UNIVERSITÀ DEGLI STUDI DI TRIESTE

XXIV CICLO DELLA SCUOLA DI DOTTORATO DI RICERCA IN FINANZA

Il rating delle imprese del settore agroalimentare

The rating of agri-food sector

Settore scientifico-disciplinare SECS-P/09 FINANZA AZIENDALE

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ANNO ACCADEMICO 2010 / 2011

Contents

ABSTRACT

The thesis represents a study of financial and economic aspects of agri-food sector together with ratings assigned to companies, in particular to understand the features of the sector in Italy, a deep comparison between Italian companies with the ones in France- Spain and eventually Friuli-Venezia Giulia.

The analysis is conducted, in detail, through a study of macroeconomic overview including the sector's general overview, structural features, and impacts on economies of countries (first at the European Union base, followed by country base). In order to highlight current situation and future development of the agri-food sector; sector's impact on economies and rural development, structural features of the sector, mid-term perspectives, European policies for the sector are analyzed with details. Same study is realized for France, Italy and finally for Spain.

A basic conceptual structure is identified for modelling credit risk in agri-food sector. Various methodologies and components of several credit risk models applied in rating evaluation are analyzed in relation to credit risk in the agri-food sector. The core and features of the models are exhibited and furthermore a comparison of the models based on daily business examples and academic studies is realized.

Taking into account features of companies that comprise the sector, the difficulties faced by the academicians, analysts and business profiles who are willing to comprehend financial and economic behaviours of the sector; a model so-called "Multi Objective Rating Evaluation- MORE Model" is selected to be the most applicable for evaluating the companies within the sector and assessing a rating to each company. "MORE" is deemed the most appropriate, since the data requirements of the model can be fulfilled by the available data and features of the model are suitable for defining credit risk in agri-food sector.

The model is tested on several macro geographic regions many times, especially during the global economic downturn; the results prove that model is quite accurate in distinguishing healthy companies between bankrupt companies; and deteriorating the ratings towards bankruptcy date.

The model is applied to Italian agriculture companies in order to understand economic behaviour of companies by segregating the panel for size, economic scale, solvency, liquidity,

profitability. This analysis is also carried out for the companies in Spain and France which is chosen on purpose since the government of the mentioned countries gave the same amount of importance to the sector in terms of economic, cultural and historical aspect, representing the "competitors" within the European Union. During the statistical studies, same data source is used for the three countries. The evaluation is followed with a local comparison of Italian companies and Friuli Venezia Giulian companies including a deep financial and economic analysis and a rating evaluation.

The analysis is based on a data set which is derived from financial statements of the companies (between 2008 and 2010) in the geographical locations mentioned and thanks to this a trend analysis and a comparative analysis are easily conducted.

The study shows that results of model's application can be extremely important in comprehending the trend of the sector within three years, the impacts of global financial crisis on companies in terms of various financial and economic aspects.

Abstract – Versione in Italiano

Questa tesi rappresenta lo studio del settore agroalimentare, osservandolo dal punto di vista economico e finanziario. In particolare saranno studiate le aziende appartenenti, in Italia, Spagna e Francia, al settore in esame, conducendo anche un'analisi del rating delle singole aziende, studiando quindi in dettaglio i particolari punti di forza e debolezza del settore nei tre diversi Stati.

L'analisi è stata condotta partendo dallo studio macroeconomico all'interno dell'Unione Europea, andando poi in dettaglio, sempre da un punto di vista macroeconomico, dei singoli Stati. Lo scopo dello studio macroeconomico era il comprendere al meglio quali siano, in Europa, le visioni sul settore agroalimentare e come queste visioni si riflettano nelle singole realtà nazionali.

Il passaggio successivo è lo studio dei modelli di rating, cercando di comprendere quale fosse il più efficiente per lo studio delle singole aziende al fine di determinare, con un diverso approccio rispetto a quello macroeconomico, i punti di forza e debolezza del settore in esame rispetto i tre Stati esaminati.

Il modello di rating che è stato scelto è denominato MORE (Multi Objective Rating Evaluation) e si diversifica e caratterizza per la capacità di rendere comparabili diverse realtà quali aziende che operano in diversi Stati.

Il modello di rating MORE, prima di essere utilizzato nello studio del settore agroalimentare, è stato anche testato nella sua capacità di predizione del default; questo test è stato effettuato sia in

ambiato extranazionale, sia studiando il comportamento del modello rispetto le aziende fallite durante l'ultima crisi economica.

Si è quindi andati in dettaglio nello studio delle singole aziende apprtenenti il settore in esame (nel triennio 2008-2010), andando a deteminarne le caratteristiche di dimensione, solvibilità, liquidità, redditività e in, per concludere, rating. Lo studio è stato condotto confrontando Italia (anche con la regione Friuli Venezia Giulia), Francia e Spagna.

Lo studio ha così dimostrato come sia assolutamente interessante condurre, parallelamente allo studio macroeconomico di un determinato settore, anche lo studio delle singole imprese, successivamente agglomerate come panel. In questo modo è possibile quindi arricchire le informazioni ricavate, ottenendo un quadro più chiaro ed esaustivo, del settore in esame.

INTRODUCTION

It is a well known fact that European agriculture is having countless challenges linked to freeing of the market and strong competitiveness among the countries both from Europe and outside.

Indeed, World agriculture is at a crossroads, coming up against an increase in the level and volatility of agricultural prices not seen since the 1970s, a more powerful influence from factors outside of agriculture, like macroeconomic shocks or the correlated movements of agricultural with energy and other commodity markets, and major climate-related uncertainties.

Both deteriorating and volatile situation of agri-food sector today takes its place in newspapers, academic studies; but most importantly in country's agriculture policies and eventually the EU's agriculture policies. The share of expenditures for agricultural activities has been shrinking recently. The revenues of the agri-businesses are having uncertainties because of fluctuating commodity prices.

The scale of businesses in agri-food sector is mostly composed of Small and Medium Sized companies in Europe (most of the time, family run). This feature makes it compulsory to understand the financial and economic health of companies by defining a creditworthiness score since they are more open to weaknesses and are more fragile.

The lenders in agriculture sector or the analysts who are willing to analyze companies' financial health are having limitations to simply apply all credit rating models which they are fond of or mainly supporting. They should find a way to either to adapt commonly used credit models in assessing ratings or simply apply a flexible, not only a mathematical model, but which also takes into account the different aspects such as sector's character, country risk and a financial analyst perspective. Latter model defines "MORE" rating model which is applied for evaluating agri-food businesses' creditworthiness. The lack of complete database of companies' financial information all over the countries and boundaries of most of the sophisticated models such us they are only applicable for quoted corporate have led a need of a rating model which is most appropriate in evaluating the agri-food companies.

In order to satisfy the need of study of economic-financial aspects of agri-food sector, this thesis has following objectives:

- To analyze the sector deeply in a continental level; analyzing the macro dynamics in the EU, capturing the recent challenges and bottlenecks and exhibiting the EU's medium term perspectives and expectations;

- To study three European giants in the sector: France, Spain and Italy in terms of Value Added at basic prices, farms' structure and production levels; and finally general overview of food industry in each country;

- To compare the mostly used credit models and try to understand their fundamentals by questioning whether they are applicable to agribusinesses;

- To find the most appropriate model to assess a credit rating and validate why it is the most appropriate one and test it within different markets.

- To apply the model on Italian, Spanish, French and Friuli Venezia Guilian companies and reach a utile comparison among the different geographic regions for the same sector.

CHAPTER I: OVERVIEW OF AGRI-FOOD SECTOR and ITS POSITION IN EUROPE

The aim of the thesis is to focus on a financial and economical analysis on the sector so called "agri-food" which is a combination of agricultural sector (Branch A: agriculture, hunting and forestry) and food industry (branch DA: Manufacture of food products; beverages and tobacco).[1] The agriculture and food (known as agri-food) sectors cover the agricultural production, food processing, also delivery chains and even interacts with different sectors like wholesale-trade, transport, services such as logistics, financial management) and public administration.

It is a well known fact that the agri-food sector has a fundamental role in European economic, political, social and cultural life. The importance of agriculture business taking into account its contribution to a sustainable economic development is becoming indubitable. This feature gains an extra attention considering the significance of the sector for the EU (implied the EU27 countries[2]). Today, it is a well known fact that Europe: [3]

- is a major exporter as well as the largest importer of food (especially from emerging countries) in the world;

- has a farming sector that uses clean, secure and respectful to the environment production methods;

- Has a role in not only producing food but also guaranteeing the survival of the rural areas as a lively, working and producing place.

The agriculture policy in EU is determined at EU level by the governments of Member States and performed by the Member States. Agriculture has today more important meaning than only crop or animal production increasing the roles of the today's farmers starting from using a technical know-how to obey the rules of food safety. The farmers are important because they are the first link in the food chain; the farmers do sometimes process the products on their farms or sometimes sell them to the third parts who convert them into the final products in the markets. The scope of the farms can be defined as "small business" and even mostly family-run being very important local employers in the rural world in Europe.

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[1] Situation and Prospects for EU Agriculture and Rural Areas, December 2010
[2] EU-27: Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom.
[3] Source: "The Common Agricultural Policy Explained, European Commission Agriculture and Rural Development" European Commission Directorate-General for Agriculture and Rural Development

The CAP-Common Agricultural Policy

Analysis of the agricultural system in the EU cannot be imagined without understanding the "Common Agricultural Policy (CAP)". The CAP has its original roots starting in 1950s in Western European countries. In those years, the society of the continent had taken many damages from the war years and the agriculture had been weakened so much that the supplies of food were not guaranteed. The initial phases of the CAP were based on the objective of carrying the agricultural productivity in food chain to better levels, providing the farmers with fair standards, a stabilized market and so that ensuring stable food supplies to the consumers of the EU at a price which is reasonable. The CAP had offered incentives (high support prices to farmers together with export support and border support) and financial aids to the farmers in order to restructure their farming operations (for instance, by helping farm investment, targeting to have the farms which were stronger in size, management and technological competences).

The early years were really successful in meeting its targets carrying the EU from non guaranteed food levels or damaged economical features to a stronger agricultural system, however by the 1980s some issues such as surpluses of the farm commodities had arisen for long periods. The surpluses had been either exported or stored or destroyed within the EU; these measures, however had been costly and given harm to world markets and had not really served the farmers. Meanwhile, the concerns among the European society about the environmental sustainability of agriculture with the Rio Earth Summit [4] had risen.

In the light of these developments, a series of reforms were fatal in the policy; as a result in 1992 the reform processes started. The reform processes were deepened in 1999 with *Agenda 2000[5]*. Essentially, this reform was a phase which started the reduction in support prices, the beginning of direct payments for some key agricultural sectors and supply-management key tools and introduced a new rural development policy. These developments also set the second pillar of the CAP which had helped farmers improve their marketing activities and even restructure their businesses by encouraging countless rural initiatives.

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[4] In 1992, more than 100 heads of state met in Rio de Janerio, Brazil for the first international Earth Summit met to address the urgent problems of environmental protection and socio-economic development. http://www.un.org/esa/earthsummit/

[5] "Agenda 2000" resulted in the fourth reform of the CAP in March 1999 and it took account the enlargement of EU. The package included the regulations targeting to develop a more modern and long lasting European agricultural sector: http://europedia.moussis.eu/books/Book_2/6/21/02/02/index.tkl?all=1&pos=301

New economic, social and environmental targets according to the renovated objectives of CAP in accordance with the requirements of Amsterdam Treaty[6] were set by Agenda 2000. The objectives included more principles such as food safety and quality, market orientation and more competitiveness, the stabilization of agricultural incomes, integration of environmental issues such as water management, bio energy, and climate change. etc into the agriculture sector, increasing the vitality of rural world and a stronger decentralization. Some new set of reforms were realized in 2003 and kept on in 2008-2009 with the health check targeting a more competitive farm sector promoted to be more market oriented and sustainable.

The European farmers are not only paid to produce food. The CAP drove the sector in a direction where the farmers many challenges such as respecting environment, keeping food safety-quality, the welfare of animals which were fulfilled by the EU State Members. At the beginning, the more farmers had produced the more subsidies they had obtained. The aid paid to farmers is now independent from how much the farmers have produced. The term used for separating the link between production and subsidies is called "decoupling". Thanks to this new term, European farmers became independent to decide what to produce depending on what promises more profit and so they started operating as market-oriented players in the sector.

In September, 2005 the Council of Ministers admitted a Rural Development Regulation for the period 2007-2013. Since that time, Rural Development has been carried out via one fund, one management and control. The policy set for rural development in the EU between the years 2007-2013 focused on three main objectives:

- Improving the competitiveness of agriculture and forestry sectors,
- Improving environment and the rural sites by the assistance for land management and eventually improving the life quality in the rural world,
- Promoting the economic activities by encouraging the diversification of economic activities.

Accordingly, each of these objectives composes one of the three axis combined with the leader approach (see Figure 1) creating the structure of Rural Development Policy 2007-2013. All member states have got to spread their rural development funding between these axes.

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[6] Official name: "Treaty of Amsterdam Amending the Treaty on European Union, the Treaties Establishing the European Communities and Related Acts, 10 November 1997.
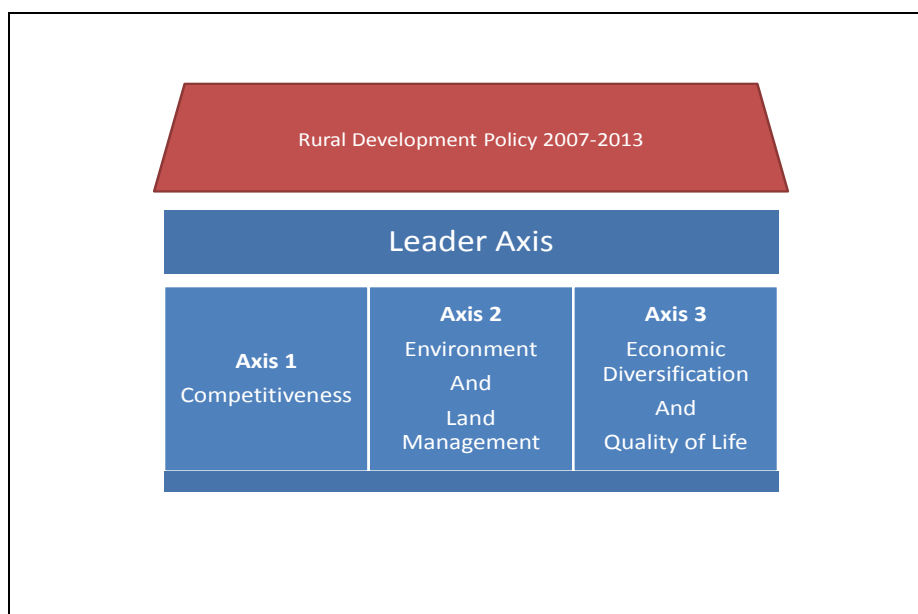
Figure 1: The main structure of the EU Rural Development Policy 2007-2013.

In spite of important reforms executed in recent years, more steps exist to be taken after the current funding package which expires in 2013. The EU proposed, during the Doha Round[7] , excluding export subsidies by 2013 and reducing import duties on farm production. There are big challenges such as "the requirement to double the world food production by 2050" [8] taking into account the population growth and climate change issues.etc

Efficiency of the Policy Tools and Composition of the CAP

The latest policy reforms resulted in a better performance of EU's agricultural policy. Accordingly, more efficient value for money is given through supporting the demands of citizens and consumers which are:

- More market orientation with creating more competitiveness;
- Giving support to the farmers for the farming activities and delivering the public goods as well as protecting environment, providing food safety, food quality and animal welfare;
- More incentives and promoting the sustainability in the EU rural areas.

The significant change from "price support" to "income support" and from "product support" to "producer support" has given the power to the markets to be able to guide to allocate the resources which results in less irregularity in trading.

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[7] The Doha Round of world trade negotiations was launched in Doha /Qatar) in November 2001: www.ec.europa.eu/trade/creating-opportunities/eu-and-wto/doha/
[8] The head of the UN's food and agriculture Organisation said in 2009 that global food production which got damaged from the credit crunch must double by 2050 to stop the mass hunger: http://www.wfp.org/content/world-must-double-food-production-2050-fao-chief

The changes in the EU policy combined with the strict financing policies have changed the level and also the composition of financial aids done for the EU agricultural sector and rural areas. The CAP has been the most important common policy more than 40 years for the European Union; so that's why it takes its place with a large share within the EU budget. There is another fact that the share of spending for farms has declined dramatically within the years i.e. in 1970s the share was about 70% whereas is 34% between 2007 and 2013. Financing agriculture spending is conducted by two funds: The European Agricultural Guarantee Fund (EAGF) (It finances direct payments to farmers, refunds for exporting to non-EU countries, intervention measures, certain informational and promotional measures, expenditure on restructuring measures in sugar industry, some programmes for schools) and European Agricultural Fund for Rural Development (EAFRD- It finances rural development programmes executed in accordance with Council Regulation no 1698/2005 only where expenditure is jointly managed).[9]

Graph 1: The trend in the CAP expenditure between 1980 and 2009 (in 2007 constant prices)
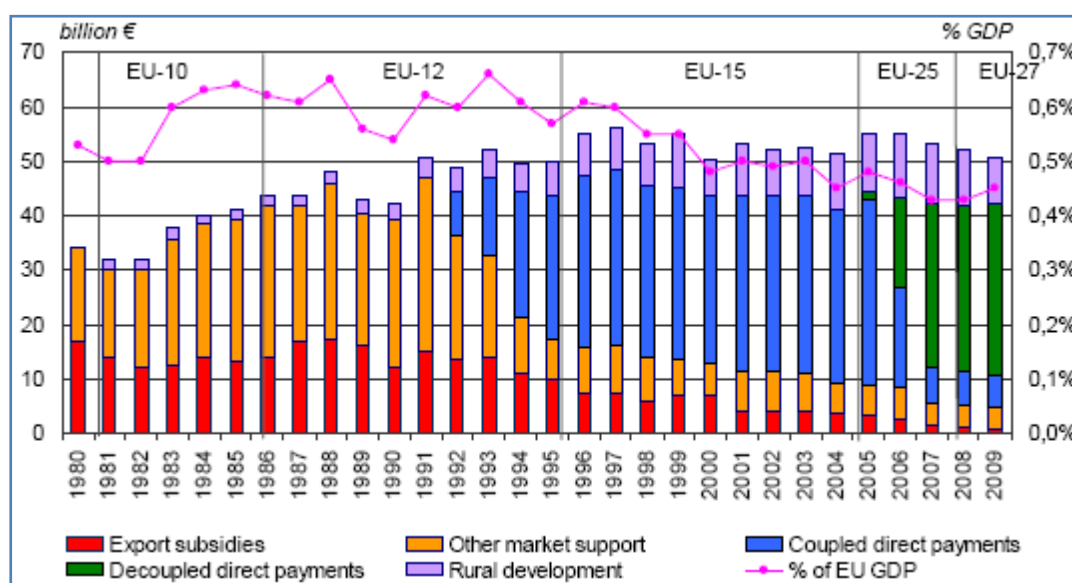
As it can be seen in the Graph 1; the majority of the budget is now spent for the decoupled direct payments whereas the share of export subsidies and market support had only a share of 9 % of the CAP budget between 2007-2009 (before the share of export subsidies and market support used to be significantly high). The support for rural development has increased with a share of 19% of the total CAP budget between 2007 and 2009.

The CAP expenditures take approximately 41% of the EU total budget while this share used to be around 60% in 80s. When analyzed the share of CAP expenditures which are made for supporting

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[9] Source: "Financing the Common Agricultural Policy"-European Commission

the European farmers and rural areas, in EU GDP in early 2000; it is observed that figure amounted to 0.45% in 2009; however it is expected to diminish even more in 2013.

Economy and agriculture in the EU

Impacts of EU Agriculture in the Economy and in the Environment

As mentioned earlier, regarding the particular characteristic of agri-food the sector; it is composed of the primary sector (branch A: agriculture, hunting and forestry) and the food sector (branch DA: Manufacture of food products; beverages and tobacco). Hence, the combination of this sector accounted for around 17 million jobs (more than 7% of total employment) and 3.5 % of total gross value added (GVA)[10] in EU-27 in 2009. The majority of the food sector activities depend on the production of the primary sector.

There is a different distribution of importance of the sector among the member states, e.g. the agri-food sector is relatively more significant for the EU-12, especially for the employment in the primary sector of rural areas.

The primary sector (agriculture, hunting and forestry) employed 12.1 million people in EU-27 in 2009 and this figure is representing 5.4% of the total employment situation of the EU-27. The primary sector in EU-27 reached €168 billion in terms of value-added in 2009 and accounted for 1.6 % of the total GVA. There are different variations among the member states (see graph2) in GVA: in Romania there is a significant share by 7% while in Luxembourg it is even less than 0.5%.

Graph 2: Contribution of the agri-food and forest sectors to the economy: share in total gross value added (GVA), 2008
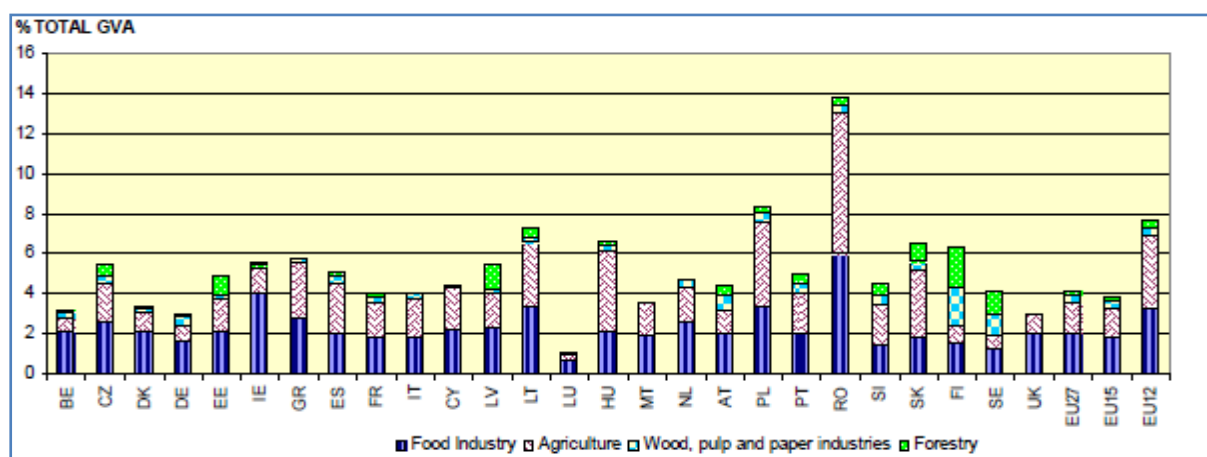

Source: Situation and Prospects for EU Agriculture

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[10] GVA: footnote: Gross value added is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector; gross value added is the source from which the primary incomes of the SNA-system of national accounts are generated and is therefore carried forward into the primary distribution of income account http://stats.oecd.org/glossary/detail.asp?ID=1184

Analyzing the contribution of the primary sector in the EU27 between 2000 and 2009 it is clarified that the importance of the primary sector for the economy is shrinking, held up by important productivity gains of labour and capital and the significant decline in real prices. From 2000 to 2009, its impact on the economy fell (see the graph 3) in terms of both employment (1.4%) and value-added (0.7%). In this period, the number of jobs fell by 2.8 million (the highest falling rates were observed in Lithuania, Poland and Romania). The value added declined by €20 billion between 2000 and 2009.

Graph 3: Importance of the primary sector in the total GVA and employment 2001-2009
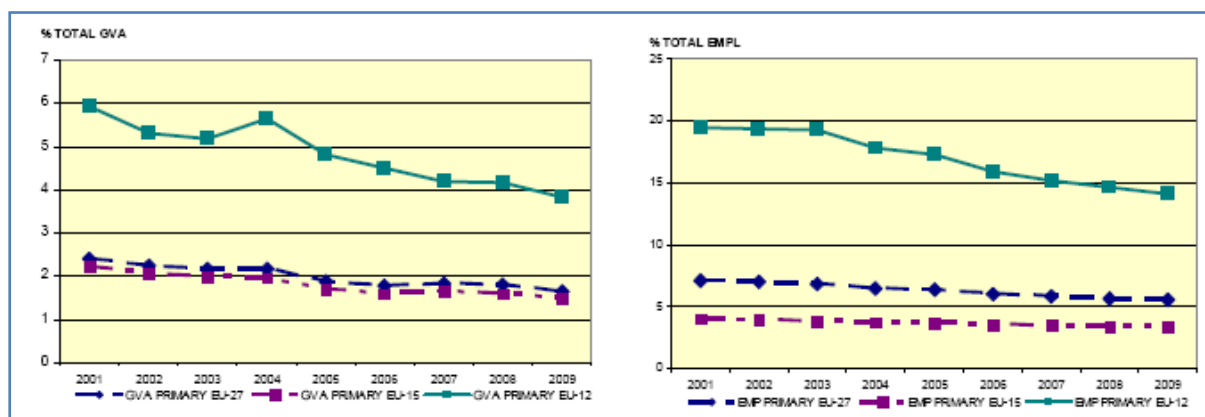
The agriculture sector contributed to 1.6% of the total GVA in EU-27 states in 2009. In terms of employment in 2009, agriculture sector employed 13.2 million annual working units (AWU)[11]. The share is especially high in Romania (it is more than 7%) and in Bulgaria (it is 8.5%).

As to the territory occupation, agriculture occupies 47% and forestry occupies 31% of the territory in the EU-27. There are naturally differences among the Member States at EU-27 level in terms of occupation, e.g. Nordic countries such as Estonia, Finland and Sweden and countries having many mountains as Austria and Slovenia cover the land as dominant. Historically, between 1990 and 2000, the agricultural land diminished especially in the significant centres due to the urbanization; however this was compensated by the conversion of semi-natural lands and forests into agricultural lands. For instance, in Spain and Greece these changes appeared; but there were some examples of land abandonment and withdrawal of farming in marginal areas of EU.[12] (E.g. in the regions of Europe where there are many mountains and in Portugal, Slovakia, Hungary and Italy and also some

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[11] Definition by Eurostat: One **annual work unit**, abbreviated as **AWU**, corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis. Full-time means the minimum hours required by the relevant national provisions governing contracts of employment. If the national provisions do not indicate the number of hours, then 1 800 hours are taken to be the minimum annual working hours: equivalent to 225 working days of eight hours each.

[12]" Situation and Prospects for EU Agriculture and Rural Areas", December 2010

parts of Germany where the lands which were arable have been turned into to forest by the natural processes.)

In 2009 in the EU-27, the forest and logging industry had a share of 0.2% of the total GVA which was a quite low level (the forestry –wood, pulp and paper industries itself as a whole has a contribution of 0.6% of total GVA). In the period 2000-2009 the GVA share of the forestry declined in many member states such as Finland and Sweden. Countries such as Estonia, Latvia, Lithuania and Romania presented a stable ratio in GVA share.

Food and Drink Industry in the Economy

The EU food and drink industry is the largest manufacturing sector in the EU both in terms of employment and turnover. According to the report by Confederation of the food and drink industries of the EU (CIAA), this sector is ranked as the second leading manufacturing industry in the EU both in terms of value added and number of companies.[13] In 2009, the turnover created by the industry was € 954 billion (a decline of 4% in comparison with 2008) and the sector created 4.2 million jobs (-1.5% compared to 2008). It is a fragmented industry with 310,000 companies.

Graph 4: Share of food and drink industry turnover, value added and employment in the EU manufacturing industry, 2004-2008 (%)[14]
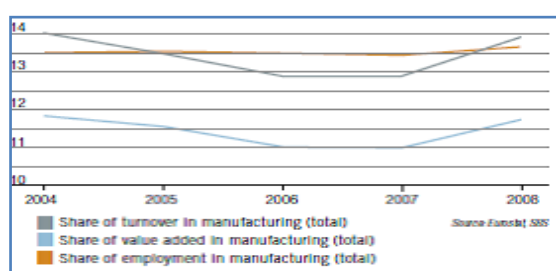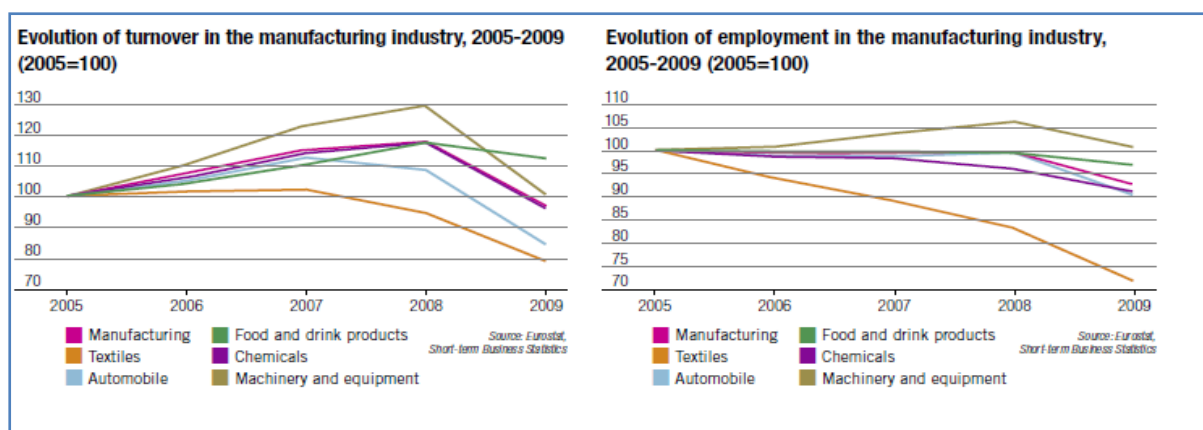

The share of the food industry in manufacturing concerning the employment did not represent big fluctuations between 2004 and 2008 while in terms of both value added and turnover exhibited variations within the same period (see graph4).

In 2009, the turnover recorded a more significant decrease caused by the combined effects of the decline in factory-gate prices and decreased exports. Nevertheless, in both terms of turnover and employment manufacturing industry registered a fall.

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[13] "Data and Trends of the European Food and Drink Industry", Food and Drink Competitiveness report 2011
[14] Source: www.ciaa.eu

Graph 5: Evolution of turnover and employment in the manufacturing industry 2005-2009 (2005=0)

Evolution of turnover in the manufacturing industry, 2005-2009 (2005=100)

Legend: Manufacturing, Textiles, Automobile, Food and drink products, Chemicals, Machinery and equipment

Source: Eurostat, Short-term Business Statistics

Evolution of employment in the manufacturing industry, 2005-2009 (2005=100)

Legend: Manufacturing, Textiles, Automobile, Food and drink products, Chemicals, Machinery and equipment

Source: Eurostat, Short-term Business Statistics

When compared the labour productivity for the food and drink industry with the EU manufacturing as a whole, it can be observed that the productivity for food and drink is lower than manufacturing as a whole. (See figure 2). The labour productivity per person employed recorded an annual growth rate of 1.4 % for food industry and 4.5% for drinks industry where there was a decline in labour productivity per person for manufacturing industry.

Figure 2: Labour Productivity[15]

Labour productivity, profitability and investment in the manufacturing industry

	Labour productivity¹ €1000	Gross operating rate² %	Investment per employee €1000
Manufacturing	52.5	9.6	7.6
Food and drink products	42.7	9.1	8.0
Automobile	68.9	5.8	11.8
Basic metals	80.2	10.0	13.9
Chemicals	104.2	12.8	15.6
Textiles	30.0	9.0	4.2

(1) Value added per employee
(2) The gross operating rate is the gross operating surplus expressed as a percentage of the turnover generated. The gross operating surplus is value added minus personnel costs. It is an indicator of profitability.

Source: Eurostat, SBS, 2007

Labour productivity per person employed, 2004-2009, annual growth rate (%)

	2004	2008	2009	2004-2009
Manufacturing	4.7	-1.6	-8.2	0.4
Food products	3.3	-0.6	1.4	1.2
Drinks	-1.2	-0.7	4.5	2.8

Source: European Competitiveness Report 2010

The comparison of the EU-27 with its global counterparts in labour productivity (value of output per unit of input in terms of international $ purchasing power parities) indicates the EU-27 has registered an increase by 3% in 2009 , however still remaining below the global industry players such as U.S., Canada and Switzerland (see table 1).

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[15] *Labour Productivity* in terms of value added per employee and *Gross Operating Rate* is the gross operating surplus in terms of a percentage of the turnover generated. The gross operating surplus is value added minus personnel costs and it measures profitability.

	Labour productivity (1,000 $ international PPP)		%
	2008	**2009**	**2008/2009**
EU 27	223	229	3
US	337	342	1
Canada	270	277	2
Switzerland	426	450	6
China	38	49	27
Mexico	171	172	0.4

Table 1: Food and drink labour productivity trend (ratio of production value per person employed) in 2008-2009, EU& Global[16]

Food and drink industry of EU can be called as "diversified". SMEs represent € 450 billion of turnover, € 95 billion of value added, 2.9 million employees and 308.000 enterprises. SMEs account for 48.2% of food and drink turnover, 47.7% of value added, 62.8% of employment and 99.1% of the food and drink companies. There are more SMEs in the food and drink industry than that in other manufacturing industries (see Table 2). Micro companies amounted to 7% of food and drink industry while reached 6% of manufacturing; medium-sized companies' share reached 27 % food and drink while this rate captured 21% of manufacturing.


More SMEs in the F&D industry than in other manufacturing sectors

Turnover (%)	F&D	Manuf.
Micro companies	7	6
Small companies	15	13
Medium-sized companies	27	21
Large companies	52	61

Employment (%)	SMEs
Textile	73
F&D	63
Machinery & equipment	56
Chemicals	35
Automobile	18

Table2: Comparison of SMEs in different industries, Source: Data & Trends of European F&D Industry, 2010

Medium sized companies' contribution to the food and drink turnover accounts for 27% and to the employment accounts for 25% while having only a share with 3.6 % of food and drink companies.

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[16] Source: Food Drink Europe Competitiveness Report 2011

Graph 6 illustrates the sub-sectors exhibited in terms of the distribution of turnover, employment and value-added. The share of the various food products is the highest with a value of 26% in turnover and 43% of the employment and 38% of the value added. This sub-sector is composed of chocolate homogenised food preparations and dietetic foods; pasta, noodles and couscous; condiments and seasonings; sugar; teas and coffee; rusks and biscuits; other food products; cocoa, chocolate and sugar; bread, fresh pastry goods and cakes.
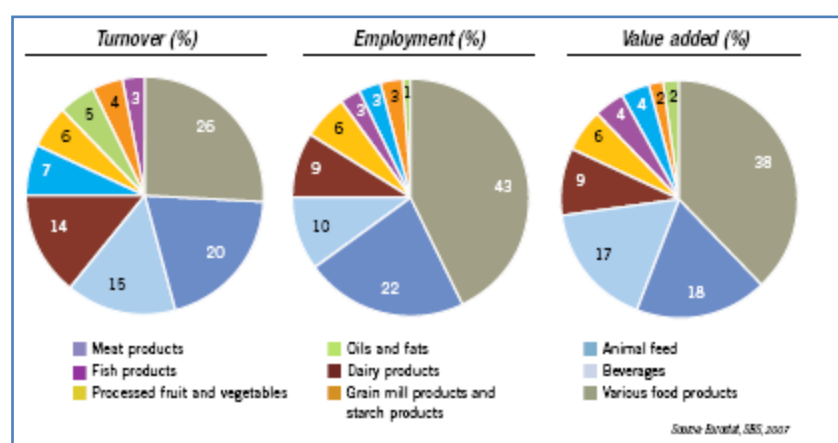
Graph 6: Distribution of turnover, employment and value added in sub-sectors

The food and drink industry is in the top three manufacturing activities in terms of sales in the some EU member states. The countries such as Germany, France, Italy, Spain and UK are the largest EU food and drink producers (see graph 7) in 2009.
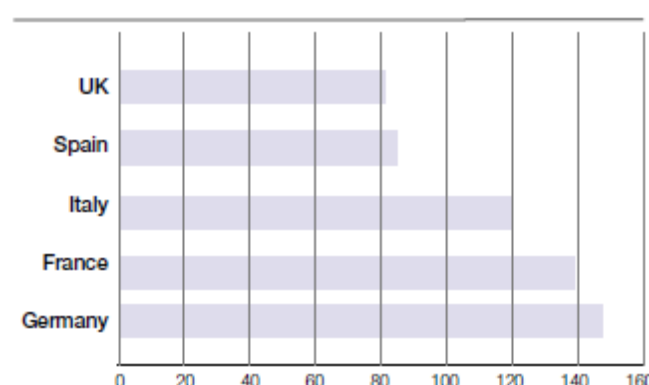
Graph 7: Top five Member States in terms of food and drink industry, 2009 (€ billion) Source: Data & Trends of European F&D Industry, 2010

Table 3 presents key data available for the EU member states. When analyzed the difference of years 2008 and 2009, the fall in the net sales from 2008 to 2009 is clear, moreover this trend is valid for almost all Member States. The reason behind should be searched in the economic

downturn in 2009. In terms of employment, the number of employees had also downward trend in most of the Member States.

Food and drink industry data as published by National Federations[1]

	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LV	NL	PL	PT	RO	SE	SI	SK	UK
Net sales[2] (€ billion)																									
2008	12.1	40.4	4.4	1.6	11.9	156.3	18.8	1.1	87.6	10.6	151.0	12.1	7.6	24.2	120.0	3.3	1.5	67.4	35.3	15.2	11.2	16.4	2.1	4.1	88.2
2009	11.5	38.7			10.7	147.7	17.7	1.1	84.6	10.4	139.0	12.0	7.4		120.0		1.2		37.2	15.3	8.2	16.5	1.9		81.2*
2009/2008 (%)	↘-5.8	↘-4.1			↘-9.8	↘-5.5	↘-5.9	↘-2.1	↘-3.4	↘-1.1	↘-7.9	↘-0.8	↘-2.0		↔	-	↘-19.6		↗5.7	↗1.0	↘-26.6	↗0.6	↘-9.5		↘-7.9
Rank[3]	5th	3rd			5th	5th	1st	2nd	1st	4th	1st	1st	3rd		2nd		-	1st	1st	1st	-	3rd	5th	10th	1st
Employment (1000)																									
2008	56.9	88.8	103.0	12.7	115.8	530.0	66.4	16.7	541.0	34.1	402.9	71.8	99.7	40.7	386.0	47.9	30.6	122.5	410.9	105.0	205.1	55.2	14.4	39.9	424.0
2009	56.7	88.6			111.6	535.0	64.2	15.0	519.0	33.0	399.3	69.0	94.6		378.0			131.1	396.0	106.0	176.0	53.5	13.3		424.0
2009/2008 (%)	↘-0.4	↘-0.2			↘-3.6	↗0.9	↘-3.3	↘-10.2	↘-4.1	↘-3.1	↘-0.9	↘-3.9	↘-5.0		↘-2.1			↗7.0	↘-11.8	↗1.0	↘-14.2	↘-3.1	↘-7.6		↔

(1) or by Eurostat
(2) or production value (in current prices)
(*) UK turnover decrease due to UK-EU exchange rates.

Source: National Federations and CIAA (details available on request)

Table 3: Food and drink industry data published by National Federations

The Situation of Agriculture and Forestry in Terms of Environmental Issues

Since agriculture and forestry occupy together 78% of land cover in the EU-27, therefore agriculture activities and forestry play an important role in preserving natural sources and cultural landscapes. Land cover defines the actual distribution of forests, water, desert, grassland and other physical features of the land, including the ones created by human activities, especially artificial and agricultural activities.[17] Commonly, the countries with a lower percentage of agricultural area have higher percentages of forests. In 2006, all together agriculture and forestry occupied 77 % of land cover in the EU-27 (e.g. Malta with 55% and Poland with 94%). Considering the important impact on natural sources and all human activities in rural areas, various types of agricultural activities and land use have significant effects on issues such as Biodiversity, Water Quality, Soil Erosion, Organic Agriculture, and Climate Change which will be defined in the next part.

Biodiversity

There is a strong and complex link between different types of farming and natural values. High Nature Value Farmland (HNV)[18] are areas widely recognized as a valuable asset of European agricultural system providing greatly varied living conditions for a broad range of species and so assisting biodiversity. Typically, they are found in eastern and southern Europe and dehesas and montados in Portugal and Spain. Because of the variation in HNV areas in the Member States, it is not really possible to reach an aggregate value for the EU-27 in terms of hectares of HNV areas.

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[17] Source: Rural Development in the European Union, Statistical and Economic Information, Report 2011
[18] Rural Development Report, 2011

According to the estimates, the biggest share of areas so called HNV in the utilized agricultural area (UAA) (more than 30%) is observed in Bulgaria, Greece, Spain, Italy, Cyprus, Austria, Portugal, Romania, Slovenia and Finland. Generally, 16 % of UAA of EU-27 is located in mountainous areas in which the agricultural activities help in maintaining the biodiversity.

The realization of Natura 2000[19] also contributed with an important contribution to protecting the biodiversity. Natura 2000 covers the 24% of the total forest area and this percentage can sometimes exceed 40 % in some Member States.

The farmland bird indicator is accepted as a barometer of change for the biodiversity of agricultural land in Europe. Farmland birds[20] which are strongly linked to intensive farming can be given as a deteriorating record since there is a fall in the population of them.

Water Quality

Even if the quality of water is affected by various operations of human, the role of agricultural activities affects it quite significantly. Water pollution problems are result of nitrates from agricultural sources are followed by EU Nitrates Directive 91/676/EEC which is an authority for the Member States to take the measure to diminish water pollution. For the water pollution issue, an indicator so called "Nitrate Vulnerable Zone (NVZ)" is used aiming to give an idea of scale of the pollution plus the political significance dedicated to this issue. These are the zones where there is a regime of specific legal requirements that target decreasing the pollution which agricultural sources lead to.

In 2009, the area determined as NVZ in the EU-27 captured around 1.9 million Ha with a coverage of 43.8 % of the whole territory. In figures, the greatest areas can be met in Finland, France and Germany where the area of the NVZ reached more than 25,000 ha in each country.

Climate Change

According to the data of 2009, the amount of emissions produced by agricultural sector in the EU-27 is 476 millions of CO_2 equivalents equals to 10.3 % of the total EU-27 emissions. As a positive improvement; the emissions generated by the agricultural sector have diminished by 7.5 % since 2000 in the EU-27. In the last ten years, the Member States which have had relatively higher increase of GHG emissions in the three following countries: Latvia (16.5%), Lithuania (16.8%),

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[19] Natura 2000 is the centrepiece of the EU and biodiversity policy. It is an EU wide network of nature protection areas established under the 1992 Habitats Directive : http://ec.europa.eu/environment/nature/natura2000/index_en.htm

[20] The farmland bird indicator consists in an aggregated index of population trend estimates of a selected group of 36 breeding bird species dependent on agricultural land for nesting or feeding. Assuming a close link between the selected bird species and the farmland habitat, a negative trend signals that the farm environment is becoming less favourable to birds.

Romania (11.8%). The countries such as Belgium, Ireland, Greece, Spain, Malta, the Netherlands, Slovakia and the United Kingdom have realized a lowering more than 10% in agricultural GHG emission.

Production of renewable energy is a significant indicator in analyzing the climate change; and the EU forestry and agriculture have an important role in the production. In 2009, the EU-27 reached 73.2 million tonnes and 14.2 million tonnes in the production of renewable energy from forestry and agriculture, respectively.

When compared agricultural sector with forestry sector, it is seen that the production of renewable energy has risen faster in the agriculture than the forestry. Between 2004 and 2009, the production of renewable energy in agricultural sector has nearly quintupled whereas the forestry sector has increased by 39.5% in the period 2000-2009.

Soil Erosion

Today in Europe, soil erosion is one of the most well known forms of soil reduction. In the EU-27, in 2006, the average (estimated) rate of soil loss that is result of water erosion was roughly 2.8 tonnes[21] per hectare per year.

The problem seems more serious in some Member States such as in Italy (7.8 t/ha/year), Portugal (7.6 t/ha/year) and Greece (4.9 t/ha/year). The rates of soil erosion were high also in Austria (4.8 t/ha/year), Slovenia (7.2 t/ha/year) and the United Kingdom (4.6t/ha/year) while they were below 1t/ha/year in Ireland, Latvia, Lithuania, the Netherlands, Finland and Sweden.

Erosion is indeed very sensitive to both land use and climate as well as to conservation practice at farm level.[22] Especially, Mediterranean region carries a particular risk since because it has long dry periods and afterwards takes heavy erosive rains and the rain falls on steep slopes with delicate soils. Erosion is also an important problem in North West and Centre of Europe and is even having an increasing trend. In some regions of Mediterranean, the level of erosion is really irreversible moreover in some parts it ended due to the depleted soil.

Organic Agriculture

The definition of organic production by Council Regulation (EC) no 834/2007 is as follows: "the organic production is an overall system of farm management and food production combining best environmental practices, a high level of biodiversity, the preservation of natural resources, the

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[21] "Rural Development in the EU, Statistical and Economic Information, 2011"
[22] Source: Joint Research Centre: http://eusoils.jrc.ec.europa.eu/library/themes/erosion/

application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes".[23]

The total area of organic agriculture amounted to 8.6 million ha and occupied 4.7% of the total UAA in 2009. Among the Member States Austria (16.4%), Sweden (12.8%), Estonia (11%) and the Czech Republic (10.6%) have the highest importance of organic agriculture in terms of UAA at national levels. There is an increase in the share of UAA which is used for organic farming, for the years between 2004 and 2009, the area dedicated to organic production increased by 43% in the EU-27.

Structural Features of Agricultural Sector in the EU

The structure of agricultural sector shows diversity among the members as a result of agricultural background of each member, natural and climatic conditions and the institutional framework. This multiplicity has also been caused by enlargements of the EU. The diversification in size, type and socio-economic performance of the agricultural holdings are supported by the structural conversion in the EU-12 depart from nature and intensity from those in the EU-15.

There are two factors that have carried out a significant modification over the last twenty years: productivity (highly affected by mechanisation or development in crop and animal genetics) and national scale and global economic bottlenecks or downturns.

To conduct an evaluation of the structural features of European agriculture, following the recommendation of Food and Agriculture Organization (FAO) (which carries out world agricultural census every ten years since 1930), Eurostat has been carrying out since 1970 an "Agricultural Census" (AC). Agricultural census is a survey in order to collect information about all agricultural holdings in a given country. The objective of AC is to exhibit the most recent situation of the agricultural activities in terms of economical, social and environmental aspects. Eurostat also practices intermediate surveys every 2/3 years which are known as "Farm Structure Survey". It is carried out by all the Member States every decade and creates a chance to monitor all the development of agricultural holdings in the EU and assess the agricultural situation among the Member States. The last sample survey was fulfilled in 2007.

Accordingly, the structural features of the sector are subject to be analyzed in terms of:

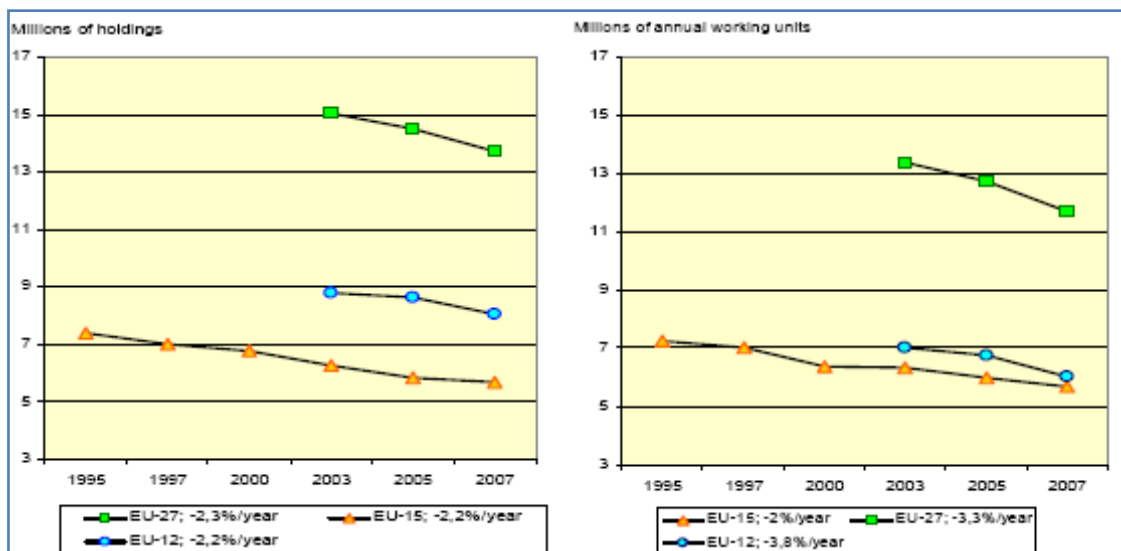- Agricultural Holdings and Labour Force
- Agricultural Area

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[23] Source: Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labeling of organic products and repealing Regulation (EEC) No 2092/91

- Size of the farms

- Distribution of production factors

- Labour force

Agricultural Holdings and Labour Force

The number of the agricultural holdings accounted to 13.7 million (of which 5.6 in the EU-15 and around 8 million in the EU-12) in the EU-27 in 2007. There is a fall in number of agricultural holdings by an annual rate of 2.2% both in the EU-15 and in the EU-12. The Member States which hold the highest number of farms are counted as Romania (3.9 million holdings), Poland (2.4 million) and Italy (1.7 million). A decrease also in the labour force by 2.0% per year between the years 1995 and 2007 is observed within the EU-15. The labour force captures now 11.7 million AWU for the EU-27. Out of this figure less than 1 million belong to workers who are non-regular.

Graph 8: Evolution of the number of agricultural holdings and of the labour force (AWU) in the EU - 1995-2007, Source: Eurostat Farm Structure Survey 1995-2007.

Utilized Agricultural Area

The utilized agricultural area with 172 million ha in 2007 for the EU-27 has exhibited only a small fall over the last decade (for the period 1995-2007 by -0.3% per year) in the EU-15. According to the distribution over the member states, despite the fact that the EU-12 has the majority of EU farms, the EU-15 holds the majority of the utilized agricultural area with a share more than 70%.

**Graph 9: Evolution of UAA in the EU - 1995-2007**
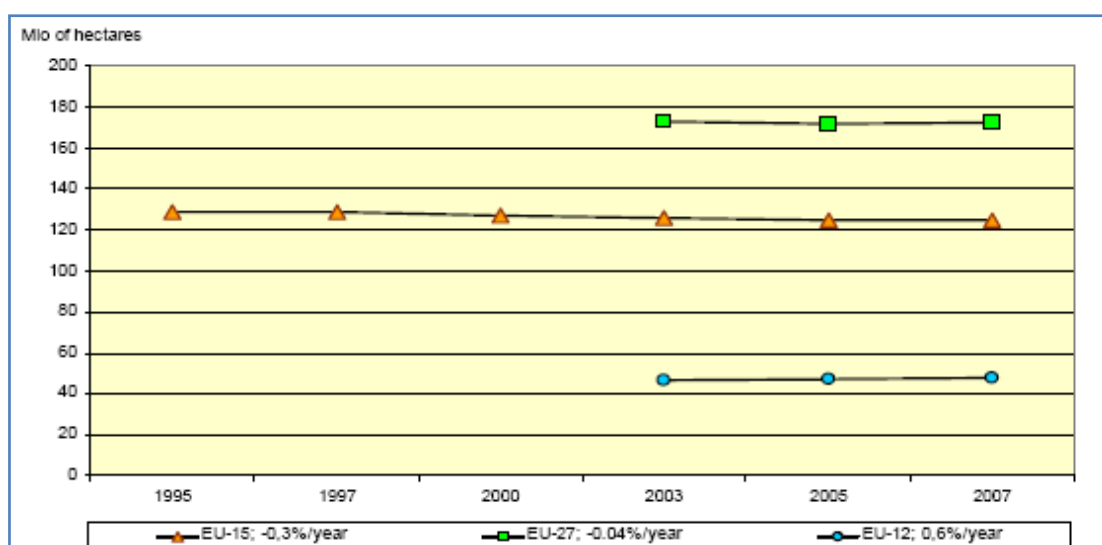
The area where arable crops and olives are cultivated showed a rise within the years whereas permanent grassland and vineyards fell. Arable crops occupied 68%, permanent grassland 25%; permanent crops occupied 7 % of the agricultural area of the EU-27. EU-12 had higher share of arable crops (76%) than that of the EU-15 (64%).

61 % of the farms were specialized in one sector; hence the farm types remained unchanged over the last decades. There was an important rise in the farms which are focused on olive production; field crops with the share of 20%, permanent crops with the share of 18% and grazing livestock with a share of 16 % represented the most important farm types. The production of poultry and pigs (5%) and horticulture (2%) did not exhibit an importance in the type of the farms.

Distribution and Size of Farms

Between the years 1995 and 2007 the increase in the average physical size of the farm is observed for the EU-15 (see Graph 10) the average size increased from 17 ha in 1995 to 22 ha in 2007. The situation is different for the EU-12 Member States because of the many small farms[24] with an average of 6.0 ha and this value reaches 12.6 ha in the EU-27 in 2007.

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[24] In spite of taking attention of the political sides recently, due to wide variations in farm structures among the Member States and lack of consistent data resulted in a non clear definition of "Small Farm". In the political debate, the elements such as disadvantage, risk of poverty, lack of opportunity, and the need for support are used are used to define "Small Firms" together with some appropriate thresholds (to be used as common criteria) for the statistical analysis
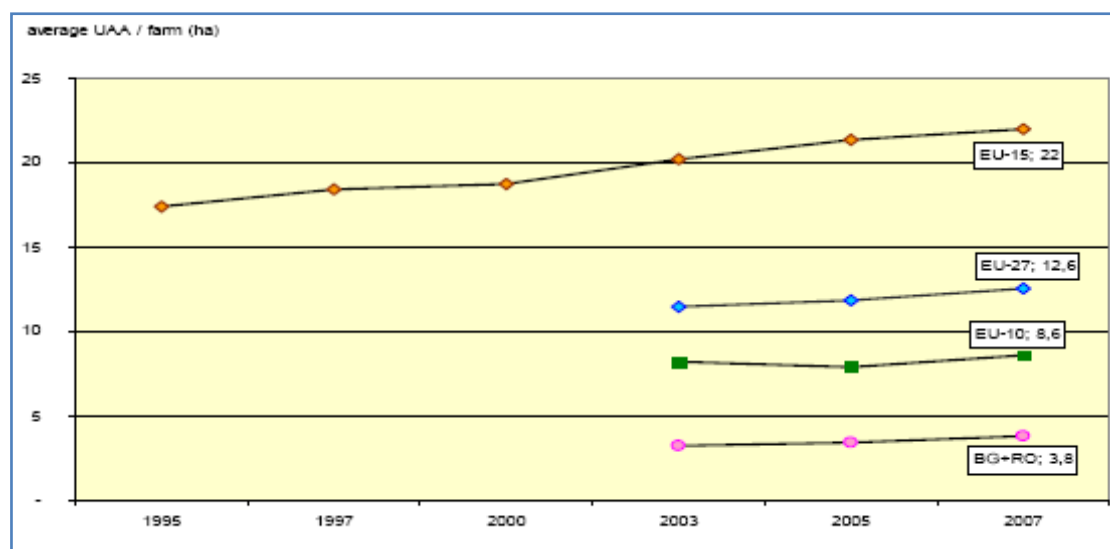
Graph 10: Development of the average physical farm size in the EU - 1995-2007

The average farm size for the EU-27 approaches 12.6 ha in 2007 which is quite lower than that of the EU-15 with 22 ha. It is vital to know the differences among the Member States of which some countries such as Czech Republic, Denmark, Luxembourg, the United Kingdom and France had the average farm size more than 50 ha whereas some Member States such as Malta, Romania, Cyprus and Greece had less than 5 ha.
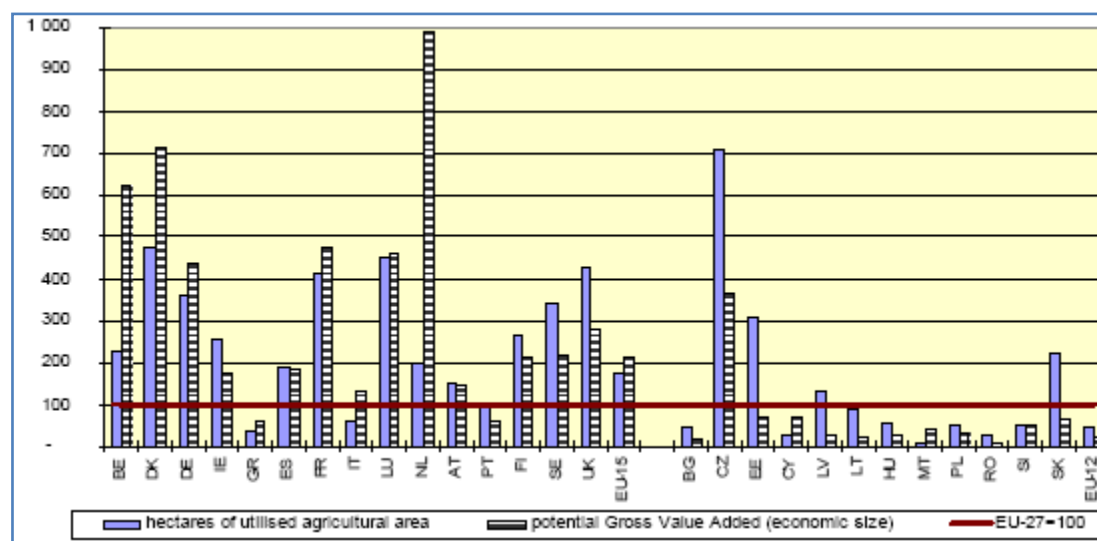

Graph 11: Average physical and economic farm size in Member States – 2007 (EU-27 = 100) and Potential Gross Value Added

The differences become even bigger when the economic size of the farms is also taken into account including the potential economic productivity of the areas (potential GVA).

29

Distribution of production factors

The distribution of production factors across the farms in the Member States exhibits a non-uniform level, that is; in 2007 approximately 77 % of the agricultural area was concentrated in 11% of farms which have a size of 20 ha or more. Moreover, the structural improvement of the area and the labour force happened with a very low momentum since the area farmed by the largest farms (which have 100 ha or more) increased by solely 1.3% per year in the EU 15 in the period 1995-2007.
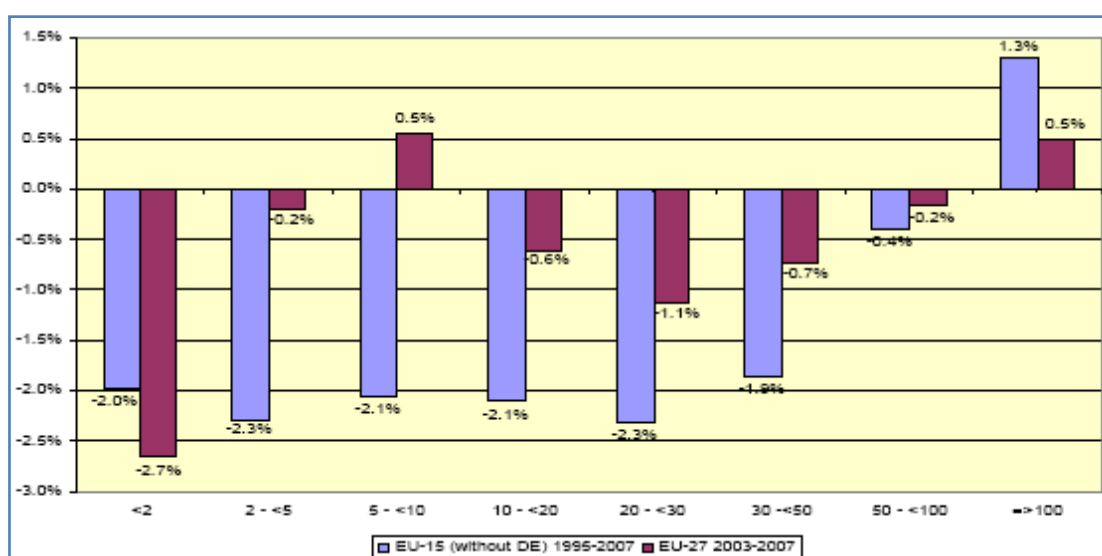
Graph 12: Annual rate of variation of the UAA by category of area farm size in the EU between 1995 and 2007

Labour Force[25]

The farm labour force amounts to 11.69 million full-time workers in the EU-27 in 2007. Of this number, 10.8 million were belonging to regular workers accounting 92% of whole number (See Table 4). In the EU, more than 80 % of the labour force is coming from the farm holders' families, so the agriculture sector seems a family oriented one in most of the Member States. There are exceptions such as Slovakia (44%) and Czech Republic (27 %) in which the ownership structure is distinctive. The situation of the sector in Italy was similar to the majority and remains family oriented with 84 %.

Regarding the gender, 34 % of the agricultural labour force in the EU-27 was female, however in countries such as Latvia (50 %), Lithuania (48 %) and Estonia (46 %) around half of the regular agricultural sector labour force is female. Age structure of the Member States shows that only 6 % was belonging to under the age of 35 whereas 34 % was belonging to the age equal or more than 65 years in 2007.

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[25]Source:http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Farm_structure#Source_data_for_tables.2C_fi
gures_and_map_.28MS_Excel.29)

Table 4: Labour Force Structure

	Farm labour force (1 000 AWU) (1)		Analysis of labour force (% of total)				Agricultural holders (1 000)		
	Total	Regular	Regular	Full-time regular	Female regular	Family	Natural persons	Age <35 years	Age >=65 years
EU-27	11,693	10,796	92	34	34	80	13,441	823	4,584
Belgium	66	63	95	71	29	79	44	3	9
Bulgaria	491	467	95	38	39	85	490	15	222
Czech Republic	137	134	98	68	32	27	36	4	7
Denmark	56	54	96	70	23	61	44	3	9
Germany	609	555	91	50	28	69	365	28	27
Estonia	32	31	98	46	46	61	22	1	7
Ireland	148	144	98	60	21	93	128	9	32
Greece	569	489	86	22	29	82	860	60	321
Spain	968	790	82	42	20	65	988	44	361
France	805	719	89	67	25	47	428	34	66
Italy	1,302	1,169	90	37	30	84	1,664	49	741
Cyprus	26	24	94	31	32	75	40	1	12
Latvia	105	104	99	30	50	84	108	8	32
Lithuania	180	176	98	14	48	85	230	10	93
Luxembourg	4	4	98	63	27	85	2	0	0
Hungary	403	390	97	25	37	77	619	47	172
Malta	4	4	99	41	14	88	11	0	3
Netherlands	165	151	91	56	26	61	73	3	13
Austria	163	159	97	53	41	88	161	16	18
Poland	2,263	2,194	97	34	42	95	2,387	294	388
Portugal	338	315	93	35	41	82	269	5	130
Romania	2,205	2,044	93	4	42	90	3,914	167	1,762
Slovenia	84	80	96	21	41	92	75	3	26
Slovakia	91	87	96	40	32	44	67	2	22
Finland	72	68	94	56	30	83	67	6	4
Sweden	65	63	97	42	26	76	68	4	15
United Kingdom	341	318	93	55	23	67	283	7	92
Norway	56	53	94	32	25	80	50	4	4

Early Results of Agricultural Census 2010

Agricultural census, as mentioned earlier, has been carried out every ten years in the EU gathering data on the structure of agricultural activities including basically the number and size of farms, the number of livestock, and types of crops grown and labour force. The latest Agricultural Census was realized in 2010[26]; the results are preliminary and final results will be ready by early 2013; however still, thanks to some available results, basic analysis can be conducted.

According to the early results, in 2010 there were 12 million agricultural holdings and 170 million ha utilised agriculture area (UAA) in the EU-27. In comparison with 2003, there was a decrease in the number of holdings by 20% and UAA by 2%. The structural change of European agricultural sector has a trend of having less and larger holdings. The average size amounted 14 ha in the EU-27 while it was 12 ha per holding in 2003.

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[26] Source: Eurostat news release "EU Agricultural census 2010- first results"

In Member State level, the largest number of holdings belong to Romania with 3.9 million holdings (32% of the EU 27); then came Italy with 1.6 million holdings (13.5% of the EU-27); Poland with 1.5 million holdings (12.5 % of the EU-27), Spain with 1 million holdings (in 2009, 8.2% of the EU-27), Greece with 0.7 million holdings (5.9% of the EU-27), Hungary with 0.6 million holdings (4.8% of the EU-27) and France with 0.5 million holdings (4.3% of the EU-27).

In the period 2003-2010, there was a decline in the number of agricultural holdings in majority of the Member States excluding Malta and Sweden. The highest decreases were registered as follows: Bulgaria (-44.2%), Estonia (-46.6%), Latvia (-34.4%) and Poland (-30.7%).

In terms of utilised agricultural area, in 2010 France had the largest area with 27.1 million ha. The following countries were recorded after France as: Spain (23.8 million ha in 2009),Germany (16.7 million ha), the United Kingdom (15.9 million ha), Poland (14.4 million ha), Romania (13.3 million ha) and finally Italy with 12.9 million ha of UAA all together composed approximately three quarters of the UAA in the EU-27 in 2010.

There were some declines in the UAA in the period 2003-2010 registered in some countries such as: Cyprus (-24.3%), Slovakia (-9.4%)[27] and Austria (-8%) whereas Bulgaria (+24.7%), Latvia (+19.9%) and Estonia (+18%) recorded increases.

Czech Republic recorded in 2010, the largest holdings on average (152 ha per holding), followed by the UK (with 79 ha), Denmark (with 65 ha), Luxembourg (with 59 ha), Germany (56 ha) and France (53 ha). The smallest average value of holdings was recorded in Malta with 1 hectare while Cyprus and Romania both recorded 3 ha and finally Greece and Slovenia both recorded 6 ha.

Foreign Trade in Agriculture and Food

The foreign trade of the EU in the period 2008-2010 had important results on a global scale since the import captured € 83 billion and the export reached annual average of € 82 billion in the given period. EU is the largest importer in the world (even though share of the EU in the world decreased from 21% in 2007 to 19% in 2009).

The foreign trade of agri-food in the EU has had a significant improvement in the last decade exhibiting an average annual growth in imports by 3.7% and in exports by 5.1%. The growth was realized with a higher pace particularly between 2005 and 2008.

The year 2009 had the impact of the economic downturn; accordingly, imports shrank faster than the exports; hence trade deficit of EU fell from € 7 billion in 2008 to € 2.5 billion in 2009.

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[27] Between 2003 and 2007
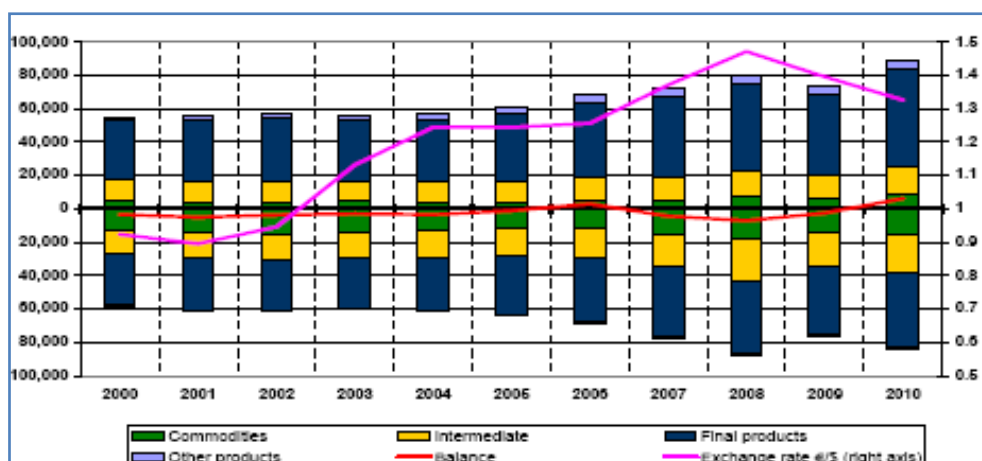
Graph 13: EU Agriculture and Foreign Trade, source: Situation and Prospects for EU Agriculture

In 2010, the feature of the trade balance changed with an improvement and from becoming a net importer transformed into a net exporter and the trade surplus captured a value of more than € 6 billion. The reason behind the surplus could be explained with the growth in the value of the exports and the drop in the prices of commodities.
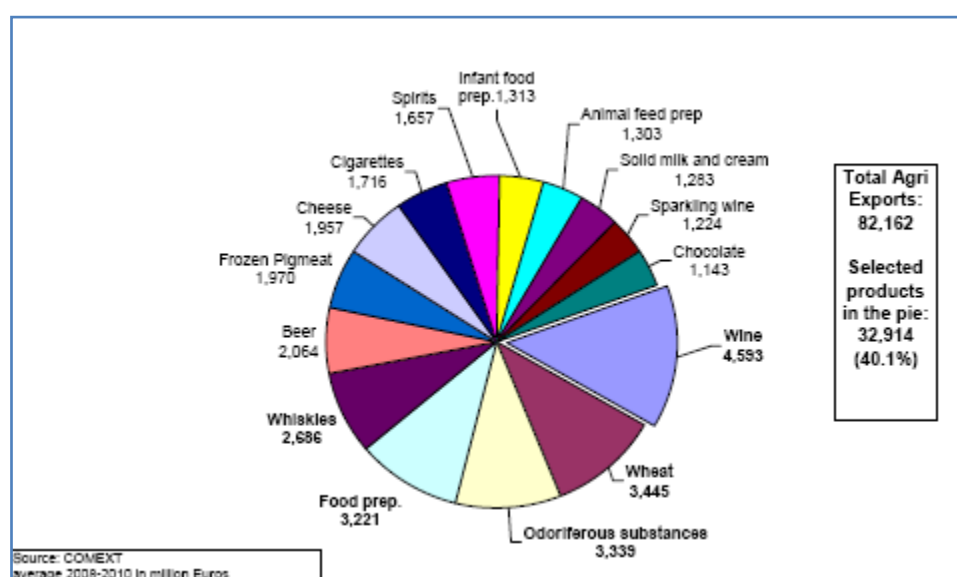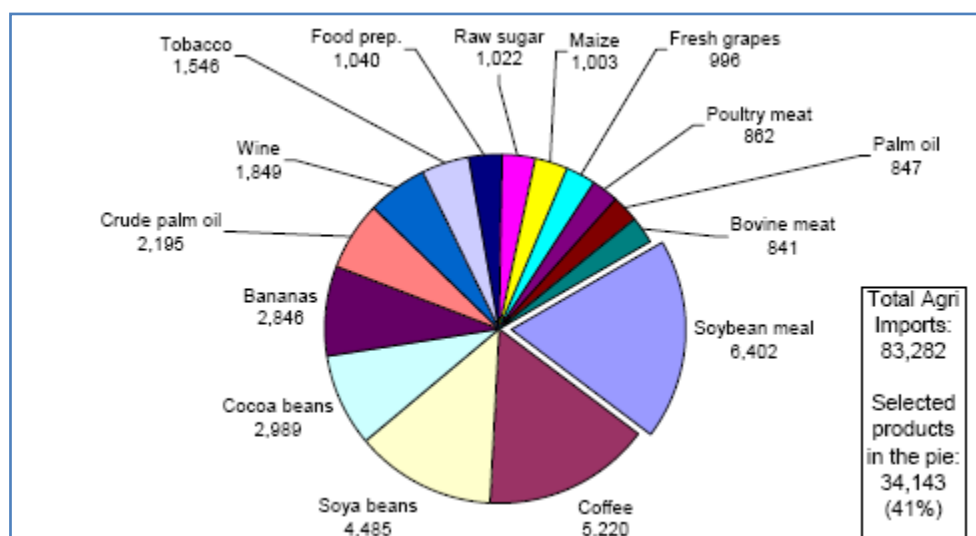

Graph 14: EU-27 Agriculture and Food Exports, average 2008-2010 (€ billion)

The illustration of the exported products distribution can be found in the Graph 14. The EU agri-food trade is dominated by the final products[28]. The share of final products in the value of export accounts for 63 % and in the value of imports accounts for 52 % in the period 2008-2010.

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[28] Final products are products purchased for own use and not for resale of for embodiment in a product for resale; those purchased by households, by government or by business on capital account. Source: OECD, glossary of statistical terms.

Among the export items of the EU, intermediary products and commodities registered 20% and 9 % of the total exports, respectively. According to the Graph 14, in the period 2008-2010 final goods dominated the top 15 exports. The highest shares belong to wine with € 4.6 billion, wheat with € 3.4 billion, odoriferous substances with € 3.3 billion, food preparations with € 3.2 billion and whiskies with € 2.7 billion. This group accounted for one fifth of the EU exportation.

The first 15 imported products are exhibited in the Graph 15. The first three products are soybean meal, coffee and soya beans with an import share of €6.4 billion, € 5.2 billion and € 4.5 billion, respectively.

Graph 15: EU-27 Agriculture and Food Imports, average 2008-2010 (€billion)

Regarding the trade partners of the EU; the USA has had its share as the key partner for both import and export activities. The USA occupied a share of 15 % of the EU exports in 2010 in spite of the decreases since 2006. As a second biggest partner, Russia keeps its place with a share over 10% in 2010. The biggest import partner of the EU is Brazil in 2010 with a share of 14% of total EU imports. For the period 2008-2010, the EU is the biggest importer of agricultural products from the emerging markets with a value of € 59 billion and this value is above the total of US, Japan, Canada, New Zealand and Australia.

Agricultural Income Development
When developments are analyzed historically, it is seen that the growth of agricultural income in the EU-27 between the period 2000 and 2011[29] has been important in nominal terms (average

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[29] Source: European Commission, Agriculture and Rural Development Publishing: "Prospects for Agricultural Markets and Income in the EU". The agricultural income of 2011 is Eurostat's early estimates for Economic Accounts for Agriculture, published on 20 December 2011.

4.3% per year), however relatively smaller in real terms (2% per year). There have been fluctuations within last ten years. Real agriculture income per worker had risen by around 16% between 2000 and 2004; then fell by roughly 9% in 2005. Between the years 2006 and 2007, it increased by 14% as a result of increasing commodity prices; however fell again in the next two years due to the price bubble and the economic recession (fall by 10.3% in 2009). The years 2010 and 2011 presented a significant income improvement with 19.8% over the two years. The reason that has resulted in such a rise is the increase in the agricultural prices; hence today the agricultural income level of the EU-27 captured a level that is 25% higher than in the year 2000.

When observed the development of agricultural income per annual working unit, it is seen that there are various results in the EU-15 and in the EU-12. In the EU-15, real income did not show any progress in the period 2000-2006. In 2007, income increased by around 8% compared to the previous year mostly due to the price increase of commodities. Now, EU-15 agricultural income fixed itself slightly higher than in the year 2000 (+1.1%). On the contrary, income of the EU-12 has been regularly growing since 2000. The 2009 decline in the agricultural income had an impact on the EU-12, however the recoveries of 2010 and 2011 has supported the historical trend. Hence, the real income per worker in the EU-12 in 2011 was higher by 86% than that of 2003.

In 2011, an increase of 6.7% in the EU-27 real agriculture income per working unit was observed; and in comparison with 2010, a rise in real income at sector level (+3.9%) together with a fall in agricultural labour input (-2.7%) were realized. Actually, the EU-27 has obtained an income at aggregated level which is a result of the agricultural output's important growth in real terms by 7.9% (despite the rise in expenditures for intermediate consumption by 9.7 %) and fixed capital consumption's marginal increase.

In 2011, at sector scale, the growth in real production was almost same for vegetable crops (8%) and the animal products (7.8%). When analyzed the inputs, the total expenditure in real terms increased for almost all cost items however the most significant rises were observed for fertilizers by 24.5%, energy by 11.3% and feeding stuffs by 15.9%.

Why did the value of agricultural production in 2011 have an increase? The increase was mostly the result of increasing commodity prices while the expansion in production volumes was relatively smaller. Regarding the crop sector, the producer prices increased on average by 5.4% whereas volumes of production increased by 2.5%. The cereals exhibited the highest increase in producer prices with 18.9%, followed by 18.4% for oilseeds, 10.2% for forage plants. The other crop products such as fruits, potatoes, wine presented relatively smaller increase. The average increase of

the real producer price of the animal products with 6.7% was higher than for the crops; however the production volumes increased only marginally by 1.1%. Showing various volumes movements, the main animal products have increased for milk by 9.1%, poultry by 8.7 % and cattle by 8.6 %.

Agricultural markets in the EU and medium term perspectives

Future economic capacity of survival of the EU agriculture depends heavily on future developments in the EU and world markets. This section of the thesis provides an overview of the most updated medium-term prospects for agricultural markets and their effects on agricultural income. The outlook for EU agricultural markets remains subject to a number of uncertainties. The outlook presented herein are composed of a set of market and sector income prospects detailed on the basis of specific assumptions regarding macroeconomic conditions, the agricultural and trade policy environment, weather conditions and possible international market developments.

These are not intended to compose a forecast of what the future will bring, however they describe what may happen under a specific set of assumptions and circumstances, which at the time of projections were judged reasonably. Thus, they aimed to be used as an analytical tool for medium-term market and policy issues, not as a forecasting tool for monitoring short-term market developments.

The following projections and analyses, that will be presented next, have been performed based upon the economic models available in the European Commission (at the Directorate- General for Agriculture and Rural Development (AGRI) and in the Joint Research Centre – Institute for Perspective Technological Studies (IPTS)).

The present medium-term outlook for EU agricultural markets and income is based on a status quo assumption for agricultural and trade policy. Macroeconomic assumptions comprise a low EU GDP growth in 2012 of 0.6% and after that a return to a modest growth of about 2% per year, and a steady appreciation of the EUR to around 1.50 USD/EUR in 2020.

The Situation of Arable Crops in the EU
According to the European Commission determinations, the medium-terms projections are exhibiting a positive outlook for the EU cereal markets since because the world demand seems concentrated and moreover the there were price developments. These developments are mainly led by the bio fuel market that is now one of the most dynamic followed factors.

The latest developments in the market

As the nature is a fundamental ruler for the agricultural activities, the changes in climate have had a great impact on the arable crops. Due to very hot summer seasons in Eastern Europe, Russia and overflowing rains in Central and North EU harvest quality showed various qualities. The EU cereal area decreased by 3.9% in the year 2010 reaching 56.2 million ha in comparison with 2009. The EU-27 production of common wheat would reach 128 million t. Maize and barley production would reach 57 million t and 53 million, respectively.

In the period 2010-2011 the EU oilseed areas reached 10.9 million ha (0.2 million ha higher than the period 2009-2010).

How is 2011-2012 marketing year?

The area cultivated for cereals is expected to decline by 1.2% reaching 55.5 million ha in comparison with 2010-2011 period. The area dedicated to soft wheat is expected to be permanent at 23.1 million ha and there is an expectation of the increase of maize reaching 8.7 million ha. But the decline in total cereal area, together with more favourable yield forecasts, would result in a cereal production of 277 million t which is almost same with the last year. Accordingly, the EU exports are assumed to decline to 21 million t.

In 2011-2012 period EU-27 oilseed area is forecasted to be 11.3 million ha (3.5% increase), though total oilseed production would fall to 28.6 million t (by 2.8% fall) because of the narrowing yields.

Market Expectations

The demand for cereals, oilseeds, vegetable oils, oil meals and sugar continues on worldwide scale to increase with a slower speed in comparison with the previous decade (see graph 16). Especially regarding the wheat and oilseeds, the slowdown in growth is being mentioned relatively more. Relatively less favourable short term economic expectations together with a drop-off in population growth rates refer a downturn in the growth of the demand.

Graph 16: World demand for crops and products-average annual growth (in percent)
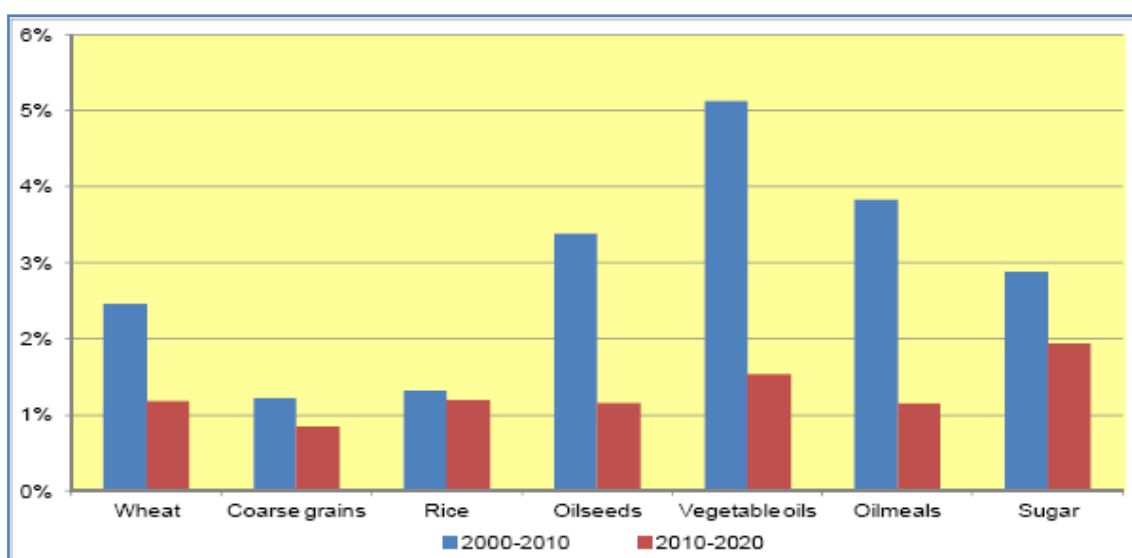
The Situation of Cereal Markets in the EU

The cereal markets in the EU have medium-term projections which have relatively narrow market conditions represented by low stocks and prices that are higher than the long term averages (see the graph 17).

Another interesting topic is that the domestic use of cereals in the EU is expected to increase significantly due to the growth in the biomass and ethanol industry as a result of the initiatives provided to the Member States which exist in the bio fuel directives framework, the biomass action plan and the 2008 Renewable Energy Directive (RED).

Graph 17: Cereal Market Developments (million t), 2005-2020
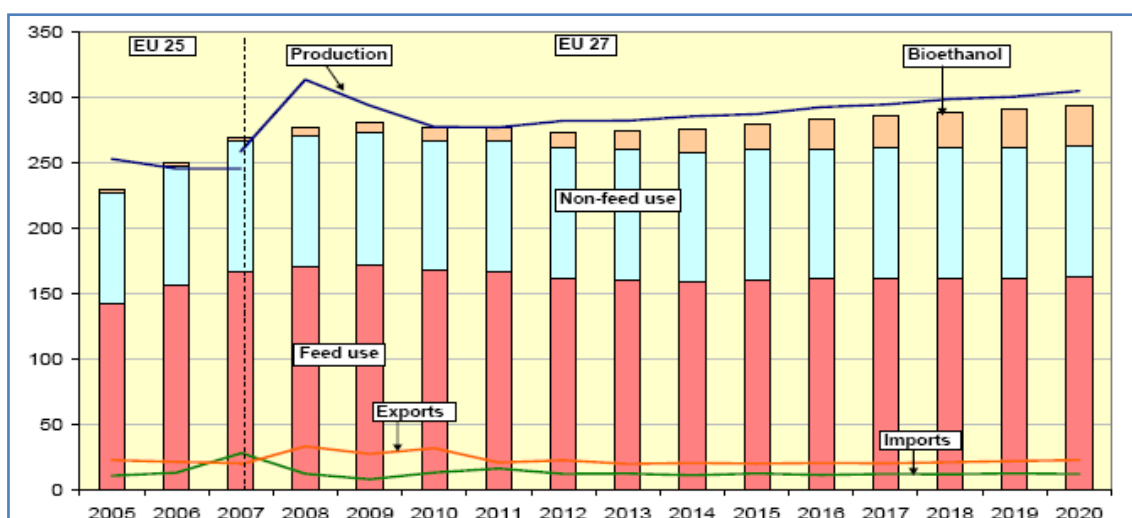
The EU realized strong export performances in the period 2008-2010, however the export of the cereals are expected to remain at levels of about 20 million t as relatively firm EU market conditions,

maintained domestic prices and presumed that the EU competitiveness on export markets will be limited by exchange rate trends.

The production of cereal in the EU is expected to recover in the medium term and be higher than 305 million t. by 2020 which was 278 million t in 2011. Thanks to the fast growth and big interest in ethanol use, the domestic use of cereals is also planned to keep expanding (expected to reach three times more and reach a value of 30 million t by 2020). Exports are planned to decrease from 32 million t in 2010 to approximately 20 million t via during the projection period, while imports should be fixed at 12 million t.

The Situation of Meat Production in the EU

In terms of an overview and expectations for EU meat production markets, it can be stated that there is a fall in the production of beef and sheep meat. Although the consumption of poultry meat exhibits the fastest growth, the EU gives much more importance to pig meat. Regarding the foreign trade, the EU will become the significant exporter of poultry and pig meat under the accepted current market conditions.

In 2009, the demand for the meat in the EU fell and this affected the import numbers. However, this changed throughout the year 2010 and the production rose and resulted in positive trade numbers. In spite of a stable falling trend in goat and sheep meat, the total production in meat industry rose in 2009 and 2010. One of the important issues in goat, sheep, beef and veal meat production was animal diseases. In pig meat production, the producers have had difficulties since the input costs have had a significant increase especially in autumn 2010 and early 2011 the fluctuations in feeding stuff and the fall in the pig meat prices have had a negative impact on the profitability.

The beef meat exports have also increased in both 2010 and 2011 (export included both live animals and final products). The countries showing bigger interest to beef products were Russia and Turkey. The key markets such as Middle East countries and China also kept their importance. The reasons behind the EU's increased export operations can be counted as relatively weaker Euro currency and a slowdown in the supply of Argentina and Brazil (which are significant players in world meat market).

The market prospects for the EU seem to have some challenges. Uncertainties regarding production, rising production and investment costs combined with market up-down trends and animal health issues are the basic issues. Especially, the prices for protein feed components and other essential feed ingredients and energy are waited to be high.

It is obvious that the meat market has had a hit from the economic downturn; however the world demand for the aggregate meat market is expected to do better and reach a level by 2013

that exceeds the level before crisis. The developments in the overall meat exports can be stated like this: the exports are expected to pass the level of the year 2009 by 22% in 2020 (the pig meat by 31%, poultry meat by 26%, beef meat by 14 %, sheep and goat meat by 4 % more than the level in 2009).

There are various factors in terms of macroeconomic developments in the meat market with various results: the current environments assume a deterioration in the EU export potential since the currency EUR is expected to become stronger against the currency USD (from 2013 and on). However, there is a positive prospect stating that the growing population and expected meat consumption volumes are still indicating better prospects for total meat production for both world and the EU. On the other hand, one of the most powerful factors behind the meat production expectations is the continuous increase of crude oil price as it affects the input costs.

The aggregate meat production is projected to reach 44.7 million t in 2020 (that is higher than 2010 level by 2.4 %, graph 18). The distribution of meat types is naturally different since beef meat declines by 1.3%, goat meat declines by 7.9% whereas the pig and poultry meat increases by 3.6 %. A slight increase in the meat import operations (sheep, beef and poultry meats) and a decline in the exports of pig and poultry meat are expected from medium term to long term. By 2020, aggregate meat import would expand by 6.1% and meat exports would exceed the 2010 level by 1.9 %. The rising levels of poultry and pig meat consumption drives the meat production in the EU. The most demanded meat is pig meat in the EU by 41.6 kg/capita as expected in 2020 in comparison with the beef meat with 15.8 kg, 23.6 kg for poultry and 2 kg for sheep and goat meat.[30]
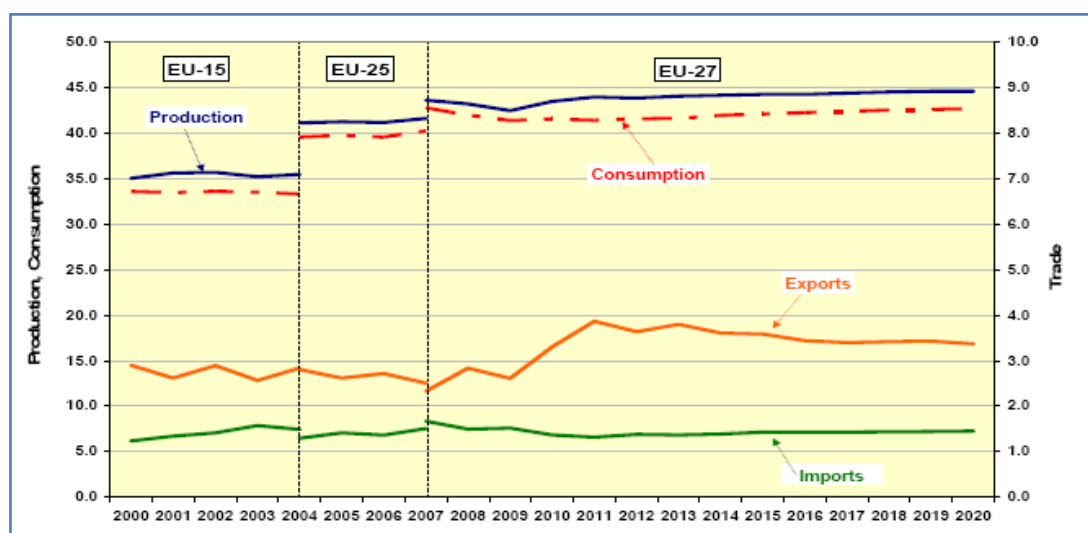
Graph 18: Aggregate meat market developments (million t), 2000-2020.

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[30] Source: Prospects for agricultural markets and income 2011-2020.

Milk and dairy Products in the EU

In the context of the latest developments in milk and dairy products market, the 2010 and the first nine months of 2011 presented fortunate price indicators. In the past, the market had experienced hard conditions such as in 2007 unpredicted high prices, a sudden drop in 2008 and in 2009 finally resulting in a milk crisis both in the EU and on a global scale.

2011 was actually on the favour of commodity markets since they have continued recovering thanks to the strong world demand. Weighted average EU milk price reached 34.8 euro/100 kg in 2011, September (which is 6.6% higher than September, 2010). Total milk production would arrive 150.8 million t in 2011 as a result of the permanent rise of the milk yields in the EU-15 and the EU-12. The prospects for the short term mainly depend on the level of the increased milk production in the EU and in the main market player countries such as Australia, New Zealand, USA.etc and a consistent demand on the world. The opposing weather conditions in the Southern Hemisphere, high import demand from China, some countries in South-East Asia and some countries in Near and Middle East have helped the development of prices in the period 2010-2011. For Skimmed Milk Powder (SMP) and Whole Milk Powder (WMP) and cheese there is prospect towards an increase in the prices. Being dependant on a well built relation between commodity prices and milk prices and stable cereal prices, the producers of milk and dairy products can have higher gross margins.

Long term expectations appear positive for the EU, supported by the main factor of increase in the world demand as a result of higher population and growing per capita consumption. The emerging markets are expected to increase their import levels on dairy products which empower the EU exports potential. On the other hand, the EU market share in this market is expected to loose some market share as well because of the expected strengthening of the Euro creating a disadvantage versus the other market players.

Indeed, the EU exports are expected to expand in the short term since the EUR currency is assumed to have a weaker value against the USD currency, while in the long term the forecasts become less fortunate since the EUR currency is assumed to be stronger from the year 2014 and so on.

The accepted exchange rate developments soften long term commodity price expectations when they are expressed in EUR. The economic developments both in the EU and world create a noticeable danger and help the uncertainties increase about the outlook projections. To illustrate, if the Gross Domestic Product has descending position, this could result in less advantageous expectations for high value added dairy consumption and resulting in lower EU consumption and decreasing the demand for EU exports.

The current political conditions point to a bigger potential for milk production thanks to the ending of milk quota system by 2015. The growth in milk production is expected to increase starting from

2011 with a conservative rate (see graph 19). Aggregate production of milk in the EU is expected to stay below the plausible growth rate via phasing out of the quota regime.

Graph 19: Cow milk supply & dairy herd evolution, 2000-2020
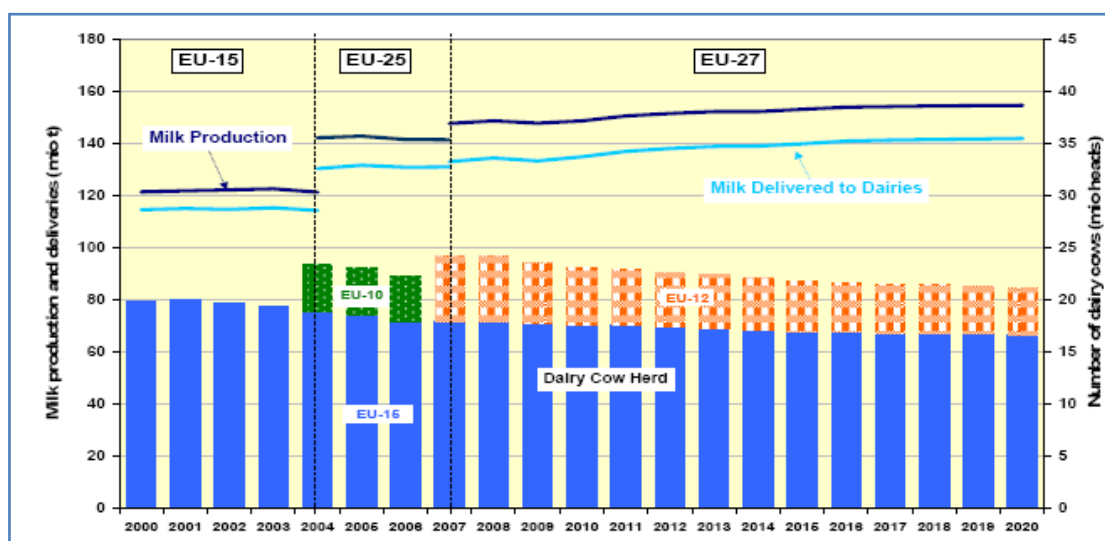
The milk production of EU is expected to reach 157.6 million t in 2020 (an increase of 7 % in comparison with 2009). Expected milk deliveries would account for 145 million t in 2020 and production for on-farm consumption would fall below 13 million t. Actually, the rise in the milk production is caused by the a steady increase in the average yield per dairy cow (which is expected to reach 7.400 kg by 2020, an aggregate growth of 18%).

Regarding higher value added dairy commodities (such as fresh dairy products and cheese), in the short term, consumer prices are expected at relatively high levels. Cheese consumption in the EU per capita is projected to reach 17.3 kg in 2020, going beyond the 2009 level by around 6 %. For the outlook from 2009 to 2020, the cheese output is expected to expand by nearly 10% on aggregate arriving 9.5 million t by 2020 (see graph 20).

Graph 20: Developments in cheese market, 2010-2020
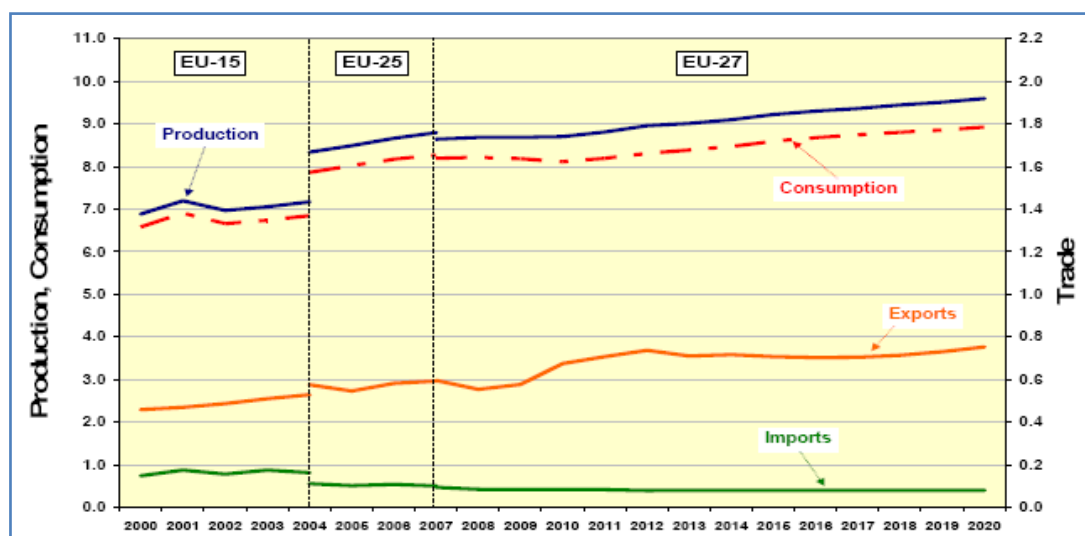
In the light of favourable expectations for both local and world market demands, significant amount of import from world markets is being expected leading EU export to be 727 thousand t in 2020. The potential demand is expected from the countries such as Japan, Russia and US. Europe is assumed to be losing its world market share slowly, nevertheless capturing an amount with 27 % of world exports in 2020.

The export expectations for skimmed milk powder (SMP) are less positive due to stronger EUR and effective supply from other exporter parts. The demand by EU is also expected as weak, so the price growth would be limited over the projection period. The pressure of supply in the market would be lessened by lowered EU production.

CHAPTER II: ROLE OF AGRICULTURE and FOOD INDUSTRY IN FRANCE, SPAIN and ITALY

In this section, the role of the primary sector and food industry in the economy of each country will be presented in terms of key indicators. The analysis will be carried out for France and Spain on a general scale, while for Italy a more detailed study will be presented.

Overview of Agriculture in France

According to the results of Agricultural Census 2010, the French Agriculture occupies more than half of the Territory National with a production of 66 billion Euros in 2010 getting a ranking of the first country in EU. It is the base as one of the first national industries, agro-business and new alternatives in the petrochemical industries. The challenges like the depletion of the fossil fuels, global warming places the agriculture in the heart of the economic and global environment for years to come. Agriculture today must meet its primary purpose which is to feed the population, probably more than 9 billion by 2050, but also new challenges in France and the borders of whole Europe. Since the last agricultural census in 2000, French agriculture was part of a process of professionalization and has adapted its practices to meet new sector issues and concerns of the French society (environment, health, quality of food, employment and planning. etc).

The French farmers seem to be more trained. According to 2010 results, more than one million male and female farmers regularly participate in agricultural activities. Since 2000, these professionals improved their status regardless of age or gender. The number of farmers reported with an increase from 26.800 to 37,500. This improvement has also led in particular to improve legal protections and social rights of the farmers who now represent 27% of these professionals.

French agriculture represents diversification: there are small and medium-sized farms often in forms of family businesses, and big companies in form of firms bring together a variety of agricultural operations. From 2000 to 2010, the operations have expanded. The average size of farms increased from 42 ha to 55 ha on average. The downward trend continued but with a slower pace: the number of the farms decreased by 26% in the period 2000-2010, while their number had decreased by 35% in the period of 1988 and 2000.

The first results of 2010 agricultural census data are based on general framework. The forecasted agriculture account for 2011 (estimated on 21 November 2011) will be evaluated within

the next section. According to the census results, in France 1,022,300 people regularly participated in farming activities in 2010 of which 52,300 are in the DOM[31].

The French Agriculture Account Forecasts for 2011

At the request of the European Commission, Eurostat published in December of each year an account of the branch Agriculture forecast for the entire EU. As each member state, France also established an account forecast. The establishment was made by monitoring agricultural statistics developed for a certain period of time, and by the existence of many agencies involved in the implementation of agricultural policy. The data in this section has been prepared on database and information available by November 21, 2011.[32]

In accordance with the provisional accounts of agriculture established in the year 2011, agriculture production subsidies increase in volume by 2.3% and value 5.6 %. In volume terms, growth in crop production (+3.0%) includes different situations: spring drought reduced production of grains and some fodder while later productions (corn, beets, potatoes, wines.etc) benefited from the summer rains. Prices are broadly stable (+3.0%) with fluctuations with a range between -2% and +3 %. However, barley and durum wheat show prices rose by 20% while prices of maize, potatoes and fruits and vegetables fall as a result of abundant supply.

Driven by the recovery of milk production, animal production increased by 1.4% by volumes, other productions are almost stable. Apart from eggs, prices of livestock increased significantly, for overall an increase of 8.5 % is reached.

In 2011, the value of intermediate consumption of agriculture sector increased by 10% after two years of decline. The price of energy, fertilizer and animal feeds obtained an increase of 8.7%. Their evolution is moderate in volume, with the exception of fertilizer consumption growing by 21%. Since the establishment in 2010 of the new CAP reform, the importance of subsidies on products is relatively limited. Operating subsidies, which are nearly 90% of direct aid to agriculture, decreased slightly in 2011.

According to the 2011 forecasts, given the rising price of expected GDP (+1.5%), net farm income per worker in real times decreased by almost 3% in 2011. This modest change followed three years of large scale fluctuations downward and a rising volatility related for sure. The indicator remains about 7% below the exceptional level reached in 2007. In trend, it stabilizes at a level comparable to 2004 or 1994. As always, all agricultural activities are not affected in the same so based on their respective developments and production inputs.

Some graphs of basic agricultural macro indicators were exhibited in the following parts.

[31] Overseas Departments (départements d'outre-mer)
[32] Source: "Le compte prèvisionnel de l'agriculture francaise pour 2011" (estimation on 21 November 2011)
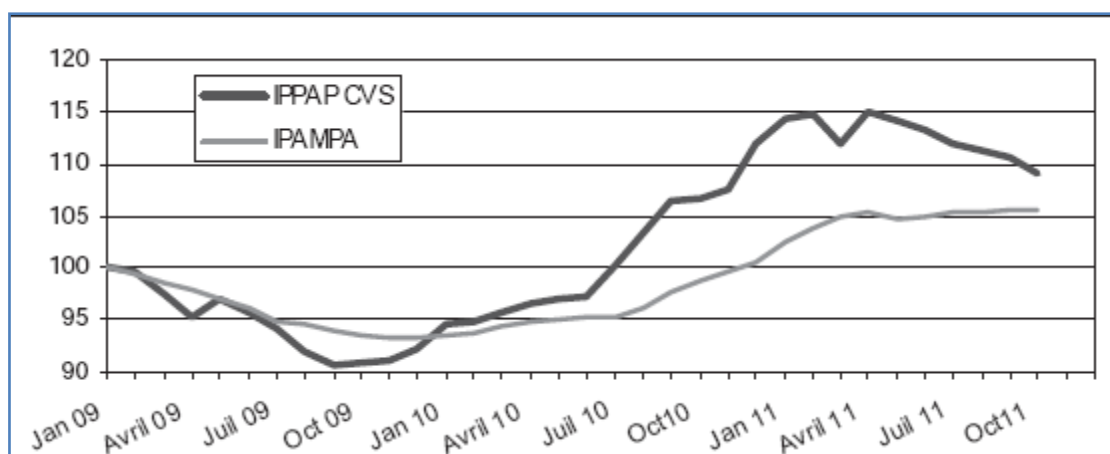
Graph 20: Price index of agricultural production (IPPAP) and total purchase prices of agricultural inputs (IPAMPA) (Monthly indices-January 2009=100), Source: INSEE
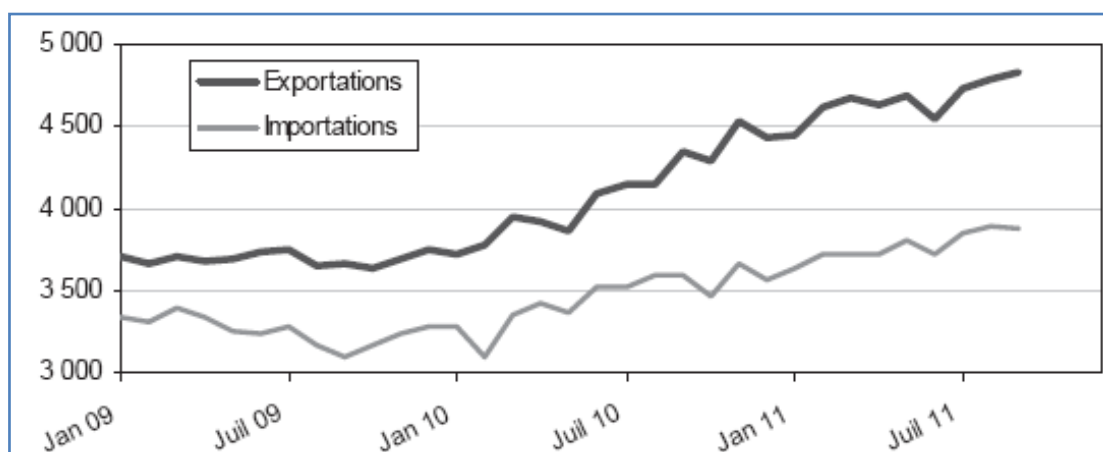
Price Index of agriculture production had a dip in October, 2009 followed by an upward trend until January, 2011 and once again in April, 2011 a decreasing trend started. On the other hand, prices of agricultural inputs' prices exhibited a decreasing trend from January 2009 to April 2010 followed by an increasing trend until April 2011. After April, the prices of inputs have had a tendency of remaining stable.

Graph 22: Consumer Price Index (IPC), all households. All products and foods, drinks and tobacco-IPC alim (Monthly Indices-January 2009=100), Source: INSEE
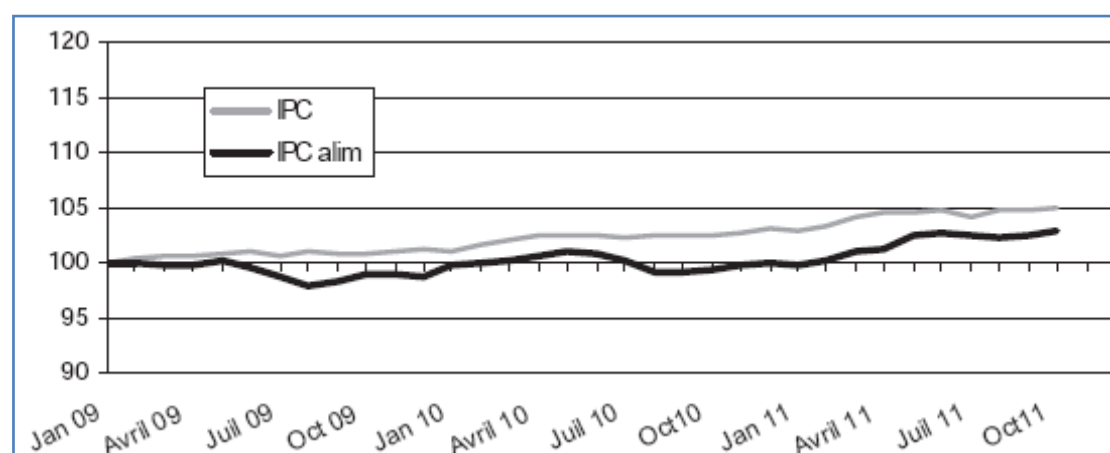
In the period of January 2009-October 2011, in terms of up and down movements the prices represent almost parallel path; only in October 2009 and in October 2010, the trends exhibit opposing directions.

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Graph 23: Foreign Trade of Agri-food Stuffs-Export FOB and Import CIF (in million Euros CVS-CJO) ,Source: "Le comptre prèvisionnel de l'agriculture francaise pour 2011"

In accordance with graph 23, between January 2009 and July 2011, France has been a net exporter of food exhibiting a constant increase trend.

Agri-food industry in France

The agri-food industry has a significant meaning in France and its contribution to the economy of France is quite important. Today France is one of the most considerably big producers in the world.

Taking into account the high standards of the products, the strategic position of the lands and innovation highly given importance by the government, the agri-food industry in France is quite competitive.

In 2010, the agri-food industry in France represented 143.6 billion Euros in terms of revenues having its first place among other industries moreover far from the automotive industry. The agri-food industry created an employment for 477.000 people being the second largest employer in France after the mechanical engineering sector.

There are 10.282 businesses which are Small and Medium Sized (SMEs) having less than 200 employee 73 % of which represent small businesses (having less than 20 people).[33] In 2009, the French agri-food industries transformed the 70% of the French agricultural production.

In terms of foreign trade, 36.1 billion Euros was the export revenues of France having its place as the 4th biggest exported of agricultural and agri-food products worldwide. The importance of wine business in France is accepted by all parts of the agriculture industry. The 2011 harvest is estimated around 50.2 million hectolitres, including 23.3 million of wine appellation, 14.5 million for wine with a protected geographical indication, 4 million for other wines and 8.4 million for other type of spirits. The expected export revenue for 2011 is 6.9 billion Euros.

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[33] Source:www.frenchfoodandbeverages.com

The agri-food business in France is facing some vital challenges taking into account the current economic and social conditions:

Environmental Issues: The issues regarding environment are having a global importance for both consumers and so for the producers. In this context, the Grenelle Environment Forum[34] (large consultation on environmental issues which took place in France in 2007) which made the agri-food industry involved helped to realize the ideal environmental targets.

Research and Development (R&D): In order to be able to remain competitive in the market, the investments done for food industry has significant meaning and supported by France as well (By tax credits and investment programs).

The relationship with retail sector: The impact of the big rise in the price of agriculture commodities and energy cannot be rejected; hence the industry should show support and flexibility to satisfy the retail requirements and by this way the consumer needs.

Nutrition: The French agribusiness industry gives big importance to this topic. There are two important programs called "French National Food Program" and the "National Health and Nutrition Program. According to those, an agreement was signed with the sector for promoting more physical activity and a better diet and meanwhile the search for new products with a better nutritional composition is being continuously run.

Quality: It is obvious that to produce and provide the market with the product having high quality standards is a major matter for the whole food industry.

Foreign Trade: Exportation is basic for a sector defined as dynamic. The majority of the businesses in food industry are medium-sized with a share of 97% and 80 % of them have never exported; so new support programs are conducted to help these SMEs be able to export their products.

Social relations and the training of employees: Even if having a strong innovation and good reputation is vital for the industry, in order to keep this to have qualified people are strongly required to develop the sector.

Relationship with the agricultural sector: Having the price of agricultural commodities as one of the major concerns for the sector, the market cannot be assumed as stable anymore, so businesses have to find a way to deal with this matter.

**Overview of Agriculture in Spain**

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[34] The aim of Environment Round Table, instigated by France president Sarkozy, is to define the key points of government policy on ecological and sustainable development issues for the coming five years, source: www.legrenelle-environnement.fr

With the population of 46,152,926 inhabitants (Source: Eurostat, by 2011) and an area of 505,365 km^2 Spain takes an important place in agricultural activities. In 2010, the agriculture, hunting and fishing accounted for 2.7% of total GVA representing 1.7% in the EU-27. The agriculture sector also accounted for 3.8% of the total employment. The exportation of agricultural goods reached 27.4 billion Euros and the import activities reached 21.5 billion Euros by 2010.

Agricultural income (indicator A)[35] in 2011 registered a decrease of 0.4% compared to 2010, while this indicator registered an increase of 8.4% compared to 2009. By June 2009, the total farm labour force (persons) accounted for 2,125,270 while in terms of annual working units (AWU: is equivalent to a worker employed on a full time basis for one year) it reached 967,690 AWUs. According to FAOSTAT, the gender in agriculture is illustrated in graph 24. Accordingly, sector's labour force is dominated by males (62.15%).

Graph 24: Gender in agricultural Labour Force-2011, Source: FAOSTAT
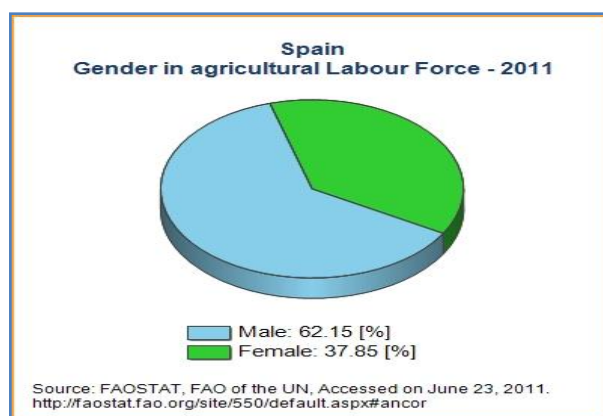
As illustrated in the graph 24, the evolution of agricultural income compared to wages and salaries in exhibits even there is an intersection in 2007 of all sectors, from 2007 to 2008 there was a fall in the agricultural income (indicator A), then remaining always below other sectors, in 2008 a modest rise was recorded continuing in 2010 followed again by a fall towards 2011. The wages and salaries index in the sector of construction is above the index of industry, services and agricultural income between 2007 and 2010.

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[35] The so-called indicator A is the real net value added at factor cost of agriculture per annual work unit (AWU). The net value added at factor cost (factor income) is calculated by subtracting the consumption of fixed capital from gross value added at basic prices and adding the value of subsidies less taxes.

Graph 24: Evolution of agricultural income compared to wages and salaries in other sectors of Spanish Economy
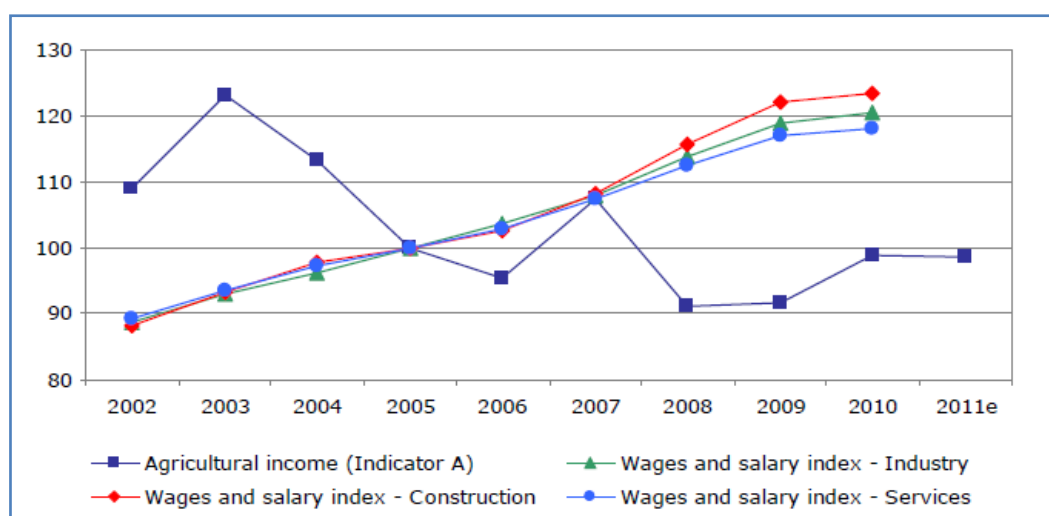
In terms of foreign trade, Spain's exports are mainly carried out to the EU-15 countries as well as imports of the country. Foreign trade balance has tendency to increase starting from 2009 while balance with the EU-12 is more stable.

Graph 25: Foreign Trade of agricultural products
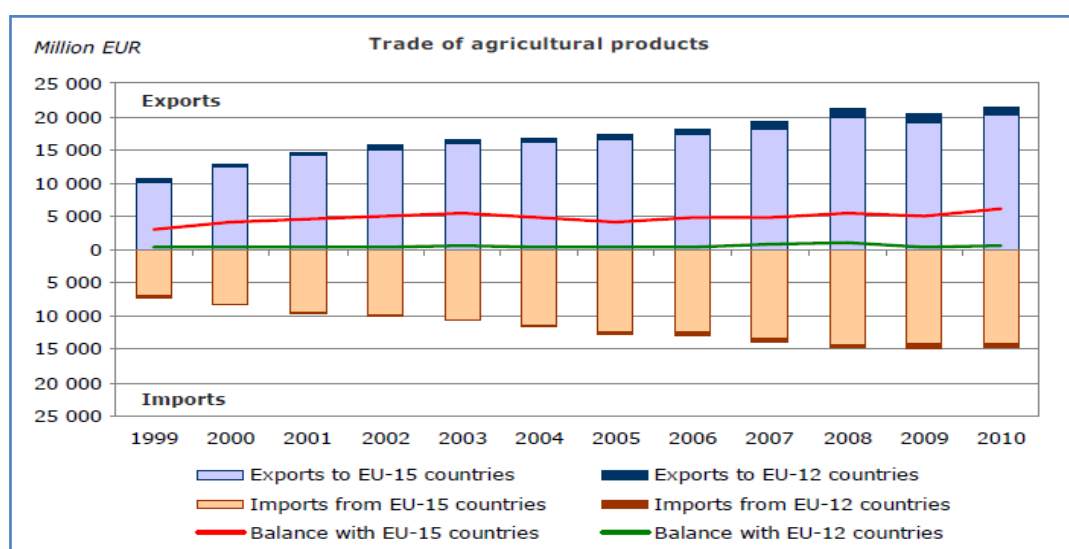
Agri-Food Industry in Spain

According to the figures released by Spanish Federation of Food and Beverage Industries, in 2010 with more than 30,000 companies and half million of employees, the food and drink industry became the first industrial sector of the Spanish economy with an export value of 16 million Euros by fostering the R&D operations.[36]

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[36]Source: " Industria de Alimentaciòn Y Bebidas, Sector estrategico para Espana, FIAB federaciòn Espanola de Industrias de la Alimentacion y Bebidas."

Today, by size, by production scale, exportation strength and its strategic value, the food sector seems as one of the main economic locomotive sectors for Spain. It is also evaluated as a strong industry. The food and drink industry in Spain attracts also foreign investors as 706 million Euros (equals to 41% of the foreign investments in the country) of foreign investments were carried out. There are 30.261 businesses in the sector 96% of which are composed of SMEs. As foreign investments in Spain, the Spanish companies also invested abroad with a value of 642 million Euros which accounts for 49% of the Spanish investments abroad (and this value is five times as much as the value realized in 2009).

The food drink industry created employment opportunities for 445.475 people becoming the second biggest sector in 2010 (5.63%) rising from 6th biggest sector in terms of ranking in 2009 according to Report "Infoempleo 2010".

The distribution of the employees' profile of the sector is as in graph 26:

Graph 26: Distribution of employees in F&D Sector in Spain
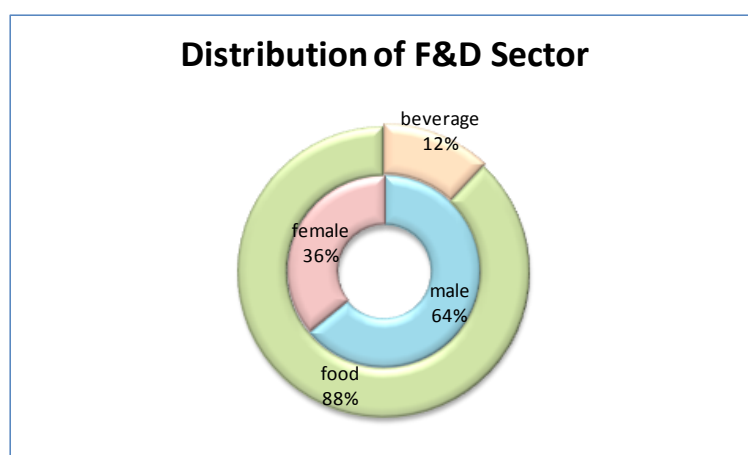
Spanish food and drink sector is mainly dependant on the food sector since it occupies 88% of the (while 12% belongs to drinks). 64% of the total employees working in the sector are composed of males.

The distribution of Spanish food and beverage companies in 2010 can be analyzed in the graph 27. According to that, the "other food" sub-sector occupies the major share without giving the content of the subsector, and then it is followed by beverages with a share of 17% and in the third place comes meat reaching a share of 14%.

Sub-sectors of food and beverage companies
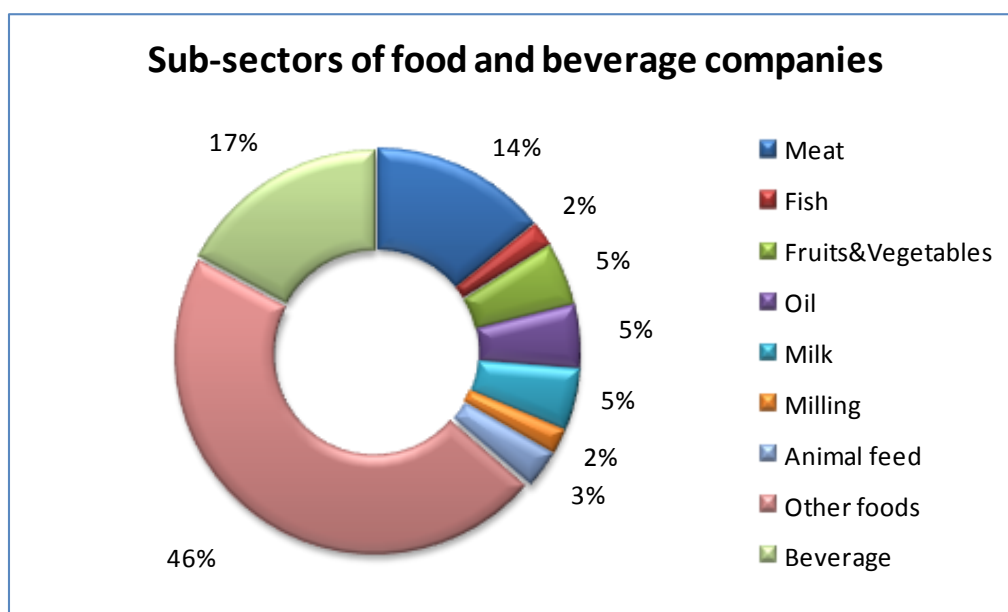
The research and development operations have a crucial meaning for the food and drink industry in Spain. The percentage of the innovative firms became higher than that of total economy. From 2003 to 2009 the number of the firms invested in R&D operations multiplied by four. Promoting innovation and technologies projects led by mostly the industrial sector was one of the main roles of FIAB in 2010.[37] The federation participated in several projects both on regional and national scale, within the National Programme between 2008 and 2012 and Europeans through the Seventh Framework Programme for research and development, as well as other programs such as Eco-innovation and Interrag- SUDOE. In order to promote and lead the work of European technology Platform Food for Life Food for Life Spain, promoting cooperation between enterprises, associations, technology centres and universities were also committed in 2010. Food for life-Spain carries out its work via eight working groups: Training and Technology Transfer; Food and Health; Quality, Manufacturing and Sustainability; Food and Consumer; Food Safety and Food Chain Management and two newly formed work groups: Meat Sector and Horeca[38] sector. The working groups have been meeting regularly to work around the interests of constituents to mobilize all stakeholders in the food sector (academic environment and associations, users, consumers.etc) and supporting the projects the projects originating within the same objective. Thus, in 2010, 35 research projects worth over 83 million Euros were promoted, along with those promoted in 2009, a total of 70 projects worth 160 million Euros were reached.

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[37] Source: FIAB-Annual Report of Activities, 2010.
[38] It is the abbreviation of the words "Hotel, Restaurant and Café" and used as term for the establishments in the food and drink industry.

Overview of Agriculture in Italy

According to the 24th edition of "Italian Agriculture in Figures-2011" edited by the National Institute of Agricultural Economics (INEA), the year 2010 showed some modest improvements in main economic indicators of Italian agri-food sector, nevertheless the report and states that the indicators are not likely to look at the future with a great optimism. In the light of 6th General Census of Agriculture, this fact is underlined that the farms in Italy shrank by 32.2%; however the average size has increased from 5.5 hectares to 7.9 hectares UAA per holding; and the number of farms with less than one hectare of UAA has fallen by half. In 2010, the themes of production of renewable energy obtained from non-traditional energy sources; didactic educational activities specifically intended for children at school age; non economic but social benefits of agriculture such as being conservation and transmission of cultural heritage; protection of Italian forests were in the agenda of Italy in the recent year.

The General Overview

The land area of Italy amounts to 301,336 km^2 and 60,626,442 inhabitants; and an important part of the country land (54.3%) is covered by mountains. With an average density of 200 inhabitants per km^2, Italy is among the most densely populated countries of the EU. The total agricultural area in Italy amounted to 17.8 million hectares, of which 12.7 million are utilized agricultural area (UAA). The distribution of utilized agricultural area among the regions is: Southern Italy amounts to 45.7%, North and Central Italy amount to 36% and 18.3%, respectively.

	Italy	EU 27
Total area	30,132	432,525
Utilised Agricultural Area	12,744	172,485
Arable crops	6,939	104,341
Cereals (%)	56.5	55.7
Dried legumes (%)	1.6	1.3
Potatoes, sugar beets and hoed fodder crops (%)	1.7	3.9
Industrial crops (%)	3.3	10.7
Fresh vegetables, melons and strawberries (%)	3.3	1.7
Flowers and ornamentals (%)	0.2	0.1
Total fodder crops (%)	25.9	18.0
Non-subsidised fallow land (%)	3.8	3.6
Permanent crops	2,323	10,963
Grapevines (%)	32.8	31.1
Olive trees (%)	43.9	39.9
Fruit-bearing plants and other crops (%)	23.4	28.9
Market gardens	30	390
Permanent grasslands and pastures	3,452	56,791
Wooded land	3,814	30,980
Set-asides and subsidised areas - total	423	8,157
Urbanised areas and other land	1,284	11,931

Source: Eurostat.

Gross Domestic Product (GDP)

The general situation of economic developments occurred in 2010 in comparison to 2009 had various results in the different parts of the world. While the advanced economies recorded a level of growth rather smaller, emerging countries in particular Asian, instead drove the global recovery. In the period 2008-2009, the Europe area had a strong fall followed by a positive economic growth at the end of 2009 and finally in 2010 a modest increase. Italy has shown the highest fall in GDP together with Germany, however the latter on the contrary showing a small recovery by 1.3%.

Trend in GDP in some major areas and countries (% change over previous year in real terms)

Country	% of World GDP	2006	2007	2008	2009	2010
Industrialised countries						
United States	19.7	2.7	1.9	0.4	-2.6	2.9
Japan	5.8	2.0	2.4	-1.2	-6.3	4.0
Euro zone	14.6	3.1	2.9	0.4	-4.1	1.8
United Kingdom	2.9	2.8	2.7	-0.1	-4.9	1.3
Canada	1.8	2.8	2.2	0.5	-2.5	3.1
Emerging and developing countries						
Brazil	2.9	4.0	6.0	5.2	-0.6	7.5
China	13.6	12.7	14.2	9.6	9.2	10.3
India	5.4	9.7	9.9	6.2	6.8	10.4
Russia	3.0	8.2	8.5	5.2	-7.8	4.0
Turkey	1.3	6.9	4.7	0.7	-4.8	8.9
Sub-Saharan Africa	2.4	6.4	7.2	5.6	2.8	5.0
Middle East and North Africa	5.0	5.8	6.2	5.1	1.8	3.8

Source: Bank of Italy.

Value Added in the Sector

In 2010, the impact of agriculture, forestry and fishing on the country base value added remained stable placing at 1.9% with an increase of 1% with respect to 2009. In terms of local areas in Italy, the value added increase levels in North-East, South, North-West and Centre are respectively, 1.5%, 1.4%, 0.9% and (-) 0.5%. The industrial sector presented a recovery relatively significant than the other sectors with a rise of 4.8% as well as the trend in the food industry with 1.5% and the service sector with 1.1% and particularly the sector "trade, transport and communications" with an increment of 2.7%. The share of value added from Italian agriculture in 2010 is 1.9 % where the ratio of the EU-27 value added agriculture to total of all sectors is 1.7% indicating Italy was in line with most of the Member States.

Value added at basic prices

26.370

351.197

■ Agriculture, forestry and fishing

■ Industry including building

■ Services including the public sector

1.009.375
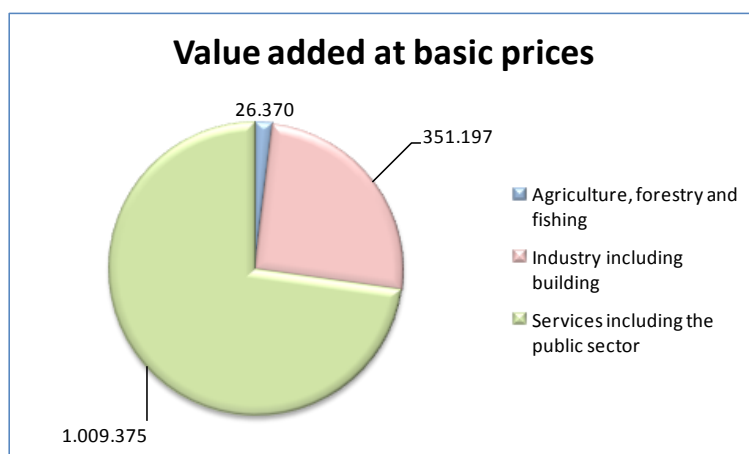
Table 7: Share of value added in agriculture to total of all sectors, 2010

% share of value added* in agriculture to total of all sectors, 2010

Country	Value added
Slovak Republic	3.8
Estonia	3.5
Greece	3.3
Finland	2.9
Spain	2.7
Portugal	2.4
Slovenia	2.4
Cyprus	2.3
Netherlands	1.9
Malta	1.9
Italy	1.9
France	1.7
Austria	1.5
Ireland	1.0
Germany	0.9
Belgium	0.7
Luxembourg	0.3
Euro zone 17	1.7
EU 27	1.7

The Employment in the Sector

In the year 2010, the total number of the people employed, expressed in AWU was 0.7% less than 2009. The decline has especially had an impact on the industrial sector (a fall by 3.5%) and construction (a decline by 1%) whereas; the agricultural sector exhibited a growth by 1.6 %. The number of employees in the sector reaches 891,000 units (The women occupied 28.7% of this

figure). 38.9% of total agricultural employed persons belonged to North, 14.3% belonged to Central Italy and 46.8% belonged to South. In spite of the decline in 2009 (by 2%) in 2010 the there was a rise by 1.9%. Self-employed in agriculture accounts for 8% of the independent labour overall, on the other hand the share of salaried agricultural labour accounts for 2.5% of the corresponding total.

Graph 29: Total work units

Total work units ('000), 2010

- Agriculture, forestry and fishing : 1,281
- Industry in the narrow sense: 4,378
- Building : 1,934
- Services : 16,454
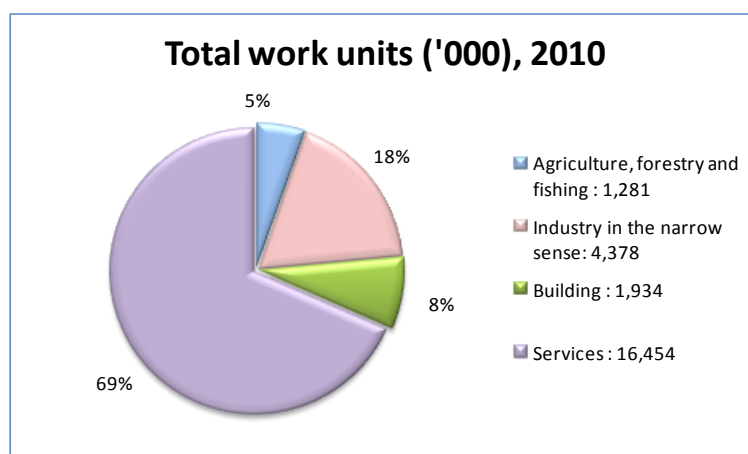
Table 8: Share of employed in agriculture to total employed (%), 2010

	Total	Women[1]
Austria	5.2	5.0
Finland	4.4	2.8
France	2.9	1.8
Germany	1.6	1.2
Greece	12.5	12.7
Italy	3.8	2.8
Netherlands	3.1	1.9
Poland	12.9	12.5
United Kingdom	1.2	0.6
Spain	4.3	2.5
Sweden	2.1	0.9
Hungary	4.5	2.3
Romania	30.1	31.4
Bulgaria[2]	6.8	5.2
EU 27	5.2	4.3

Productivity of the Sector in Italy

According to the definition of productivity of labour by ISTAT, "productivity" is the ratio of the volume index of value added to the volume index of labour inputs, in terms of work hours.[39]

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[39] Source: Report "Italian Agriculture in Figures 2010", INEA

The results of 2010 indicate that there was a recovery in production while there was a reduction of labour even more limited than that of 2009 until early phases of 2011; the phenomenon has exhibited an early sign of reversal. The labour productivity recovered slightly by 2% having various results at the sectoral level. There was an improvement in agriculture with a modest increase of 0.5% compared to 2009. There was an increase in productivity of industry by 7.2%; trade, transport and communication by 3.3% ; food industry by 5% while the industries such as construction and financial services recorded declines in productivity as respectively by 2.3% and 0.8%.

Production Results

The Italian agricultural production in 2010 remained invariable in terms of quantitative amounts (0.2%) compared to previous year with a price increase of 1.8%. As a result, the value of agricultural production, forestry and fishing at base prices increased by 2% reaching 48.8 billion Euros. In 2010, confirming the contribution of various sectors to the composition of the total value of agricultural production with crops that together account for 51% and livestock accounting for circa 30%. When the details of each sector analyzed, it is observed that the value of crop production increased by 3% with respect to 2009, with positive results for woody crops (4.2%). A modest fall in the value of livestock production (-0.4%) with different dynamics between the beef sector (1.1%), that of milk, stable, and that of other livestock products, especially honey (26.3%). There was an increase in related services, contractors and maintenance (2.4%) and secondary activities (5%) like farm stays and processing. Within this division of production of green plant, herbaceous crops slowed down by 0.2% following the decline in potatoes and vegetables by 1.3% and a rise contrast in cereals by 2.2%, legumes by 9.6% and industrial plants by 1.3%.

Table 9: Value of output and services at basic prices by main category, 2010

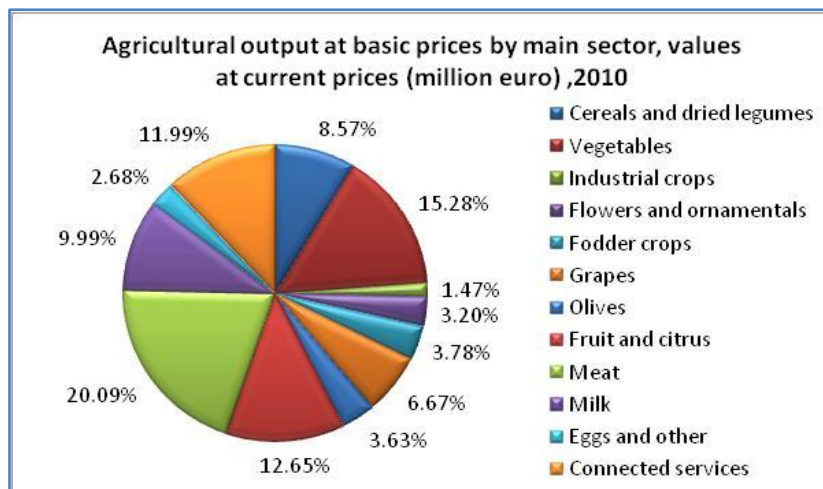| Value of output and services at basic prices by main category, 2010	Italy		Var. % 2010/09	
	million euro	%	volume	prices
Field crops	12,971	26.5	-0.2	1.8
Tree crops	10,439	21.4	0.0	4.1
Fodder crops	1,717	3.5	1.3	2.4
Livestock	14,890	30.5	0.2	-0.7
Connected services[1]	5,449	11.2	0.6	1.7
Secondary activities[2]	1,565	3.2	1.5	3.5
Forestry	477	1.0	1.4	1.6
Fishing	2,247	4.6	2.6	6.5
Total[3]	48,855	100.0	0.2	1.8

The fall in horticultural crops had an impact on potatoes by 10.1%, as well as sweet peppers falling by 10%, carrots by 7.4% and strawberries by 5.4%. The result has been steady throughout the tree crops sector although a significant decrease production has damaged the fruits and other wood crops (-2.3%). Some negative records were recorded for apples (-4.4%), pears (-3.0%), peaches (-3.5%), nuts (-19.8%), kiwi (-4.1%), wine grapes and dessert grapes (-0-2%) while a sharp recovery in olive oil was observed by an increase of 6.7% after reverse results in the previous year. The value of the production of the entire three crops sector increased with respect to 2009 due to the increase in the prices by 4.1%. There has been a modest recovery in the livestock sector in the meat category as a whole (0.3%): there was a significant decrease in the quantities of sheep and goat meat products by 3.9%, however offset by a positive result in the production of poultry meat by 5.4%. Milk production decreased by 0.3% compared to 2009, while production of eggs increased by both volume and value (1.4%) and honey recorded an increase of 9.9%.

Table 10: Main livestock output, 2010

Main livestock output, 2010

	Volume[1]		Value[2]	
	000 t	var. % 2010/09	million euro	var. % 2010/09
Beef	1,409	-1.8	3,199	-1.5
Pigmeat	2,058	-1.1	2,459	-1.9
Sheepmeat and goatmeat	68	-3.9	215	-5.8
Poultry	1,645	5.4	2,229	2.3
Cow's milk and buffalo milk	11,200	-0.2	4,040	1.6
Sheep and goat milk	598	-0.8	501	-11.7
Eggs	1,343	1.4	1,169	2.8
Honey	12	9.9	36	26.3

[1] Live weight.
[2] At basic prices.

Agricultural output at basic prices by main sector, values at current prices (million euro), 2010

8.57%
15.28%
11.99%
2.68%
9.99%
1.47%
3.20%
3.78%
20.09%
6.67%
3.63%
12.65%

- Cereals and dried legumes
- Vegetables
- Industrial crops
- Flowers and ornamentals
- Fodder crops
- Grapes
- Olives
- Fruit and citrus
- Meat
- Milk
- Eggs and other
- Connected services

The production of forestry and fishing sector also increased by 1.4% and 1.6%, respectively. In the latter sector also a significant price increase was recorded (+6.5%), because of the cost of diesel fuel which has raised the cost production by about 7%.

Main vegetable output, 2010

	Volume		Value[1]	
	000 q	var. % 2010/09	million euro	var. % 2010/09
Wine[2] ('000 hl)	19,112	-0.73	1,803,256	-3.81
Hybrid maize	84,362	3.60	1,434,154	32.42
Olive oil[2]	5,016	7.25	1,398,428	7.04
Tomatoes	66,402	-3.46	909,939	-12.11
Durum wheat	38,243	6.07	863,929	-6.25
Oranges	24,799	2.43	778,937	-1.16
Apples	22,232	-4.41	762,780	-1.25
Potatoes	15,952	-10.07	682,614	-0.70
Sold wine grapes	34,892	-3.31	635,034	-0.24
Dessert grapes	14,030	5.05	584,069	28.37
Pears	8,457	-3.05	566,873	33.80
Soft wheat	29,526	0.80	532,354	23.89
Lettuce	5,088	1.82	493,155	3.03
Artichokes	4,800	-1.34	455,808	-18.33
Rice	15,164	-6.42	409,364	-21.44
Peaches	10,301	-3.47	356,106	8.03
Courgettes	4,926	-3.28	347,763	-5.77
Lemons	5,198	-4.54	324,043	5.39
Strawberries	1,488	-5.40	290,061	-0.27
Fresh beans	1,865	-3.02	286,742	18.65

[1] At basic prices.
[2] According to SEC95 methodology, agricultural output includes wine and olive oil produced from the farm's own grapes and olives, excluding those produced by coops and the food industry.

Table 11: Main vegetable output, 2010

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[40] Dried legumes account for 86.8 million Euro. Vegetables include potatoes (682 million euro) and fresh beans (286 million euro). Industrial crops include sugar beets (147 million euro), tobacco (278 million euro), sunflowers (64 million euro) and soya (148 million euro). "Eggs and other" item includes honey (36.million euro).

At community level, the agricultural year 2010 was characterized by a downturn in production volume by 1% while an important increase in prices by 8%. The decrease in the production belonged to potatoes by 7%, cereals by 6%, tree crops by 5% and wine by 5%. The year exhibited a successful result for the production of olive oil with 19% where for livestock production an increase of 1% was recorded together with the good results for poultry and pig meat whose production increased by 3% and 2%, respectively. Milk production remained unchanged in comparison to 2009.

Table 12:Agricultural output at basic prices, (2010)

Agricultural output at basic prices and intermediate consumption in EU countries (% of EU total), 2010	Output	Intermediate consumption	Share of intermediate consumption to output (%)	
Austria	1.8	1.8	Austria	59.5
Belgium	2.2	2.4	Belgium	66.2
Cyprus	0.2	0.2	Cyprus	54.3
Estonia	0.2	0.2	Estonia	62.9
Finland	1.1	1.3	Finland	70.4
France	18.6	18.6	France	59.7
Germany	12.7	14.2	Germany	66.8
Greece	2.9	2.2	Greece	45.7
Ireland	1.6	1.9	Ireland	72.9
Italy	12.5	10.1	Italy	48.1
Luxembourg	0.1	0.1	Luxembourg	68.1
Malta	0.0	0.0	Malta	52.5
Netherlands	7.0	7.5	Netherlands	63.8
Portugal	2.0	2.3	Portugal	70.1
Slovak Republic	0.5	0.7	Slovak Republic	80.2
Slovenia	0.3	0.3	Slovenia	63.2
Spain	11.0	8.0	Spain	43.6
			EU	60.0
Euro zone (million euro)	264,190	151,854	Euro zone	57.0
EU (million euro)	354,558	211,752		

Agricultural Income

The composition of the value of agricultural production, including production subsidies and indirect taxes in 2010 presented a share of intermediate consumption (seeds, fertilizers, feedingstuffs, energy, services.etc) reached 43.1%. Income from dependant labour reached 18.35; remuneration for independent labour (farmers, entrepreneurs, and family members et al.), capital and business accounted for 28.4% of production value after depreciation. Grants and subsidies allocated by the state and the EU accounted for 8.6% compared with 11.5% in 2009.

At the EU level, according to Eurostat estimates, the real income per work unit increased by 12.3% on average in the EU-27 indicating a recovery after the severe crisis of recent years. The increase in 2010 compared 2009, was significant for Denmark (56.5%), Estonia (46.2%) the Netherlands (38.9%), and France (34.3%). However, there were declines observed in the countries such as United Kingdom (-6.4%), Romania (-3.6%), Greece (-3.5%) and Italy by - 2.8%.

Value of agricultural production,2010

Income from independant labour,capital and business 14.799 28%

Intermediate consumption 22.845 43%

Income from dependant labour 9.557 18%

Subsidies 4.473 9%

Indirect taxation on products and production 853.00 2%

- Intermediate consumption
- Indirect taxation on products and production
- Subsidies
- Income from dependant labour
- Income from independant labour,capital and business

Farm Structure in Italy

Farms

According to 6th General Agriculture Census, in comparison with 2000, the number or crop and livestock farms declined by 32.2%. There has been a much more drop in total farm surface by 8% and Utilised Agricultural Area-UAA (2.3%). The number of active farms is 1,630,420, managing nearly 13 million ha of agricultural land. Average UAA per farm is 7.9 ha recording a rise of 44.4% in comparison with 2000. TAA for farms has also risen on avarege, from 7.8 to 10.6 ha. The most significant increases were seen in Sicily,Sardinia and Lazio.

Smaller and medium-sized farms (less than 2 ha of UAA) account for 50.1% of the total,even if recorded a decrease of 43.7%. However it still has had only 5.7 of total UAA. On the other hand, farms with over 30 ha increased both in number and size from 3% in 2000, to 5.3% in 2010 (54.1% of UAA).

Crops

The share of arable crops kept having dominant share and occupying 54% of UAA; followed by permenant grasslands and pastures (26.9%) and wood (18.4%).

The wood crops are grown on 70 % of farms surveyed, concentrated in mostly south regions; such as Puglia (521,000 ha). In the last decade, on national scale, the total area dedicated to wood crops has declined by 3%. Emilia-Romagna, Lombardia, Sicily and Puglia are the regions where 41% of natioanal area planted to arable crops. There has been a decline by 3.7% since 2000 in total land planted to arable crops nationwide.

Livestock

In 2010, there were 209,996 active livestock farms (almost 13% of total farms).The share of livestock sector to agriculture varies among the regions of Italy: 48.3% in Alto Adige, 40% in Lombardy, 38.6%

in Valle d'Aosta where with lower values in south such as 2.2% in Puglia, 6.8% in Sicily, 7.2% in Calabria.

Farms which raise cattle continue to dominate accounting for 59.2% of total livestock farms. Over half of cattle farms are in the North (50.2%), in particular, in Lombardia,Veneto and Piedmont having 70.4% if the nation's cattle.

Sheep and goat production have a concentration in South and Islands, 43% of the national total. 85% of the national pigs are raised in Lombardia, Emilia-Romagna, Piedmont and Veneto. In terms of poultry production, head of poulty captures 58.1 million in Veneto, 34.9 million in Emilia-Romagna and 27.2 million in Lombardia.

Food Industry in Italy

The food industry (including drinks and tobacco) had 58,000 enterprises in 2009 (a decline by 4.2% from 2008). In 2010, the employmen reached 441,000 work units (having a 10.1% share of employment in industry as a whole). 77% of value added at basic prices was concentrated in the Centre-North.

In year 2010, prodcution in the food and drinks industry showed a growth of around 2%, still remaining below the increase in industrial sector (+6.5%). Value added increased in volume (+1.6%) in comparison to 2009, but fell in monetary terms (-3.5%).

In comparison with 2009, production levels increased for different sectors, particularly, oils and fats (+11.9%), sweets (+4.9%), milk and dairy (+3.1%), sugar (+3%), bread and bakery products (+2.5%) and finally wine (+2.4%). There was also an increase in feedingstuffs (+3.7%). In several groups production dropped such as spices (-5.1%), fizzy drinks (-2.6%), meat processing (-1.1%) and processed fruits&vegetables (-0.9%).

Changes in volume of food industry production by category (%)	
	Var. 2010/09
Milling[1]	2.2
Bread and fresh pastries	2.5
Biscuits	2.0
Pasta	-0.7
Processing of fruit and vegetables[2]	-0.9
Vegetable and animal oils and fats	11.9
Slaughter and processing of meat	-1.1
Processed fish products	2.3
Milk and dairy products[3]	3.1
Sugar production	3.0
Confectionery	4.9
Condiments and spices	-5.1
Wine[4]	2.4
Beer	0.1
Mineral water and soft drinks	-2.6
Animal feed	3.7
Total	2.0

Foreign Trade

In year 2010, exports grew by 11.5% and imports by 12% resulting a negative trade balance which remained unchanged in comparison with 2009. The share of the agrifood sector in 2010 was slightly lower compared to Italy's total trade: agrifood exporter's share decreased by 0.3% while imports were down by 1%.

Table 14: Agri-industrial balance

The agri-industrial balance and the agri-industrial system*		2000	2009	2010
MACROECONOMIC AGGREGATES				
Total agri-industrial output[1]	(O)	67,899	73,782	75,224
Imports	(I)	25,358	31,640	35,408
Exports	(E)	16,867	25,166	28,087
Balance	(E-I)	-8,491	-7,344	-7,321
Volume of trade[2]	(E+I)	42,225	56,806	63,495
Apparent consumption[3]	(C=O+I-E)	76,390	80,256	82,545
INDICATORS (%)				
Degree of self-sufficiency[4]	(O/C)	88.9	91.9	91.1
Propensity to import[5]	(I/C)	33.2	39.4	42.9
Propensity to export[6]	(E/O)	24.8	34.1	37.3
Degree of trade cover[7]	(E/I)	66.5	79.5	79.3

* Million euro at current value; figures for output and trade include "cured tobacco".
[1] Total output from agriculture, forestry and fishing plus VA from the food industry at basic prices.
[2] Sum of exports and imports.
[3] Agri-industrial output plus imports minus exports.
[4] Output-consumption ratio.
[5] Imports-consumption ratio.
[6] Exports-output ratio.
[7] Exports-imports ratio.

A significant share of Italian agrifood exports targeted EU-27 countries (70%) exactly like previous year. 10% were sent to North America (mainly the U.S.) and 7% were destined for non Mediterranean European countries. In terms of imports, 71% of agrifood was purchased from the EU-27, 8% from South America (mostly Argentina) and 7% from Asian (non-Mediterranean) countries.

Graph 32: Destinations and Sources for Italian agri-food trade

Destination for Italy's agrifood exports (million Euro), 2010

- EU-27 : 19,586
- Other European countries (Non Med.) : 2,000
- Non-EU Mediterranean countries : 721
- North America : 2,824
- Central and South America : 345
- Asia (non-Mediterranean) : 1,528
- Other : 1,083

4% 5% 1% 10% 3% 7% 70%

Supplier of italy's agrifood imports (million Euro), 2010

- EU-27 : 25,297
- Other European countries (Non Med.) : 946
- Non-EU Mediterranean countries : 786
- North America : 955
- South America : 2,796
- Asia (non-Mediterranean) : 2,478
- Other : 2,150

6% 7% 8% 3% 2% 3% 71%

CHAPTER III: CREDIT RATINGS MODELS

Definition of Credit Rating

In spite of criticism on a global scale, credit ratings remain the most common and widely used measure of corporate credit quality. The definition of "Credit Rating" has been made by many authorities; institutes, academicians, rating agencies, finance companies.etc. Traditionally, credit ratings are thought to provide information regarding the likelihood of default and other forms of company failure. They are a forward looking assessment of creditworthiness of companies usually based on an established methodologies or criteria using public or non public information.

The mutual feature of all of the definitions is that rating is an opinion. Standard & Poor's (S&P) defines credit ratings as "credit ratings are forward-looking opinions about credit risk. S&P credit ratings express the agency's opinion about the ability and willingness of an issuer, such as corporation or state or city of government, to meet its financial obligations in full and on time"[41]. Fitch Ratings states "Ratings assigned by Fitch are opinions based on established criteria and methodologies that Fitch is continuously evaluating and updating. Fitch's opinions are forward looking and include analysts' views of future performance."[42]

Accordingly, the fundamental aspects of "Credit Rating" can be listed as;

- It is an opinion;
- It is an assessment of one company, state or government or even individual debt issue's financial strength for meeting financial obligations complete (paying principal and interest) and on time;
- They are predictive and have advanced views since they state the likelihood that the evaluated part will go bankrupt ;
- Usually the parties which assess the ratings (e.g. rating agencies, financial institutions.etc) utilize their own methodology to measure the creditworthiness and use a rating scale to declare its rating evaluation and mostly it is expressed in letters such as "AAA to D".

Credit ratings are used in portfolio allocation decisions; especially by pension funds, banks and insurance companies (Hilscher and Wilson, 2010) as investment screens and in order to allocate regulatory capital. Credit ratings are also used by central banks as proxies for the quality of

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[41]Source: http://www.standardandpoors.com/ratings/definitions-and-faqs/en/us
[42] Source: "Fitch Ratings definitions and scales"

collateral. Even executives in the companies evaluate corporate policies partly on the basis of how their credit rating may be affected.

Overview of Various Credit Rating Models

Due to recent financial crisis across different continents there have been many cases such as bank failures and important credit problems, the importance of measuring credit risk was underlined, accordingly many financial institutions had to decide on the most appropriate model for the various needs.[43] There are various credit rating models; external ratings services like Standard & Poor's, Fitch and Moody's, models based on financial statement analysis (like Altman Z score, Moody's Risk Calc), models measuring default probability (as Structural Models), Machine Learning Models (such as Maximum expected Utility). In the following parts, the basic features of the mentioned models will be explained.

External Rating Services

Agency ratings are opinions based on extensive human analysis of both the quantitative and qualitative performance of a company. Companies with agency-rated debt tend to be large and publicly traded.[44] The most well-known three rating agencies are known as Standard & Poor's, Moody's and Fitch Ratings. The ratings measure the creditworthiness of the entities, taking into account the factors as environmental conditions, competitive position, management quality and financial strength of the business. The comparison of rating scales of the mentioned rating agencies are shown in the following table:

S&P	AAA	AA+	AA	AA-	A+	A-	BBB+	BBB	BBB-	BB+	BB-	B+	B-	CCC+	CCC-	CC	C	D
MOODY'S	Aaa	Aa1	Aa2	Aa3	A1	A3	Baa1	Baa2	Baa3	Ba1	Ba3	B1	B3	Caa1	Caa3	Ca	C	
FITCH	AAA	AA+	AA	AA-	A+	A-	BBB+	BBB	BBB-	BB+	BB-	B+	B-	CCC+	CCC-	CC	C	D

Table 15: Long-term Rating Scales Comparison, Source: Bank for International Settlements website

This comparison becomes significant when loan portfolios are composed of entities with ratings from various rating agencies.

Financial Statement Analysis Models

These models provide a rating based on the analysis of financial statement items and ratios of individual borrowers. The examples for this type of models are Altman's Z-Score and Moody's RiskCalc.

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[43] Allen and Powell, "Credit Risk Measurement Methodologies",2011
[44] "Risk Calc for Private Companies", Moody's Investor Service, May 2000

Altman Z- Score

Edward Altman developed a model using financial statement ratios and multiple discriminant analyses to predict bankruptcy for publicly traded manufacturing corporate. The advantage of discriminant analysis is to be able to use many characteristics that can be combined into a single score. The discriminant function transforms the individual variable values into a single discriminant score or Z-value which is then used to classify the analyzed company. This model uses five financial ratios which are derived from the financial statements as reported by both bankrupt and non bankrupt companies. The ratios are then combined in a specific way to produce a single number so called z-score that is a general measure of corporate financial health.

Within the American business environment, Prof. Altman used those five indicators that have enabled the prediction of 72% of the firms' bankruptcies with two years prior their occurrence. He initially used a sample of 66 firms of which 33 were distressed and 33 were financially healthy (distressed group of companies comprise the ones filed a bankruptcy from 1946 to 1965).

After the initial groups were defined and companies were selected, balance sheet and income statement data were collected. A list of twenty two potentially important indicators of bankruptcy signs were collected for evaluation process. Then, the variables were classified into five categories: liquidity, profitability, leverage, solvency and activity. The ratios were chosen on the basis of their popularity in the literature and their applicability to study. Out of 22 variables, five were chosen which are best in prediction of bankruptcy.

The resultant model is presented as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5 \tag{1}$$

X_1 = working capital/total assets

X_2 = retained earnings/total assets

X_3 = earnings before interest and taxes/total assets

X_4 = market value equity/book value of total liabilities

X_5 = sales/total assets

Where "Z" indicates an index of bankruptcy. The discriminant coefficients represent the share of economic and financial indicators in assessing the bankruptcy risk, the level of an indicator being the best as the highest absolute values. The overall value of z-score indicates as follows:

Zones of Discrimination:

z < 1.81 = Zone I – Distress Zone - High probability of bankruptcy for the company;

1.81 < z < 2.99 = Grey area – uncertain zone;

z > 2.99 = Zone II – Safe zone - Low probability of bankruptcy for the company.

The concern about original Z-score model was that the model was solely applicable to publicly traded companies (since X_4 needs stock price data), so that Altman tried to find solutions to apply model to the companies in private sector. Hence, the z-score model was revised, substituting the book value of equity with the market value. The result is exhibited in the following z'-score:

$$Z' = 0.717\ X_1 + 0.847\ X_2 + 3.107\ X_3 + 0.420\ X_4 + 0.998\ X_5 \tag{2}$$

The actual variable observed was with X_4 which became: X_4 = Book value of equity / Book value of total debt. X_3 and X_5 were virtually changed. The overall value of Z'-score indicates as follows:

Z' < 1.23 = Zone I - Distress Zone - High probability of bankruptcy for the company;

1.23 < Z'< 2.90 = Grey area – uncertain zone;

Z' > 2.90 = Zone II - Safe zone - Low probability of bankruptcy for the company.

Altman realized a further revision with the model in order to adapt the model for non-manufacturer companies and emerging markets. The modification aimed to analyze the model's accuracy without X_5 –sales/total assets . This was carried out by having the minimum potential industry impact which is more likely to take place when an industry-sensitive variable like asset turnover is included. Altman, Hatzell and Peck (1995,1997) applied this revised Z'' Score model to emerging markets' companies. The book value of equity was used for X_4 for this case. The resulting model new Z'' score model is as follows:

$$Z''=6.56\frac{Net\ Working\ Capital}{Total\ Assets}+3.26\frac{Accumulated\ retained\ earnings}{Total\ Assets}+1.05\frac{EBIT}{Total\ Assets}+6.72\frac{Book\ value\ of\ equity}{Total\ liabilities} \tag{3}$$

Where Z'' Scores below 1.10 indicate a distressed condition.

Moody's RiskCalc

RiskCalc model analyzes financial statements to produce default probability predictions for corporate obligors- especially those in the middle market. It is a nonstructural model which uses ten financial ratios to reflect a corporate size, profitability, leverage, liquidity, activity levels and sales growth. The ratios for each aspect were chosen based both on their ability to predict default and how they function within a multivariate model. The transformed variables are run through a probit regression model that produces one and five-year expected default frequencies that are also mapped to a Moody's rating of a comparable default rate.

The model also produces contribution scores which allows the lender to see which factors are the most important drivers of the final score for each individual credit.[45]

Structural Models

The model measures changes to default probabilities based on the distance to default (DD) of a firm which is a combination of asset values, debt, and the standard deviation of asset value fluctuations.[46]. The point of default is considered to be where debt exceeds assets, and the greater the volatility of the assets, the closer the entity moves to default.

The most well known structural model of default is today Merton Model which is market based approach relying on stock market information. It models the equity as a equity option on the assets where the strike price is the value of liabilities. This maps very well into the well developed theory of option pricing. There is another structural model which is of the gambler's ruin and predates the Merton model.

In original Merton model (1973), debt has an unambiguous maturity and option value is calculated with this singular date. When the market value of the company's assets falls below a certain level, the company will default. According to the Merton model, the company's future asset value has a probability distribution characterized by its expected value and standard deviation. The number of standard deviations the future value of assets is away from the default point is the "distance to default". The greater is the value of the company, and the smaller its volatility, the lower the probability of default.

One of the innovative forecasting models that has been widely applied is a particular application of Merton model and it was developed by the KMV corporation; hence it is named as "KMV-Merton Model". According to Bharath and Shumway[47] the KMV-Merton model applies the framework of Merton (1974), in which the equity of the firm is a call option on the underlying value of the firm with a strike price equal to the face value of the firm's debt. The model recognizes that neither the underlying value of the firm nor its volatility are directly observable. Under the model's assumptions both can be inferred from the value of equity, the volatility of equity and several other observable variables by solving two nonlinear simultaneous equations. After inferring these values, the model specifies that the probability of default is the normal cumulative density function of a z-score depending on the firm's underlying value, the firm's volatility and the face value of the firm's debt.

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[45] Source: "Moody's Releases New Version of RiskCalc for Measuring Risk of Private Firms"
[46] Allen and Powell, "Credit Risk Measurement Methodologies",2011
[47] Bharath, Shumway "Forecasting Default with the KMV-Merton Model", 2004

The KMV-Merton model is defined as a clever application of classic finance theory, but how well it performs in forecasting depends on how realistic its assumptions are. The model is a somewhat stylized structural model that requires a number of assumptions. Among other things, the model assumes that the underlying value of each firm follows geometric Browninan motion and that each firm has issued just one zero-coupon bond. If the model's strong assumptions are violated, it should be possible to construct a reduced form model with more accuracy.

The KMV-Merton default forecasting model produces a probability of default for each firm in the sample at any given point in time. In order to calculate the probability, the model subtracts the face value of the firm's debt from an estimate of the market value of the firm and then divides this difference by an estimate of the volatility of the firm (scaled to reflect the horizon of the forecast). The resulting z-score, which is referred to as the distance to default, is then substituted to a cumulative density function to calculate the probability that the value of the firm will be less than the face value of debt at the forecasting horizon. The market value of the firm is simply the sum of the market values of the firm's debt and the value of its equity. If both these quantities were readily observable, calculating default probabilities would be simple. While equity values are readily available, reliable data on the market value of firm debt is usually unavailable. The KMV-Merton model estimates the market value of debt by applying the Merton (1974) bond pricing model. The Merton model makes two particularly important assumptions. The first assumption is that the total value of a firm is assumed to follow geometric Brownian motion:

$$dV = \mu V\,dt + \sigma_V V dW \qquad (4)$$

where V is the total value of the firm, μ is the expected continuously compounded return on V, σv is the volatility of firm value and dW is a standard Weiner process. The second important assumption of the Merton model is that the firm has issued just one discount bond maturing in T periods. Under these assumptions, the equity of the firm is a call option on the underlying value of the firm with a strike price equal to the face value of the firm's debt and a time-to-maturity of T. Moreover, the value of equity as a function of the total value of the firm can be explained by the Black-Scholes-Merton Formula. By put-call parity, the value of the firm's debt is equal to the value of a risk-free discount bond minus the value of a put option written on the firm, again with a strike price equal to the face value of debt and a time-to-maturity of T.

Symbolically, the Merton model requires that the equity value of a firm satisfies:

$$E = V\,N(d_1) - e^{rT}\,F\,N(d_2) \qquad (5)$$

where E represents the market value of the firm's equity, F represents the face value of the firm's debt, r is the instantaneous risk-free rate, N(·) is the cumulative standard normal distribution function, d_1 is given by

$$d_1 = \frac{\ln(V/F) + (r + 0.5\sigma^2{}_V)T}{\sigma_V\sqrt{T}} \qquad (6)$$

$$d_2 = d_1 - \sigma_V\sqrt{T}$$

Under the Merton model, the volatilities of the firm and its equity are as follows:

$$\sigma_E = \left(\frac{V}{E}\right) N(d_1)\, \sigma_V \qquad (7)$$

Where d_1 is defined in equation 3.

The KMV- Merton model uses the two nonlinear equations, (5) and (7) in order to interpret the value and volatility of a company's equity into a suggested probability of default. In many applications, the Black Scholes-Merton model describes the unobserved value of an option as a function of four variables such as strike price, time to maturity, underlying asset price and the risk-free rate and one variable that can be estimated (volatility). In the KMV- Merton model, the value of the option is observed as the total value of company's equity, while the value of the underlying asset (the value of the company) is not directly observable. Hence, while V must be inferred, E is easy to observe in the market place by multiplying the company's shares outstanding by its current stock price. The volatility of equity, σ_E can be estimated but the volatility of the underlying company, σ_V must be inferred.

The four steps in implementing the KMV-Merton model are explained as follows: first step is estimating σ_E from either historical stock returns data or from option implied volatility data. The second step is to choose a forecasting horizon and a measure of the face value of the firm's debt. For instance, it is common to use historical returns data to estimate σ_E, assume a forecasting horizon of one year (T = 1),and take the book value of the firm's total liabilities to be the face value of the firm's debt. The third step is to collect values of the risk-free rate and the market equity of the firm. After realizing these three steps, the values for each of the variables in equations (5) and (7) are found except for V and σ_V , the total value of the firm and the volatility of firm value respectively. The fourth step in implementing the model is to simultaneously solve equations (5) and (7) numerically for values of V and σ_V. When this numerical solution is obtained, the distance to default can be calculated as:

$$DD = \frac{\ln(V/F) + (\mu - 0.5\,\sigma^2{}_V)\,T}{\sigma_V\sqrt{T}} \qquad (8)$$

where μ is an estimate of the expected annual return of the firm's assets. The corresponding implied probability of default, also called the expected default frequency (or EDF), is

$$\pi KMV = N\left(-\left(\frac{\ln\left(\frac{V}{F}\right) + (\mu - 0.5\sigma^2 V)T}{\sigma V \sqrt{T}}\right)\right) = N(-DD) \qquad (9)$$

If the assumptions of the Merton model really hold, the KMV-Merton model should give very accurate default forecasts. In fact, in case the Merton model holds fully, the implied probability of default defined above, πKMV, should be a sufficient statistic for default forecasts.

Machine Learning Models

One of the new methodologies on credit rating is the Maximum Expected Utility (MEU) Principle (based on machine learning) which is developed by Standard&Poor's Risk Solutions. The model has a clear economic interpretation and it measures the performance in economic terms (Marassi D. and Pediroda V. 2008).The basic idea is to find a probability measure which maximizes the out-of-sample expected utility of an investor who selects her investment strategy so as to maximize her expected utility under the model she believes to be efficient. The authors demonstrate how this method perform better than the Logit and Probit Methodology, since it takes into account the interactions between the financial ratios to reach a better approximation of the real probability of default.

The statistical problem to dispose the default risk of a company can be defined in terms of the conditional probability $p(y|x) = Prob(Y = 1|x)$ where X is the free problem variable. Y is the random variable, representing default probability, $Y \in \{0,1\}$ indicates default $(Y = 1)$ or survival $(Y = 0)$ over some time interval from the observation.

The problem can be solved by using the numerical methodologies obtained by theory of Statistical Learning. Commonly used methodologies are the logistic regression (Fitting Logistic Regression Model) and more recently Neural Networks and Support Vector Machines. However, although they represent optimal models to solve the problem, they lack a theoretical financial base. To eliminate the deficit, MEU is presented which takes its origin from an economical interpretation and measures the quality of the model in financial terms, reaching a clear improvement in comparison to the methodologies purely statistical.

Risk Insolvency Predictive model MEU

This model analyses Italian companies to induce the risk degree in terms of default probability. The output of the model is probability for an enterprise to be classified in an insolvent company category, established on the evaluation of its financial statements data.

The definition of default risk, for a company, used in this method is the risk for an enterprise not to succeed to pay its own obligations within a prefixed technical time, in this case an accounting exercise.

The analysis of the default probability allows determining the rating class for every analysed enterprise. The fundamental objective of the model is to reach the definition of the insolvency risk.

Development of MEU Model

Development of MEU model applied the following phases.

Data collection: The data on which was utilized during the development of MEU model are the annual financial statements of the enterprises. High numbers of ratios are computed (all the data represented in the MEU model input data are called explanatory data). The data used comprise not only healthy companies but also distressed group of companies that filed petition.

Construction of the stratified sample: In order to develop a correct insolvency risk model, a representative stratified sample of Italian companies, according to specific criteria (territorial distribution in Italy, economic sectors and company size more than Euro 1 million yearly revenues), is extracted from the database.

Correlation analysis: In order to construct a logistic regression statistical model developed by explanatory variable, it is necessary that they must be independent. So, the study of the correlations between ratios (explanatory variable) was carried out.

In order to avoid redundancy, these ratios were processed, excluding those that were highly statistically correlated, either directly or inversely. This means that, in the case of high correlation of two ratios, the one that is considered to have a lower relation with default status has been excluded. The cleaning process of the ratios with the correlation methodologies has allowed reducing their numerousness to approximately 42 ratios.

Selection of Explanatory Variables: MEU model is shaped within the widest class of the non-linear multiple regression models. This class of models forecasts/fits essentially the modeling (non-linear) for the expected value of an observable and predicted variable (in our case, risk of default) in the function of an unknown parameter vector and in the function of explanatory variables vector (in our case, the balance sheet ratios and drivers which can describe the state of enterprise solvency).

To understand the importance of financial ratios in terms of distress predictive power, different methods are used such as *t*-Student parameter, Self Organising Maps (SOMs)[48] and Default Frequency. By combining these three different methodologies, different aspects of the predictive power of each factor was shown, hence it was possible to identify the level of importance to be attached to each financial ratio.

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[48] The SOM (Kohonen, 2001) is an unsupervised neural network algorithm that projects high-dimensional data onto a two-dimensional map.

MEU- Maximum Expected Utility

The basic idea of the MEU methodology is to find the probability measure which maximises the utility function of an investor on the unknown future data; the hypothesis is that, the investor will choose the investment strategy which maximises the own utility in respect of a model in which he believes. The MEU approach will find asymptotically that result, choosing the utility function on the unknown data (the data is not used for building the model, normally known as *cross validation set*).

The interesting aspect of the methodology is that, the quality model maximisation is not simple mono objective, but it becomes multi objective: at the same time the model will seek the data consistency (with the used data, normally known as *training set*) and with the probability measures in which the investor believes before knowing the data. The relative weights between the two optimisation objectives are parameterised with a user defined parameter α.

In this case, as there is the presence of two states for the random variable (0–1, no default-default), the problem becomes the maximisation of the difference between the probability measure p and the a priori probability p^0:

$$D\left(p\|p^0\right) = \sum_x \tilde{p}(x) \sum_{y=0,1} p(y\|x) \log \frac{p(y\,|\,x)}{p^0(y\,|\,x)} \tag{1}$$

$$Nc^T\Sigma^{-1}c \leq \alpha \tag{2}$$

$$c = E_p[f] - E_{\tilde{p}}[f] \tag{3}$$

$$E_p[f] = \sum_x \tilde{p}(x) \sum_{y=0,1} p(y\,|\,x)f(y,x) \tag{4}$$

$$E_{\tilde{p}}[f] = \sum_x \tilde{p}(x) \sum_{y=0,1} \tilde{p}(y\,|\,x)f(y,x) \tag{5}$$

In the relations illustrated above, Equation (1) represents the improvement in the utility function (in this case logarithmic) by using the relative Kullback-Leibler entropy. The difference is between the probability p and the a priori model probability p^0:

The definition of the relative entropy between the two models $q1$ and $q2$ is:

$$D_{U,o}\left(q_1\|q_2\right) = \sum_y q_y U\left(b_y^*(q_1)O_y\right) - \sum_y q_y U\left(b_y^*(q_2)O_y\right) \tag{6}$$

where U is the utility function. Equation (6) defines the quality of a predictive model: the model 1 has to be preferred in comparison with the model 2 if , $1\,2\,(\,||\,)\,0\,U\,O\,D\,q\,q >$ on the real data.

In Equations (5) and (6), there is the presence of the terms $f(y, x)$, which are defined ad *kernel function*. The use of that methodology is mainly used in the *Machine Learning* theory, with the *Support Vector Machine* approach. The utility of the kernel is to transform the dual couple *(y,x)* in a unique value in order to change the definition space of the function to reach an easier separation between default and no default enterprises. It is possible to use different kernel definition; here three types of features were used:

1. Linear features

$$f(y,x) = (x)_j$$

where $(x)_j$ denotes jth coordinate of the explanatory variable vector x

2. Quadratic features

$$f(y,x) = (x)_i(x)_j$$

3. Cylindrical kernel features

$$f(y,x) = g\big((x)_j\big)$$

where $g((x)_j) = e^{-(x-a)^2/\sigma^2}$

The logical algorithm implementation becomes:

Find $\beta^* = \arg\max_{\beta} h(\beta)$

$$con\, h(\beta) = \frac{1}{N}\sum_{k-1}^{N} \log p^{(\beta)}\big(y_k | x_k\big) - \sqrt{\frac{\alpha}{N}\beta^{\mathrm{T}}\Sigma\beta} \qquad (7)$$

$$p^{(\beta)}(y|x) = \frac{1}{Z_x(\beta)} e^{\beta^{\mathrm{T}} f(y,x)} p^0(y|x)\; Z_x(\beta) = \sum_{y-0,1} p^0(y|x) e^{\beta^{\mathrm{T}} f(y,x)}$$

As optimisation algorithm, a BFCG Quasi Newton Approach (Press, 1989) is used, based on the function gradient. The algorithm choice is motivated from the high number of free parameter to be optimised. An interesting consideration could be observed from the second part of Equation (7). It is possible to note how that part takes to the minimisation of the absolute values of the free model parameters (weighted by the kernel): that minimises the *over-fitting* risk. The over-fitting is a well-known problem in Machines learning: it leads to a good minimisation error on the training set data, but with poor accuracy results on the validation set. Normally that behaviour could be avoided using a recursive methodology that however carries to higher computational time resources. The advantage in the MEU methodology is that the method to avoid the over-fitting is implemented directly in the model algorithm.

To sum up the model MEU, an important method based on machine learning, has a clear economic interpretation and it measures the performance in economic terms. The main idea is to seek a probability measure that maximises the out of sample expected utility of an investor who chooses his investment strategy so as to maximise his expected utility under the model he believes to be efficient. This method outperforms other numerical methods like Logit and Probit methodology, since because it takes into consideration the interactions between the financial ratios in order to obtain a better approximation of the real probability of default. The disadvantage of this method, like other numerical methods based on statistical theory or machine learning is the necessity to have an accurate and complete database of the companies (universe of the companies), data that could be difficult to obtain, especially considering the data of the companies which experienced bankruptcy in the past.

Critiques regarding the Models

The advantage of external credit ratings is that they are based on a deep a complete analysis of business, financial and economic environmental risks. Moreover, the ratings are available to the users as ready without a need of modeling to develop them. Nevertheless, the rating agencies like Standard and Poor's and Moody's underline that ratings are not absolute measures of default, but instead a relative ranking of one corporate to another, which do not have a ratchet effect of the changing economic conditions. Tough Standard & Poor's itself states that the rating opinions are not the guarantees of credit quality or an exact measure of the probability that a particular debt issue will default. However, ratings express relative opinions about the creditworthiness of an issuer or credit quality of and individual debt issue, from strongest to weakest, within a universe of credit risk. Even though the credit ratings are stated as they are not the definite measures of default, they are still used by banks for measuring default probabilities. Furthermore, external credit ratings are also utilized by banks under the standardized Basel accords in order to allocate capital. Accordingly, if the credit ratings do not fluctuate with market conditions, then the capital allocated does not either.

Financial statement analysis models have some powerful aspects. Firstly, they are practical to apply. Most of the cases, the financial statement figures are integrated into the model, thus the ratios will be computed for the user. There is also a disadvantage since it might be relatively simple to reproduce the models as they are composed of few basic ratios. The models showed an accuracy when they are applied to industries and economic conditions which were used in developing the model. For instance, Altman showed bankruptcy accuracy rates of 95 % using a sample of 91 manufacturing companies in the same period as the model was developed. There were, however some critics about the accounting models as well. They were extensively developed using specific

industries, for example Altman's z-score was developed using manufacturing companies. There are some other authors who have analyzed the ratios in order to understand whether they are applicable to other industries than that of they were developed in and they reached a lower accuracy when they are applied to other industries. Platt&Platt (1990) acclaimed that industry-relative ratios should be used during the development of models. Grice & Dugan (2001) reached a low accuracy when the models were applied to time periods or alarm situations different to those used to develop the model. Gutzeit & Yozzo (2011) reached a result that during the recession periods, the model precisely determined which companies failed but classified many survived ones as having bankruptcy potential and also the model had low accuracy when prediction period was more than two years. Zaygren (1985) worried about the time lag in receiving the financial information. There were also concerns shown by different authors regarding the inactive character of accounting information in assessing the credit risk and adding the market based variables into credit modeling. Accounting models were also criticized for being backward looking in contrast to the Merton model that uses market prices reflecting investor expectations of future performance. Vassalou and Xing also claimed that financial statement based models give a hint that companies with similar financial ratios will present similar default probabilities, while companies with similar debt and equity levels might have very different default probabilities in case the volatility of their assets diversify.

Structural models use the market data as a key component, making the models sensitive to changing conditions. This is an advantage of such models over other models as it gives a chance to banks to find potential problems at early stages. A disadvantage of the structural models centered on the information included in the model being inadequate to generate meaningful default probabilities, hence the model suffers from incomplete causality. There were some other authors who criticized the structural models such as Huang and Huang (2003) found that structural models generate very low spreads for investment grade bonds. KMV (Crosbie & Bohn, 2003) find the probabilities of default generated by the Merton model are too small to be of practical uses. Allen and Powell (2011) found that the structural model understated credit risk in the pre Global Financial Crisis period, but overstated it during the highly volatile Global Financial Crisis times. Bharath and Shumbway (2004) also criticized the KMV-Merton model regarding the market value of equity. Accordingly, the most important inputs for the model are market value of the equity, the face value of debt and volatility of equity. When the market value of equity declines, the probability of default increases. Bharath and Shumbway stated this as both strength and weakness of the model. For the model to function well, both Merton model assumptions must be met and markets must be efficient and well informed. KMV mentions the Enron case in its promotional material, as an example of how

their method is in a higher position than that of agency ratings. When stock price of Enron started to fall, its distance to default decreased right after. The rating agencies did downgrade Enron's debt in some days later. On the other hand, using equity values to interpret default probabilities allowed the KMV-Merton model to reflect the information faster than rating agencies. Nevertheless, when Enron's stock price was unsustainably high, KMV's expected default frequency for Enron was actually significantly lower than the default probability assigned to Enron by standard ratings. In case the markets are not perfectly efficient, then conditioning on information not captured by π**KMV** probably makes sense.

The structural model has attracted critiques because it assumes exact information regarding the point of default (that the model takes as the point where asset values fall below liability values), which some believe as unrealistic, preferring instead a reduced form approach which views default as an unexpected event (a jump to default).

The Selection of the Model

Considering the features of firms in the agricultural industry, one should not expect applying all assumptions and methods used by credit risk models to be appropriate in evaluating firms within the industry. The diversity of most farm businesses in the EU is generally low and it can be noted that most of the time, the scale of the businesses is limited with family businesses and more precisely Small and Medium Sized Enterprises (SMEs). Thus, for example external credit ratings by credit agencies have not been applied to the small-scale nature of the agricultural firms (Lyubov Zech, "Evaluating credit risk exposure in agriculture", 2003)

Regarding the other stated methodologies above, there is a fact as parameter inconsistency might happen due to using totally different data sets. Since the models compute various results when input parameters are inconsistent, Koyluoglu, Bangia and Garside suggest that the quality of estimates from different models should be compared to find out which model uses the most suitable data. For instance, Merton model which is derived from equity price relationships should be most accurate for the firms that are publicly traded in stock markets, while the majority of the companies within the agricultural sector are not publicly traded. It is also significant that inputs of the model be unbiased estimates of their true values. Misspecification of model might be other different results from various models. For instance, the assumption of normally distributed asset returns in a KMV type of model may not be fitting for agricultural companies.

Which methodology should perform better is an empirical matter taking into account specific circumstances. An analyst, who intends to evaluate one company in agricultural sector, needs to choose a model which is not only based on theoretical correctness but on practical issues such as

ease of use and data availability. According to Lentino and Pizada, selection of the model is secondary to providing consistent and reliable data for a model.

Since the tools of credit risk measurement generally depend more on the quality of inputs rather than on the modeling approach, a model must be selected based on the use of a more reliable set of parameters. In this context, machine learning models requiring a complete information on companies those are bankrupt would create difficulties to apply in the process of evaluation of agricultural companies. This is mostly due to the lack of full information on bankrupt companies across the world. Especially, emerging markets or relatively more risk carrying markets do not allow appropriate circumstances for the analyst to apply this methodology. The situation would be relatively easier in the EU; however the evaluation of the companies in other countries where even data of healthy companies are not always attainable would create fundamental bottlenecks in applying the model. Even in the EU, especially among East European countries, the statistical studies exhibited that the disclosure level of financial data on the companies is quite low (even for the companies which are not bankrupt). Accordingly, the availability of data of bankrupt companies is quite limited.

On the basis of available agricultural sector data and the need of finding a model with the ability to satisfy model assumptions, it is understood that there is a requirement to find a model which is more appropriate for the current situation of agricultural sector. In the following section, a model so-called "Multi Objective Rating Evaluation- MORE", chosen to evaluate agri-food companies will be discussed with details.

"MORE" Rating Model

Based on agricultural companies' financial data disclosure (either bankrupt or healthy) it is understood that there is a need of a specific model in order to be able to assess credit risk of companies by using the available data. By "available" data it is meant that an ideal model for evaluating the agri-food companies should be able to measure the credit risk of a company even if the inputs are incomplete.

"MORE" is a model for assessing credit risk of companies by using financial statements and industry-specific information. In particular, the model permits each enterprise to associate a fundamental credit rating giving an indication of the creditworthiness of industrial companies. "MORE" model is fundamentally used to assess the level of distress of industrial companies by using data included in financial statements. The basic philosophy of the model is to analyze a set of financial ratios in a predictive corporate bankruptcy model with the target of creating a credit rating model for each sector. Results of the model are obtained by applying several numerical

methodologies drawing together financial theory, data mining and engineering methodologies. The core of "MORE" is a multi dimensional and multi objective algorithm that produces a classification of each company by taking into account any attributes (such as sector and country) characterizing a firm.

The model gives the implementer an opportunity to assign a rating to a firm even without considering a complete dataset and moreover a chance to process qualitative information. It provides a better understanding of a company's powerful and weak aspects thanks to data mining tools and also taking into account the analysts' experiences and knowledge.

In the comparison of the various credit risk rating models' part, it is stated that those models are developed for quoted companies or based on the availability of complete data of bankrupt companies whereas MORE does not require a complete database, moreover evaluates companies' creditworthiness although bankruptcy data are missing. Furthermore, MORE methodology exhibits a flexibility and accuracy for evaluation of companies from various sectors and countries. MORE is not only a mathematical tool; but is based on financial analysis (balance sheet and income statement analysis) and always takes into account the economic changes in various industries as well.

The Development Phases of "MORE" Model

The first phase comprises selecting the most appropriate financial ratios for computing. Utilizing statistical correlation, default frequency and financial analysts' knowledge the model chooses several various ratios for various economic sectors. During selection process two significant criteria were taken into account:

1. They must be capable of predicting bankruptcy
2. They must be representatives of financial and economical behaviours of a firm

In order to understand the importance of financial ratios in terms of distress predictive power, three different methods are used: t-Student parameter, Self Organizing Maps and Default Frequency. By combining these three different methodologies, which show different aspects of the predictive power of each factor, it was possible to identify the level of importance to be attached to each financial ratio.

As a second phase, the model translates the ratio values into a rating attribution. This process is carried out for every ratio; with an idea that in each financial ratio there is the indication of the final rating which means that the model converts qualitative values into quantitative values by translating the ratio results into rating class. The translating process is not only executed according to statistical models (using the probabilistic distribution of the ratios), but some values are determined by financial analysts based on their knowledge and experience following the corporate finance theories.

After determining the rating values for every financial ratio, the MORE model gathers all information to reach the ratings for the selected company. The model is based on an approach which evaluates the company from many dimensions (Multi Dimensional) in order to find equilibrium; that is, if one company is better in financial and economic equilibrium, then the final rating will accordingly be better as well.

Accordingly, the verbal sentences and qualitative information were translated into quantitative terms. As illustrated in graph 33, the MORE model fastens the BB rating class as the average value of the ratio distribution (median value), while the higher rating classes and the lower rating classes are fixed in according with the financial rating distribution. Thanks to this adaptation, the Company X gets AA rating value for its ratio because its ratio performs relatively better than the other companies belonging to the same country. On the other hand, the Company Y, with the same ratio value, gets the CCC rating class, because its ratio performs worse in comparison with the other companies belonging to the same country. It is important to state that the transformation of ratios is not built solely on statistical models; but some points are corrected by financial analysts; as an example, if the leverage ratio is less than zero; the maximum rating class can be CC.
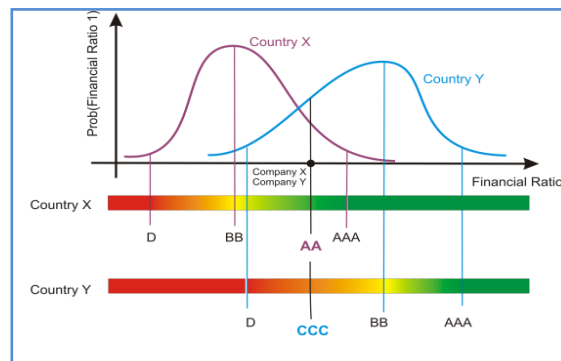
Graph 33: The transformation of financial ratios

"MORE" model is based on Multi Dimensional Approach as basis in which for a company, the better the financial equilibrium, the better final rating. The idea is to remunerate a company if it has a good financial equilibrium between the different financial figures (which represent different financial and economical aspects of the company behavior). To understand this model better, it is possible to examine the graph 34 where presented three different companies, with different ratio behaviors: company ABC and company XYZ, which perform well for one financial ratio (ratio 1 and ratio 2, respectively) but bad for the others and the company UVW which has two ratios with more similar values to each other. It is possible to observe as the Company UVW is the nearest one to the Best Ideal Company (every ratio assigned with AAA). Taking into account this, the MORE model gives a better rating to the Company UVW in comparison with the two others companies.
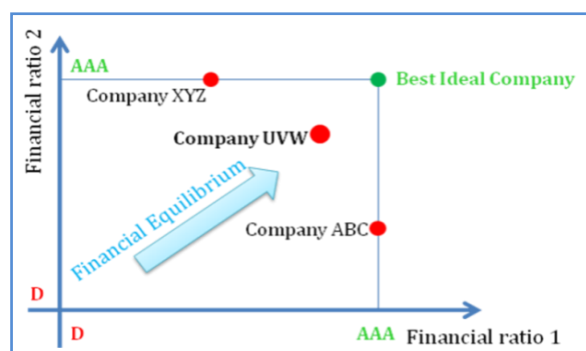
Graph 34: Financial Equilibrium

The MORE model as mentioned before is not only a mathematical tool; but is an accurate rating model that can be used in financial analysis and most importantly in comparative analysis of any which company from different economical sectors, geographical regions and industrial districts. By this way, the implementers of the model would have a chance to find a common platform of comparison. In agri-food companies' ratings evaluation part, this advantage of the model will be presented in a clearer way. Table 16 illustrates MORE Rating classes attached with the meaning of each rating class.

Table 16:MORE Rating Classes

Rating class	Rating macro class	Assessment
AAA		The company's capacity to meet its financial commitments is extremely strong. The company shows an excellent economic and financial flow and fund equilibrium.
AA	Healthy	The company has very strong creditworthiness. It also has a good capital structure and economic and financial equilibrium. Difference from AAA is slight.
A		The company has a high solvency. The company is however more susceptible to the adverse effects of changes in circumstances and economic conditions than companies in higher rated categories.
BBB		Capital structure and economic equilibrium are considered adequate. The company's capacity to meet its financial commitments could be affected by serious unfavourable events.
BB	Balanced	A company rated BB is more vulnerable than companies rated BBB. Furthermore the company faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions.
B		The company presents vulnerable signals with regards to its fundamentals. Adverse business, financial, or economic conditions will be likely to impair the company's capacity or willingness to meet its financial commitments.
CCC	Vulnerable	A company rated CCC has a dangerous disequilibrium on the capital structure and on its economic and financial fundamentals. Adverse market events and an inadequate management could affect with high probability the company's solvency.
CC		The company shows signals of high vulnerability. In the event of adverse market and economic conditions, the company's strong disequilibrium could increase.
C	Risky	The company shows considerable pathological situations. The company's capacity to meet its financial commitments is very low.
D		The company has not any longer the capacity to meet its financial commitments.

Validation of "MORE" Model

In order to validate a credit rating model, there is a necessity on demonstrating two points:

1. For bankrupt companies, the assigned rating deteriorates, approaching the default rate (Bankruptcy Dynamics).

2. The model discriminates between healthy companies and bankrupt companies (Discriminating power of the model).

For demonstrating these two points there is a need of information on bankrupt companies.

Using the companies labeled as "bankrupt" in ORBIS (a global database which has information on 60 million companies, provided by Bureau van Dijk Electronic Publishing) we have compiled the following distribution (years: 2000-2009):

Table 17: Number of bankrupt companies

Country	Number of bankrupt companies
FR	9110
BE	8172
NL	5232
IT	4529
UA	1991
RO	1207
PL	1100
FI	1098
CZ	780
LT	655
LV	598
EE	525
RU	320
SK	158
Others	318
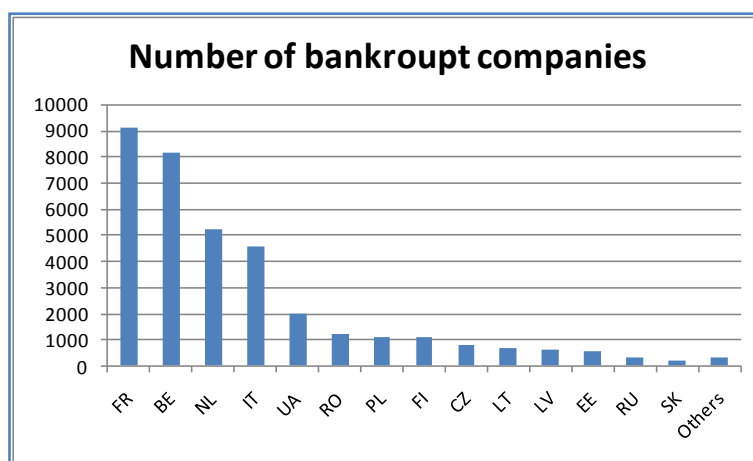
Graph 35: Distribution of default companies

In order to validate the model, following methodology will be applied:

1. Validation of the MORE ratings on the ENTIRE bankruptcy database (years 2000-2009);
2. Validation of the MORE ratings on the ENTIRE bankruptcy database but only in 2008-2009 to enhance the knowledge of MORE ratings in the financial crisis.
3. Validation of the MORE rating in Continental Macro Areas.

In each validation, two steps were followed to demonstrate the following features of the model: **Bankruptcy Dynamics & Discriminating Power** of the model.

Validation of the MORE ratings on the ENTIRE bankruptcy database (Between the years: 2000-2009)

In order to validate MORE ratings, firstly the evaluation of the bankrupt companies' ratings was studied checking their evolution over the years. In this case, all bankrupt companies in ORBIS were used (around 40,000 companies).We observed the ratings one, two, three and four years before the FINAL available annual report.
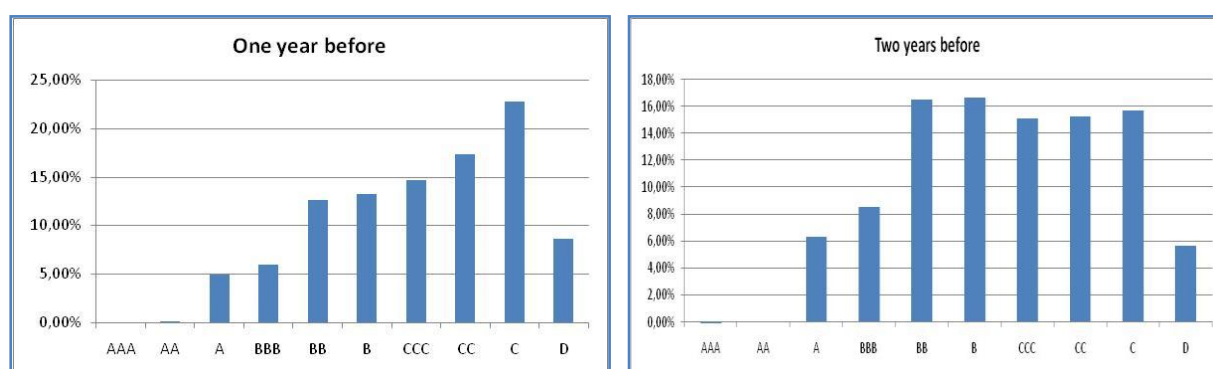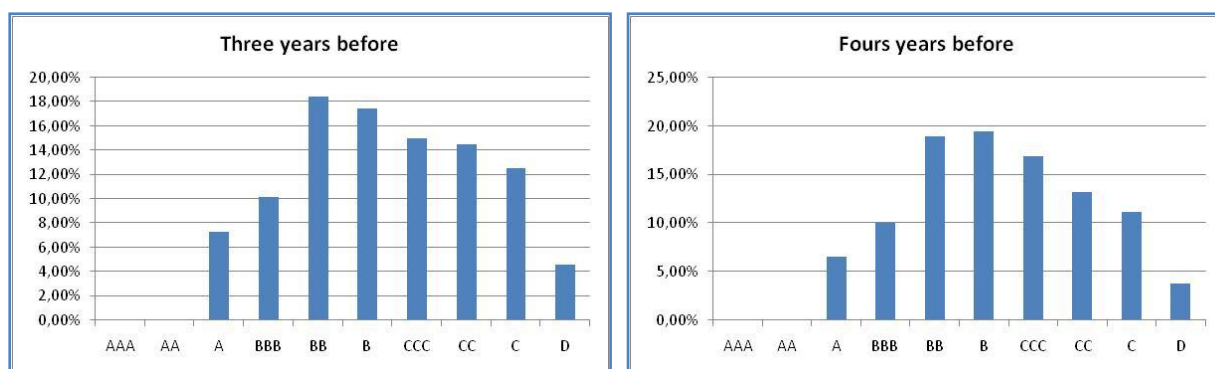
Graph 26: Distribution of ratings of default companies (entire ORBIS database)

	One year before	Two years before	Three years before	Four years before
■ Risky companies – D, C, CC	48,60%	36,65%	31,67%	28,05%
■ Vulnerable companies – CCC –B	27,82%	31,81%	32,45%	36,36%
■ Balanced companies – BB-BBB	18,53%	25,10%	28,55%	29,02%
■ Healthy companies – A, AA, AAA	5,05%	6,45%	7,33%	6,58%
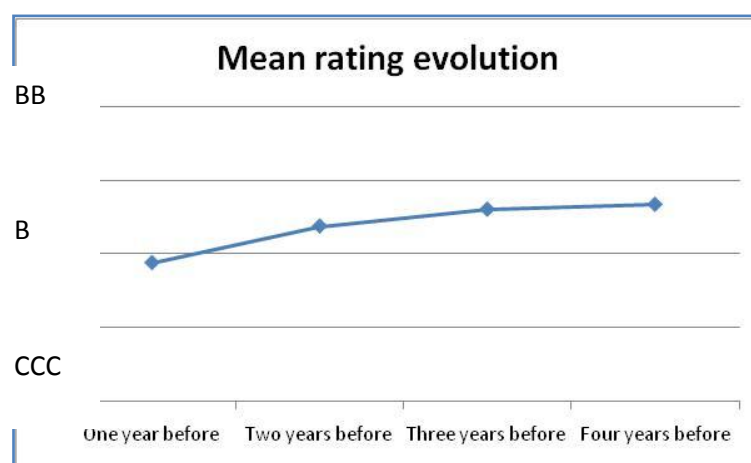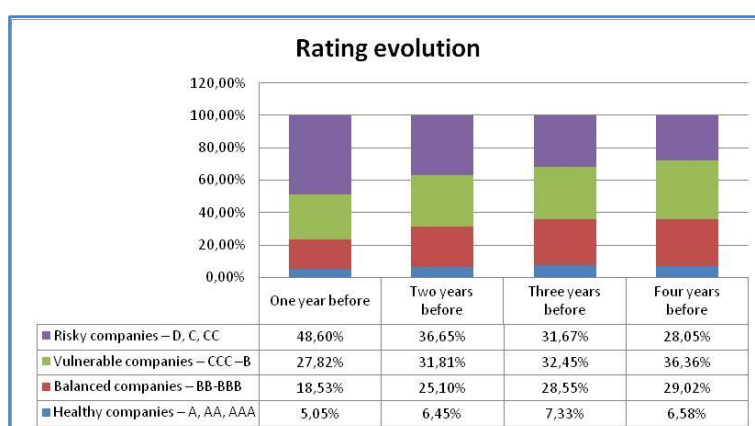
Graph 37: Dynamic of default companies: rating distribution and mean rating (entire ORBIS database

To demonstrate the first feature, it is important to see ratings' evolution for the bankrupt companies. From Graph 37, it is possible to observe that the MORE ratings catch the performance degradation of the companies with a high accuracy, approaching the default date.

It was observed that one year before the last available annual reports, 48% of the companies were classified as risky and 27% as vulnerable, so that 75% of companies had bad economic and

financial ratings. It is very interesting to note that four years before the last accounting year, MORE ratings classified 64% of the defaulted companies as risky and vulnerable (or worse); and so MORE has a great ability to predict the default.

To analyze the second feature of the model, there was a requirement to demonstrate whether the model discriminates between the non-defaulted companies and defaulted companies. To execute this, one of the well-known statistical methods: **ROC** (Relative or receiver operating characteristic) method and computing AUC (area under the curve) are used. ROC curves generalize contingency table analysis by providing information on the performance of a model at any cut-off that might be chosen.

ROCs are constructed by scoring all credits and ordering the non-defaulters from worst to best on the x axis and then plotting the percentage of defaults excluded at each level on the y axis. So, the y axis is formed by associating every score on the x axis with the cumulative percentage of defaults with a score equal to or worse than that score in the test data. In other words, the y axis gives the percentage of defaults excluded as a function of the number of non-defaults excluded.

A convenient measure for summarizing the graph of the ROC is the area under the ROC (AUC), which is calculated as the proportion of the area below the ROC relative to the total area of the unit square. A value of 0.5 indicates a random model, and a value of 1.0 indicates perfect discrimination.

A rough guide for classifying the accuracy of a diagnostic test is the traditional academic point system:

- 1,00-0,90: excellent
- 0,90-0,80: good
- 0,80-0,70: adequate
- 0,70-0,60: poor
- 0,60-0,50: fail
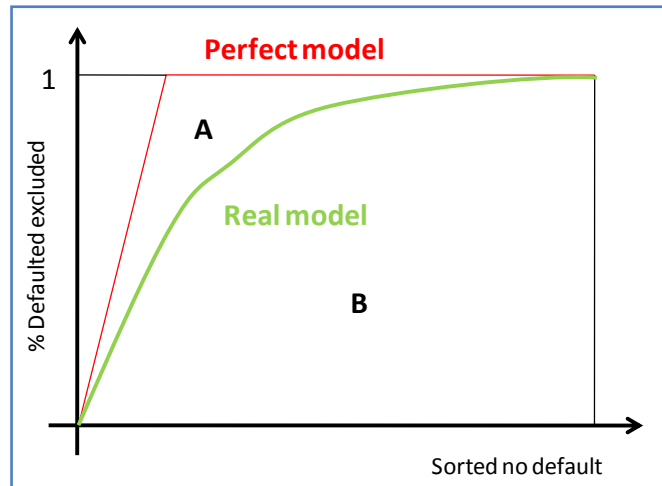
It is possible to observe within the following graphs that the model achieved very accurate results in distinguishing defaulted companies, reaching a AUC (area under the curve) value of 86 in the last year, with a very promising AUC value of 73, four years before the final available annual report. This behavior can be seen when the distribution of the world rating, a typical Gaussian distribution, where BB is the most probable rating class is compared to the distribution of the defaulted companies in which the most probable rating classes are the poor ones (See Graph 39).
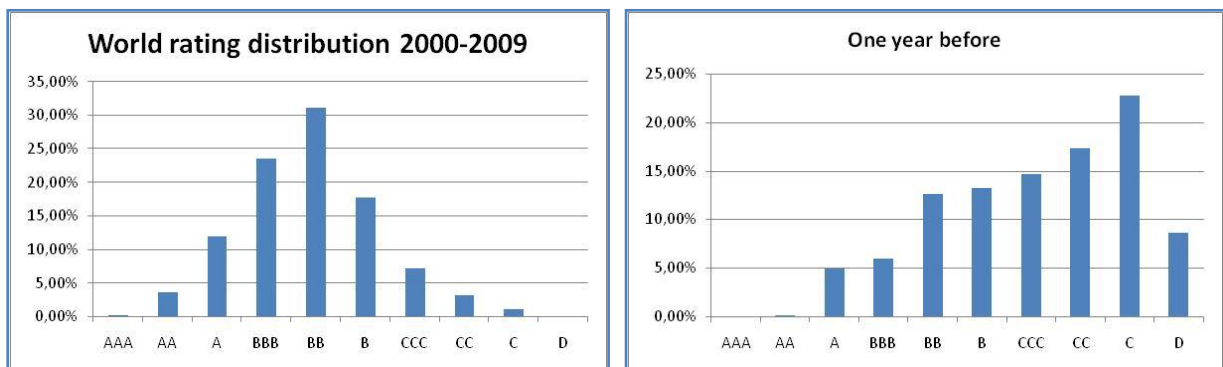
Graph 39: World rating distribution: non-default companies (left), default companies (right). Entire ORBIS database
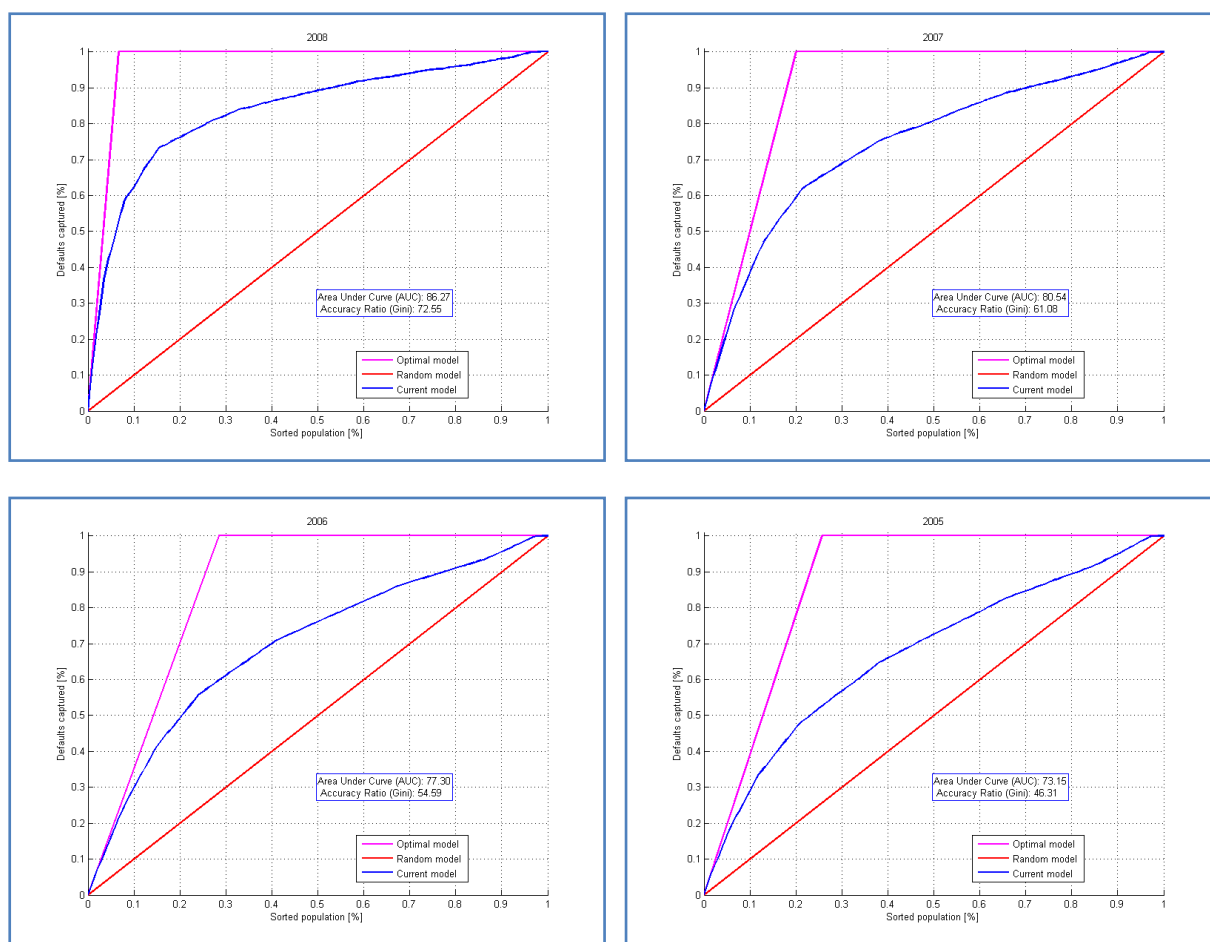
Graph 40: ROC graphs; one year before: up-left; four year before: down right. Entire ORBIS database.

As a conclusion, it is possible to assert that the model predicted the world defaulted companies with very good accuracy even four years before bankruptcy occurred.

Validation of the MORE ratings on the ENTIRE bankruptcy database; only during the 2008&2009 Financial Crisis

After evaluating the MORE ratings on the entire database, we wanted to extend the study to investigate if the MORE ratings recognized the financial crisis during the years 2008-2009. This is because understanding MORE ratings' success in monitoring the crisis was quite important.

To do this, the companies which went bankrupt in 2008-2009 were selected and studied in the same way as before. In this case, the database consisted of around 4,000 companies from all around the world.

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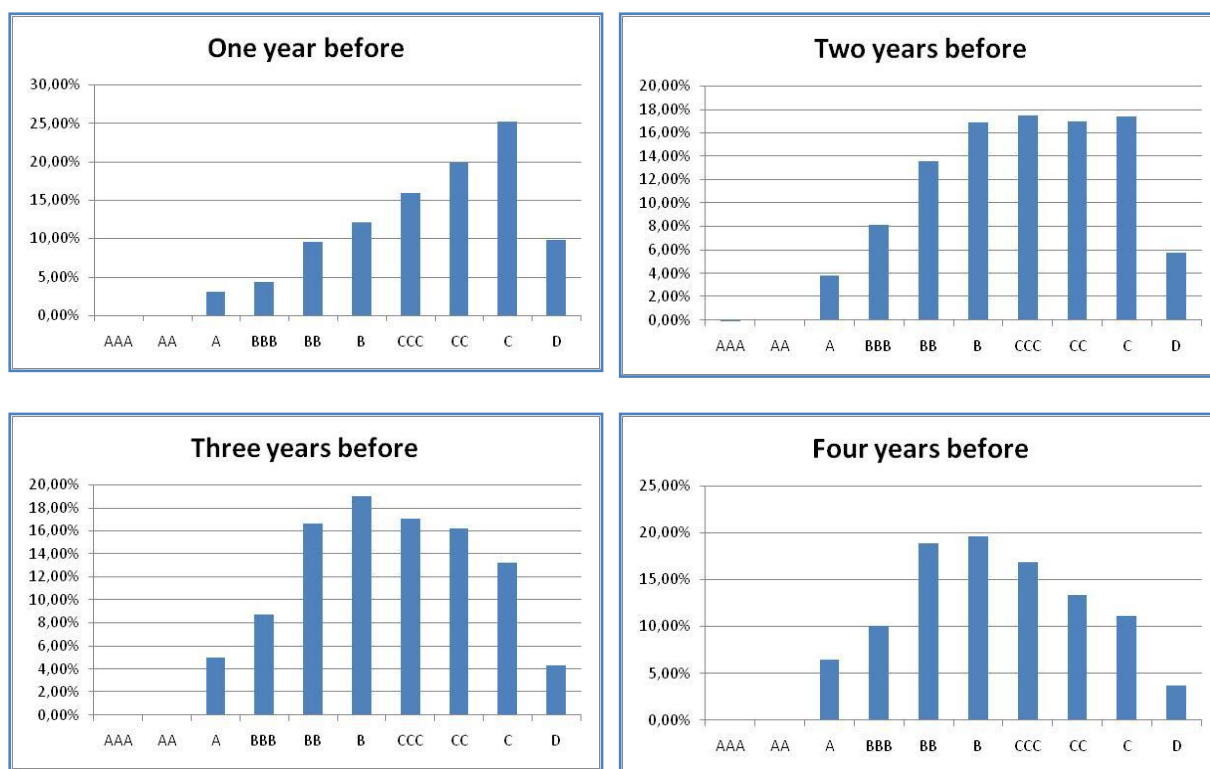
Graph 41: Distribution of the ratings of defaulted companies (2008-2009 ORBIS database)

	One year before	Two years before	Three years before	Four years before
Risky companies – D, C, CC	54,81%	40,07%	33,70%	28,09%
Vulnerable companies – CCC –B	21,68%	30,39%	35,57%	38,40%
Balanced companies – BB-BBB	14,00%	21,68%	25,29%	28,85%
Healthy companies – A, AA, AAA	3,15%	4,00%	5,00%	6,59%

Mean rating evolution
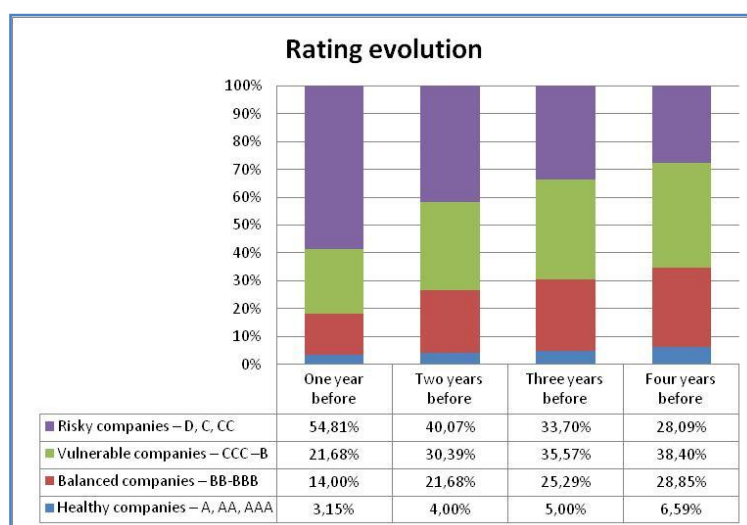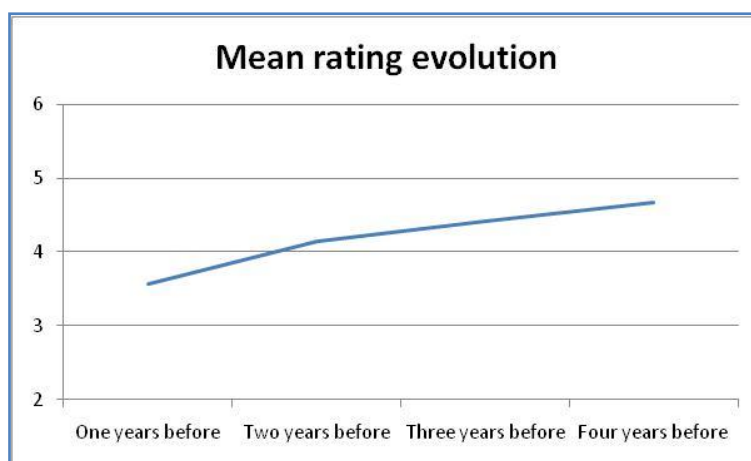
Graph 42: Dynamic of defaulted companies: rating distribution and mean rating (2008-2009 ORBIS database)

In the first step; the MORE ratings once again recognized the evolution of the bankrupt companies approaching the default date. According to Graph 42, it can be observed that one year before the final accounting year, the MORE ratings classified 75% of the defaulted companies as vulnerable (or worse).

It is interesting to note that the MORE ratings had a stable behavior when companies moved towards bankruptcy, both in 2000-2009 and in the 2008-2009 crisis. This demonstrates that the MORE methodology was successful in predicting the impacts of the financial crisis.

Again as the second step, there was a need to demonstrate if the model can discriminate between non defaulted companies and defaulted ones. As it was done for the companies all over the world between the years 2000-2009; once again ROC was used for the world companies in the 2008-2009 crisis. According to the AUC values, the model again achieved very accurate results in distinguishing defaulted companies, reaching an AUC value of 85 in the last year together with an AUC value of 73 four years before the final available annual report. This behavior is seen in the comparison between the distribution of the world rating (the distribution where BB is the most probable rating class) and the distribution of the default companies in which the most probable rating classes are the poor ones (See Graph 43).

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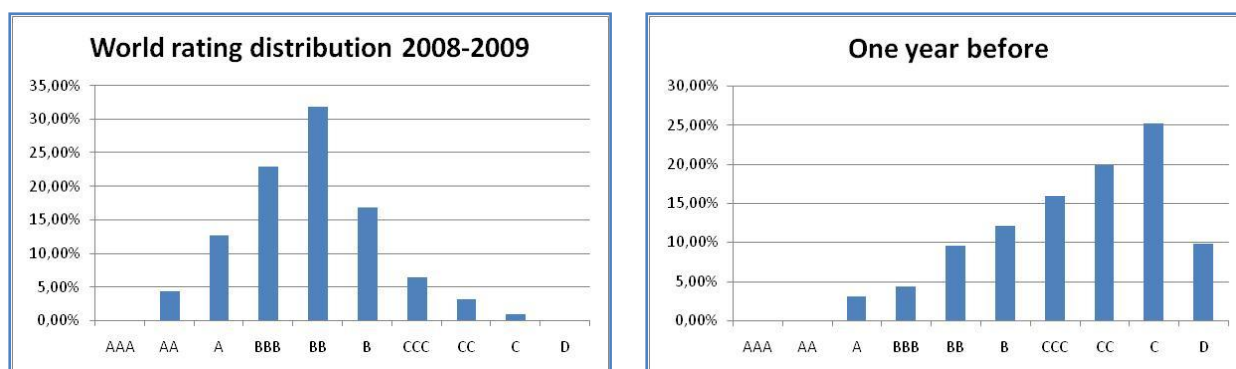
Graph 43: World rating distribution: non-defaulted companies (left), defaulted companies (right). 2008-2009 ORBIS database
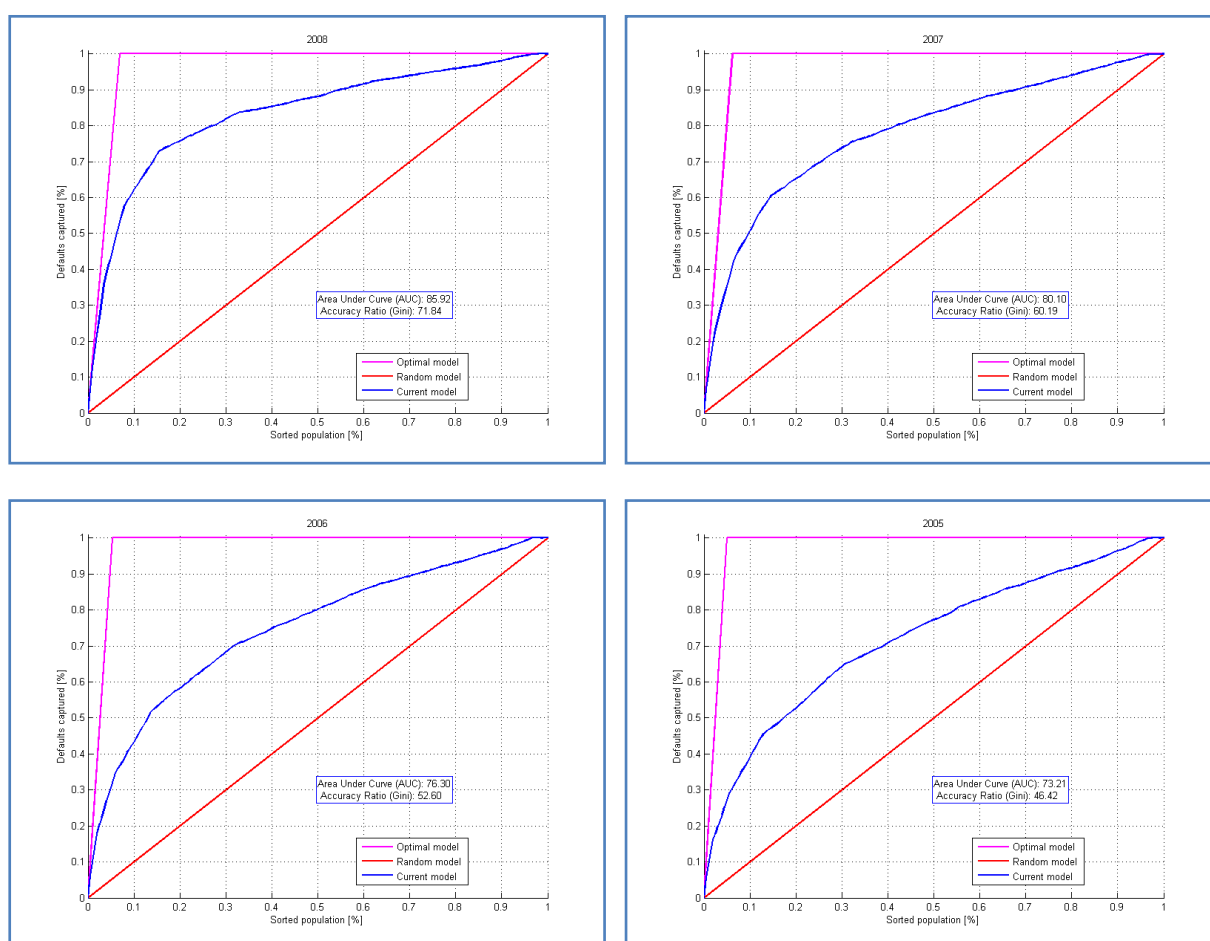
Graph 44: ROC graphs; one year before: up-left; four year before: down right. 2008-2009 ORBIS database

Validation of the MORE rating in Continental Macro Areas

In order to understand the behavior of MORE rating better, the rating performances in the different Continental Macro Area (following the definitions of ORBIS) were evaluated, defined in the following table:

Continental Macro Area	Number of bankrupt companies
West Europe	30'000
East Europe	9'000
North America	120
Far East	50
Rest of the World	10

For statistical reasons to apply the ROC evaluation and the rating evolution, an analysis was performed on following macro areas: West Europe, East Europe, North America and Far East. In all those cases, the data were derived from financial statements that are dated one annual reporting period prior to last available account.

Validation of the MORE rating in West Europe
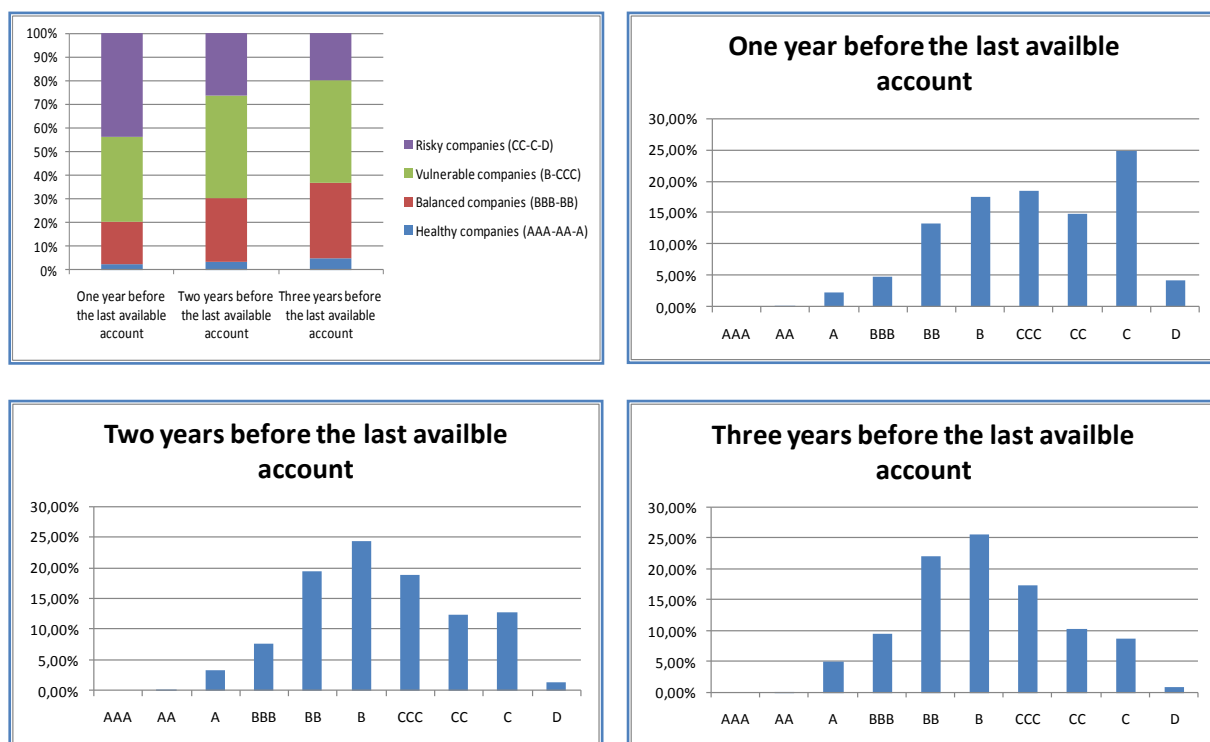
Graph 45: Dynamic of defaulted companies: rating distribution and mean rating (West Europe ORBIS database)
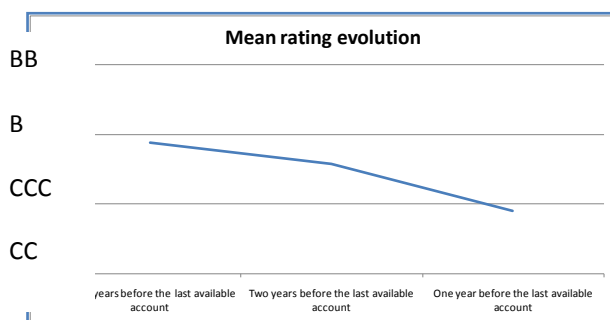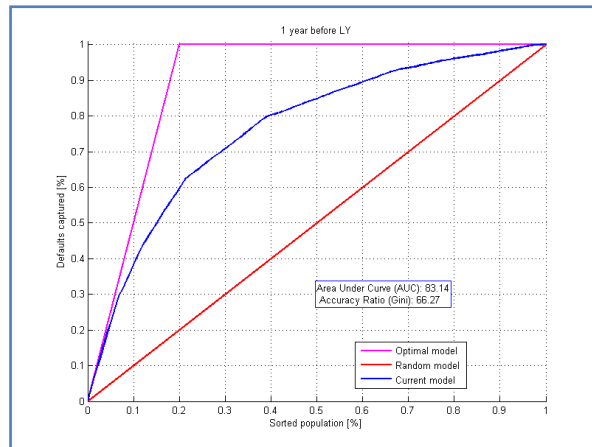
Graph 46: Mean rating evolution and ROC graph: West Europe ORBIS Database

For West European countries, the deterioration in ratings is clear since one year prior to last available accounting year, the MORE ratings classified approximately 80 % of the defaulted companies as vulnerable (or worse). As per the second step, according to the AUC values, the model achieved accurate results in separating defaulted companies by reaching an AUC value of 83.14 in the available last year.

Validation of the MORE rating in East Europe

Accuracy of the model was also proven within East European countries since the share of companies classified as vulnerable and risky increased regularly until last year (together with a decreasing mean rating value trend). AUC value of 83.03 one year prior to last year can be accepted as quite accurate.
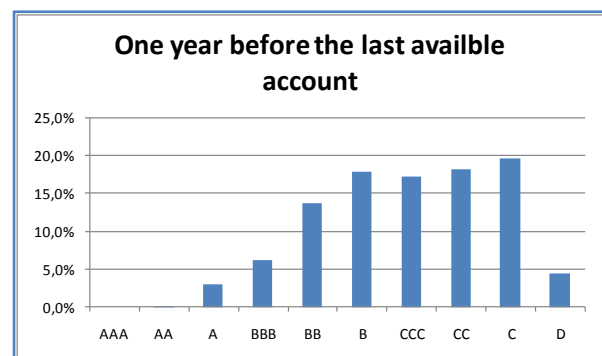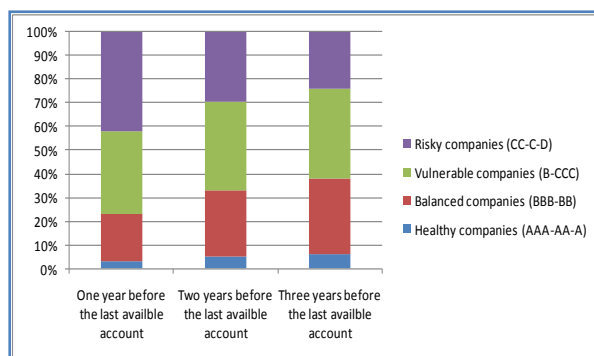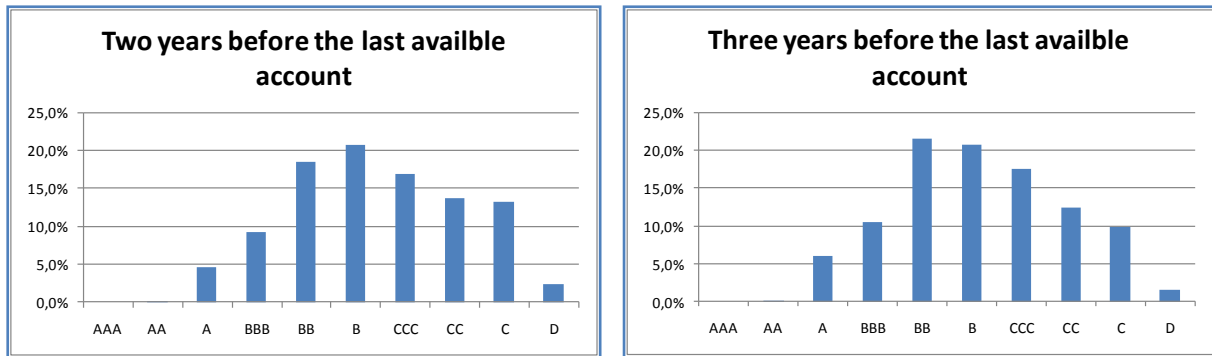
Graph 47: Dynamic of defaulted companies: rating distribution and mean rating (East Europe ORBIS database)
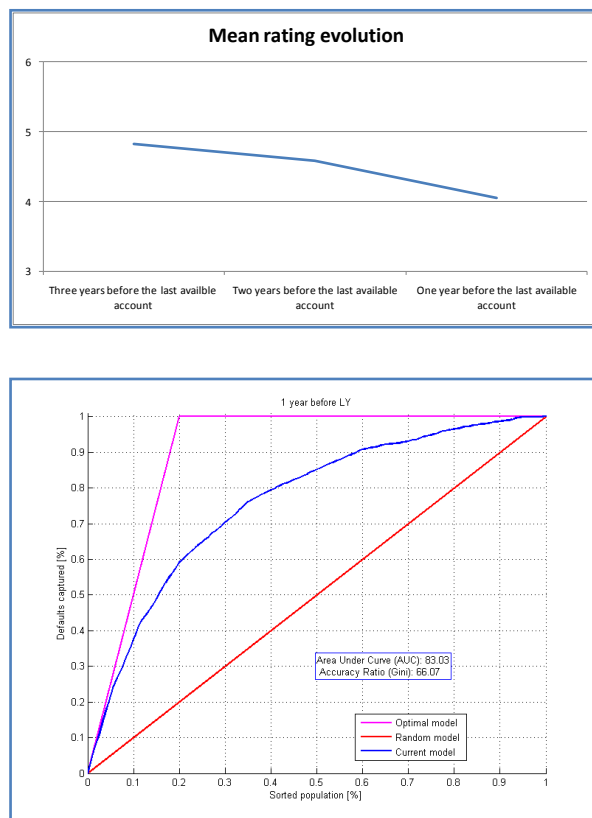
Graph 48: Mean rating evolution and ROC graph: East Europe ORBIS database

Validation of the MORE rating in North America

The validation of the model in North America was based on publicly traded companies (since financial data of companies which are not quoted are unavailable). For this macro area, one year prior to the last available account the share of companies classified as vulnerable or risky arrived almost 90 % which is a strong indicator. As a second step, to understand whether model can discriminate default companies between none default ones, ROC evaluation was applied and an AUC value of 90.64 was obtained.
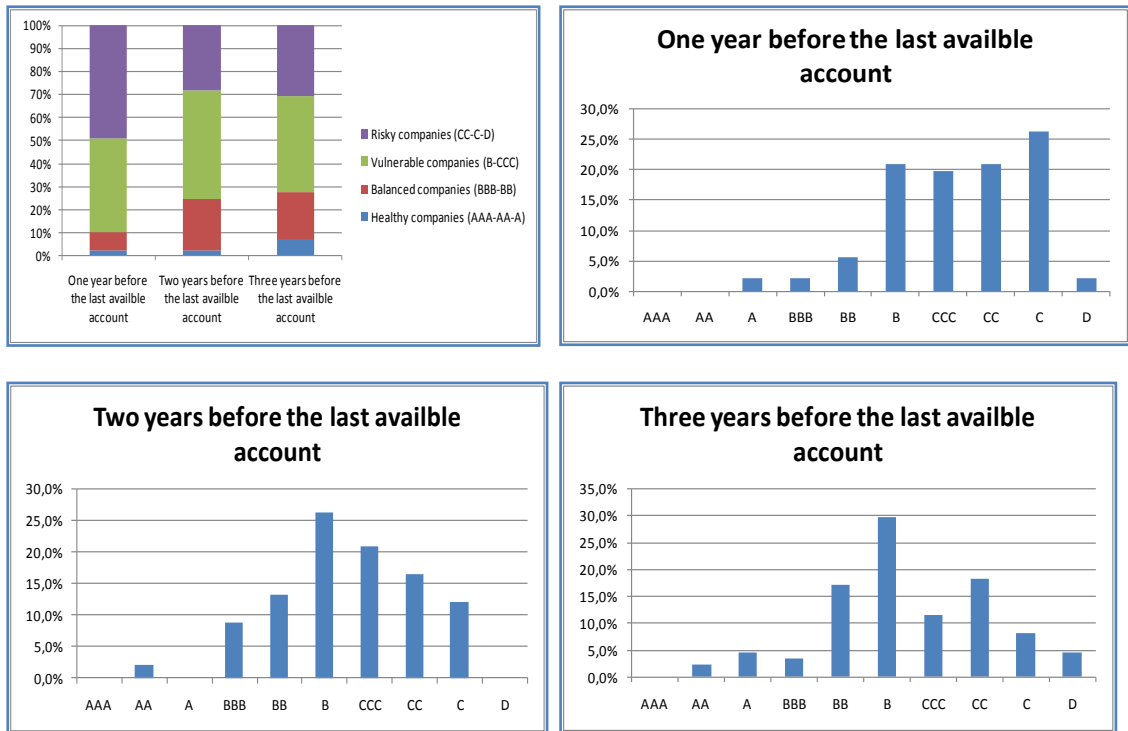
Graph 49: Dynamic of defaulted companies: rating distribution and mean rating (North America ORBIS database)
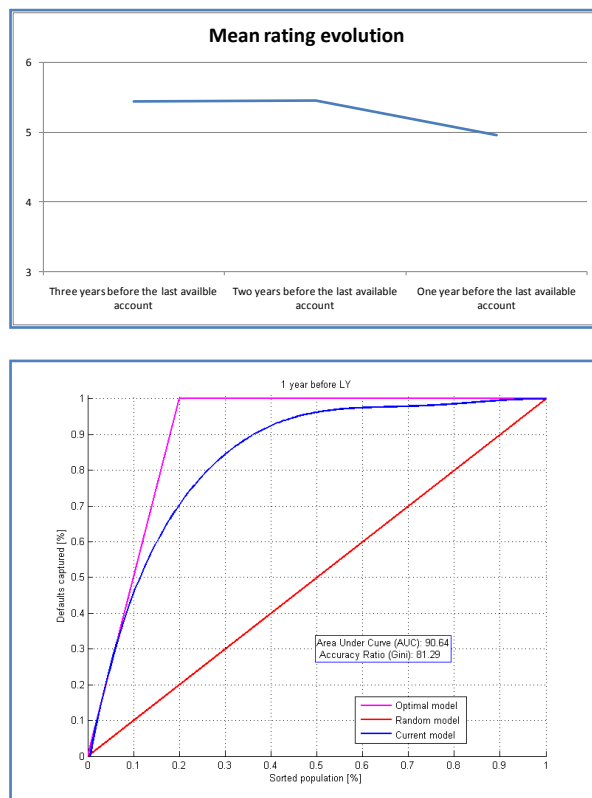
Graph 50: Mean rating evolution and ROC graph: North America ORBIS database

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Validation of the MORE rating in Far East
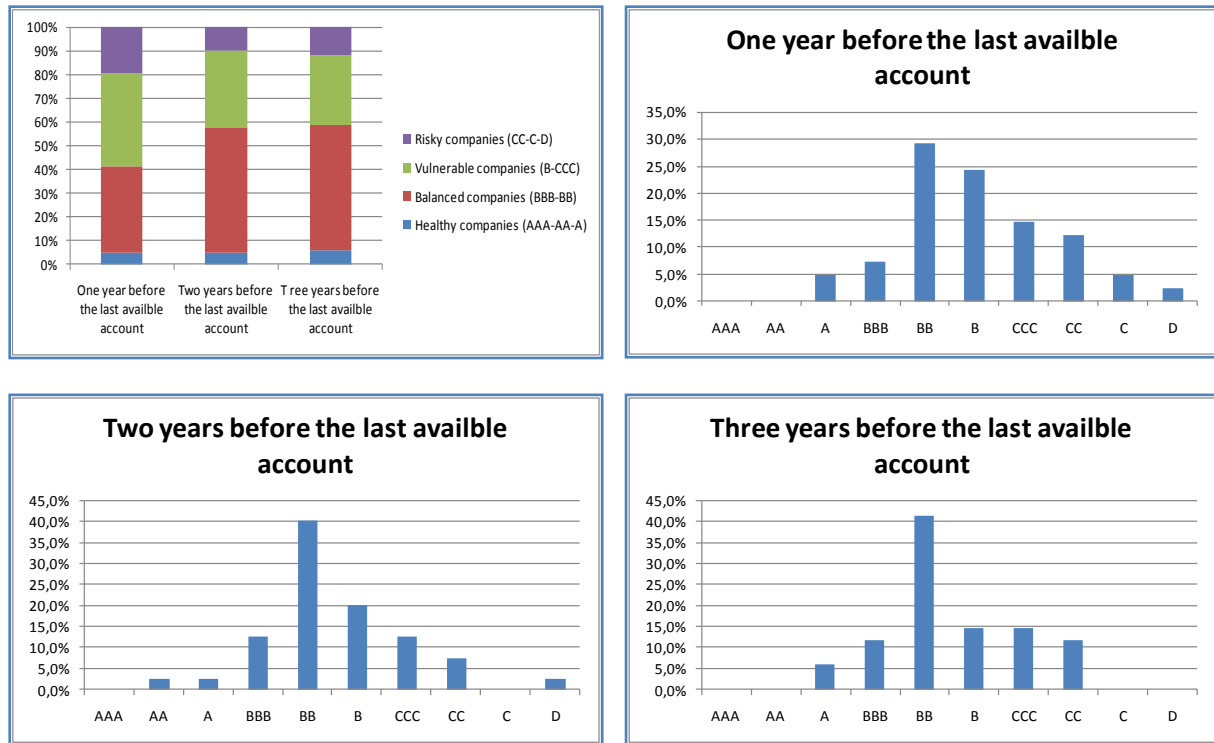
Graph 51: Dynamic of defaulted companies: rating distribution and mean rating (Far East ORBIS database)
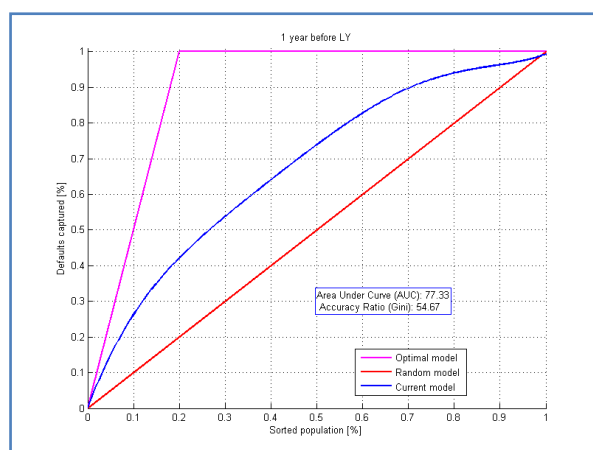
Graph 52: Mean rating evolution and ROC graph: Far East ORBIS database

For Far East companies, for the first step MORE Ratings classified around 60% of defaulted companies as vulnerable (or worse). As the second step an AUC value of 77.33 was obtained for the period one year before bankrupt.

Comments on Continental Macro Areas Rating Evaluation

From the graphs of the MORE rating evaluation in the different Continental Areas (Graphs 45, 46, 47, 48, 49, 50, 51, 52) it is possible to observe that the behavior of the MORE rating is quite stable and accurate. In every Continental Area there is a clear downgrade of the ratings of the defaulted companies approaching to the bankrupt data.

As it is possible to observe from the following table, the accuracy of the MORE rating is quite high all around the world. MORE rating obtains one slight difference only for the Far East evaluation where the number of bankrupt companies is very low to have an accurate statistical analysis.

Continental Macro Area	AUC value one year before bankrupt (Gini value)	AUC value two year before bankrupt (Gini value)	AUC value three year before bankrupt (Gini value)
West Europe	0,83 (0,66)	0,76 (0,52)	0,72 (0,44)
East Europe	0,83 (0,66)	0,77 (0,54)	0,74 (0,48)
North America	0,9 (0,8)	0,83 (0,66)	0,79 (0,58)
Far East	0,77 (0,54)	0,64 (0,28)	0,55 (0,1)

Table 18:AUC Values

Conclusions on Validation

In order to validate the MORE model, we used the bankruptcy information on companies found in ORBIS. The entire database and data from the 2008-2009 crises were taken into account.

Using two well-known statistical methods, ROC & Bankruptcy Dynamic the MORE ratings achieved very accurate and stable results for the entire database as well as data from the crisis period.

The results are stable and this is essential for the validation of the rating method. From this analysis we were able to confirm the worth of the "world" (entire database) validation.

In order to enhance the quality of the validation, the rating MORE has been evaluated on four different World macro regions. Also in those cases, the results are accurate and stable between different economical regions.

CHAPTER IV: FINANCIAL AND ECONOMIC ANALYSIS ON AGRI-FOOD COMPANIES IN ITALY, FRANCE AND SPAIN

This section aims to analyze the agri-food companies' financial health in terms of several financial and economic indicators such as number of the companies within the sector, economic scale, turnover, liquidity, leverage, profitability and eventually the MORE ratings assigned to the companies. In the further parts, the comparison of Italian companies with French and Spanish companies; and more specifically the analysis of Friuli- Venezia Giulia will be carried out. As regards the phases of the analysis to achieve the results it should be noted that:

- The data used within the analysis were obtained from Bureau Van Dijk (BVD) –ORBIS Database.

- Analyses were conducted over the period 2008 - 2010.

- The NACE code of the companies those are selected from the database is: 01-Crop and animal production, 02-Forestry and logging, 03-Fishing and Aquaculture.

- The ratings of the companies were computed via MORE rating model of which features were explained in the previous section.

The analysis will be divided sub groups as General Overview, Solvency, Liquidity, and Profitability and finally MORE ratings assigned.

General Overview of Agri-food Companies in Italy

According to the statistical analysis carried out for the period 2008-2010, Italian agri-food companies have had fluctuations in terms of number of the companies. The graph 53 illustrates that the number of the agri-food companies was higher in 2009 compared to 2010. Using the ORBIS database, the number of the companies in agri-food sector was obtained in absolute terms 13,693, 14,708 and 14,335 in 2010, 2009 and 2008, respectively. The decrease in the number of the companies in 2010 reminded the impacts of recent economic and financial downturn on the country base.
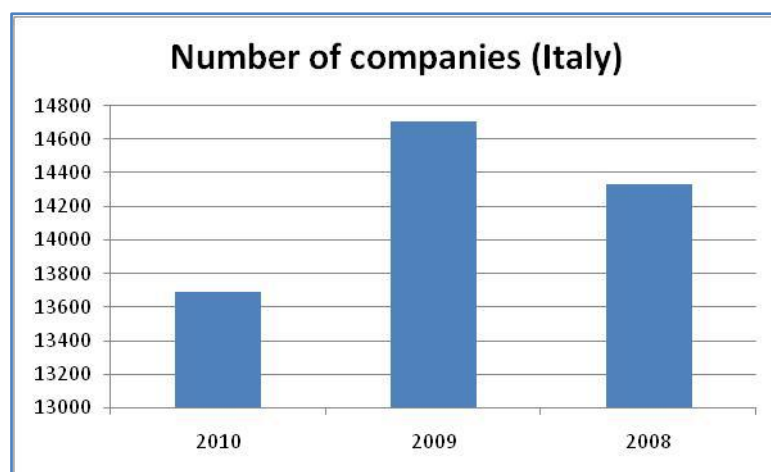
Graph 53: Number of companies in Italy, source: ORBIS Database

To conduct a dimensional analysis over Italian companies in the industry, for each year, the total turnover of the sector was calculated. The output of these analyzes are summarized in the following graph:

Graph 54: Total turnover trend
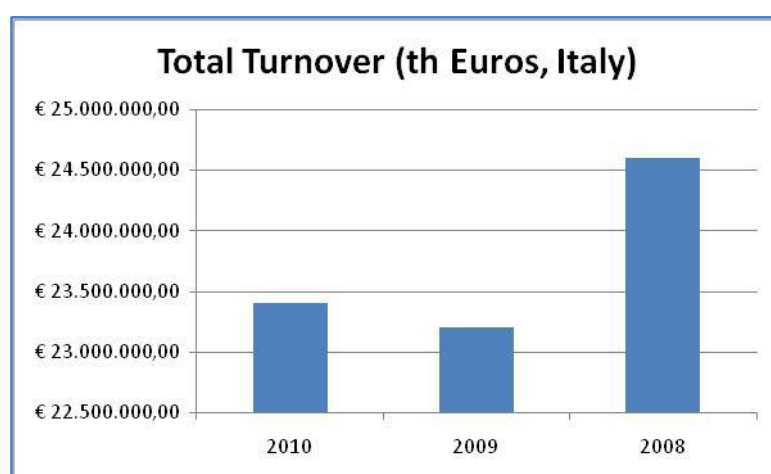
According to the graph 54, as over the years, the aggregate values of turnover has shown some instability, among the three years the highest total turnover value is captured in the year 2008 with 24,600,000 thousands Euros followed by a fall to 23,200,000 thousands Euros in 2009 and a modest increase in 2010 reaching 23,400,000. This might be interpreted as the companies started to recover in early 2010 and achieved an increase in turnover.

In order to comprehend dimension of the agri-food companies which are subject to this study; the turnover distribution was conducted, results of the study was exhibited in the graph 55. As early mentioned for European agricultural sector is composed of mainly Medium and Small Sized

Enterprises (SMEs), for the sector in Italy, this fact is still valid. Even, according to the statistical studies executed, the sector's majority comprises micro companies.[49]

Graph 55: Turnover structure
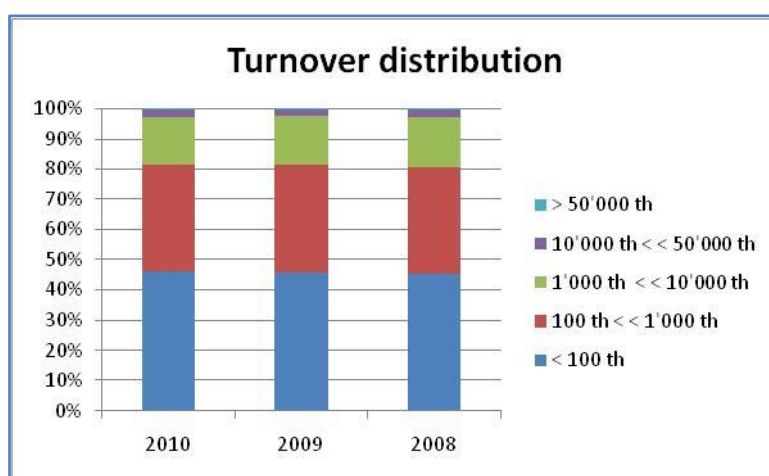
In Italy, indeed, the enterprises in agri-food sector met the standards which are even below the "micro" enterprises according to the EU definition. That is, 46.17 %, 45.97% and 46.17% of the companies in respectively 2008, 2009 and 2010 obtained a turnover less than 100 thousand Euros. This ranking was followed by the companies which reached a turnover between 100 thousand and 1,000 thousand Euro with the shares of 35.36%, 35.41% and 35.19% in 2008, 2009 and 2010, respectively. It is interesting to note that the lowest share in the turnover distribution belongs to the companies generating a turnover above 50,000 thousand Euros.

Solvency Analysis of Agri-food Companies in Italy

In order to understand the economic and financial strength of the sector in Italy, some financial ratios were considered to be most suitable for this purpose. One of the indices that is significant to comprehend the ability of one company in paying its obligations in due period: Leverage.

Leverage or Gearing is the relationship between debt and equity[50]. Raising finance from external sources increases risk because; in the case of loans there is a cost (interest) and an obligation to repay the loan. Accordingly, management of the companies should make sure the balance between debt and equity finance is appropriate for the business being conducted. In case of too much debt, a company is said to be highly geared; a low-geared company is financed mainly by its shareholders. For a general definition of the leverage indicator:

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[49] According to European Commission's SME definition; "small" companies are expected to have a turnover $\leq$ 10 million Euros and "Micro" companies do have a turnover that is $\leq$ 2 million Euros : http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

[50] "A Guide to Analyzing the Companies", Bob Vause, The Economist Publishing

$$\text{Leverage} = non\ current\ liabilities + current\ liabilities/equity$$

According to the studies regarding the leverage, the following results illustrated in graph 56 were obtained. The leverage median results show that agri-food companies in Italy had fluctuations reaching a maximum value in 2010 with 2.6 while in 2009 (2.41) and in 2008 (2.39) values were having relatively lower results within the period analyzed. The rise from the year 2009 to 2010 is worth to mention exhibiting Italian companies started to have higher level liabilities in their balance sheets.

Graph 56: Leverage structure
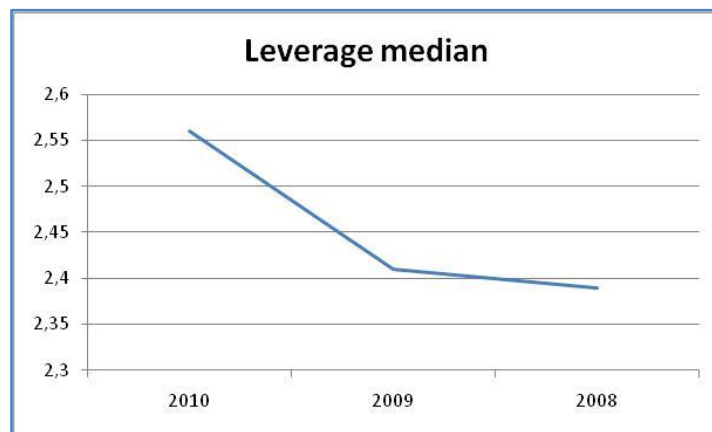
Distribution of leverage (see graph 57) illustrates that companies which have a leverage value higher than 5 composes the majority of the industry. In 2008 this value captures 37.60%; in 2009 37.58% and finally in 2010 38.53%; this can be interpreted as the Italian companies are carrying heavy loads of the liabilities in their balance sheets which have even increased in 2010.

Graph 57: Distribution of leverage
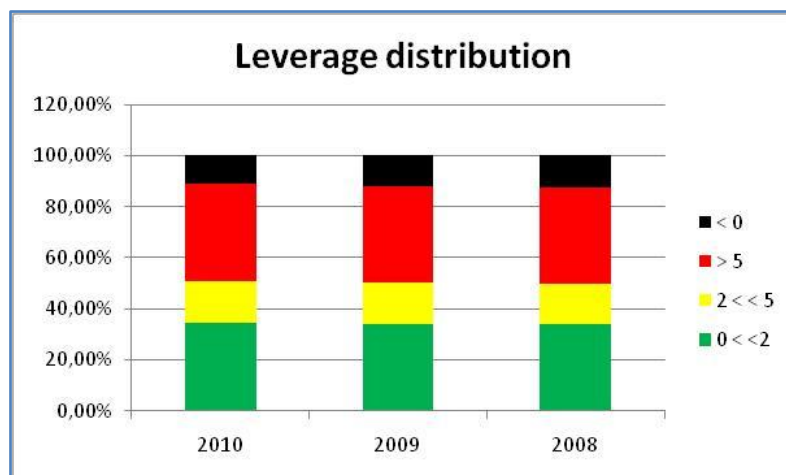
The analysis of solvency was conducted by proceeding with "Financial Leverage" of agri-food companies which aims to express the state of the financial equilibrium with the following indicator:

$$\text{Financial Leverage} = \frac{Total\ Long\ Term\ debt + Loans}{Equity}$$

The results of studies for understanding financial leverage level of companies are exhibited with graph 58. According to that, like leverage indices, financial leverage median values rose in 2010 reaching 0.9 while it was 0.83 in 2009. This can be understood as Italian companies have had an increasing trend in level of debts they utilized to finance their operations.

Graph 58: Financial leverage
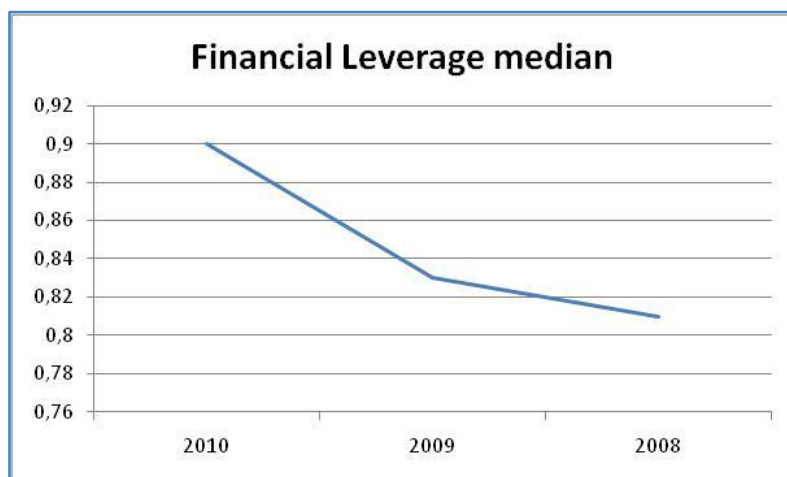
Distribution of financial leverage illustrates that companies which have financial leverage less than 1 still have the majority as this value captures 42.7% in 2008, 43.4% in 2009 and 42.5% in 2010. The companies having a financial leverage ratio above 3 come in second place for three years (2008: 27.5%, 2009: 28.2% and 2010: 29.5%); nevertheless this also shows a fact that those companies which have financial leverage below 1 decreased in 2010 while the companies which have financial leverage above 3 increased in 2010.

Graph 59: Financial Leverage Distribution
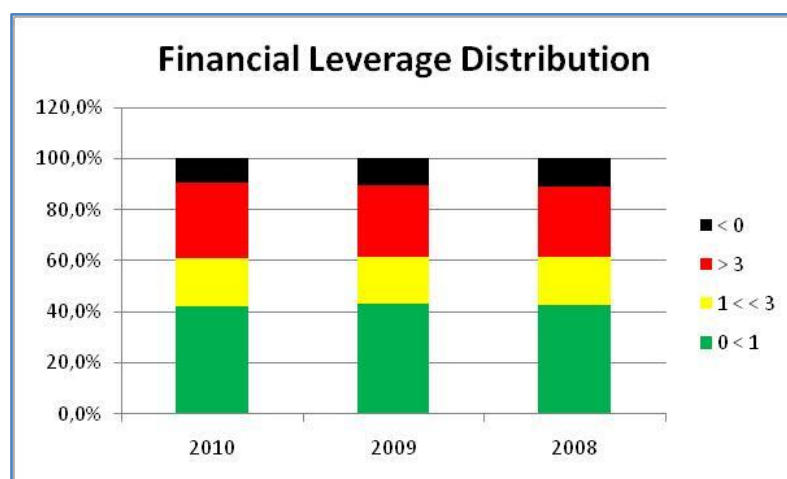
Liquidity Analysis of Agri-food Companies in Italy

In order to understand the liquidity of companies within the industry; first current ratio, then quick ratio were computed. Current ratio which links current assets to current liabilities showing the companies' ability to meet its short term obligations is computed as follows:

$$\text{Current ratio} = \frac{Current\ Assets}{Current\ Liabilities}$$

The results of studies for liquidity show that companies' current ratio median showed instabilities as: from 2008 to 2009 from 1.025 to 1.022; then with a rise reached 1.038 in 2010. Following a general opinion that a current ratio below 1 can create cash flow problems, it can be stated that Italian companies have just passed the threshold since they have a value only slightly above 1.
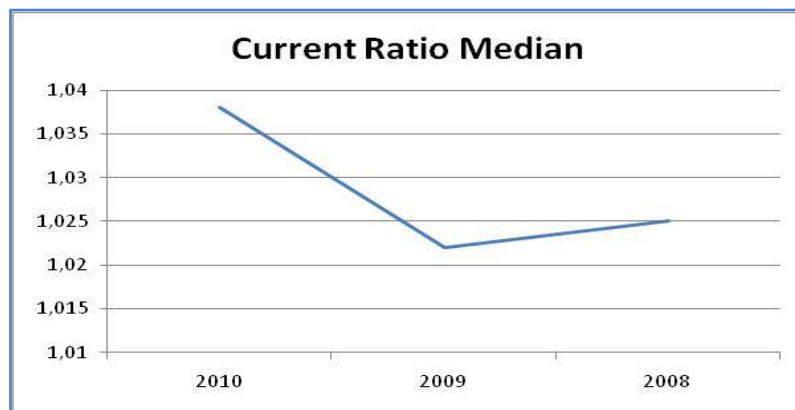
The distribution of current ratio also illustrates that agri-food companies which have current ratio value above one (1) still have the majority and increased with a modest share from 52.5% in 2009 to 53.7 % in 2010.
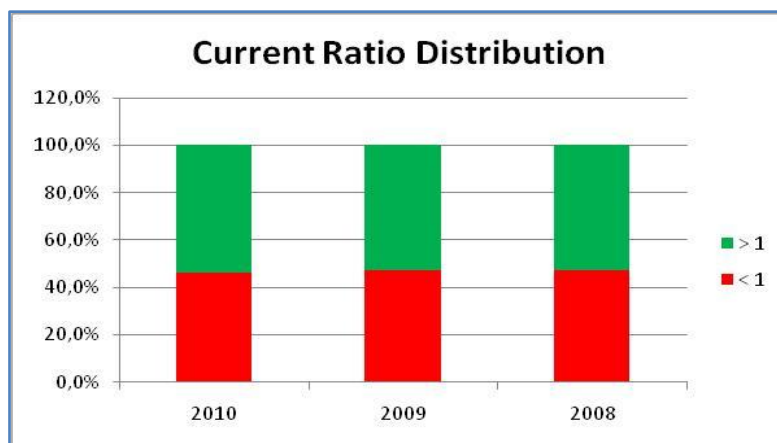
As a second indicator of liquidity, the "Quick Ratio" is selected which is an effective measure of one company's short-term financial position. According to this indicator, it is assumed that inventories will not provide an immediate source of cash in case of need, so they are ignored. It is calculated as follows:

$$\text{Quick Ratio} = Current\ Assets - Inventories \Big/ Current\ Liabilities$$

The results of the quick ratio calculations according to our calculations are exhibited with graph 63. Quick ratio median reveals that Italian companies had a fall in 2009 and captured 0.76 within the analyzed period, having an increase in 2010 (reaching 0.78) .These two liquidity measures might indicate a rise in current liabilities in 2009.

Graph 63: Quick ratio median
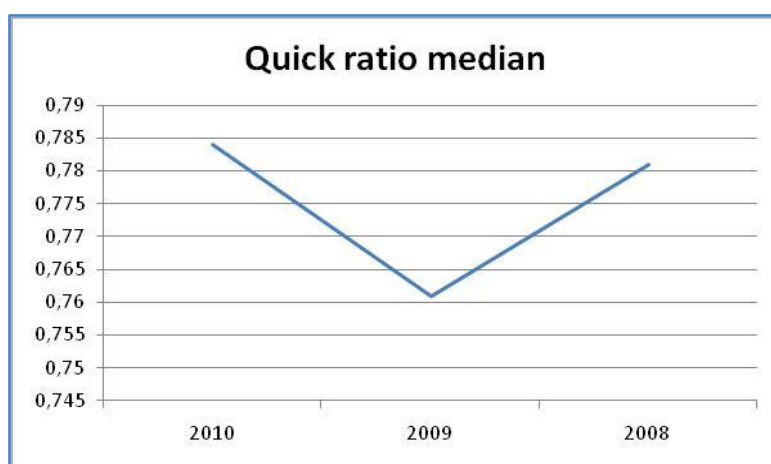
Distribution of quick ratio median shows that most of Italian companies in agri-food sector have had quick ratio median values below 1; accordingly 61.8 %, 62.3% and 61.0% of companies in 2008, 2009 and 2010, respectively had quick ratio median less than 1. This can be interpreted as a major share of the companies in Italy might meet difficulties in covering their short term liabilities completely, without selling any inventory or borrowing money.
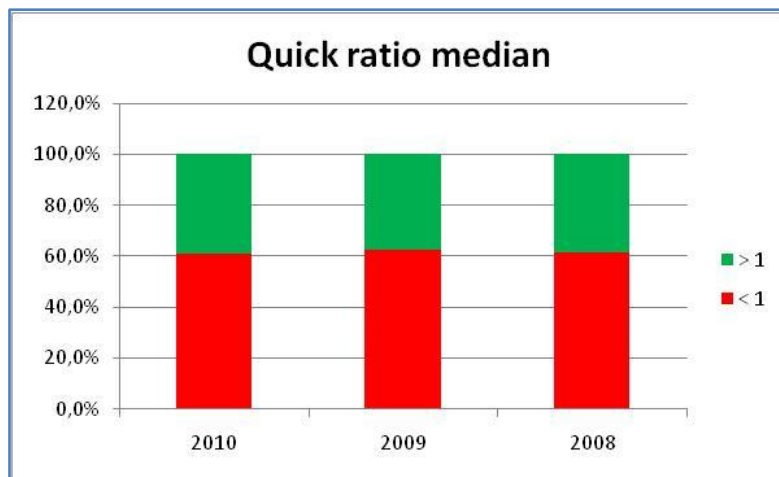
Profitability of Italian Agri-food Companies

In order to analyze profit levels of companies in the sector, firstly "Return on Investment" (ROI); secondly "Return on Equity" (ROE) ratios were computed. The ROI indicator helps us for understanding how profitable one company in relation to its assets. It is calculated via dividing profit by assets expressed as a percentage. According to the median ROI results of Italian companies in agri-food (graph 65), the highest ROI value is observed in the year 2008 which is 0.307% then had a dip in 2009 and fell to 0.157%; and a again reached 0.253 % with a rise in 2010.

$$ROA = {Profit\ Before\ tax}/{Total\ Assets} \times 100$$

Graph 65: Return on Investment results
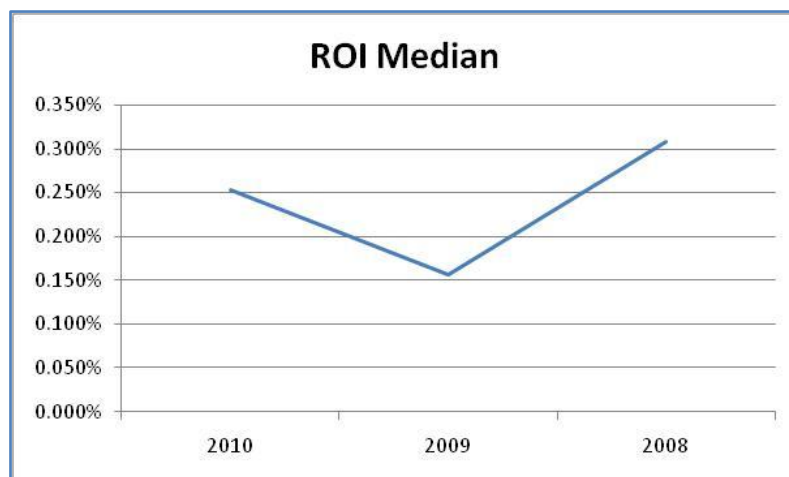
The profitability results will be analyzed once again in the comparison of Italian companies with French and Spanish companies.

Distribution of ROI indices (graph 66) gives ideas regarding performance of the worst and the best performing companies within the industry; for instance the worst companies in the 5 percentile are having a ROI around -30 % while the best companies representing the first 5 percentile are having a ROI indices around 14-15%. An interesting detail to note is that the ROI indices are not showing big differences within the years: e.g. the first 5 % are having a ROI values as follows; in 2010 14.9%, in 2009 14.9 and in 2008 15.0%.

Graph 66: ROI Distribution
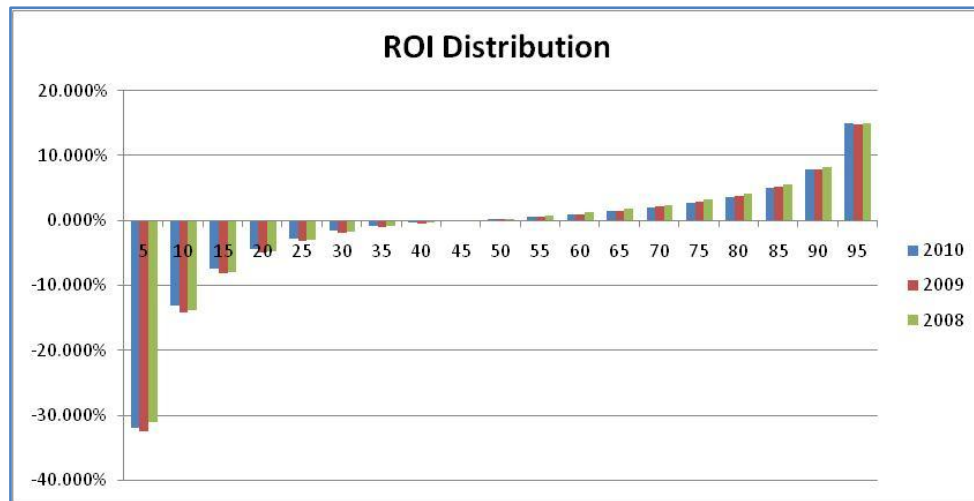
As the second indices of profitability, Return on Equity (ROE) is applied to companies throughout the analysis. ROE indices refer the amount of net profit returned as a percentage of shareholders' equity and calculated within analysis as follows:

$$ROE = {Net\ Profit}/{Total\ Equity} \times 100$$

"Return on Equity" indices of Italian agri-food companies have shown the following trends: ROE median being negative for three years, in 2008 it was -0.17% had the lowest value in 2009 (-0.27%) reaching zero (0) in 2010. The remarkable point of this analysis is that the year 2009 was a year of the highest ROE results in agri-food industry in Italy.

Graph 67: ROE Median
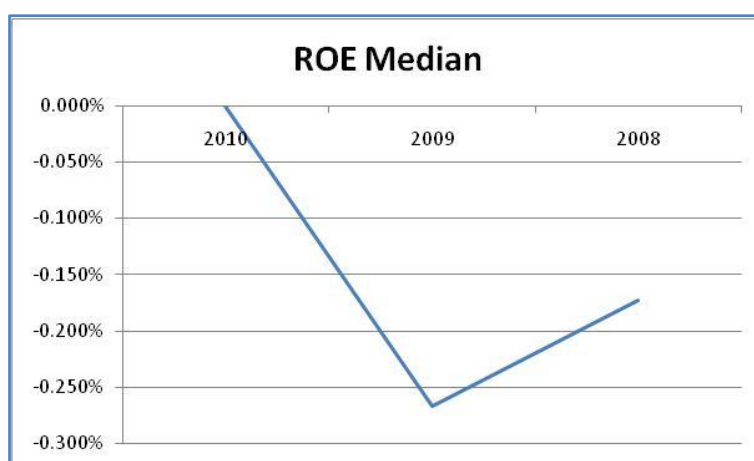
The distribution of Return on Equity is exhibited with graph 68 illustrating the lowest 5 percentile that have the ROE values as (-) 247.1%, (-) 252.85%, (-) 242% in 2010, 2009 and 2008, respectively whereas the highest 5 percentile of the ROE indices have 53.3%, 51%, and 53.7% in 2010, 2009 and 2008, respectively. Like Return on Investment's distribution among the years, there are no big differences observed in terms of Return on Equity values.

Graph 68: ROE Distribution
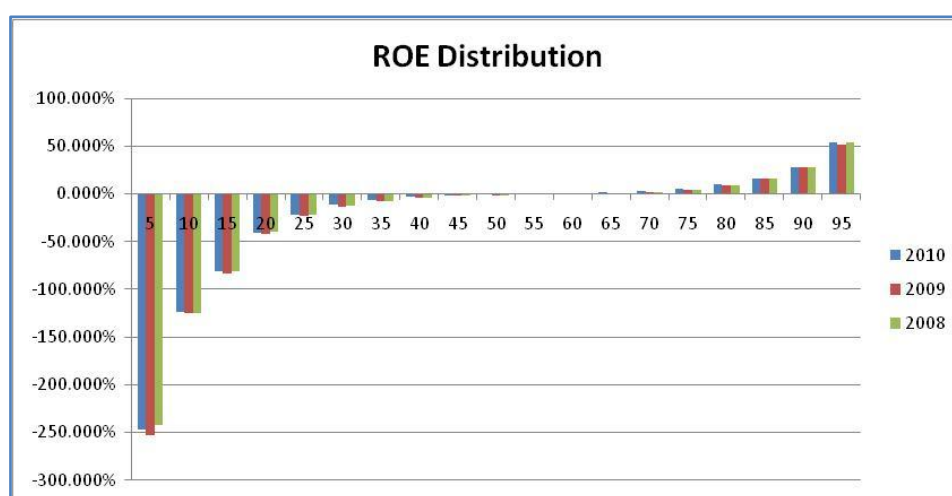
As a last indicator of profitability, following graph demonstrates how the performance of Italian companies in generating or losses goes for the analyzed period. For all the years 2008, 2009 and 2010 Italian companies have generated losses more than profits at the end of the year. The highest share of companies with losses is found in 2009 (56% of the total companies) while it arrives 55% for 2008 and 53.4% for 2010.
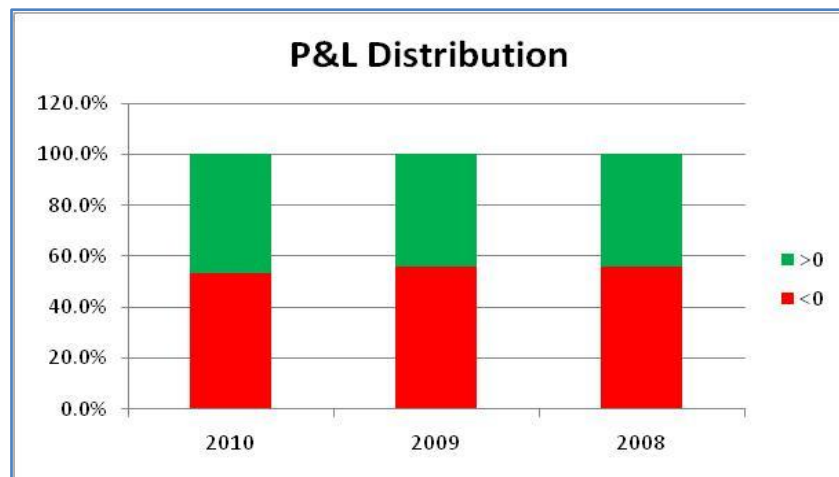
MORE Ratings Evaluation

Until this phase, all financial aspects which are basis of MORE Rating were analyzed with details. According to these results, MORE Ratings were computed; and in the following part the ratings assigned to Italian agri-food companies will be presented. Firstly, mean rating of the companies in 2008, 2009 and 2010; afterwards distribution of the ratings among years and different rating classes will be exhibited.

Illustrated in the graph 70, mean rating of Italian companies does not show instabilities in three years. The values on y-axis: 5, 6 and 7 are representing the rating classes as follows: CCC, B and BB, respectively. Accordingly, Italian companies' mean rating remains almost in same rating class: B where a slight tendency of decrease is observed in 2010.

Graph 70: Mean Rating
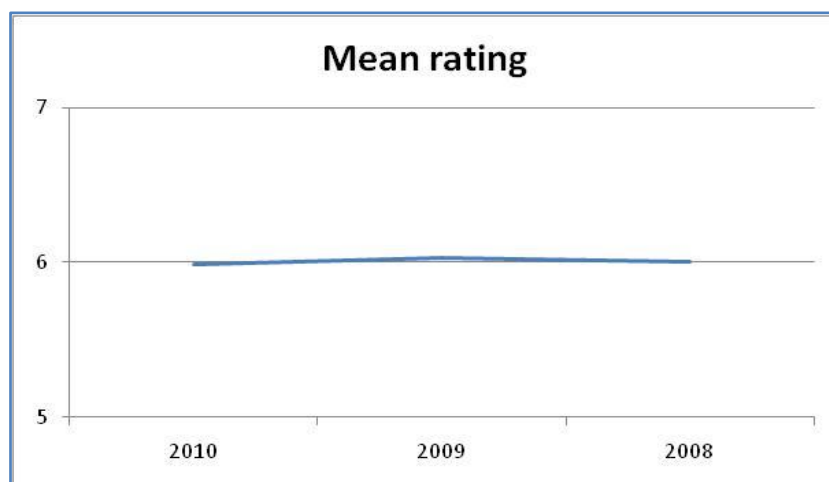
MORE Ratings distribution shows that for the three years: 2008, 2009 and 2010, the majority of the companies are gathered in "B" Rating Class (around 25% of the companies for three years). Again for all three years, the second most assigned rating class is BB which represents the sector average. For the highest rating class "AAA", unfortunately the studies did not indicate any companies, while 1.48%, 1.42% and 1.35% of total number of companies in 2010, 2009 and 2008, respectively are assigned with the lowest rating class "D".

Graph 71: Rating distribution of Italian companies
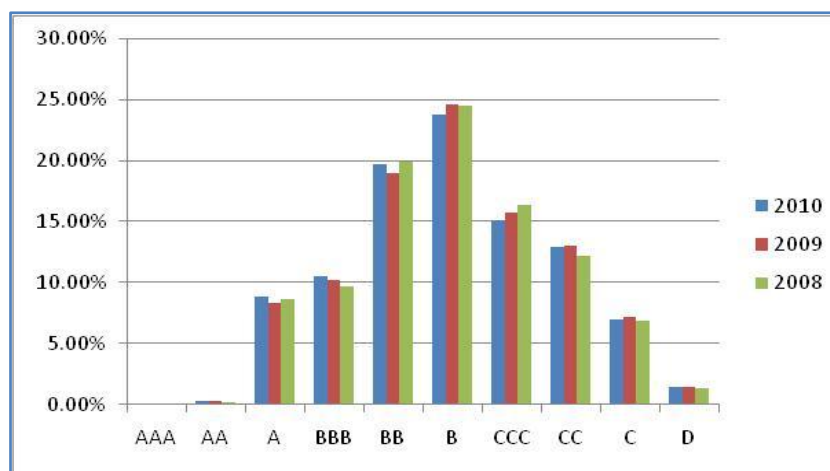
When the years are analyzed one by one in terms of the rating distribution, the first detail taking attention is for three years, the highest share of Italian companies in agri-food sector belongs to Vulnerable Macro Classes (B-CCC). This macro class captured 40.96% for 2008, 40.43% for 2009 and 39.04% of total companies for 2010 showing a fall from 2008 to 2010. Vulnerable Macro Class is followed by Balanced Macro Class (BBB-BB) with a share of 29.65% in 2008, 29.22% in 2009 and 30.36% in 2010. The falling trend from 2008 to 2010 in Vulnerable Macro level and increasing level in balanced macro level are modest positive improvements. Nevertheless, the shares of Risky companies come in the third place with 20.46% in 2008, 21.68 % in 2009 and 21.39 % in 2010. Risky companies refer the ones assigned with CC, C and D MORE rating classes. The smallest share belongs to Healthy Macro Class having 8.93% in 2008, 8.67 % in 2009 and 9.21% in 2010 where healthy companies comprise the ones assigned with AAA-AA-A.

Graph 72: Distribution of macro Rating classes
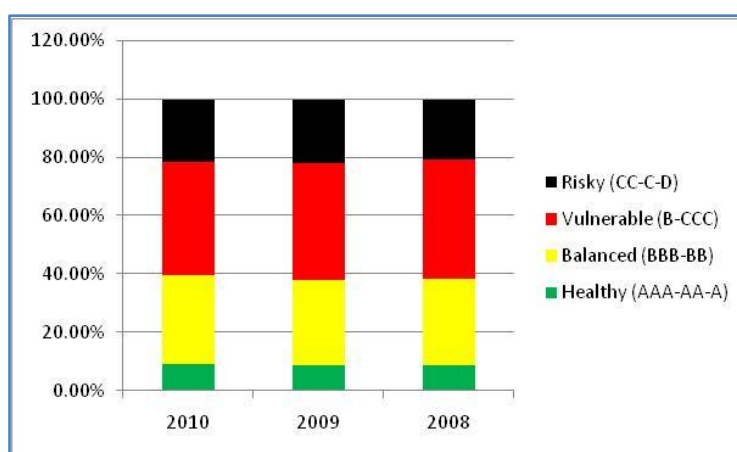
Comparison of Italian, French and Spanish Companies in Agri-food Sector

In this section, like throughout the previous section, in the first phase financial and economic behaviors of companies will be deeply analyzed; followed by the second phase where ratings assigned are presented. In both phases, the analysis will be based on comparison of Italian companies with French and Spanish companies. The formulas utilized to compute financial ratios will not be exhibited repeatedly since unique formulas were used during the whole analyses.

General Overview

In order to view structural features of companies, number of the companies was designated in three countries. In accordance with statistical studies carried out through ORBIS database, number of companies is presented in graph 73 illustrates that the mutual point of three countries is the decline in the number of companies in year 2010. For three years, the lowest number of companies belongs to France. The biggest change from 2008 to 2010 is observed with Spanish companies since there were 16,839 companies found in 2008 falling down to 10,069 companies in 2010. Italian companies recorded an increase in 2009, however a decrease in 2010 in terms of number.

Number of companies
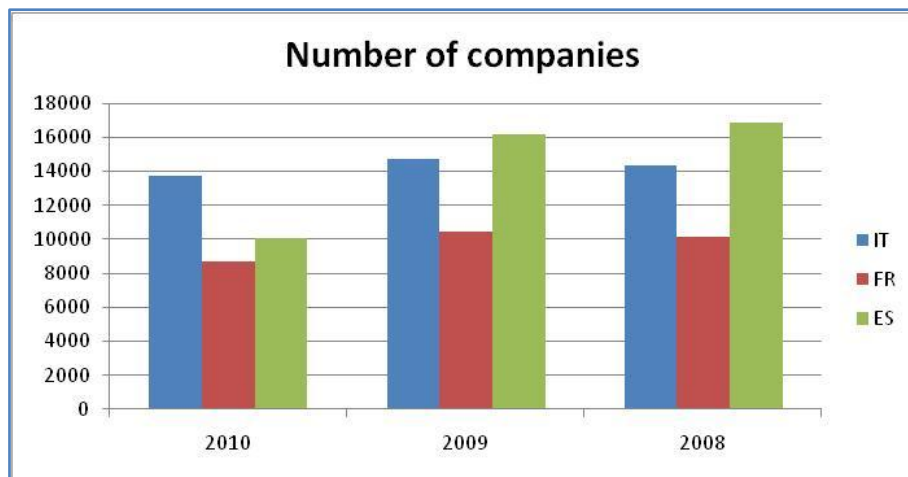
In order to compare dimensions of companies in three countries, the turnover indicator was analyzed in terms of both total value and distribution. Total turnover graph 74 shows an interesting detail for Italian companies that they have had the highest total turnover among all in 2008, 2009 and 2010. Spanish companies came as second in the ranking, recording a steady fall towards 2010. French companies are third in the total turnover, also presenting a decrease from 2008 to 2010. Italian companies recorded a fall in terms of turnover in 2009, however in 2010 a modest increase in the turnover is observed.

Graph 74: Total turnover

Total Turnover (th Euros)
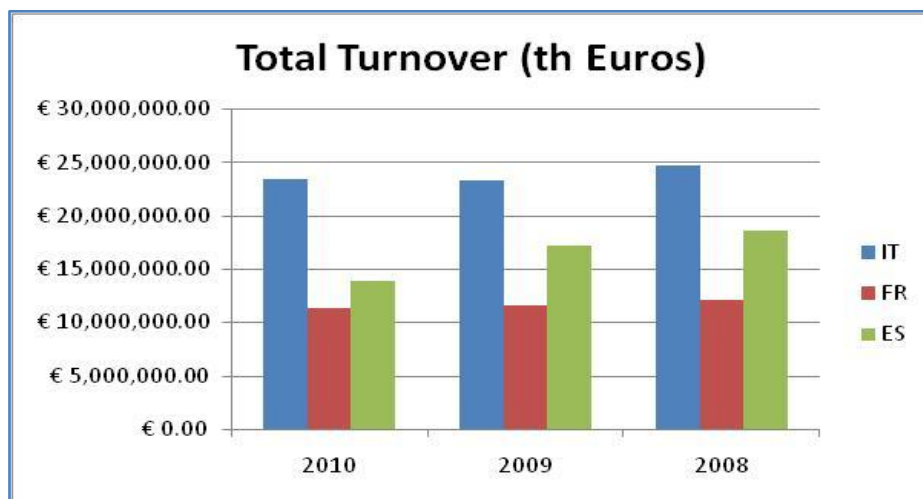
Turnover distribution aimed to illustrate economic scale of the companies in Italy, France and Spain. Statistical studies based on 2010 total turnover's absolute values show main differences among three countries: Italian companies mostly comprise micro companies with a turnover values below 100 thousand Euros; French companies' majority have a turnover between 100 thousand Euros and 1,000 thousand Euros (58.26%) which is valid for Spanish companies (55.98%) as well.

There is one common property of all three countries is that the lowest share belongs to the companies which generate a total turnover value above 50,000 thousand Euros. This fact once again proves the fact that companies in agri-food sector are mainly composed of Small and Medium Sized companies.

Graph 75: Turnover distribution
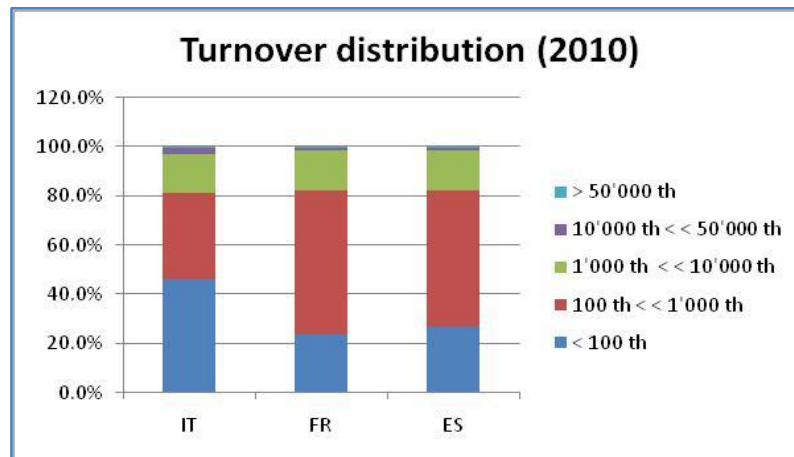
Solvency Analysis of IT, FR and ES Agri-food Companies

Leverage median results gave us a chance to evaluate the countries with a trend analysis within the years, moreover to compare their solvency performances with each other. Accordingly, French companies tend to have a fall in leverage results from 2009 to 2010 while Spanish companies' leverage has remained almost same (around 1). Comparing three countries agri-food companies, it is observed that Italian companies have had the highest leverage ratio result in three years in comparison with French and Spanish companies leading to a higher default risk for the companies.

Graph 76: Solvency results
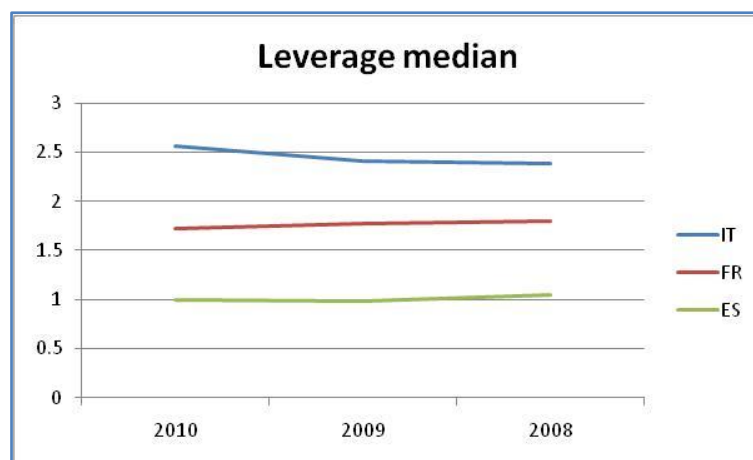
The distribution of leverage in 2010 illustrates a comparison of how strongly companies used external financial resources to run their operations in each country. For France and Spain, the

highest share belongs to the companies whose leverage is between "0" and "2" while in Italy the highest share belongs to those which have leverage more than 5. Negative leverage refers negative shareholders' funds; for three countries the lowest share is occupied by negative shareholders' funds (Italy: 10.82%, France: 13.38%, Spain: 13.40%). Spain had the highest share of companies with negative leverage in 2010.

Graph 77: Leverage comparison
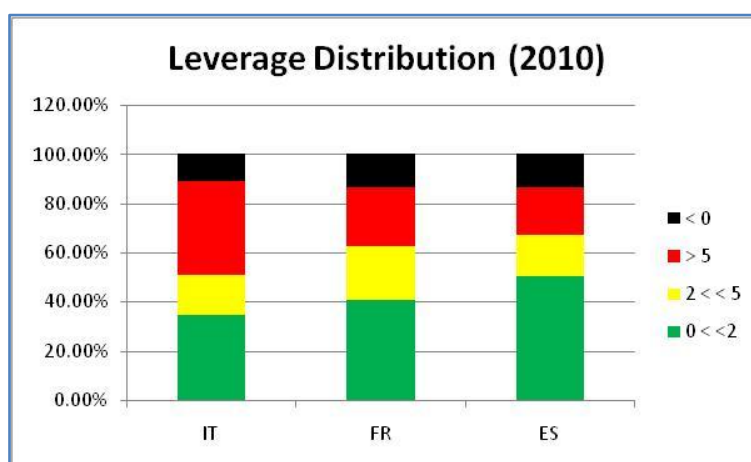
As it is analyzed previously for Italian companies, after leverage indicator, financial leverage was computed for French and Spanish agri-food companies in order to have a comparative analysis. The results obtained are illustrated firstly in terms of median values, then in terms of distribution. In terms of median values, in three years, France and Spain have almost kept their stability whereas Italian companies in 2010 increased the financial liabilities in their balance sheets.

Graph 78: Financial Leverage
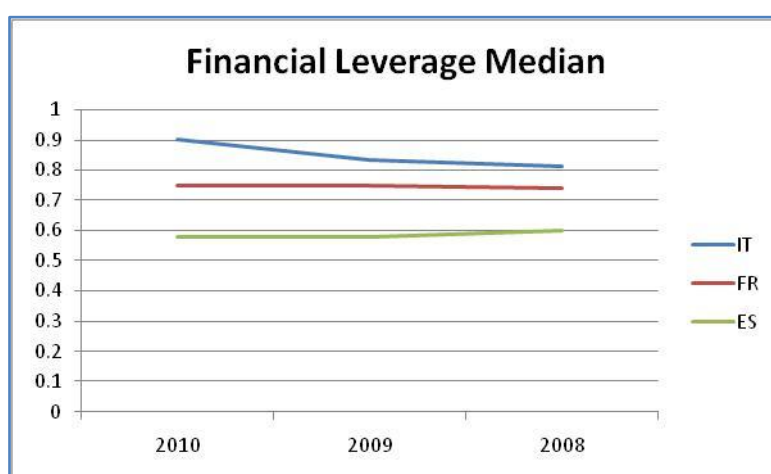
When compared the median financial leverage values among the countries, Italian companies show the highest values in three years (2010: 0.9, 2009: 0.83, and 2008: 0.81). According to this, it

can be stated that in Italy the companies have used relatively higher amounts of long term debts and loans in order to finance their operations.

Distribution of financial leverage (see graph 79) illustrates that, in 2010, all of the three countries' companies had a financial leverage of a value between "0" and "1" with the highest share (IT: 42.5%, FR: 43.6%, ES: 47.6%). Financial leverage ratio above "3" comes in the second place for Italy (29.5%) and the ratio results capturing between "1" and "3" comes in the second place for France (22.2%) and Spain (19.8%).

Graph 79: Financial leverage comparison
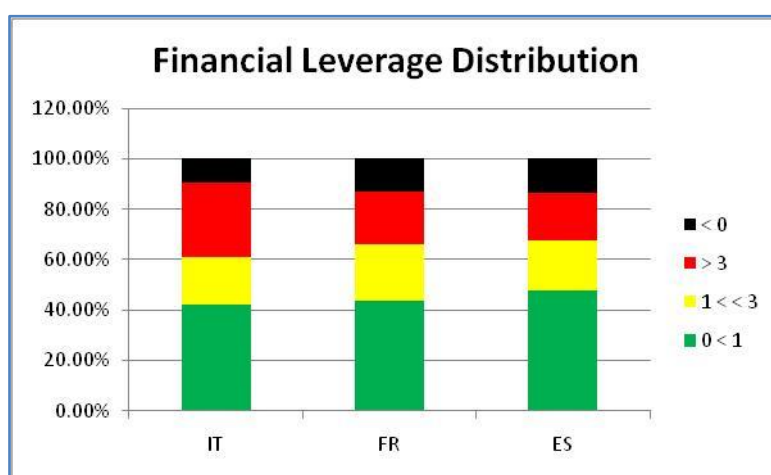
Liquidity analysis of the Companies in Italy, France and Spain

Liquidity analysis is carried out by computing current and quick ratio as carried out during earlier phases. According to Median Current Ratio results of three countries' companies, there is an unstable overall picture: Italian and French companies show almost stable current ratio results (Italian companies have values which are below those of French and Spanish). Spanish companies' current ratio result has had a regular increasing trend from 2008 to 2010, reaching a higher level than the French and Italian companies.

French and Spanish companies have captured a current ratio above 1 for all three years where the two countries' companies have obtained the highest values in 2010 (FR: 1.17 and ES: 1.24).

Median Current Ratio
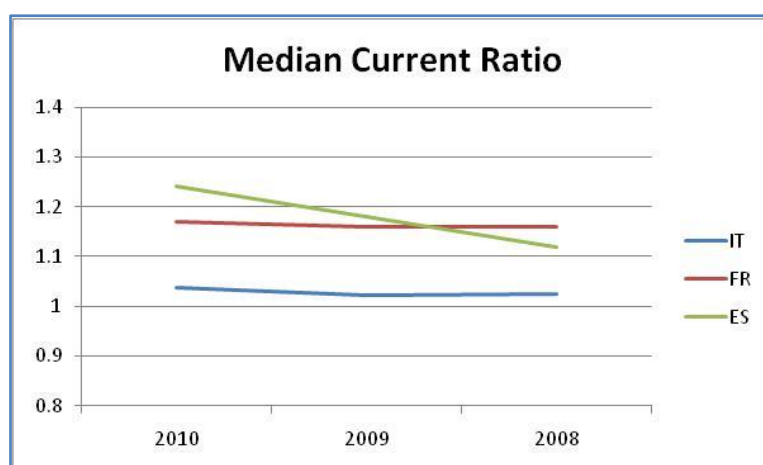
Nevertheless, the quick ratio results showed variations among the three countries as: in three years French companies have had the highest values. Within the three years, French companies exhibited a slight fall in 2010 compared to 2009. Italian companies, on the other hand, have had lower quick ratio result in 2009 followed with a rise in 2010. Spanish companies have showed a consistent increasing trend from 2008 to 2010. According to the two liquidity measurement indicators, Spanish companies steadily increased their liquidity.

Graph 81 : Quick ratio comparison

Median Quick Ratio
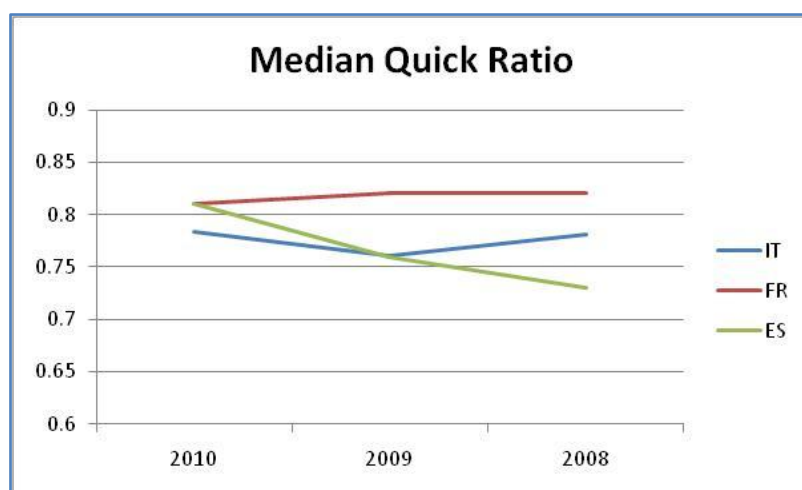
Profitability Analysis over the Companies in Italy, France and Spain

Profitability analysis is based on Return on Investments (ROI), Return on Equity (ROE) and P/L values at the end of the year. With reference to ROI results, French companies had highest results in three years (2010: 2.76%, 2009: 2.23% and in 2008: 2.85%) in comparison to those in Italy and Spain. France is followed by Spain in the second rank and Italy in the third rank. Spanish companies have had a regularly decreasing ROI results from 2008 to 2010 (2008: 2.17%, in 2009: 2.06% and in 2010: 2.04 %). In overall analysis, Italian companies have had the lowest ROI results in three years.

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Median ROI
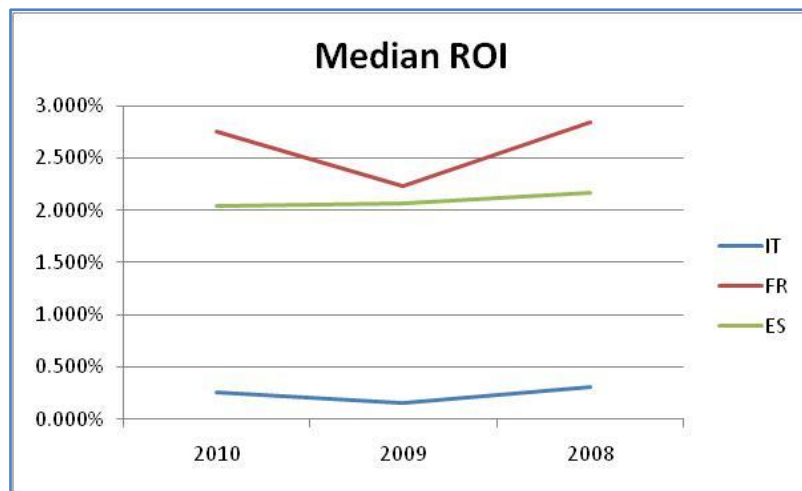
ROI distribution is illustrated in graph 83; so the best ROI and the worst ROI results are easily observed thanks to this graph. Regarding both the highest and lowest results of ROI, there are big differences among countries. Among the first best 5 percentile companies, French companies have had the highest results (28.6%); among the worst 5 percentile companies, Italian companies have had the lowest results (-32.04%).

ROI Distribution (2010)
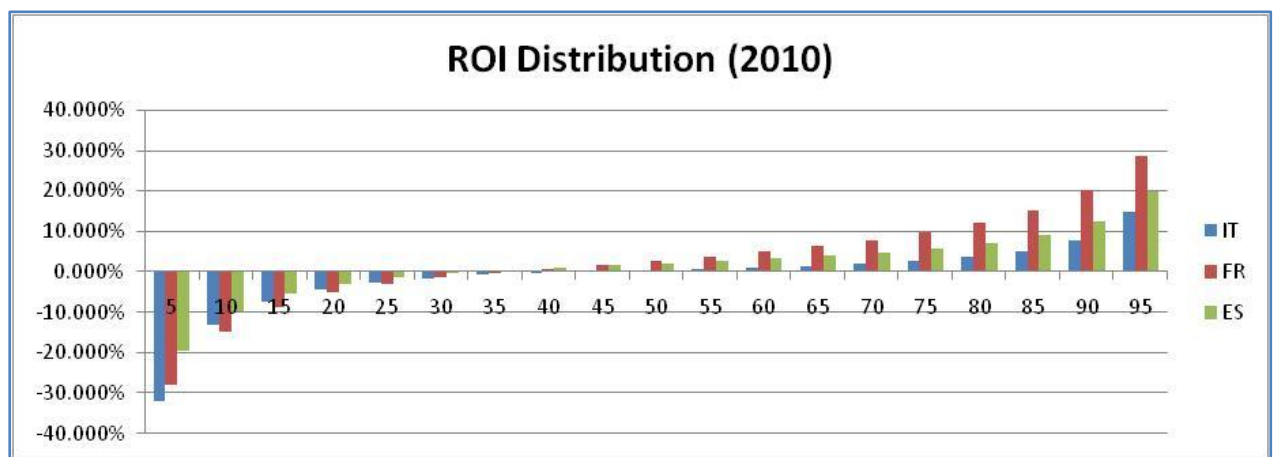
"Return on Equity" Median values show interesting results: Italian companies have had the lowest values (negative), Spanish companies have shown a modest increase (2008: 1.06%, 2009: 1.12 % and in 2010: 1.41%) while French companies, having the highest results, have recorded a decline in 2009 then increased in 2010 (2008: 8.54%, 2009: 6.39% and in 2010: 7.85%). Hence, it can be claimed that French companies in three year period has been the best in generating highest amount of profit with the money invested by shareholders.

Median ROE

IT
FR
ES
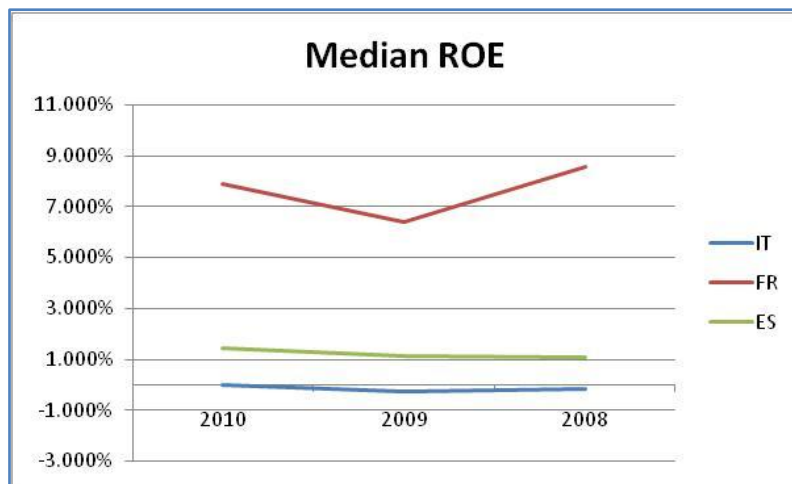
According to 2010 ROE calculation results, the distribution gives the following results: there are significant variations among the best and the worst companies. Among the best companies in the first 5 percentile, French ones have had the highest values while among the worst companies in the first 5 percentile, Italian ones have had the highest negative values.

ROE Distribution (2010)

IT
FR
ES
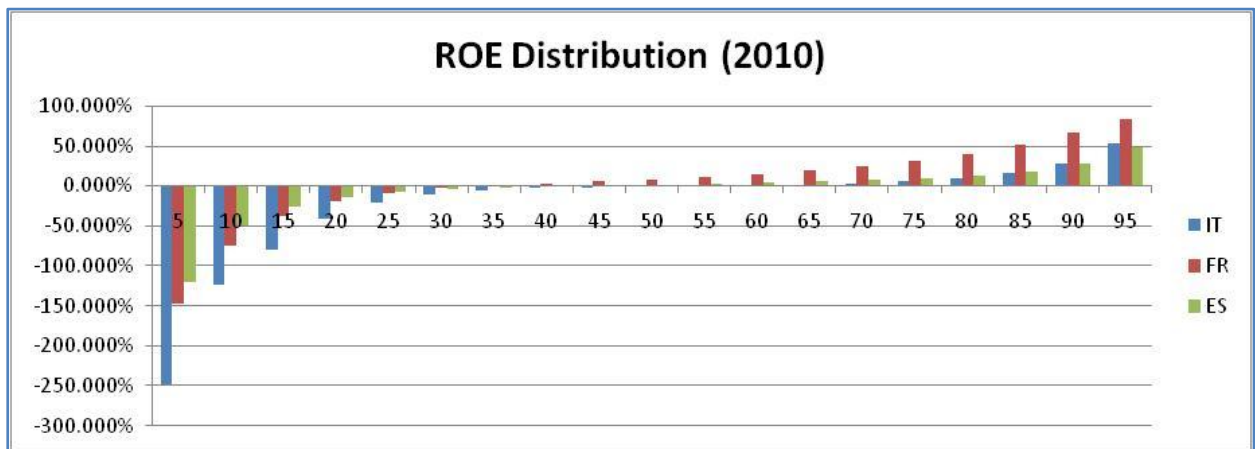
Profitability analysis is completed with "Profit and Loss Distribution" results. This study shows that the percentage of the companies ending fiscal year with the profit is the highest in France (for 2010: 69.1%); it is followed by Spain (63.9%). Italy is the unique country where companies ending the fiscal year with losses have a higher ratio (53.4%) than that of companies generating profits (46.6%) in 2010.

P&L Distribution (2010)
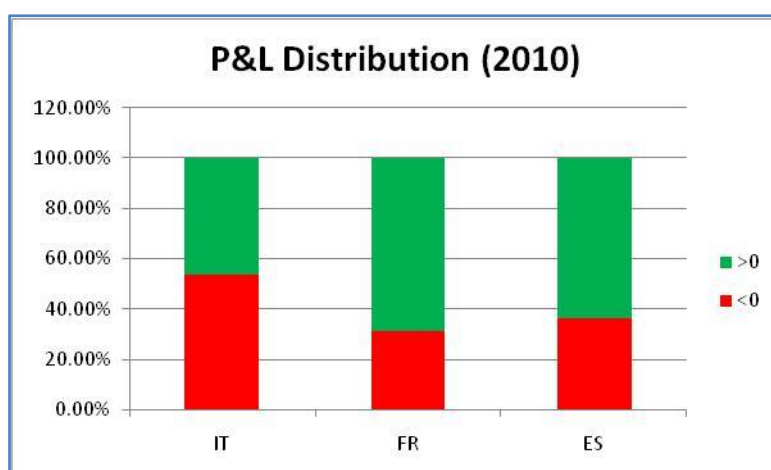
"MORE" Ratings Evaluation

According to the mean rating results, French and Spanish companies present similar values (here 4 represents "CCC", 5 represents "B", 6 represents "BB" rating class) having a tendency to rise after 2009. Italian companies have had the lowest mean rating class among three countries' companies in agri-food industry, remaining in B rating class, for three years and not indicating an improvement within three years.

Graph 87: Mean rating of IT, FR and ES

Mean Rating
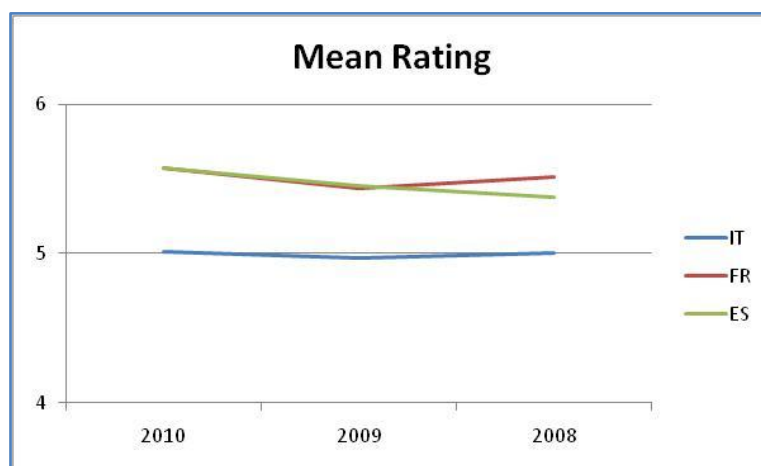
Rating Distribution for 2010

According to the distribution of ratings in three countries for the year 2010, following results were obtained: most of the Italian companies have gathered in "B" rating class while French and Spanish companies have congregated in "BB" rating class (23.84% of Italian companies are assigned with "B" rating class while 20.93% of French companies and 22.59% of Spanish companies are assigned with "BB" rating class). Companies assigned with "D" rating class (no return level) has had

the highest share in Spain in 2010 with a share of 2.27% while this amounts to 2.05% in France and 1.48% in Italy.

Graph 87: Rating Distribution
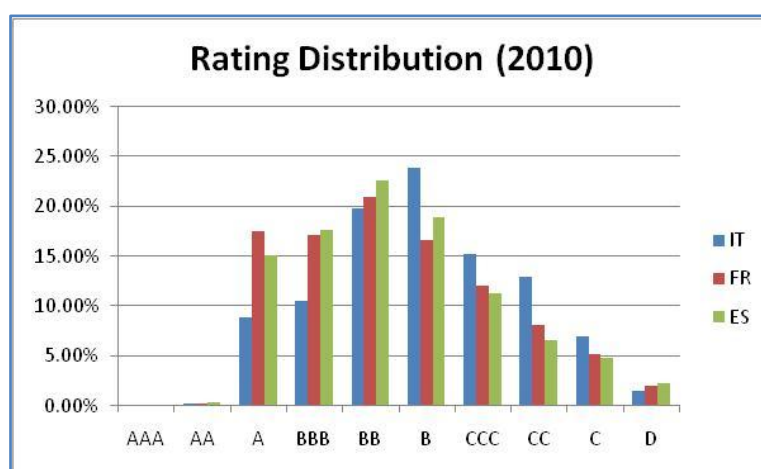
Rating distribution was illustrated with the graph 88 in terms of macro classes. Accordingly, healthy grouped companies have had the highest share in France (17.77%), followed by Spain (15.60%) and Italy (9.21%). Balanced grouped companies have the highest share in Spain (40.32%), followed by France (38.13%) and Italy (30.36%). Vulnerable grouped companies have been mostly observed in Italy (39.04%) while in France this value has reached 28.69% and 30.31% in Spain. Unfortunately, risky grouped companies which are assigned with "CC, C and D" rating classes, have had the highest level in Italy with a share of 21.39%, followed by French companies with 15.40% and Spanish companies with 13.77%.

Graph 88: Rating distribution, macro classes
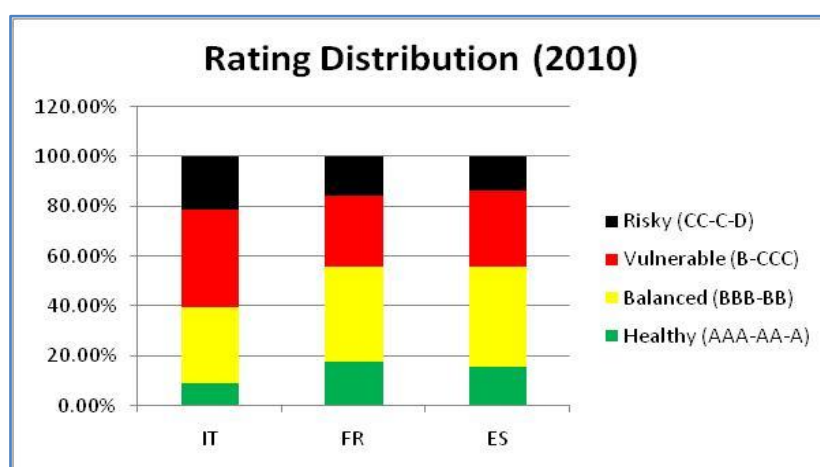
Comparison of Agri-food companies in Italy (Country General) and Friuli-Venezia Giulia (FVG)

The last section of Rating Analysis chapter was dedicated to a comparison of Italian companies against the region Friuli-Venezia Giulia of which the capital city is Trieste. Thanks to this analysis, it is comprehended where the regional companies were placed against the rest of country in terms of economic and financial development level in agri-food industry.

General Overview

In order to understand the dimensions of the companies, turnover structure was analyzed like previous analyses. Turnover distribution exhibits interesting details such as the companies generating turnover less than 100 thousand Euros are relatively higher in Italy than FVG. In FVG region, the companies generating turnover between 100 thousand Euros and 1,000 thousand Euros; and turnover between 1,000 thousand Euros and 10,000 thousand Euros have had the same share (32.65%). For both locations, the smallest share belongs to the companies with a turnover above 50,000 thousand Euros (Italian companies: 0.5% and FVG: 1.53%).

Graph 89: Turnover distribution, IT vs. FVG
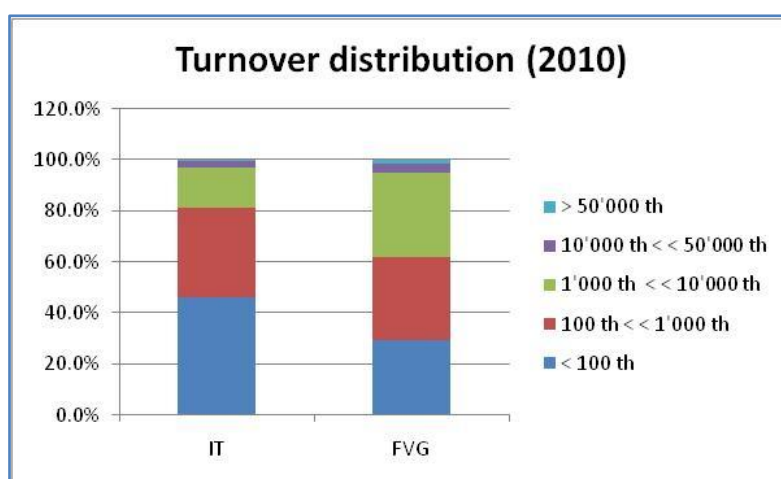
Solvency Analysis of companies in FVG

Leverage ratio results exhibit a various movement for two parts, especially after 2009. After 2009, companies in FVG started to have lower leverage (in 2009: 2.34 and in 2010: 2.07) while the trend is in opposite way for Italy.
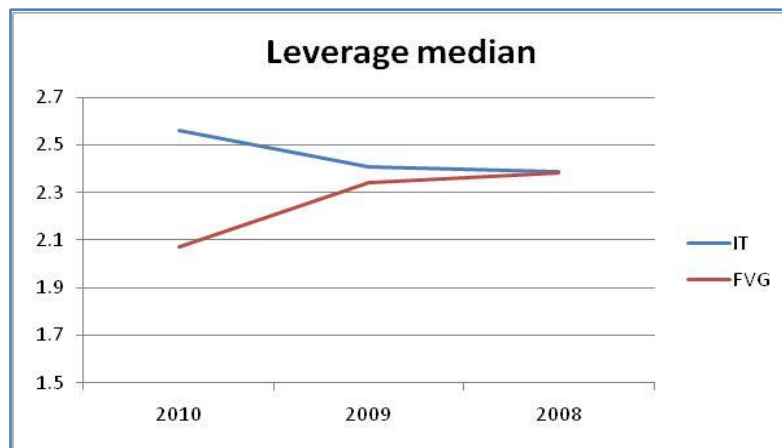
Regarding the distribution of leverage in 2010, graph 91 explains how much solvent FVG companies have been in comparison to the entire Italian companies in agri-food sector. With reference to the results, majority of FVG companies have had leverage between "0" and "2" while for Italian companies the majority belongs to companies with the leverage that is above "5". For both, the lowest share belongs to the companies with a negative leverage; however this share is lower in FVG (6.63%) than that of entire country (10.82%).

Graph 91: Leverage distribution
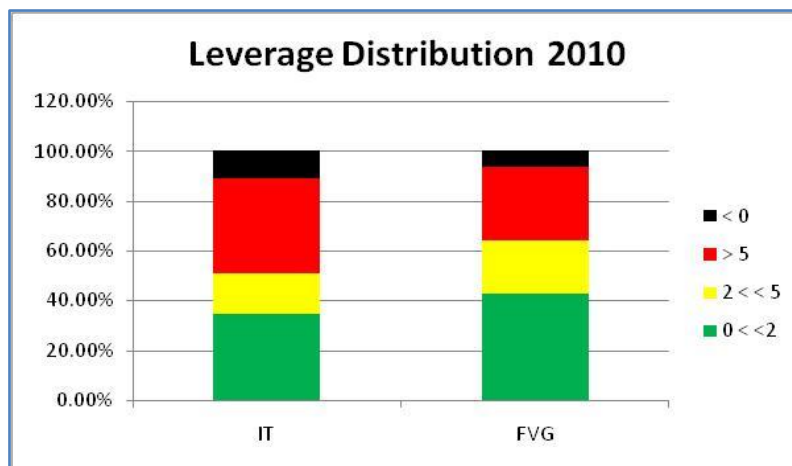
The level of financial debts should be better analyzed via graph 92 below: financial leverage median results express that financial leverage median in Italy is lower than that of companies in FVG; however this is due to higher "negative" shareholders funds of Italian companies which lowers the median value. As it can be observed via financial leverage distribution graph, negative financial leverage (refers to negative shareholders funds) is higher in Italy (9.49%) than in FVG (1.6%).
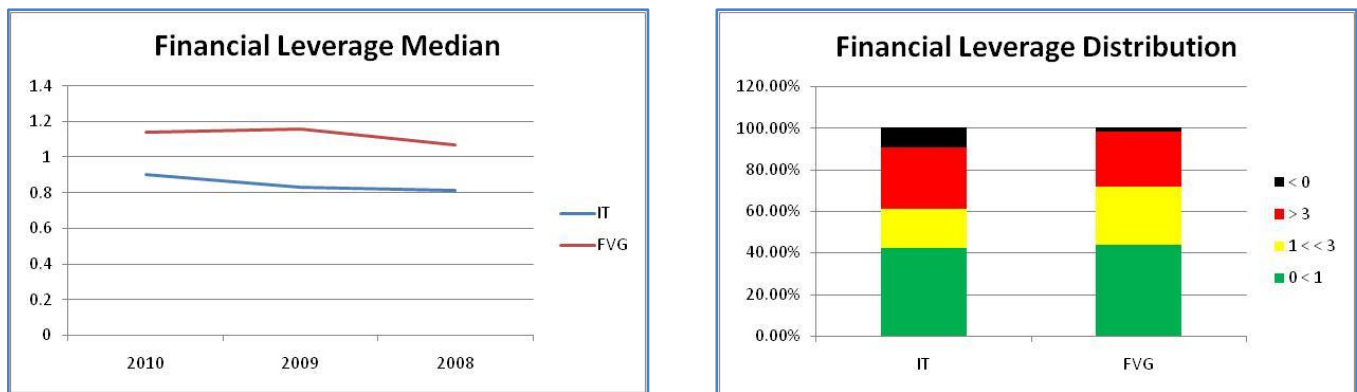
Distribution graph indicates FVG also shows financial leverage less than "1" has higher share in FVG (43.5%) than that in entire country (42.5%). This is also valid for leverage between "1" and "3" (FVG: 28.2%, IT: 18.5%).

Liquidity Analysis

According to current ratio results, FVG agri-food companies seem less liquid than Italian companies; for FVG companies from 2008 to 2010 there is an increase trend, however it still remains below 1 which is generally accepted value that is expected from companies to realize.

Graph 93: Current ratio comparison
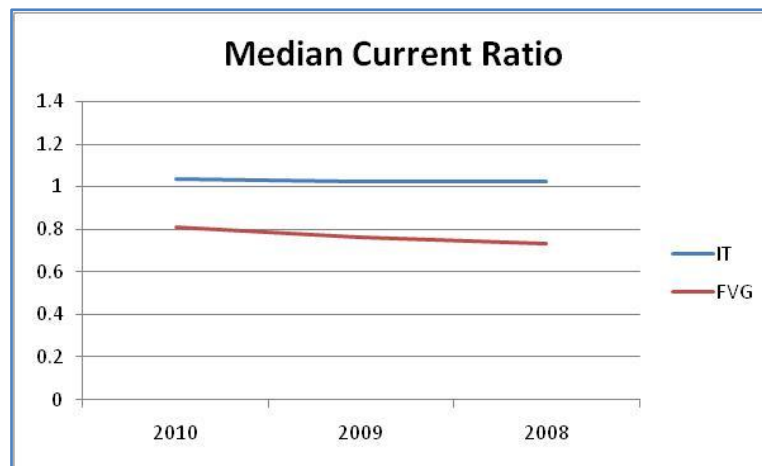
Second ratio in order to analyze the liquidity is quick ratio; and gives different results for two locations: for Italian companies there is a fall in 2009 followed by increase in 2010; for FVG companies the trend is towards falling (2008: 0.73, 2009: 0.69, 2010: 0.68). For the three years, FVG companies' quick ratio result has been below 1 and given signs of possible future problems in covering its short term liabilities with the most liquid asset items.

Median Quick Ratio
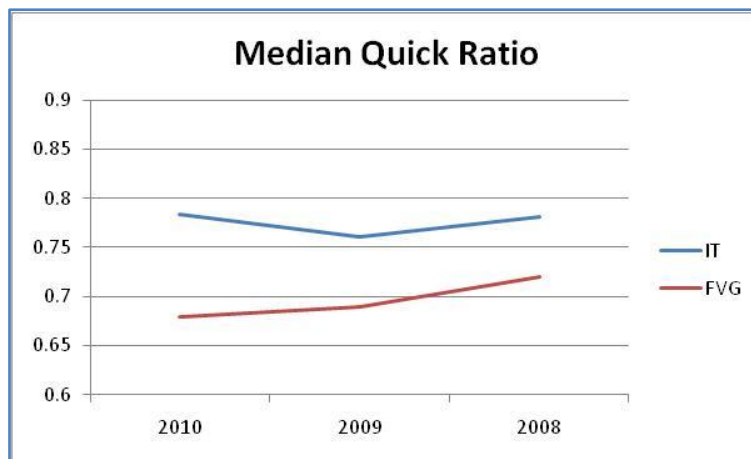
Profitability Analysis of FVG Companies

In terms of Return on Investments, FVG companies exhibit higher levels than the companies in entire country; but has recorded a fall from 2008 (1.25%) to 2010 (0.79%) indicating a possible fall in "Profit before tax" in income statement.

Graph 95: Return on investment comparison

Median ROI
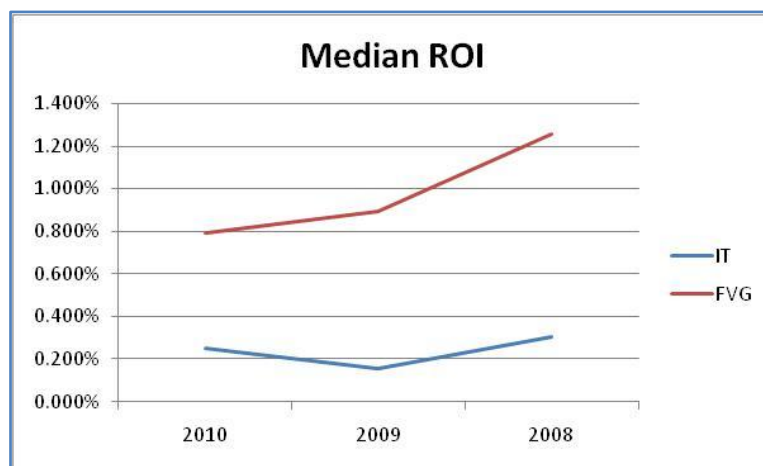
In accordance with the distribution of ROI in 2010; the best companies in the first 5 percentile have had almost same ROI results: FVG: 15.0% and IT: 14.9%; whereas the performance of the worst companies in the lowest 5 percentile are showing differences as FVG companies have had: -11.06%, but Italian companies have had -32.04 %. As it is observed with graph 96, differences among positive ROI results are not as big as differences of negative ROI results.
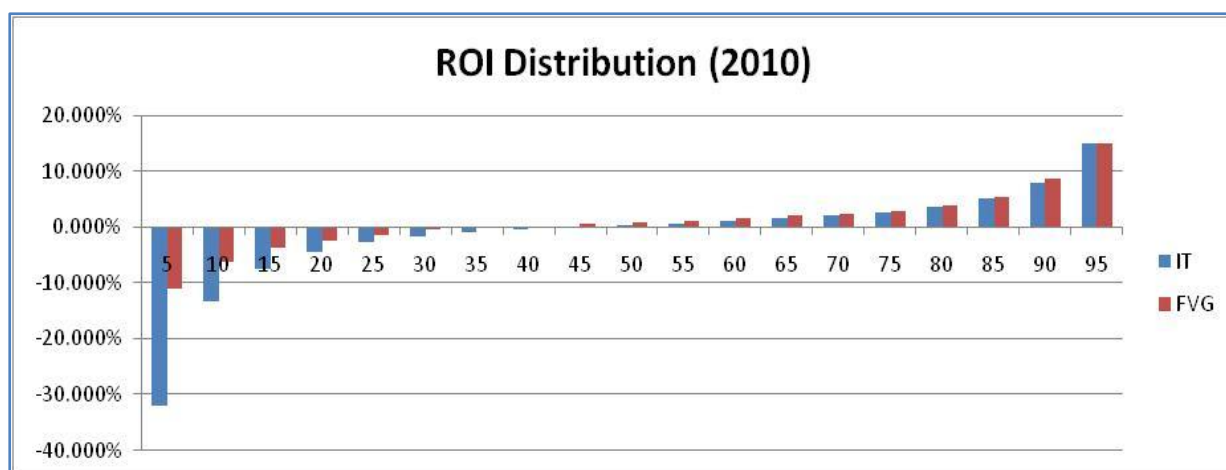
According to our second ratio for understanding profitability: ROE median results express that the companies in FVG have had negative values, but meanwhile having an increasing trend from 2008 to 2010. Italian companies, also having negative results like FVG companies, exhibit a deep fall in 2009 (-0.27%), then started an increasing trend towards year 2010, remaining always below the level of FVG companies (-0.09%).

Graph 96: Median ROE Comparison
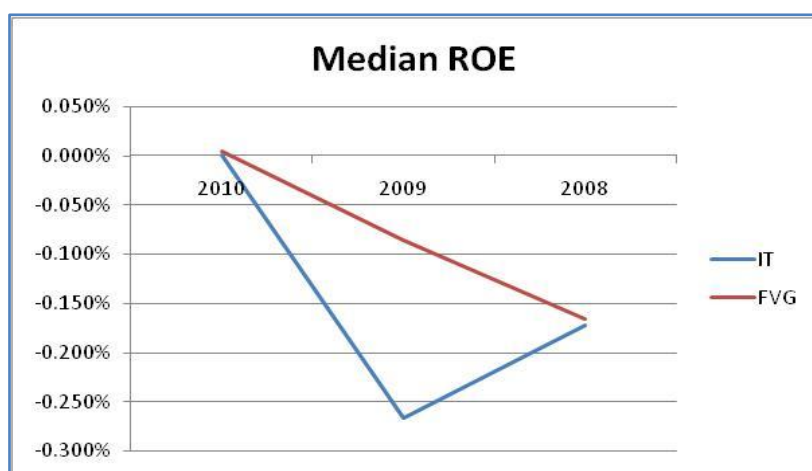
Distribution of ROE in 2010 exhibits that the best companies in the highest 5 percentile have had slightly different results (FVG: 52.57%, IT: 53.37%) while the difference for the worst companies in the lowest 5 percentile is more significant (FVG: -146.48%, IT: -247.14%).

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ROE Distribution (2010)
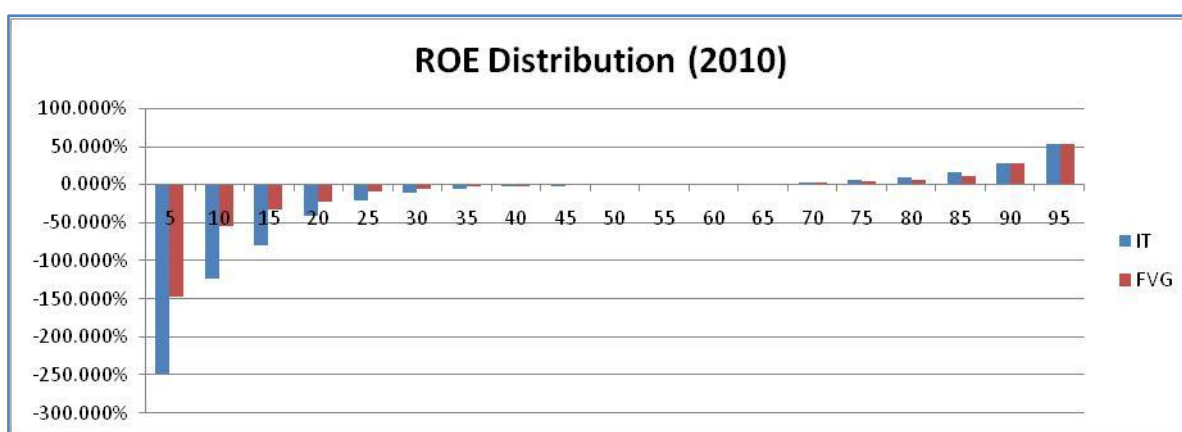
For both distributions, the worst performing Italian companies in terms of profitability have had the ROI and ROE values which are far below those of FVG.

Graph 98: Profit & loss comparison; IT & FVG
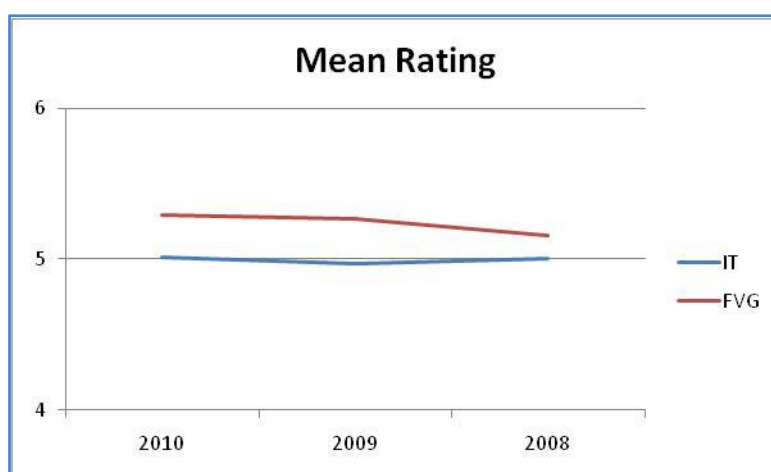
P&L Distribution (2010)
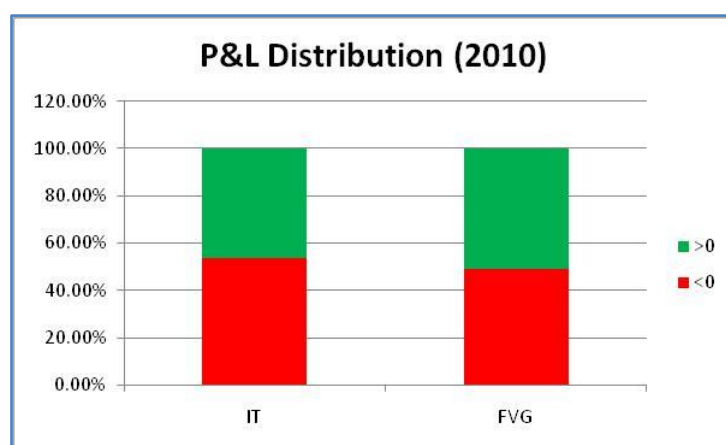
To complete the last step of profitability analysis, profit and loss distribution is exhibited via graph 98 above. Results exhibit that FVG companies which generated net profit in 2010 capture 51% of all companies while this share amounts to 46.6% for the entire country within agri-food sector.

Rating Analysis of Companies in FVG

In 2008, 2009 and 2010 mean rating class assigned to FVG companies (remaining between 5 and 6) has been above the companies' mean rating in entire country. As presented within this graph, "4" represents "CCC", "5" represents "B" and "6" represents "BB".

Rating Distribution of FVG companies vs. Italian Companies

According to the rating distribution of 2010, FVG companies mostly gathered in "BB" rating class, while Italian companies are mostly found in "B" class. The share of companies assigned with "BBB" rating class is higher in FVG (17.21%) in comparison to Italy (10.55%). The share of "A" rating class is again bigger for FVG companies (17.54%) than that for Italian companies (8.90%). The highest rating class "AAA" was not assigned to any companies in both places. However, the lowest rating class "D" was assigned to 2.05 % of FVG companies and 1.48% of Italian companies expressing that "D" rating class was relatively more visible among FVG companies.

In the second rating distribution graph (see graph 101), it is exhibited that in terms of macro classes, the "Vulnerable" class has had the highest share for both FVG (38.27%) and Italy (39.04%). For both, in the second ranking "Balanced" grouped companies came: FVG (36.22%) and IT (30.36%), followed by "Risky" grouped companies (IT: 21.39% and FVG: 14.80%). It is interesting that for both geographic locations, the lowest share belongs to companies grouped as "Healthy": FVG: 10.71% and IT: 9.21%.

Graph 100: Rating distribution; IT & FVG
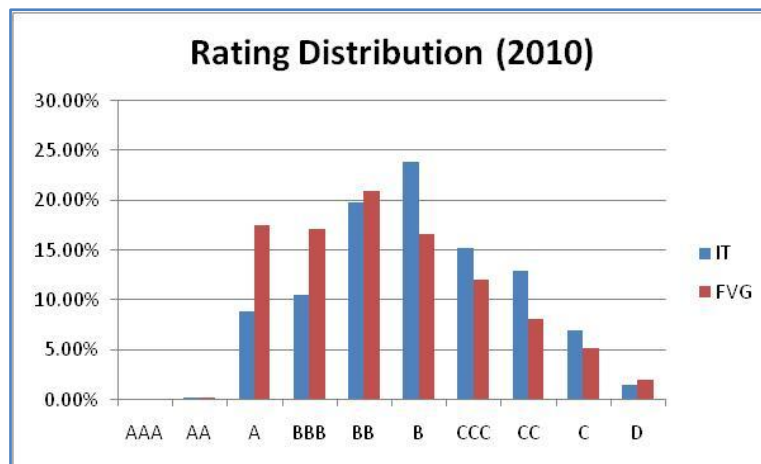
Graph 101: Rating distribution among macro classes

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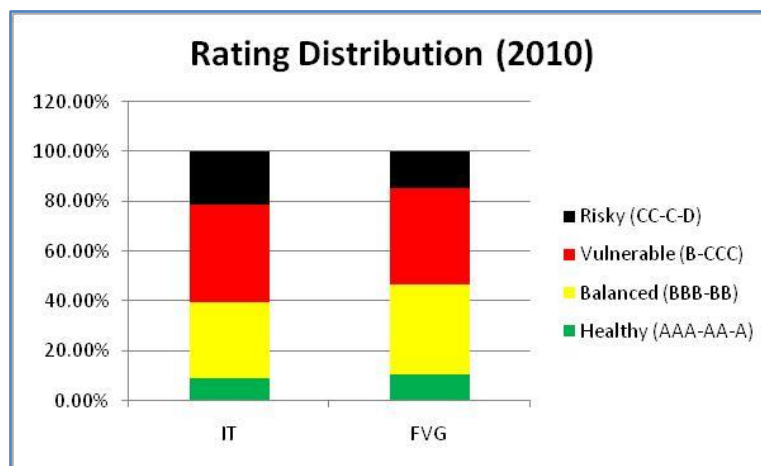
CONCLUSIONS

This research targets to make a contribution to the enlightening the financial and economic features of agri-food sector at both macro level (Europe) and at country level (Italy, Spain and France). The analysis provides the general features of the sector in terms of its contribution to economic development of the EU (Gross value added, employment, turnover and economic size of the holdings in sector) and then going deeper with a comprehensive financial analysis (including turnover, solvency, liquidity and profitability aspects) and concludes with the credit ratings assigned.

The analysis is divided into two subgroups as agriculture and food industry for analyzing all aspects for both the EU and the countries selected. In terms of contribution to economy; for the EU, it is observed that importance of the primary sector for the economy is shrinking (both in terms of GVA and employment). Food industry has also recorded a decline in terms of turnover and employment in EU base. The companies that comprise the food sector are mainly composed of Small and Medium Sized Enterprises.

Beside economic properties of both primary and food sector, the contribution to the environment is analysed as well. Accordingly, important fields as biodiversity, water quality, climate change, soil erosion and organic agriculture issues will be analyzed together with future perspectives for the continent.

The structure of agriculture is analysed and seen that structural change in agriculture is a complex phenomenon affected by interlinked dynamics. In accordance with the Eurostat Farm Structure Survey results it is conceived that the diversification in size, type and socio-economic performance of the agricultural holdings are supported by the structural conversion in the EU-12 depart from nature and intensity from those in the EU-15. The structural features of the sector are subject to be analyzed in terms of holdings and labour force, agricultural area, size of the farms, distribution of production factors. There is a fall in number of agricultural holdings by an annual rate of 2.2% both in the EU-15 and in the EU-12 while utilized agriculture has remained relatively stable over the last decade, with only a slight decline. The distribution of land and labour input across farms reflects the size structure: in 2007 around 77% of the agricultural area was concentrated in 11% of farms with a size of 20 ha or more. Regarding the distribution of labour force in terms of age and gender it is found out, in accordance with the studies by Eurostat, in the EU, more than 80 % of the labour force is coming from the farm holders' families, so the agriculture sector seems a family oriented one in most of the Member States. Concerning the gender, 34 % of the agricultural labour force in the EU-27 was female; and age structure of the EU exhibits that only 6 % was belonging to under the age of 35 whereas 34 % was belonging to the age equal or more than 65 years in 2007.

Most important and recently, the results of agricultural census 2010 are presented and according to the results ,in comparison with 2003, there was a decrease in the number of holdings by 20% and UAA by 2%.

In terms of foreign trade, the EU has had a significant improvement in the last decade exhibiting an average annual growth in imports by 3.7% and in exports by 5.1% in the last decade.

In accordance with early estimates of Eurostat for Economic accounts for agriculture, in the year 2011, an rise of 6.7% in the EU-27 real agriculture income per working unit is reached and in comparison with 2010 a rise in real income at sector level (+3.9%) together with a fall in agricultural labour input (-2.7%) is realized. The value of agricultural production increase thanks to increasing commodity prices while the expansion in production volumes was relatively smaller.

Agricultural markets in the EU are analyzed with details and illustrated medium term perspectives for arable crops, meat production and milk and dairy products. For all three aspects market developments are deeply analyzed between 2000 and 2020 with expected progress steps. With regard to European Commission's projections, the medium-term prospects for the EU cereal markets are characterised by tight market conditions, low stock levels and prices remaining above long term averages; the meat markets expect to have an aggregate meat production which projected to reach 44.7 million t in 2020 (that is higher than 2010 level by 2.4 %) and finally the milk production of EU is planned to reach 157.6 million t in 2020 (an increase of 7 % in comparison with 2009).

The sector's general position is analyzed in France, Spain and Italy in terms of their impact at country economies and structural features. In this context, the results of Agricultural Census 2010 are evaluated. For the sector in France, in the last decade operations have expanded, average size of the farms increased while the number of the farms decreased. Regarding the sector in Spain, agricultural income (indicator A) in 2011 registered a decrease of 0.4% compared to 2010, while this indicator registered an increase of 8.4% compared to 2009. In Italy, as per General Census of Agriculture, the farms in Italy shrank by 32.2%; however the average size has increased from 5.5 hectares to 7.9 hectares UAA per holding; and the number of farms with less than one hectare of UAA has fallen by half.

The next parts are dedicated to deep financial and economic analysis of the sector based on the information derived from financial statements and finally rating analysis. The most significant contribution of thesis is to find the optimum rating model in order to evaluate the financial health of

the companies; moreover this is done through a comprehensive study of key aspects such as Turnover, Number of Companies, Solvency, Liquidity, Profitability and Rating Assessment.

In order to find the most appropriate rating model, the rating models which are commonly used for both business and academic purposes were studied; their core and mathematical basis were analyzed. After, via objective critiques some key findings were obtained: Considering the features of agri-food companies, one should not expect applying all assumptions and methods used by credit risk models to be appropriate in evaluating companies within the industry. It is found that for financial statement analysis models they were extensively developed using specific industries, for example Altman's z-score was developed using manufacturing companies, so these kind of models showed an accuracy when they are applied to industries and economic conditions which were used in developing the model. The structural model has attracted critiques because it assumes exact information regarding the point of default (that the model takes as the point where asset values fall below liability values), which some believe as unrealistic, preferring instead a reduced form approach which views default as an unexpected event. Difficulties in applying all models in the process of evaluating agri-food companies create handicaps for the analysts. E.g. Merton model which is derived from equity price relationships should be most accurate for the companies that are publicly traded in stock markets, while the majority of the companies operating in agricultural sector are not publicly traded. Another example is machine learning models requiring a fully complete information on companies those are bankrupt would create difficulties to apply rating evaluation of agri-food companies.

On the basis of availability of agricultural companies' data and the need of finding a model with the ability to satisfy model assumptions, it is understood that there is a requirement to find a model which is more appropriate for the current situation of agricultural sector. The model being searched, according to current needs, is pointed as "MORE" rating model. In particular, the model permits each enterprise to associate a fundamental credit rating giving an indication of the creditworthiness of industrial companies.

Validation of MORE rating model requires two fundamentals to realize:

- For bankrupt companies, the assigned rating deteriorates, approaching the default rate (Bankruptcy Dynamics).
- The model discriminates between healthy companies and bankrupt companies (Discriminating power of the model).

By utilizing two well-known statistical methods "ROC and Bankruptcy Dynamic", it is found that the MORE ratings achieved very accurate and stable results for the entire database as well as data from the crisis period. These methods are also applied in several macro geographic regions all over the world, the result did not change; the accuracy is valid for all regions (both in general and crisis period).

The model is applied to Italian, Spanish and French companies and one political region in Italy: Friuli–Venezia Giulia. For the study, the financial information of the years 2008, 2009 and 2010 were used. The results were interesting. The companies in Italy comprise mostly micro sized enterprises in Italy (turnover below 100 thousands Euros). The leverage of Italian agri-food companies soared in 2010 which is same for financial leverage meaning that Italian companies have financed their activities via relatively higher levels of bank loans in 2010. Liquidity registered a modest improvement in current ratio as well as in quick ratio in 2010. In terms of profitability, distribution of Return on Investment (ROI) indices gives ideas regarding performance of the worst and the best performer companies within the industry; an interesting detail to note is that the ROI indices are not showing big differences within the years. Return on equity values have captured quite low values (a dip in 2009). For all three years: 2008, 2009 and 2010 Italian companies have generated losses more than profits. The highest share of companies with losses is found in 2009 (56% of the total companies). Italian companies' mean rating remains in same rating class: B. When the years are analyzed one by one in terms of the rating distribution, the first detail taking attention is for three years, the highest share of Italian companies in agri-food sector belongs to Vulnerable Macro Classes (B-CCC).

In the next section, the comparison of three countries in terms of financial dynamics is carried out. It is found that Italian companies had the highest leverage ratio result in three years in comparison with French and Spanish companies leading to a higher default risk for the companies. Italian companies have used relatively higher amounts of long term debts and loans in order to finance their operations than the companies in Spain and France. With reference to Return on Investment (ROI) results, the French companies have had highest results in three years (2010: 2.76%, 2009: 2.23% and in 2008: 2.85%) in comparison to those in Italy and Spain. "Return on Equity" Median values have shown interesting results: Italian companies have had the lowest values (negative). Italian companies have been assigned with the lowest mean rating class among three countries companies in agri-food industry remaining in B rating class for three years and not registering an improvement.

Within analyzed three years, mean rating class assigned to Friuli Venezia Giulian companies (remaining between 5 and 6) has been above the companies' mean rating in the entire country (remaining at B rating class). In terms of macro rating classes, the "Vulnerable" macro class has had the highest share for both FVG (38.27%) and Italy (39.04%); the "Healthy" macro class has had the lowest share for both FVG (10.71%) and Italy (9.21%).

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ACKNOWLEDGEMENTS