, France and Germany do not report cost of goods sold. Ireland (British) and the Netherlands report cost of sales and for Denmark cost of goods sold is calculated from turnover and gross profit.

*The table of Amadeus does not give a definition for cost of goods sold for Belgium. The database also does not give a financial number. The table of Amadeus does give a definition for British (Ireland), but in the database the financial number is not included. The annual report of Glanbia gives a number for cost of sales, but this cannot be compared with the database. Campina gives the cost of sales and this number matches with the database of Amadeus. The definition is also the same. The database of Amadeus does not report any other cost of sales for other companies.*

27. 24-26

*The same applies as for cost of sales.*

28. Belgium, France and Germany are again not reporting other operating expenses. Ireland (British) defines it as other expenses and depreciation. Denmark is again calculating the number by extracting gross profit – primary result and the Netherlands state it as other operating expenses.

*The same applies as for cost of sales.*

29. Operating profit/loss is in 5 countries defined as operating profit/loss. The profit and loss of Ireland (British) can be calculated by gross profit – other operating expenses – depreciation.

*In the database of Amadeus the financial revenue of Belgomilk is reported instead of operating profit and loss. There are several problems with the operating expenses as reported for Glanbia. First the database of Amadeus mixes up the years. The database of Amadeus takes the pre-exceptional profit/loss of the year 2002. The second problem is that they take the pre-exceptional financial number (figures before exceptional items are taken into consideration) where they should use the “normal” numbers of 2003. However the definition of Glanbia and the table of Amadeus do fit. The database however uses the wrong data. The definition given by the Amadeus table does not match with the data in the*

*database for Campina. The data in the database reports a profit and loss with other business revenue (overige bedrijfsopbrengsten) as profit and loss. The data given in the database of Amadeus cannot be traced back in the annual report of Molkerei Ammerland. It is therefore not possible to give a fair value about this post.*

While in the other 5 countries profit and loss is calculated by, gross profit – other operating expenses, it is strange that the definition of Ireland includes depreciation. The conclusion is that gross profit is difficult to compare between countries or at least for Ireland. It is also possible that depreciation falls in the other 5 countries under other operating expenses, but that this is not mentioned. Another point worth mentioning is that the formula given by Amadeus for calculating operating profit and loss is wrong for the countries Belgium, France and Germany, because these countries do not mention other operating expenses.

*The post operating profit/loss is not suitable for comparison. There are too many problems with this post. Definitions that do not match. False financial numbers were included into the database. The post in the table also does not give enough information about the way it should be calculated.*

30. The six countries differ in the specifications given in their definition of financial revenue, but this is not a reason for concern.

*The numbers in the database do not match with the numbers mentioned in the annual report of Belgomilk. The database is mixing up the different numbers of financial revenue and financial expenses. The numbers in the database for Glanbia do not match/cannot be found in the annual report of Glanbia. The number in the database for Campina matches with the annual report. The definition given in the table of Amadeus however cannot be checked at the hand of Campina. The annual report of Campina does not provide enough data to check the definition. The numbers mentioned in the database for Friesland Foods cannot be traced back in the annual report. The definition mentioned in the table of Amadeus cannot be checked. The number of financial revenue cannot be traced back in the annual report.*

31. The same applies for financial expenses. The only remark here is that amortization on financial assets or current assets is taken into account by Germany. It is not clear whether the other countries take these post into consideration.

*The same applies as for above. The only difference is that for Campina and Molkerei Ammerland the financial expenses can be traced back in the annual report and the database.*

32. 30-31

*While only for Friesland Foods and Molkerei Ammerland the financial expense can be traced back this post faces the same problem as the two post described above (number 30 and number 31)*

*Overall the three post above cannot be used for a comparison. The numbers are falsely inserted (Belgomilk) or they are missing. The definitions given by the Amadeus table can therefore not be traced back.*

33. 29+32

*The profit/loss before tax can only be traced back in the database for Campina and Molkerei Ammerland. For Campina however the results of non consolidated enterprises is taken into account. This does not match with the definition mentioned by the Amadeus table.*

34. Belgium and France also include deferred taxes in their definition of tax. The other countries only report taxation.

*Taxation as mentioned in the database can be traced back in the annual report of Campina. In the other annual reports of (Molkerei Ammerland, Glanbia, Friesland Foods and Belgomilk) this is not the case.*

It is not clear whether the other countries take deferred taxes into consideration in the post taxes. Probably the other countries report deferred taxes on the balance sheet and/or as extraordinary loss. With deferred taxes in the definition of France and Belgium these post become unreliable. Taxation could be one year very high, because in the previous year the tax was not paid. In the other year the taxation could be very low, because payment was postponed. This also has an impact on the profit and loss after tax.

*Because of a lack of data this post is not suitable for comparison.*

35. 33-34

*The financial numbers in the database can only be traced back in the annual reports of Campina and Molkerei Ammerland. The definitions match in these cases with the definitions of the table.*

36. Extraordinary & other revenue is not defined in Ireland (British) and Denmark. The Netherland comes up with: extraordinary income + adjustment deferred taxes + balance of participations after taxes, but while there is no definition of extraordinary income the definition itself remains vague. France and Germany do give a definition, but they face the same problem as the Netherlands (extraordinary income is not defined).

*The database only mentions ordinary profit and loss in the case of Glanbia and Belgomilk, but these numbers cannot be traced back in the annual reports. The definitions for these post can therefore not be traced back.*

37. The same problem occurs as for extraordinary & other revenue.

*The same applies as for 36.*

38. 36-37, but strangely Ireland (British) and Denmark do give a definition: extraordinary items. It is not clear what those items are.

*The same applies as for 36.*

39. –

*The same applies as for 36.*

40. Belgium and Germany include consumables in the definition of material cost. Ireland (British) and Denmark do not give a definition. France state material cost as purchase of goods, raw material purchase + inventory variation.

*The financial number can be traced back in the database, but the definition as given in the table is different from the annual report. The database therefore uses the wrong number or the definition is false. The database only represents the purchase of raw materials, but does not take into account consumables. Material cost as stated in the database for Glanbia cannot be found back in the annual report. The wrong financial number is inserted in the database in the case of Campina. The database uses the financial number of 2002 and also the financial number of end products and commercial goods (gereed product en handelsgoederen). The definition used in the table is not correct in the case of Campina. The financial numbers of Friesland Foods in the database can be traced back in the annual report. It can be calculated by adding up raw material + packing material. This however is not in line with the definition given in the table of Amadeus. The number given in the database for Molkerei Ammerland cannot be traced back in the annual report.*

The post material cost cannot be used for a comparison between countries, while Belgium and Germany include consumables in this post. France also has a slightly different definition of raw material and Ireland (British) and Denmark do not give a definition.

*There are a number of problems with material cost. The first is that the wrong numbers are inserted in the database. Numbers of 2002 or end products and commercial goods instead of raw materials. Another problem are the different definitions for material cost or definitions that do not match with the definitions given in the table of Amadeus. These problems give reason that post material cost cannot be used for a comparison.*

41. The six countries each give another definition for cost of employees. Belgium includes social welfare. It is not clear whether the other countries are paying social welfare and under which post they state it. France also includes taxes on salaries in their cost of employees.

*The financial number for Belgomilk in the database does not match the annual report of Belgomilk. The financial number for Glanbia is wrongly inserted in the database. It cannot be traced back in the annual report. The financial number in the database for Campina can be traced back in the annual report by adding up salary and social welfare. This does not match with the definitions for the Netherland in the table of Amadeus. The same applies for Friesland Foods. In the annual report of Molkerei Ammerland the data from the database can be found back. The definition of the table does match with the definition of the annual report.*

Cost of employees cannot be used for a comparison between countries. The definitions given by each country are different and it is not clear whether social welfare is paid.

*This post cannot be used for a comparison, while the numbers from Belgomilk and Glanbia were wrongly inserted. Another problem is that the definitions do not match with the financial numbers in the database.*

42. Depreciation is every time defined the same. Belgium and Ireland (British) are also mentioning that they depreciate on goodwill.

*Depreciation is not given in the table for Belgomilk and Glanbia. The numbers in the database for Campina and Friesland Foods match with the annual reports. The definition in the table for the Netherlands is however not rather specific. The depreciation has to be calculated for Friesland Foods by adding up depreciation on material active and the depreciation on goodwill. In the table this is explicitly mentioned for British (Ireland), Belgium and Denmark. The financial number in the database matches with the annual report in the case of Molkerei Ammerland. The definition given in the table is correct in the case of Molkerei Ammerland.*

*There is a lot of data missing in the database of Amadeus for depreciation. This post cannot be used for a comparison.*

43. Interest paid is defined the same for every country.

*The number in the database for Belgomilk does not match with the data from the annual report. The number in the database for Glanbia is wrong. The database used interest received and not interest paid. The number in the database for Campina matches with the annual report. The definition of Campina also matches with the definition in the table of Amadeus. The financial number of Friesland Foods however cannot be found in the database. In the annual report of Molkerei Ammerland the financial number in the database can be found. The definition of the Amadeus table matched with the definition in the annual report.*

*Again, this post cannot be used for a comparison. Data is not filled in correctly into the database (Glanbia, Belgomilk and Friesland Foods).*

### **3.3.3. Conclusion**

The main conclusion that can be drawn from this analyses is that the main post like fixed assets, current assets, shareholders funds, non current liabilities, current liabilities and turnover can be used for comparing cooperatives and IOFs. The specifications of these post however cannot be used for a comparison. The reason is that these posts do not match with the database. The different countries and companies use different definitions, are placing items under different headlines or the financial numbers are not filled in correctly in the database.



## 4. CONCEPTUAL MODEL

In this chapter the conceptual model will be presented. The general linear equation model is explained and now the performance of cooperatives and IOFs will be compared.

### 4.1. General concept

Multiple regression analysis is used to analyse the performance of cooperatives and IOFs. Multiple regression seeks to predict an outcome from several predictors (Hair et al, 1995). The general linear equation model looks as follows:

$$(1) \quad y = b_0 + b_1 * x_1 + b_2 * x_2 + \dots + b_k * x_k + \varepsilon$$

Y is the predicted variable,  $b_1$  is the coefficient of the first predictor ( $x_1$ ),  $b_2$  is the coefficient of the second predictor ( $x_2$ ),  $b_k$  is the coefficient of the kth predictor ( $x_k$ ) and  $\varepsilon$  is the difference between the observed and the predicted value of y for the ith participant (Field, 2005). The coefficients  $b_k$  are estimated by the regression analyses and their influence on y is calculated. The general linear equation model is used to assess the influence of each independent variable on the performance variable for the group of cooperatives, the group of IOFs and for the group as a total (cooperatives and IOFs).

Following Oustapassidis et al. (1998), first the influence of the independent variables on the dependent variables for the group as a total (Cooperatives and IOFs) is determined. By doing so the influence of the independent variables on the dependent variables in the dairy industry is examined. This gives valuable information, because in different sectors of the economy the independent variables have a different impact on the dependent variable. For example: The steel sector is a business to business industry and in such an industry the influence of one euro of advertisements on profit will be smaller than in the fast moving consumer goods sector. By examining the influence of the independent variables on the dependent variables for the whole sector an average standard is created for the whole sector. Then the behaviour or the influence of the independent variables of each separate group is determined and compared with the average influence of the independent variables of the dairy sector.

So, regression analysis is the first step in our model. The second step is to compare the means of the independent variables between the cooperative group and the IOF group by the independent t-test in order to see whether the means differ significantly from each other. This in combination with the results of the regression analysis gives information on whether a cooperative or IOF is allocating its resources more efficient in comparison to each other. For example, assume the influence (coefficient) of the independent variable advertisement on profit is higher for IOFs and comparing the means of the cooperatives and IOFs shows that the means of the cooperatives for advertisements are significantly higher. This could mean that the cooperative is not allocating its resources efficient in comparison to IOFs. The higher amount for advertisement in cooperatives could also mean that cooperatives compensate the relative low impact of advertisement on profit by spending more on advertisement. By taken into account the absolute value of each variable performance can be explained better.

#### **4.2. *Concept of the regression model***

The regression model is the first step in analyzing the performance of cooperatives and IOFs. In the regression equation the dependent variable is the indicator that measures the performance of cooperatives and IOFs. The independent variables are in their turn explaining the performance of cooperatives and IOFs. Indicators for measuring performance are sales growth, profitability or earnings per share (Venkatraman and Ramanujam, 1986). Which performance indicator is best to measure performance depends on the situation.

Capon et al., (1990) state: "Although studies of performance are found in many research traditions, they share the basic approach of "natural experimentation."

Profitability indicators are chosen in this research to measure performance, because they are lagging indicators which tell us how well a company has performed (McLaney, 2005). Furthermore profitability measures are concerned with the effectiveness of the business in generating profit. Not the absolute amount of profit is important, but how effective total assets are used to generate the profit. Growth measures the process by which an organisation or any of its parts increases in size. Rappaport (1986) concludes that growth should not be a goal in itself. "In fact, if the firm is willing to accept any project just to grow in size, growth will probably make the stockholders worse off" (Ross et al., 2005). Earnings per share are important as to calculate the profit of an investment. Earnings per share will not be used while members of a cooperative cannot sell their membership certificates.

Independent variables that explain profitability are: average market share, gross margin to net sales, promotional expenditures to net sales, total debt to net worth, current liabilities, average collection period, days payable outstanding, net sales to working capital and net sales to accounts receivable (Cronin, 1985). Hirschey and Wichern, (1984) state that R&D expenditures, advertisement intensity, leverage and industrial growth are also important indicators for explaining profitability. In this research performance is seen from the property rights point of view. The choice for performance indicators is therefore limited by this perspective. In chapter 2, the following performance indicators were discussed: liquidity, efficiency, leverage, advertisement expenses and diversification. These variables are therefore used as the independent variables in the regression model.

Liquidity, efficiency, advertisement expenses are expected to be positive related with profitability. In chapter 2 this is explained. However, the theory is not straightforward for leverage and diversification. The theory expects that there are optimums for both indicators. However, that there is an optimum for leverage is not proven and for diversification there are no data available.

#### **4.3. *Performance indicators***

In this section the indicators are selected. For liquidity, efficiency, leverage, advertisement expenses and diversification, one or more indicators are included in the model. The indicators mentioned are according to Ross, et al., (2005). In appendix D the income statement and balance sheet according to Ross et al. (2005) are given.

### *Profitability:*

Indicators for profitability are:

- Net profit margin = net income / total operating revenue
- Gross profit margin = earnings before interest and taxes / total operating revenues
- Net return on assets = **net income** / average total assets
- Gross return on assets = earnings before interest and taxes / average total assets
- Return on equity = net income / average stockholders equity

Net profit margin and gross profit margin express profit as a percentage of total operating revenue. Whereas net return on assets and gross return on assets uses average total assets. Return on equity uses stockholders equity. The numerators of the ratios for profitability express that size is important for determining the profitability of a firm. That is why in this research size will be used as an independent variable. Meaning that in the dependent variable total operating revenue or asset turnover is not used. What remains is that net income or earnings before interest and taxes can be used as a measure for profitability. However, interest expenses and taxes are in most cases not available in the database. Therefore net income will be used as a measure for profitability. Return on equity is not used, because it only calculates the profitability of equity. A firm however also generates money with debt capital.

In case of comparing cooperatives and IOFs, measuring performance by net income also faces the problem that cooperatives pay out their net income more or less to their members in the form of higher milk prices. Therefore, net income is not a good indicator for performance in the case of cooperatives. Dorresteijn and Wouters, (2004) solved this problem by adding the difference of the individual dairy cooperatives price minus the average milk price paid times the volume of milk purchased by the cooperatives to the profit of cooperatives. In this research a similar solution is used. In this research the main indicator for performance is **net income + material cost**. The post material costs consist for the largest part of the costs of the raw material milk, so it includes the price paid for the milk. By adding material cost to net income the cooperative method of paying out net income in the form of higher milk prices is taken into account.

### *Size*

Indicators for size are:

- **Turnover**
- Total assets
- Number of employees

Size is used in the regression analysis as an independent variable, because it is an important factor influencing not only the absolute amount of profit, but also profit per unit of production. The reason for the latter is that large firms have more market power than smaller firms. Market power enables large firms to get larger rebates for their inputs and higher prices for their products (Penrose, 1959). Furthermore, large firms have scale advantages in their production process which enables them to produce more efficient. Size is a measure to determine the relative status of firms on the capital market. Size can be measured by turnover, total assets or number of employees (Swamidass and Kotha, 1997). Turnover is used in the regression analysis as the independent variable, because it is the best measure to determine the relative status of the firm on the markets. Turnover indicates how much a firm purchases or sells on the markets. This is the basis for market power. Total assets and number of employees are also indicators for size, but the relative market power of a firm on the market is not based on the assets of a firm.

### *Liquidity:*

Indicators for liquidity are:

- **Quick ratio = (current assets – stock) / total current liabilities**
- Current ratio = current assets / current liabilities

The quick ratio is used as a measure for liquidity. The ratio explains whether the current liabilities can be paid from the current assets excluding inventories. The quick ratio is used, because the general critique is that inventories cannot always be converted directly into cash. This is especially important for dairy companies which produce cheese. Cheese needs to age in order to develop its taste. This means big inventories. When the current ratio is used a firm which produces a lot of cheese would be very liquid in theory, but in reality this does not have to be the case. The quick ratio is therefore a better measure of liquidity.

### *Efficiency:*

Indicators for measuring efficiency are:

- **Inventory turnover = cost of goods sold / inventory**
- **Receivables turnover = Total operating revenues / receivables**
- **Total assets turnover = Total operating revenues / total assets**

Inventory turnover, receivables turnover and total assets turnover are used as efficiency measures. Inventory turnover tells whether a firm is able to optimize the inventories. Receivables turnover gives information about how well a firm is managing its account receivables. Total assets turnover is measuring the total efficiency of a firm, because it measures how well a firm is using its assets to generate revenues. An efficient firm can generate higher revenues with the same amount of assets as its competitors. All three measurements are included in the regression analyses, because the three ratios all measure different parts of a firms efficiency.

### *Leverage:*

Indicators for measuring leverage:

- **Debt-to-equity = total debt / total equity**
- Debt ratio = Total debt / total assets
- interest coverage ratio (earnings before interest and taxes / interest expense)

Leverage indicates the proportion of outside finance vs equity capital and is measured by the debt-to-equity ratio. The debt ratio indicated the proportion debt vs. total assets. It also measures leverage, but it is only a variation of the debt-to equity ratio. That is why this ratio is not included into the regression analysis. The interest cover ratio age is not an option, because the interest paid could not be used for the analyses (see chapter 3).

### *Advertisement expenses:*

Ratios for measuring advertisement expenses are advertisement expenses divided by sales and advertisement expenses divided by fixed assets. The problem is that the database does not contain any information about advertisement expenses. Therefore this variable is not included.

### *Diversification:*

The database contains information on the principal sector in which each firm is active. However, the database does not provide information on whether a firm is active in more than one sector. This means that it is not possible to determine whether a firm and to what extent a firm is diversified or not. Therefore this variable is not included.

Based on previous discussions the general linear equation model will be:

$$(2) \quad y = b_0 + b_1 * x_1 + b_2 * x_2 + \dots + b_k * x_k$$

y = (profit + material cost)

x<sub>1</sub> = Turnover

x<sub>2</sub> = Quick ratio

x<sub>3</sub> = inventory turnover

x<sub>4</sub> = receivables turnover

x<sub>5</sub> = total asset turnover

x<sub>5</sub> = Debt-to-equity

#### **4.4. Assumptions in multiple regression analysis**

The assumptions in multiple regression analysis apply to the dependent variable, the independent variable and to the regression model. The assumptions are (Hair et al, 1995):

*Linearity of the phenomenon measured:* The relationship between the dependent variable and the independent variables should be linear. The reason is that correlation is based on a linear relationship. Linearity can be checked by examining residual plots.

*Constant variance of the error term:* The variables should be tested on homoscedasticity. “Homoscedasticity is desirable because the variance of the dependent variable being explained in the dependence relationship should not be concentrated in only a limited range of the independent values” (Hair et al., 1995). Homoscedasticity is tested by the Levene test or by plotting the residuals.

*Independence of error:* The assumption in regression is that each predicted variable is independent. In other words the predicted value is not related to any other predictor. By plotting the residuals this assumption can be tested.

*Normality of the error term distribution:* The variables should be normally distributed. This is important in order to generalise the results from the regression analysis to the whole population. Normality of the error term distribution is checked by a histogram of residuals or normal probability plots. Statistical test that can be used are: Skweness test, Shapiro-wilks or the Kolmogorov-Smirnov test.



## 5. RESULTS

In this chapter the results of comparing IOFs with cooperatives are presented. First, the assumptions of multiple regression is checked. Second, a descriptive overview is given about the data. Third, the means of the different variables of the IOF and cooperative group are compared using the independent t-test in order to see whether the means differ significantly from each other, thereby indicating where the two groups differ from each other. The independent variables are checked on multicollinearity before a regression analysis is carried out. The multiple regression analysis displays information on the importance of the different variables in the model. At last a Chow test is conducted in order to examine whether the coefficients of the IOF group and cooperative group are equal to each other.

### 5.1. *Checking the assumptions of multiple regression*

In order to do a multiple regression analysis the data in the database have to comply to the assumptions mentioned in section 4.4. The assumptions of multiple regression are independently tested for the total group, the IOF group and the cooperative group. For each group the same steps are taken to make sure that the assumptions for multiple regression analysis are met.

The data for each group are first examined by plotting boxplots of each variable used in the regression model. The boxplots tell us whether there are any outliers in our database. Outliers can disturb the assumptions of multiple regression. Each outlier is examined and when necessary the outlier is removed. In case there are more problems with the data of a particular company it is possible that the whole company is deleted from the database. In appendix E the removed outliers of each group are described and the reasons are given for removing the outliers or the whole case from the database.

After the examination of the outliers the residuals of the variables in the regression model are plotted. The plotted residuals indicate whether the data comply with the assumptions of linearity, homoscedasticity and independence of error. In order for the assumptions to hold the residuals of each variable in the graph should be randomly distributed along a linear line. The profitability ratio, debt-to-equity ratio and revenue had to be transformed in order to achieve the assumptions of linearity, homoscedasticity and independence of error. The profitability ratio and revenue are transformed using the log transformation (ln) and the debt-to-equity ratio is transformed using the square root transformation (sqrt). The transformation made that the residuals are randomly scattered throughout the graph. The residuals that deviated from this pattern (residuals in the far corners of the graph) are examined and when necessary removed. In appendix D the values of the variables that were removed are also described and the reason is given for why they were removed.

In appendix G, I and K the residual graphs of the variables of the regression models are given after the transformation and after certain values of the variables were deleted. As can be seen the residuals are equally scattered through out the graph. The variables are scattered along a linear line although the line is almost horizontal. Meaning that the assumptions of linearity, homoscedasticity and independence of error hold. The assumption of normality of the residuals is tested by looking to the histograms of the variables in the regression model. The

histograms in appendix F, H and J display a bell-shaped curve indicating that the residuals are normally distributed.

## 5.2. Descriptive statistics

In this section a detailed overview of the variables used in the regression analysis is given. For the regression analysis 121 companies are available for the total group. For the regression analysis of the IOF group and the cooperative group there are respectively 84 companies and 44 companies available. In table 6 the number of missing values, the mean and the standard deviation are given for each variable. For profitability, leverage and revenue also the mean is given of the non-transformed variables (between brackets). This gives a better insight into the data, because for example a mean of 7.97 of the transformed profitability ratio is hard to interpret.

**Table 5.1: Descriptive overview of each variable in the regression analysis for the total group, IOF group and cooperative group.**

| Variables           | Total group    |             |                | IOF group      |             |                | Cooperative group |             |                |
|---------------------|----------------|-------------|----------------|----------------|-------------|----------------|-------------------|-------------|----------------|
|                     | Missing values | Mean        | Std. deviation | Missing values | Mean        | Std. deviation | Missing values    | Mean        | Std. deviation |
| Profitability       | 10             | 7.97        | 0.22           | 7              | 7.6         | 0.22           | 3                 | 8.6         | 0.44           |
| Receivable turnover | 10             | (276,479)   |                | 7              | (15,720)    |                | 3                 | (721,080)   |                |
| Asset turnover      | 10             | 9.5         | 0.34           | 6              | 14.40       | 2.33           | 2                 | 9.41        | 0.47           |
| Stock turnover      | 2              | 2.88        | 0.17           | 5              | 2.57        | 0.12           | 0                 | 3.34        | 0.42           |
| Leverage            | 13             | 40.7        | 1.58           | 0              | 42.73       | 1.82           | 2                 | 36.57       | 2.62           |
| Liquidity           | 13             | 0.75 (0.77) | 0.04           | 9              | 0.73 (0.74) | 0.05           | 5                 | 0.78 (0.83) | 0.08           |
| Revenue             | 3              | 27.25       | 1.65           | 2              | 27.09       | 1.91           | 2                 | 27.63       | 3.07           |
|                     |                | 11.25       | 0.12           |                | 10.89       | 0.11           |                   | 11.83       | 0.27           |
| Revenue             | 2              | (258,870)   |                | 5              | (105,374)   |                | 0                 | (1,417,603) |                |

In the three groups the means of the transformed variables profitability, leverage and revenue are about the same. The mean of the non-transformed variables profitability, leverage and revenue gives us more information than the mean of the transformed variables profitability, leverage and revenue. The mean of the non-transformed profitability variable for the IOF group is extremely low 15,720 in comparison with the mean of the cooperative group 721,080. This is in line with the cross tab in the following section which indicates that there are a lot of small companies active in the European dairy sector and some very large cooperatives. The same applies for revenue where the mean for the IOF group is 105,374 and for the cooperative group 1,417,603. The non-transformed mean of the leverage ratio is about the same as the transformed numbers. The mean of receivable turnover is higher for the IOF group with 14.40 in comparison with the means of the total group and cooperative group (9.5, 9.41). The standard deviation of the IOF group is also much higher 2.33 for this variable than the standard deviation of the total group and Cooperative group (0.34, 0.47). For all other variables the standard deviations of the cooperative group is roughly twice as high as the standard deviation of the total group and IOF group. However, there is no clear explanation for this.

### 5.3. Comparing means

An independent t-test is used to test whether the means of each variable in the IOF model and the cooperative model are significantly different. The t value, with its two tailed significance level is tested at a significance level of 0.05. When the means of both groups are significantly different it gives us insight in the behavior of the cooperative group in comparison to the IOF group. For example it is expected that cooperatives have lower levels of liquidity. When the means of the IOF group and cooperative group differ significantly for liquidity a firm statement can be made about whether cooperatives or IOFs hold more liquidity. The non-transformed variables are used for the independent t-test, because the means of the non-transformed variables are easier to interpret. The F values with its significance levels (smaller than 0.05 no equal variances, higher than 0.05 equal variances) give information on whether the t-test with equal variance assumed or the t-test with no equal variances assumed should be used. In table 7 the results of the independent t-test can be found for the variables of the regression analysis. The variables profitability, revenue and receivable turnover have different variances.

**Table 5.2: Comparing means cooperatives and IOFs**

| <b>Independent t-test</b>  | <b>F</b> | <b>Sig.</b> | <b>Variances assumed</b> | <b>T</b> | <b>Sig (2-tailed)</b> | <b>Difference in mean</b> |
|----------------------------|----------|-------------|--------------------------|----------|-----------------------|---------------------------|
| <b>Profitability</b>       | 11.84    | 0.001       | No equal variance        | -1.328   | 0.192                 | <i>NO</i>                 |
| <b>Revenue</b>             | 10.49    | 0.002       | No equal variance        | -1.416   | 0.164                 | <i>NO</i>                 |
| <b>Receivable turnover</b> | 8.13     | 0.005       | No equal variance        | 2.094    | 0.039                 | <i>Yes</i>                |
| <b>Asset turnover</b>      | 2.97     | 0.088       | Equal variance           | -2.156   | 0.033                 | <i>Yes</i>                |
| <b>Stock turnover</b>      | 0.36     | 0.551       | Equal variance           | 1.951    | 0.053                 | <i>No</i>                 |
| <b>Leverage</b>            | 0.129    | 0.720       | Equal variance           | -0.477   | 0.634                 | <i>No</i>                 |
| <b>Liquidity</b>           | 2.96     | 0.088       | Equal variance           | -0.156   | 0.877                 | <i>No</i>                 |

Table 7 shows that the mean of the receivable turnover and asset turnover ratio differ significantly from each other. It is expected that cooperatives are less efficient than IOFs. The mean for receivable turnover is lower for the cooperative group with 9.41 in comparison with 14.40 for the IOF group. Indicating that cooperatives are more efficient in managing accounts receivables than IOFs. A higher ratio means a lower efficiency. For asset turnover this is opposite with a mean of 3.34 for cooperatives and a mean of 2.57 for IOFs. While asset turnover is measuring the overall efficiency of a firm a preliminary conclusion could be that IOFs are more efficient than cooperatives as was expected in the literature. For the other variables the means do not differ significantly from each other. This is not what one would expect for the variable profitability having a mean of 15,720 for the IOF group and a mean of 721,080 for the cooperative group. The profitability ratio is therefore examined more by classifying the profitability values into categories, so by making a so called cross tab. Table 8 shows the cross tab for profitability. For the classification of the profitability values classes with increasing size are used.

**Table 5.3: Cross tab profitability**

| Cross tab: profitability (Euro's) | Cooperative | IOF |
|-----------------------------------|-------------|-----|
| 10,000,000 →                      | 1%          | 0%  |
| 1,000,000 – 10,000,000            | 7%          | 0%  |
| 500,000 – 1,000,000               | 0%          | 0%  |
| 100,000 – 500,000                 | 5%          | 5%  |
| 50,000 – 100,000                  | 5%          | 4%  |
| 0 – 50,000                        | 80%         | 90% |

The table shows that most companies have a profitability between 0-50000. 80% of the cooperative companies fall in that range and 90% of the IOF companies. The difference between the two groups is that in the cooperative group there are some companies, around 8% that fall in the profitability range of 1000000 and higher (Arla Foods, Friesland Foods and Campina). In the IOF group there are no companies that have such a high profitability.

#### 5.4. Multicollinearity

Multicollinearity is the problem in which two or more independent variables in a regression model are highly correlated. Multicollinearity undermines the predicting value of the independent variables in a regression analysis. Multicollinearity is detected using a correlation matrix. Correlation coefficients indicate whether there is a relationship between two variables. A correlation coefficient can have values between -1 (perfect negative correlation) and 1 (perfect positive correlation). A correlation of 0 indicates that there is no relationship between two variables. Multicollinearity exists when correlations are  $> 0.90$  (Vocht, 2007). Table 9 shows the correlations for each variable for the total group, the IOF group and the cooperative group. The table shows there is no multicollinearity between the independent variables of the regression model.

**Table 5.4: Correlation matrix**

|                          | 1            | 2            | 3            | 4            | 5            | 6            | 7    |
|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|------|
| <b>Total group</b>       |              |              |              |              |              |              |      |
| 1. Profitability         | 1.00         |              |              |              |              |              |      |
| 2. Receivable turnover   | 0.08         | 1.00         |              |              |              |              |      |
| 3. Asset turnover        | <b>-0.18</b> | 0.13         | 1.00         |              |              |              |      |
| 4. Stock turnover        | <i>-0.50</i> | <b>-0.18</b> | <b>-0.16</b> | 1.00         |              |              |      |
| 5. Leverage              | <i>0.42</i>  | 0.09         | <b>-0.18</b> | <b>-0.19</b> | 1.00         |              |      |
| 6. Liquidity             | <i>-0.37</i> | 0.06         | -0.06        | 0.14         | <i>-0.43</i> | 1.00         |      |
| 7. Revenue               | <i>0.56</i>  | 0.02         | <i>0.23</i>  | <i>-0.32</i> | 0.16         | <i>-0.12</i> | 1.00 |
| <b>IOF Group</b>         |              |              |              |              |              |              |      |
| 1. Profitability         | 1.00         |              |              |              |              |              |      |
| 2. Receivable turnover   | 0.01         | 1.00         |              |              |              |              |      |
| 3. Asset turnover        | <i>-0.34</i> | 0.03         | 1.00         |              |              |              |      |
| 4. Stock turnover        | <i>-0.47</i> | -0.08        | 0.02         | 1.00         |              |              |      |
| 5. Leverage              | <i>0.33</i>  | <b>-0.25</b> | -0.18        | -0.20        | 1.00         |              |      |
| 6. Liquidity             | <i>-0.19</i> | 0.11         | -0.03        | 0.11         | <i>-0.42</i> | 1.00         |      |
| 7. Revenue               | <i>0.46</i>  | 0.16         | -0.04        | <b>-0.24</b> | 0.072        | <i>-0.04</i> | 1.00 |
| <b>Cooperative Group</b> |              |              |              |              |              |              |      |
| 1. Profitability         | 1.00         |              |              |              |              |              |      |
| 2. Receivable turnover   | 0.26         | 1.00         |              |              |              |              |      |

|                   |       |       |       |       |              |                   |
|-------------------|-------|-------|-------|-------|--------------|-------------------|
| 3. Asset turnover | -0.20 | 0.1   | 1.00  |       |              |                   |
| 4. Stock turnover | -0.60 | -0.09 | -0.20 | 1.00  |              |                   |
| 5. Leverage       | 0.46  | 0.17  | -0.18 | -0.54 | 1.00         |                   |
| 6. Liquidity      | -0.57 | -0.25 | -0.11 | 0.25  | <b>-0.30</b> | 1.00              |
| 7. Revenue        | 0.70  | 0.16  | 0.20  | -0.45 | <b>0.36</b>  | <b>-0.34</b> 1.00 |

Bold: Correlation is significant at the 0,01 level (2-tailed)

Cursive: Correlation is significant at the 0,05 level (2-tailed)

### 5.5. Regression

Since the assumption of no multicollinearity for the dataset holds, the ordinary least square analysis can be executed. Based on the literature and the methodology set out in the previous sections, in this section the empirical results are presented. Table 9 shows the results of the regression analysis for the total group, IOF group and the cooperative group.

**Table 5.5: Regression analysis for the total group, IOF group and cooperative group**

|                        | Total group   |              | IOF group     |              | Cooperative group |              |
|------------------------|---------------|--------------|---------------|--------------|-------------------|--------------|
|                        | Beta          | Sig.         | Beta          | Sig.         | Beta              | Sig.         |
| 1. Receivable turnover | 0.004         | 0.962        | -0.017        | 0.884        | -0.005            | 0.955        |
| 2. Asset turnover      | <b>-0.177</b> | <b>0.016</b> | -0.173        | 0.134        | -0.130            | 0.164        |
| 3. Stock turnover      | <b>-0.311</b> | <b>0.000</b> | <b>-0.357</b> | <b>0.002</b> | <b>-0.337</b>     | <b>0.003</b> |
| 4. Leverage            | 0.078         | 0.345        | 0.201         | 0.122        | -0.075            | 0.481        |
| 5. Liquidity           | <b>0.009</b>  | <b>0.011</b> | -0.081        | 0.515        | <b>-0.304</b>     | <b>0.005</b> |
| 6. Revenue             | <b>0.479</b>  | <b>0.000</b> | <b>0.260</b>  | <b>0.025</b> | <b>0.522</b>      | <b>0.000</b> |
| R Square               | 0.69          |              | 0.39          |              | 0.81              |              |

Bold: Independent variables that have a significant relationship with the dependent variable

The R square indicates the goodness of fit of the estimated model or put it differently how much of the variance of the dependent variable is accounted for by the independent variables. A significant relationship means that the variables are making a significant contribution to the model, thus the independent variables explain a substantial part of the dependence variable. The unstandardized beta (B) gives information about how much the dependent variable will change when an independent variable changes by a specific amount under the condition that all the other independent variables are held constant. This can be seen in appendix K. However, this research wants to determine the importance of each variable in our model. Therefore the standardized coefficients (Beta) are reported. The standardized coefficients give a better insight in the importance of each variable in the regression model.

The independent variables account for 69% (R-square 0.69) of the variance of the dependent variable in the total group model. The independent variables in the IOF model account for 39% (R-square 0.39) of the variance of dependent variable profitability. In the cooperative model this is 81% (R-square 0.81). There is a large difference in how much of the variance of the dependent variable is accounted for by the independent variables between the IOF model on the one hand and the total group model and the cooperative model on the other hand. This is in line with the results of Oustapassidis et al., (1998) where the independent variables in the IOF model also accounted less of the variance of the dependent variable then in the cooperative model.

In the table it is readily observable that in the total group model the independent variables asset turnover, stock turnover, liquidity and revenue have a significant relationship at a five percent significance level with profitability. For the IOF group this is stock turnover and revenue. In the cooperative model stock turnover, liquidity and revenue have a significant relationship with profitability. The regression analyses is conducted in order to know the relatively influence of the independent variables on profitability, but while only stock turnover and revenue have a significant relationship with profitability in each group this is a restriction in our comparison.

In all the models it becomes obvious that revenue has a relative large impact on profitability, although in the IOF model the impact of revenue on profitability is much smaller (0.260) then for the total (0.48) and cooperative group (0.52). No clear explanation can be given of these differences. Based on literature it was expected that revenue has a large impact on profitability, because revenue as a measure of size influences not only the absolute amount of profit, but also profit per unit of production. The expectation that revenue has a large impact on profitability is therefore confirmed by the regression model.

In all the models also stock turnover has a relative large impact on the profitability ratio. This is not in line with the literature, because asset turnover was expected to measure the overall efficiency of a firm and stock turnover only a part of a firms efficiency. A reason that stock turnover has such a large impact on profitability could be that the dairy sector deals with large quantities of raw (milk) and finished products (Cheese) (Lee and Billington, 1992). When the raw and finished products have to be stored this will cost a lot of money which directly influences the profitability of a dairy firm.

In the cooperative model liquidity has a significant contribution to the model and its impact on profitability is also relatively high in comparison with the IOF group. This is in line with the expectations from the literature, because cooperatives were expected to have lower levels of liquidity. This restricts cooperatives from grasping business opportunities. Therefore it is logical that the impact of liquidity on profitability is relatively high in comparison with the IOF model. The impact of asset turnover in the total group model on profitability is also worth mentioning, although the impact on profitability is not that high as for stock turnover, because it partly confirms the literature by indicating that asset turnover is still important variable for measuring efficiency although not as important as stock turnover.

## 5.6. *Chow test*

In order to compare cooperatives and IOFs it is important to know whether the coefficient of the independent variables in the regression models for cooperatives and IOFs really are different. For example the regression analysis indicates that liquidity influences profitability in a significant way, but this is not the case for IOFs. The Chow test asserts whether the coefficients of the cooperative group and the IOF group are significantly different from each other (Chow, 1960). So whether  $a_1 = a_2$ ,  $b_1 = b_2$ , and  $c_1 = c_2$ . The following formula is used to calculate the F value of the chow test.

$$(1) \quad \left( \frac{((SC - (S_1 + S_2)) / (K + 1))}{((S_1 + S_2) / (N_1 + N_2 - 2K - 2))} \right)$$

Let  $S_C$  be the sum of squared residuals from the combined data,  $S_1$  be the sum of squares from the first group, and  $S_2$  be the sum of squares from the second group.  $N_1$  and  $N_2$  are the number

of observations in each group and  $k$  is the total number of parameters (in this case, 3). Then the Chow test statistic is

$$(2) \quad \frac{((157.719 - (119,216+51,580)) / (7+1))}{(((119,216+51,580) / (82+42-2*7-2)))} = 86.23$$

The test statistic follows the  $f$  distribution with  $k$  and  $N_1 + N_2 - 2k$  degrees of freedom. The probability that  $F(7,110) = 86.23 < 0.000$ . So, the coefficients of both regression equations are not equal to each other. Therefore, the conclusion is drawn that the independent variables in the cooperative regression model and the independent variables of the IOF model have different coefficients.



## 6. DISCUSSION AND CONCLUSION

An important discussion in this research concerns the use of the Amadeus database. After examining the Amadeus database in a qualitative way it was concluded that this database could not be used for this research, because of data that was wrongly inserted and the different accounting systems used compared to the annual reports of respectable companies. Perhaps statistical analysis could solve the problems associated with the Amadeus database.

In general it can also be debated whether databases are used properly in different research fields. For example: the World Bank used the database of Amadeus without even considering whether the database is appropriate for their analysis (Klapper et al., 2002). Juan et al. (2006) investigated whether database choice has a significantly impact on the outcome of a model. The conclusion of their research was that this is the case. This is however not a comfortable thought for many researchers and their research, because the researchers depend on databases like Amadeus.

Another discussion point is whether it is possible to capture the value of a cooperative in monetary and quantitative terms. A lot of research is conducted in order to capture the more social and indirect benefits of a cooperative in a quantitative way. In this research the social and indirect benefits are not included in the analysis, but perhaps it should have been done to give a fair representation of reality.

An important limitation of this research is the limited amount of variables in the dataset. Advertisement expenses, diversification, specifications of the numbers of employees, etc would have given a better insight into the performance of cooperatives and IOFs. On the other hand Oustapassidis (1998) included diversification and advertisement expenses, but the goodness of fit of his model was not any better than of this model. Another important limitation, already mentioned as a discussion point, is that the social and indirect benefits are not included into the model.

Further research into the field of comparing cooperatives with IOFs could focus on the difference in the R-square between the IOF model and the cooperative model. Which variables are important for explaining the performance of IOFs? This kind of information would help IOFs to perform better. On a more general level the most critical issue in directing further research is the use of databases in quantitative research. While Juan et al. (2006) concluded that database choice have an impact on the outcomes of models quantitative research based on databases has to be looked at very sceptical. It is also an opportunity for new research in the field of databases. Which databases can safely be used and in which way?

In the regression model the impact of the revenue, receivable turnover, stock turnover, asset turnover, liquidity and debt-to-equity ratios on profitability is measured. The regression analysis stated that for the total group, IOF group and cooperative group revenue and stock turnover are important factors influencing profitability. From the literature it was expected that revenue as a measure of size would have a big influence on profitability, because it is directly related to the absolute amount of profit and size also has an influence on profit per unit of production. The regression model confirmed the literature that size has a big influence on profitability then asset turnover. Stock turnover however was not expected to have a larger impact on profitability. The reason was that asset turnover was seen as the overall performance indicator of efficiency. The explanation for this outcome is that the dairy

industry deals with large volumes of raw materials and end products. In industries that deal with large volumes of raw materials and end products large amounts of stock is inefficient and have a direct impact on profitability. For the IOF group the mean of the stock turnover ratio is about 42 and for the cooperative group 36 indicating that cooperatives are more efficient. However, the means of both groups do not differ significantly from each other, so no clear statement can be made on whether IOFs or cooperatives are more efficient.

In the regression model for the total group the asset turnover ratio has a significant relationship with profitability, although this is not the case for the IOF group and cooperative group. However, it indicates that in the dairy sector asset turnover is still an important variable influencing profitability. The means for the IOF group and the cooperative group for asset turnover differ significantly from each other. With a mean of 3.34 for the cooperative group and 2.57 for the IOF group the IOF group is more efficient in the use of its assets, but while the regression analysis indicated that stock turnover has a larger impact on profitability than asset turnover it cannot be said whether the IOFs or cooperatives are more efficient. Dairy companies however should pay close attention to its inventory management and asset turnover in order to be successful.

The regression analysis also indicated for the cooperative group that liquidity has a large impact on profitability. This was in line with the expectation that while cooperatives tend to have a lower liquidity it is a restricting factor for being market oriented. Important business opportunities could be missed, because of low liquidity levels. Cooperatives should therefore continuously keep an eye on their liquidity in comparison with IOFs. For IOFs liquidity does not seem to be an issue, because the regression analysis for the IOF group did not show a significant relationship between liquidity and profitability.

An important contribution of this research is that it is possible to say that efficiency (stock turnover and asset turnover) and size (revenue) are critical factors effecting profitability in the dairy industry and that liquidity is an important factor for cooperatives to pay attention to. With this conclusion it is even possible to make a small prediction that the largest firms in the dairy sector, the cooperative firms Arla Foods, Friesland Foods and Campina have a bright future. These companies have the relevant size and low inventory levels to maintain their leadership status in the dairy industry.

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## 8. APPENDICES

### *Appendix A: Research done in the field of cooperatives and IOFs*

| Country   | Source                                  | Data Period           | Sector                                      | Performance Measure  |
|-----------|---|-----------------------|---|--|
| US        | Porter & Scully (1987)                  | 1973-1983             | Dairy                                       | Production function.   |
| US        | Sexton, Wilson and Wann (1989)          | 1980-1987             | Cotton                                      | Allocative efficiency.   |
| US        | Akridge and Hertel (1992)               | 1980-1990             | Grain and supply                            | Cost Efficiency  |
| US        | Ariyaratne et al. (1997)                | 1988-1992             | Grain and supply                            | Technical, Allocative and sales efficiencies.                                  |
| Japan     | Sueyoshi et.al (1998)                   | 1988                  | Several agricultural sectors                | Production index, comparative cost index and comparative cost reduction ratio. |
| India     | Singh et.al (2000)                      | 1996                  | Dairy                                       | Economic efficiency.   |
| Australia | Doucouliaagos & Hone (2000)             | 1969-1996             | Dairy                                       | Technical efficiency.  |
| Ireland   | Boyle (2004)                            | 1961-1987             | Dairy                                       | Economic efficiency.   |
| Canada    | Hailu et al. (2005)                     | 1984-2001             | Fruits and Vegetable                        | Technical efficiency.  |
| US        | Schrader (1985)                         | 1979-1983             | Dairy, grain and farm supply                | ROE, Leverage Ratios & Asset turnover.   |
| US        | Chen et al(1985)                        | 1983                  | Dairy                                       | ROE, 1 Leverage Ratios   |
| Greece    | Venieris (1989)                         | 1985                  | Wine  | ROE, Leverage and liquidity ratios.  |
| US        | Lerman & Parliament (1989)              | 1970-1987             | Dairy, Cotton & food marketing & processing | Asset turnover, ROE and Liquidity ratios.                                      |
| US        | Parliament, Lerman, and Fulton (1990)   | 1971-1987             | Dairy                                       | Different Financial ratios.  |
| US        | Lerman & Parliament (1990)              | 1976-1987             | Fruits, vegetables and Dairy                | ROE, SR & Liquidity ratios.  |
| Canada    | Gentozoglanis (1997)                    | 1986-1991             | Dairy                                       | Several Profitability, liquidity, solvency and leverage ratios.                |
| US*       | Barton, Schroeder, & Featherstone(1993) | 1991                  | Agricultural sectors in Knasas              | ROE, Asset turnover, & several leverage ratios.                                |
| UK        | Hind (1994)                             | 1992                  | Several agricultural sectors                | Profitability, Current ratio, & solvency ratio.                                |
| US*       | Hardesty & Salgia (2004)                | 1991-2002             | Several agricultural sectors                | Several Profitability, liquidity, solvency and leverage ratios.                |
| US        | Ling & Liebrand (1998)                  | 1986-1996             | Dairy                                       | Extra value index and return on equity.  |
| Germany   | Ebneth & Theuvsen (Ebneth)              | 2001-2004             | Dairy                                       | Foreign sales Index and Network spread index.                                  |
| US        | Ling (2006)                             | 1992-1996 & 2000-2004 | Dairy                                       | Extra value index with different values for interest rate.                     |

ROE: return on equity; SR: solvency ratio;

## Appendix B: Gathering data for the database of Amadeus

### Comments of Erick ten Pierick (LEI)

| Land         | Aantal bedrijven <sup>a</sup> | Rechtsvormen <sup>b</sup> |    |                        | Opmerking  |
|--------------|-------------------------------|---------------------------|----|------------------------|--|
|              |                               | NV                        | BV | Overig                 |  |
| 1 België     | 315.000                       | X                         | X  | --                     |  |
| 2 Denemarken | 110.000                       | X                         | X  | Samenwerkingsverbanden |  |
| 3 Duitsland  | n.b.                          | X                         | X  | --                     | Beperkte deponeringsplicht voor kleine bedrijven (criteria: tot 50 werknemers, tot € 2,5 miljoen aan totaal vermogen, tot € 5 miljoen aan omzet): alleen balans en toelichting |
| 4 Frankrijk  | 1.000.000                     | X                         | X  | --                     |  |
| 5 Ierland    | n.b.                          | X                         | X  | --                     | Beperkte deponeringsplicht voor kleine respectievelijk middelgrote bedrijven (criteria: onbekend): alleen verkorte balans respectievelijk verkorte verlies- en winstrekening   |
| 6 Nederland  | 320.000                       | X                         | X  | --                     | Beperkte deponeringsplicht voor kleine bedrijven (criteria: onbekend): geen verlies- en winstrekening  |

*Figuur C.1 Deponeringsplicht*

<sup>a</sup> Geschat aantal bedrijven waarvoor deponeringsplicht van toepassing is.

<sup>b</sup> Rechtsvormen waarvoor deponeringsplicht van toepassing is.

Bron: Amadeus (Update 140, mei 2006), bewerking LEI.

| Land         | Deponerings plicht            | Naleving deponeringsplicht    |            | Gegevensverzameling |  |
|--------------|-------------------------------|-------------------------------|------------|---------------------|--|
|              | Aantal bedrijven <sup>a</sup> | Aantal bedrijven <sup>b</sup> | Vertraging | Opmerking           |  |
| 1 België     | 315.000                       | 290.000                       |            |                     |  |
| 2 Denemarken | 110.000                       | 110.000                       |            |                     |  |
| 3 Duitsland  | n.b.                          | 1.000.000                     |            | Slechte naleving    | Alleen bedrijven met voldoende solvabiliteit (volgens normen Creditreform) |
| 4 Frankrijk  | 1.000.000                     | 850.000                       |            |                     |  |
| 5 Ierland    | n.b.                          | 100.000                       | Ja         |                     |  |
| 6 Nederland  | 320.000                       | 230.000                       | Mogelijk   |                     |  |

*Figuur C.2 Naleving deponeringsplicht (vervolg)*

<sup>a</sup> Geschat aantal bedrijven waarvoor deponeringsplicht van toepassing is.

<sup>b</sup> Geschat aantal bedrijven dat aan deponeringsplicht voldoet.

Bron: Amadeus (Update 140, mei 2006), bewerking LEI.

**Appendix C: Balance sheet, profit and loss account and ratios  
Amadeus**

**Balance Sheet**

| Item # | Formula  | Description                                       |
|--------|----------|---|
| 1      | 2+3+4    | Fixed Assets                                      |
| 2      |          | Intangible Fixed Assets                           |
| 3      |          | Tangible Fixed Assets                             |
| 4      |          | Other Fixed Assets (incl. Financial Fixed Assets) |
| 5      | 6+7+8    | Current Assets                                    |
| 6      |          | Stocks  |
| 7      |          | Debtors   |
| 8      |          | Other Current Assets                              |
| 9      |          | * Cash and Cash Equivalent                        |
| 10     | 1+5      | Total Assets                                      |
|        |          |   |
| 11     | 12+13    | Shareholders Funds                                |
| 12     |          | Capital   |
| 13     |          | Other Shareholders Funds (incl. Reserves)         |
| 14     | 15+16    | Non Current Liabilities                           |
| 15     |          | Long Term Debt                                    |
| 16     |          | Other non Current Liabilities (incl. Provisions)  |
| 17     | 18+19+20 | Current Liabilities                               |
| 18     |          | Loans   |
| 19     |          | Creditors   |
| 20     |          | Other Current Liabilities                         |

|    |          |  |
|----|----------|--|
| 21 | 11+14+17 | Total Shareholders Funds and Liabilities   |
|    |          |  |
| 22 | 6+7-19   | Working Capital* in the database they used the following formula: Stocks + Debtors - Creditors |
|    |          |  |
| 23 |          | Number of Employees  |

### Profit & Loss Account

| Item # | Formula | Description                   |
|--------|---------|-------------------------------|
| 24     |         | Operating Revenue / Turnover  |
| 25     |         | Sales                         |
| 26     |         | Cost of Goods Sold            |
| 27     | 24-26   | Gross Profit                  |
| 28     |         | Other Operating Expenses      |
| 29     | 27-28   | Operating Profit (Loss)       |
| 30     |         | Financial Revenue             |
| 31     |         | Financial Expenses            |
| 32     | 30-31   | Financial Profit / Loss       |
| 33     | 29+32   | Profit (Loss) before Taxation |
| 34     |         | Taxation                      |
| 35     | 33-34   | Profit (Loss) after Taxation  |
| 36     |         | Extraordinary Revenue         |
| 37     |         | Extraordinary Expenses        |
| 38     | 36-37   | Extraordinary Profit (Loss)   |
| 39     | 35+38   | Profit (Loss) for Period      |

|    |                |   |
|----|----------------|---|
|    |                |   |
| 40 |                | Material Costs  |
| 41 |                | Cost of Employees   |
| 42 |                | Depreciation  |
| 43 |                | Interest Paid   |
|    |                |   |
| 44 | 39+42          | Cash Flow   |
| 45 | 34+39+41+42+43 | Added Value   |
| 46 | 29             | EBIT (Earnings Before Interest and Taxes)                               |
| 47 | 46+42          | EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) |

### Ratios

| Item # | Formula                              | Description                                      |
|--------|--------------------------------------|--|
| 48     | $5 / 17$                             | Current Ratio                                    |
| 49     | $(5 - 6) / 17$                       | Liquidity Ratio                                  |
| 50     | $11 / 14$                            | Shareholders Liquidity Ratio                     |
| 51     | $(11 / 10) \times 100$               | Solvency Ratio (%)                               |
| 52     | $((14 + 18) / 11) \times 100$        | Gearing Ratio (%)                                |
| 53     | $11 / 23$                            | Shareholders Funds per Employee (monetary value) |
| 54     | $22 / 23$                            | Working Capital per Employee (monetary value)    |
| 55     | $10 / 23$                            | Total Assets per Employee (monetary value)       |
| 56     | $(33 / 24) \times 100$               | Profit Margin (%)                                |
| 57     | $(33 / 11) \times 100$               | Return on Shareholders Funds (%)                 |
| 58     | $((33 + 43) / (11 + 14)) \times 100$ | Return on Capital Employed (%)                   |

|    |                           |   |
|----|---------------------------|---|
| 59 | $(33 / 10) \times 100$    | Return on Total Assets (%)                      |
| 60 | 29 / 43                   | Interest Cover                                  |
| 61 | 24 / 6                    | Stock Turnover                                  |
| 62 | $(7 / 24) \times 360$     | Collection Period (days                         |
| 63 | $(19 / 24) \times 360$    | Credit Period (days)                            |
| 64 | 24 / (11 + 14)            | Net Assets Turnover                             |
| 65 | $(41 / 24) \times 100$    | Costs of Employees / Operating Revenue (%)      |
| 66 | 24 / 23                   | Operating Revenue per Employee (monetary value) |
| 67 | 41 / 23                   | Average Cost per Employee (monetary value)      |
| 68 | 33 / 23                   | Profit per Employee (monetary value)            |
| 69 | $(44/24) \times 100$      | Cash Flow/Turnover (%)                          |
| 70 | $(27/24) \times 100$      | Gross Margin (%)                                |
| 71 | $(46/24) \times 100$      | EBIT Margin (%)                                 |
| 72 | $[(46+42)/24] \times 100$ | EBITDA Margin (%)                               |

## **Appendix D: Income statement, balance sheet**

| <b>Income statement</b>                          |  |   |  |
|--|--|---|--|
| <b>Total operating revenues</b>                  |  |   |  |
| (cost of goods sold)                             |  |   |  |
| (selling, general, and administrative expenses)  |  |   |  |
| (depreciation)                                   |  |   |  |
| <b>Operating income</b>                          |  |   |  |
| Other income                                     |  |   |  |
| <b>Earnings before interest and taxes (EBIT)</b> |  |   |  |
| (Interest expense)                               |  |   |  |
| <b>Pretax tax income</b>                         |  |   |  |
| (Taxes)  |  |   |  |
| Current:   |  |   |  |
| Deferred:  |  |   |  |
| <b>Net income</b>                                |  |   |  |
| Retained earnings:                               |  |   |  |
| Dividends:                                       |  |   |  |
| <b>Assets</b>                                    |  | <b>Liabilities and Stockholders' equity</b> |  |
| <b>Current assets</b>                            |  | <b>Current liabilities</b>                  |  |
| cash and equivalents                             |  | account payable                             |  |
| accounts receivable                              |  | notes payable                               |  |
| inventories and other                            |  | accrued expenses                            |  |
| Total current assets                             |  | Total current liabilities                   |  |
| <b>Fixed assets</b>                              |  | <b>Long-term liabilities</b>                |  |
| property, plant and equipment                    |  | deferred taxes                              |  |
| Less accumulated depreciation                    |  | Long-term debt                              |  |
| Net property, plant and equipment                |  | Total Long-term liabilities                 |  |
| intangible assets and others                     |  | <b>Stockholders' equity</b>                 |  |
| Total fixed assets                               |  | preferred stock                             |  |
|  |  | common stock                                |  |
|  |  | capital surplus                             |  |
|  |  | accumulated retained earnings               |  |
|  |  | Less treasury stock                         |  |
|  |  | Total equity                                |  |
| <b>Total assets</b>                              |  | <b>Total Liabilities and Stockholders'</b>  |  |

## **Appendix E: Removed cases**

### **Total group**

**823:** Arnaut Freres Jurafl has a profitability ratio of 1.63 and the company is deleted for the following reasons. The cost of raw materials is higher than the turnover. Operating profit/loss is 7692, financial revenue 3778, financial expenses 3914, financial profit/loss 123178 and the profit and loss before tax is 34096. The numbers do not make any sense and are probably not inserted correctly.

**890:** Fermiers Reunis has a profitability of 0.89. Examining the case resulted in the same problems as for Arnaut Freres Jurafl: the profitability numbers do not make any sense. Current and non-current liabilities have been given the same financial number. The company is therefore deleted.

**509:** Sa Fromagerie Picon has a profitability ratio of 0.24. Material cost has a value of 2, the profitability numbers do not make any sense and current and non-current assets numbers are the same. This company is therefore removed from the database.

**127:** MGBS has a total asset turnover ratio of 8.47. The operating profit/loss is however extremely low with 11.00 especially considering an operating revenue of about 44000. Other problems associated with this case are that fixed assets has a financial number of 31, tangible fixed assets 21.00 and material cost of 1. This company is therefore excluded from the database.

**1001:** Laiterie Montferrand has a total asset turnover ratio of 6.93 which is rather high, especially considered in relationship with an operating profit/loss of 31.00. The current and non-current liabilities are the same, indicating that the numbers are wrongly inserted. The company is therefore excluded from the database.

**50:** Noerager Mejeri A/S has a receivable turnover ratio of 991.94. After examining the residuals this particular outlier is removed from the database, because the ratio is so high it is disturbing the whole dataset of receivable turnover.

**981:** SA Laiterie Saint PE has a receivable turnover of 151.38. After examining the residuals this outlier is removed from the database, because the ratio is so high it is disturbing the whole dataset of receivable turnover.

**446:** Fromagerie du pont has a leverage ratio of 19.28 and is considered an outlier. The company is removed from the database. The reason is that the database reports the same financial number for non-current liabilities as for current liabilities. There are also other problems associated with this case. The operating profit and loss is 1, but this does not match with the financial profit and loss.

**926:** Cooperative des Mont has a leverage ratio of 2.78, but the number for non-current liabilities and current liabilities are the same. This could be solved by removing current- or non-current liabilities, but the other strange thing is that other current liabilities is higher than non-current liabilities or current liabilities. The company is therefore deleted, because of the problems with the debt of the company.

**275:** Kaasmakerij Passanda has a liquidity ratio of 93.10. This outlier is removed, because current liabilities has the same value as for non-current liabilities. The ratio is therefore calculated with the wrong numbers. The outlier is removed from the database.

**137:** Artic has a liquidity ratio of -27.07. This ratio doesn't make any sense, because of the negative ratio involved. There wasn't a negative current ratio, stock or current liabilities. This outlier is removed from the database.

Examining the residuals for receivable turnover resulted in the deletion of the receivable turnover ratio for the following companies: danone SA residuals, Sa Sud Regal, Les Delices

du val P and Food Specialities A. These residuals were too high which caused a disturbance in the dataset of receivable turnover.

### **IOF Group:**

**594:** Arnoud Freres Jurafl, has higher material cost than revenue, but is still making a profit. This company is therefore removed from the database.

**652:** Fermiers Reunis, the profitability numbers do not make any sense, Current and non-current liabilities have the same financial number. The company is therefore removed.

**368:** Sa Fromagerie Picon is dismissed from the database with a stock turnover of 88. The reasons are that profitability numbers do not make any sense and current and non-current liabilities have the same financial number. Material cost has a value of 2.

**23:** Nourager Mejeri has a receivable turnover ratio of 991.94. After examining the residuals this particular outlier is removed from the database, because it disturbs the dataset of the receivable turnover ratio.

**707:** Laiterie Montferrand has a total asset turnover ratio of 6.93 which is rather high, especially considering an operating profit/loss of 31.00. The current and non-current liabilities are the same, indicating that the financial numbers are not inserted correctly. This company is therefore excluded from the database.

**70:** Artic has a leverage ratio of -2.44. Artic has a debt to its shareholders and that is why the leverage ratio is negative. Artic however is making a profit. This does not make any sense and therefore the company is excluded from the analyses.

**505:** Elvir has a revenue of 333989, this is extremely high considering all the other financial numbers. Fixed assets is only 18868, tangible fixed assets 17629, material cost 5170 and profit/loss 105. This case is therefore removed from this database.

**80:** S.A. Corman has a revenue of 325599, which is also extremely high considering all the other financial numbers. Fixed asset 33558, tangible fixed assets 15510, material cost 5653 and an operating profit 684.

**497:** SA Ingredia has a revenue of 253902, which is too high in comparison with all the other financial numbers. Fixed assets 32880, tangible assets 25294, material cost 4489, operating profit 79.

**420:** Glaces Thiriet has a revenue of 232265, with fixed assets of 13708, tangible fixed assets 6560, material cost of 3427 and a profit of 75. The financial numbers do not match the revenue. This case is therefore dismissed.

**171:** Kaasmakerij Passenda has a liquidity ratio of 93.10. This outlier is removed, because current liabilities have the same financial number as for non-current liabilities. The ratio is therefore calculated with the wrong numbers. The outlier is removed from the database.

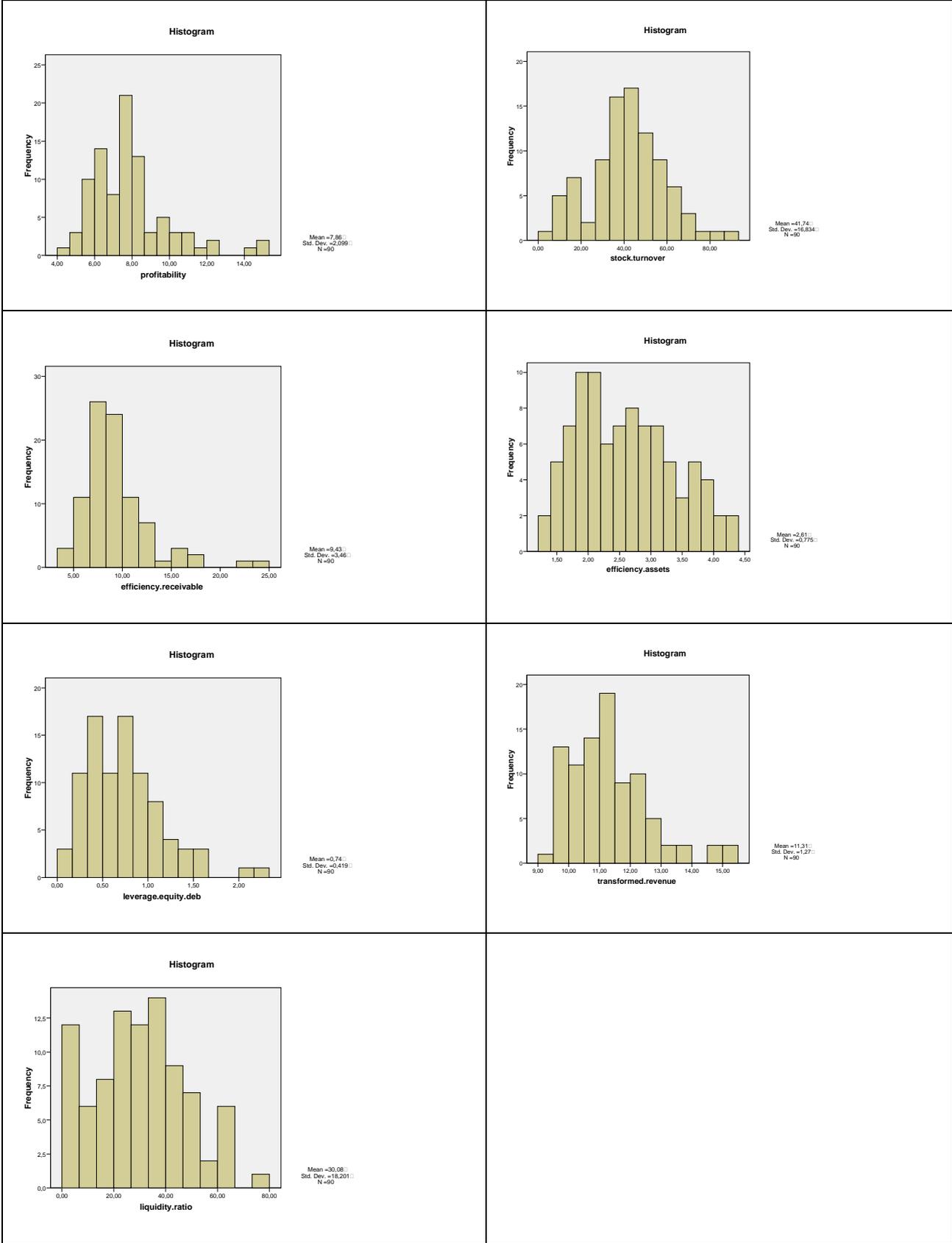
### **Cooperative group:**

**1032:** MGBS has a total asset turnover ratio of 8.47. The operating profit/loss is however extremely low with 11.00 considering an operating revenue of about 44000. Other problems associated with this case is that fixed assets are 31, tangible assets 21.00 and material cost of 1. The company is therefore removed from the database.

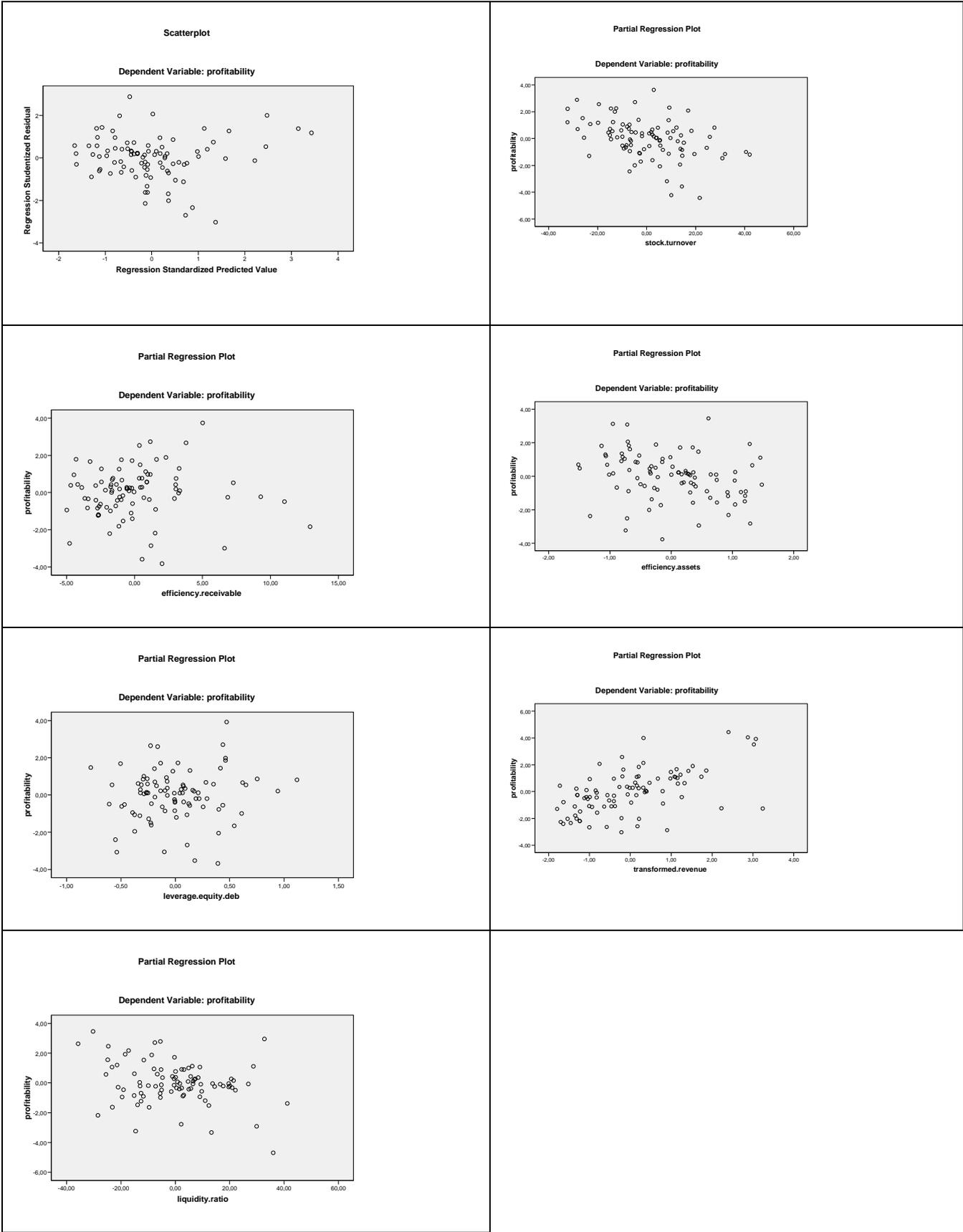
**1240:** Cooperative des Mont has a leverage ratio of 2.78, but the number for non-current liabilities and current liabilities are the same. This could be solved by removing current- or non-current liabilities, but the other strange thing is that other current liabilities is higher than non-current liabilities or current liabilities. The company is therefore deleted, because of the problems with the debt of the company.

After examining the residuals the stock turnover ratio of Borup Andelsmejeri and the debt to equity ratio of Fromagerie du Pont are removed from the database. These residuals caused disturbances in the specific dataset of the specific variables.

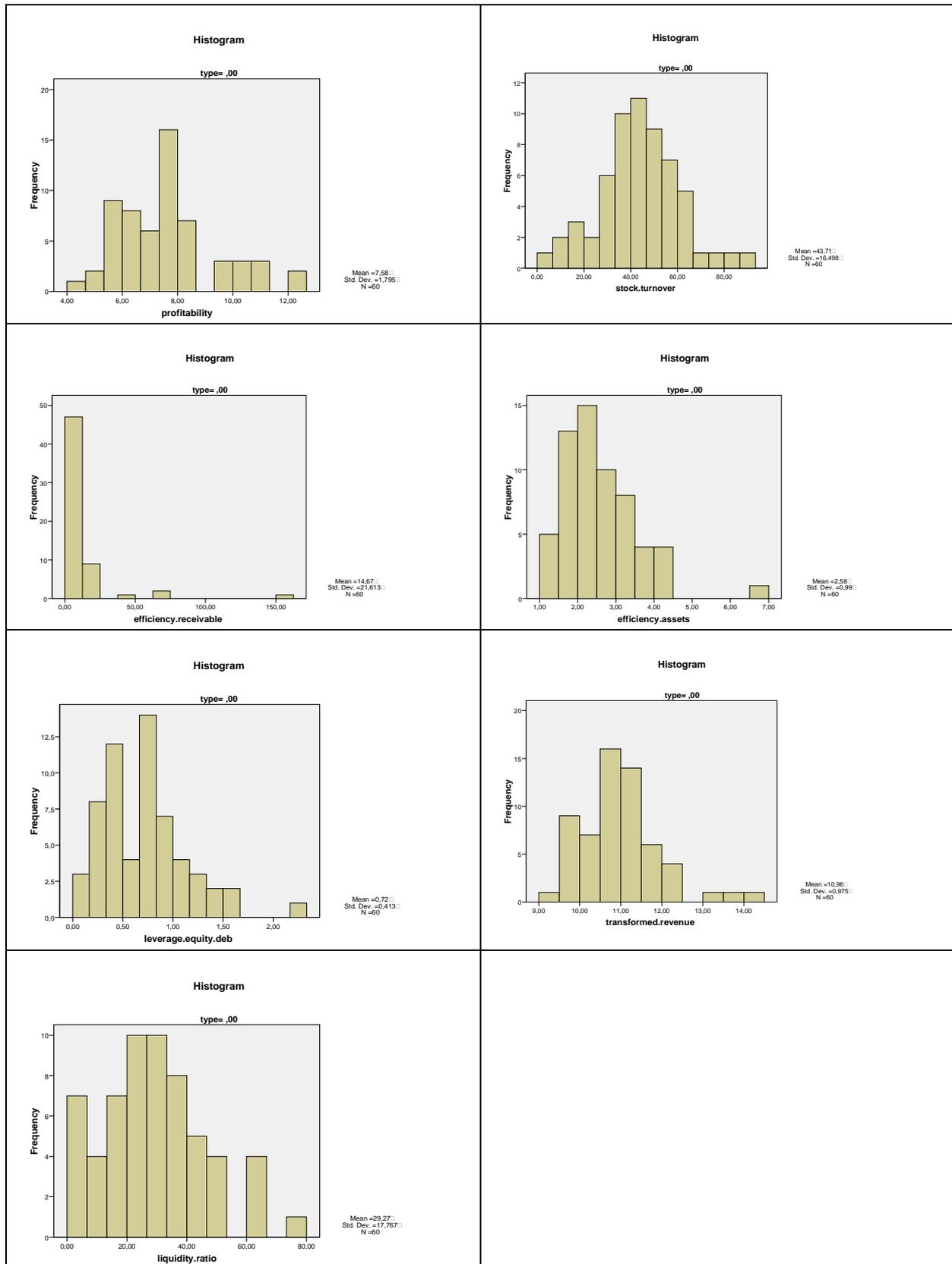
# Appendix F: Histograms total group



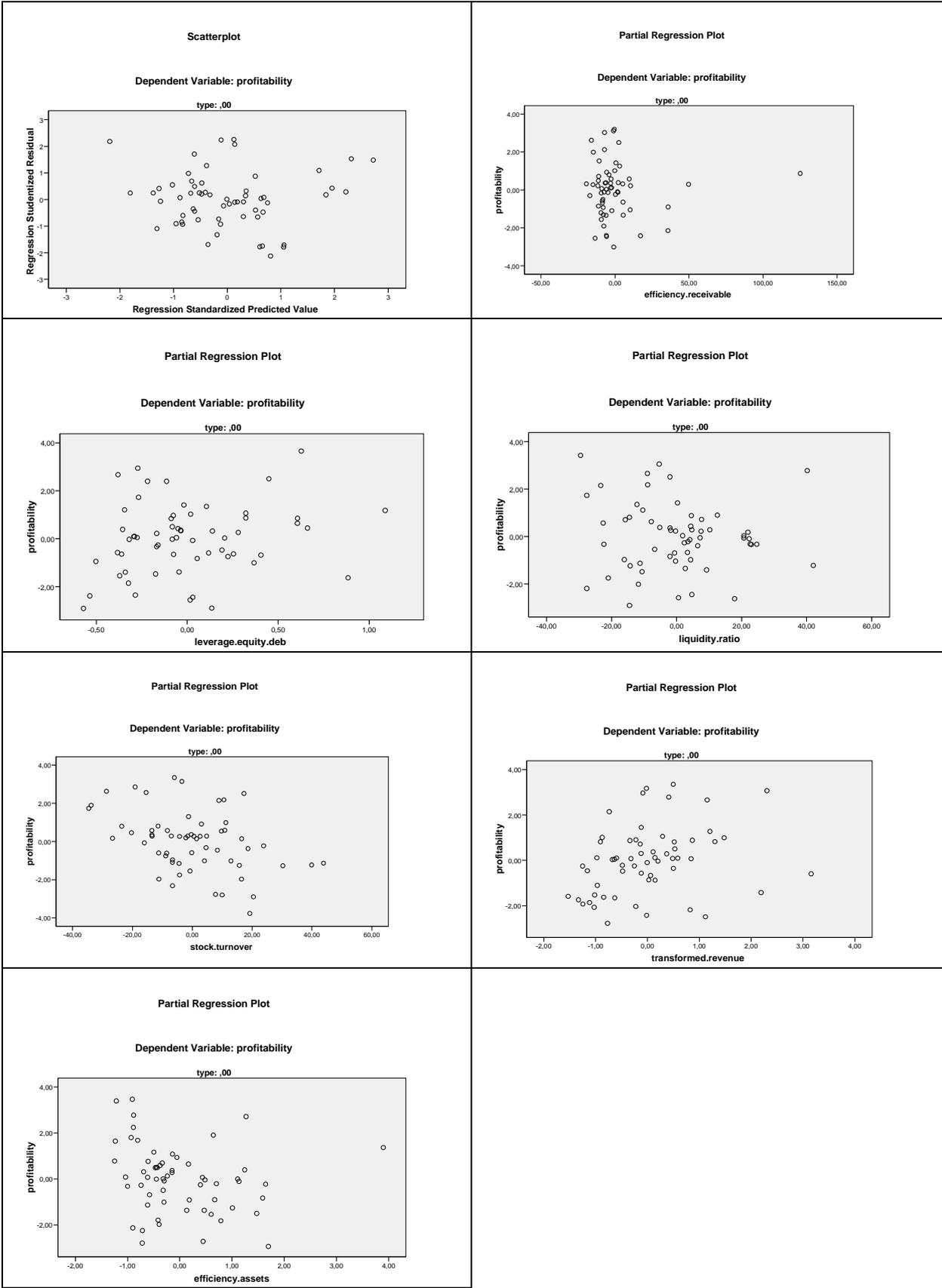
# Appendix G: Residuals check total group



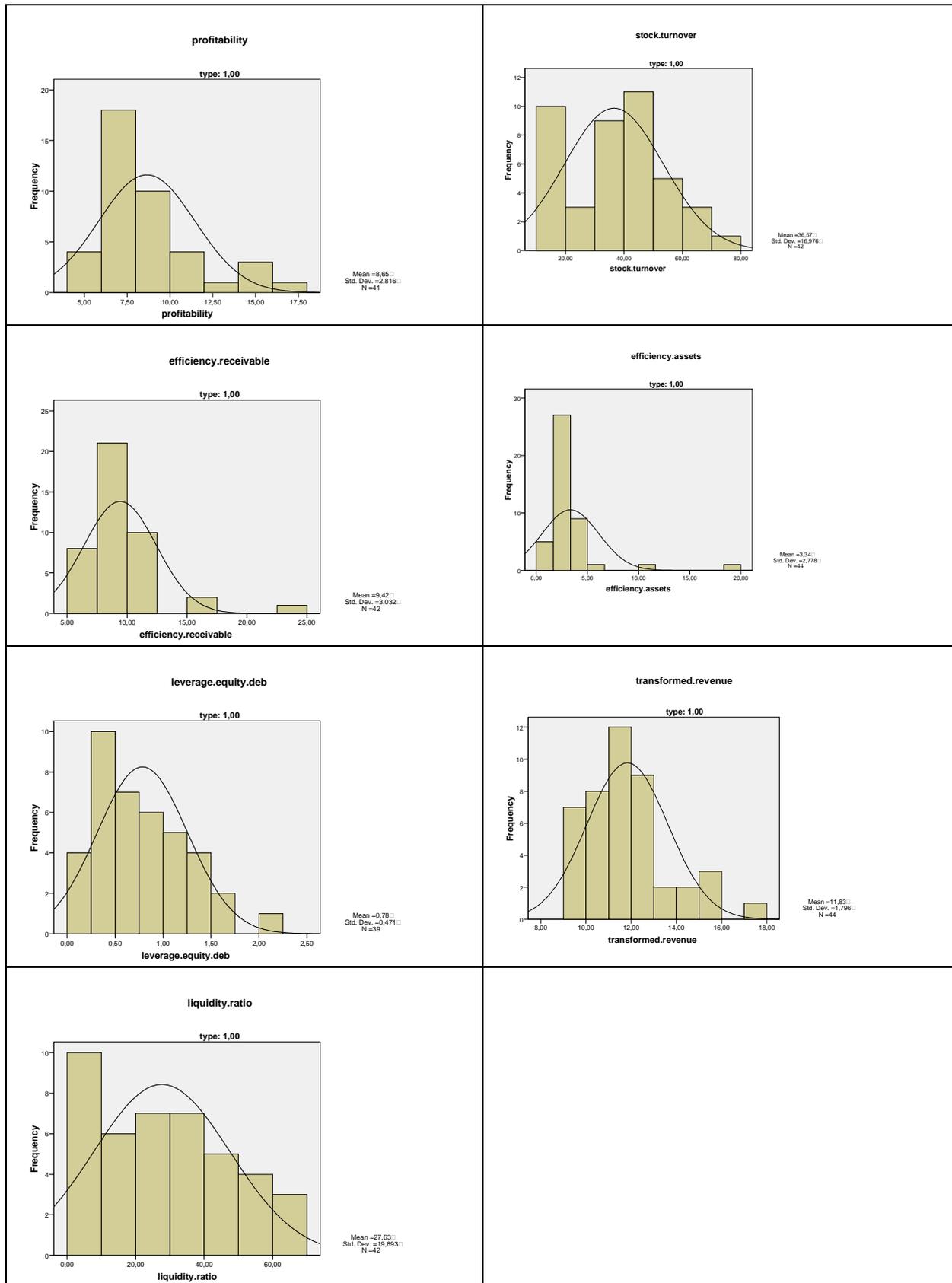
# Appendix H: Histograms IOFs



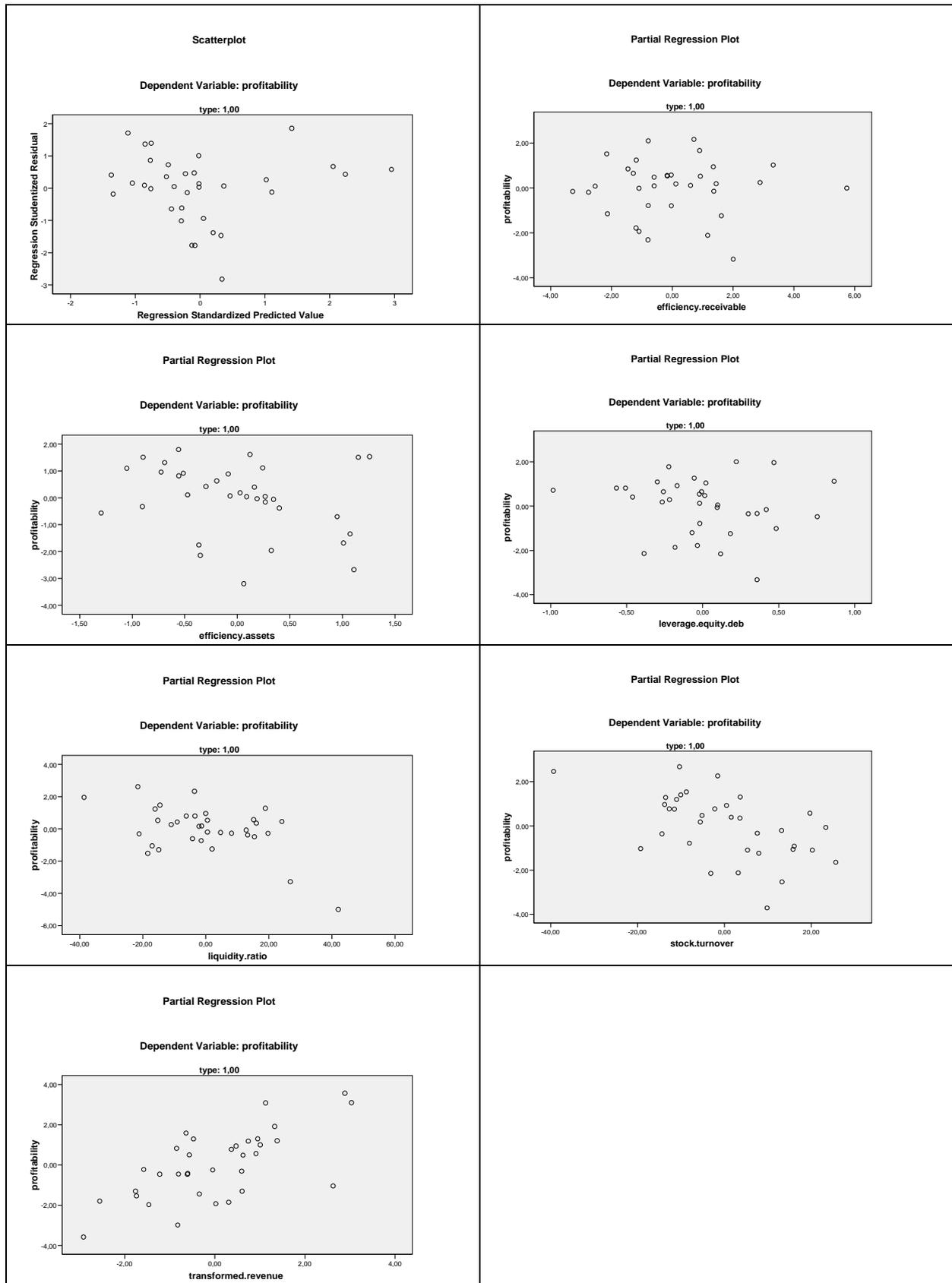
# Appendix I: Residuals plots IOFs



## Appendix J: Histograms cooperatives



# Appendix K: Residuals cooperatives



**Appendix L: Regression table with standardized beta (B)**

|                     | Total group   |               |              | IOF group     |               |              | Cooperative group |               |              |
|---------------------|---------------|---------------|--------------|---------------|---------------|--------------|-------------------|---------------|--------------|
|                     | <b>B</b>      | <b>Beta</b>   | <b>Sig.</b>  | <b>B</b>      | <b>Beta</b>   | <b>Sig.</b>  | <b>B</b>          | <b>Beta</b>   | <b>Sig.</b>  |
| Constant            | 2.184         |               |              | 4.479         |               |              | 4.190             |               |              |
| Receivable turnover | -0.002        | 0.004         | 0.962        | -0.001        | -0.017        | 0.884        | -0.007            | -0.005        | 0.955        |
| Asset turnover      | <b>-0.479</b> | <b>-0.177</b> | <b>0.016</b> | -0.315        | -0.173        | 0.134        | -0.514            | -0.130        | 0.164        |
| Stock turnover      | <b>-0.039</b> | <b>-0.311</b> | <b>0.000</b> | <b>-0.039</b> | <b>-0.357</b> | <b>0.002</b> | <b>-0.056</b>     | <b>-0.337</b> | <b>0.003</b> |
| Leverage            | 0.390         | 0.078         | 0.345        | 0.873         | 0.201         | 0.122        | -0.455            | -0.075        | 0.481        |
| Liquidity           | <b>-0.024</b> | <b>0.009</b>  | <b>0.011</b> | -0.008        | -0.081        | 0.515        | <b>-0.044</b>     | <b>-0.304</b> | <b>0.005</b> |
| Revenue             | <b>0.792</b>  | <b>0.479</b>  | <b>0.000</b> | <b>0.478</b>  | <b>0.260</b>  | <b>0.025</b> | <b>0.808</b>      | <b>0.522</b>  | <b>0.000</b> |
| R Square            |               | 0.69          |              |               | 0.39          |              |                   | 0.81          |              |

*Bold: Independent variables that have a significant relationship with the dependent variable*