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"Innovation and Integration in European Cereals Commodities Markets"

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Acknowledgments

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Finally, I want to thank CBS for all the great opportunities and unique experiences it gave to me.

Abstract

In this work, we aim to provide and discuss a set of measures that would allow improving the current state of the European cereals markets. First, the characteristics of these markets are discussed, providing appropriate information on their structure and functioning. Then, using insights from previous academic literature and the observations made during our previous discussion, we analyse the most critical problematics, identifying the sources and their effects on various classes of shareholders. Once devised a set of precise sub-goals to achieve, we apply relevant innovation methodologies to our case. We found that the structure of the market was by far more complex than what we had originally anticipated. The level of fragmentation within the supply side was much higher than expected and we soon discovered how regulation truly shapes the competitive environment, rather than traditional market forces. Another interesting finding lies in the use of commodity derivatives which is now overwhelmingly oriented towards speculation and portfolio management, rather than being an additional tool in the producers' arsenal. This fact increased prices volatilities during troubled financial periods and augmented the scale of price spikes and bursts. Finally by providing an actionable set of suggestions in regard to how to tackle the problems found, we open up new research opportunities both in terms of building upon our finding, or better still to find new solutions through a more in depth analysis of the topic of European agrarian regulation or through the further exploration of the topic of innovation clusters.

CHAPTER I.

I. INTRODUCTION

Research motivation & Problem statement:

Since its first beginning in 1951, the European Union has always pursued higher degrees of integration among its Member States, often contrasting with resisting forces. Despite high and noble purposes, the Union has always laid its foundation on an economic ground, from the institution of the European Coal and Steel Community to the introduction of the single currency among most of its members. Nevertheless, after a half century of being under this common organization, there are still vast areas that still need to converge and leave behind country-specific differences; one of these is the agricultural sector.

Despite the presence of an extensive regulation like the Common Agricultural Policy (CAP), this sector is far from being integrated at European level, as we will discuss later on in this work. This results to be an important weakness of our system, as the major foreign countries (like USA, Canada, and Australia) all rely on integrated structures, able to crush the EU in terms of efficiency and international power.

In addition to that, recent turmoil on the world agricultural markets exposed soft spots in the current system, showing the need to take specific actions to make sure higher levels of stability and reliability. This specific aspect also led to a recent growing interest from the academia, resulting in an equally growing literature about this topic. Furtherly merging these considerations with the call for more transparency and efficiency coming from multiple sector organizations and the widespread opaque spots in the determination of prices, we identify the fact that these markets are truly far away from perfection, and improvements would soon be needed.

Starting from these premises and our personal interest in covering a rather overlooked topic allowing us to merge financial, macroeconomic, and innovation subjects, we define the main objectives of our work.

> *Objective 1. Ascertain the current level of functioning of the European financial and spot cereal markets*

Acknowledging the presence of multiple problematics, our main goal is to propose a set of structured solutions that should enable the mitigation of the identified issues.

Sub-goal 1. Determining which are the major problematics affecting these markets

Clearly, in solving our first problem statement, we first must be aware of the most critical issues, understanding their sources, their effects, and their magnitude.

Objective 2. Finding ways to improve the integration of the cereals markets at European level

As the European Union is pursuing the final objective of further integrating the economies of the member countries, we want to discuss how such goal could be realistically achieved, taking also into consideration what we want to achieve in our first objective.

Sub-goal 2. Gauging the effectiveness of proposed solutions (which in turn will spur our desire to advocate further research on specific topics)

Finally, we aim at assessing the degree of feasibility of our suggestions, especially taking into consideration their effectiveness in pursuing our previous two main stated objectives. This being the preface of our work, we devised a precise structure to follow, first to understand with detail the major problematics relevant to the topic, second to provide a set of actions to take to mitigate such encountered problematics.

Delimitations and methodology

Delimitations

Discussing a wide topic such as the agricultural markets is certainly a challenging task, especially if we want to reach a certain level of detail. For this reason, we will scope our analysis only to the most traded instruments in terms of volume: cereals. This choice is done for a series of other technical reasons. First of all, cereals are a standardized commodity that can be easily traded on financial markets. This primarily means a better access to information and data compared to other food commodities. Additionally, cereals represent over 50% of the world agricultural markets and are produced in any country,

even the smallest, reason why it makes additional sense to analyse them, as this topic gains in further relevance.

Nevertheless, even the cereal world is quite crowded with many diverse varieties and typologies of products. For this motive, we will focus our attention primarily on the major classes of cereals that also represent the most part of international production and trade. Such are wheat, maize/corn, barley, oats and rice.

Ultimately, despite part of our discussion will be relevant in an international and worldwide context, we will scope all our work to the specific case of the European countries. Even if we will never consider in detail country-specific characteristics relatively to the agricultural markets, we aim to make our analysis relevant for all the states that are currently within the EU, not considering it as the monetary union.

Methodology

Considering now our methodology in conducting the analysis, to devise a set of actions that would allow for sensible improvements in the European cereal markets we will strongly rely on previous academic literature. This will allow us to better comprehend the underlying phenomena and to give more strength to our discussion. In particular, we will devise two separate analyses: in the first, we will recognise and discuss the major current problematics of the European cereal markets, identifying at the same time a set of smaller objectives to reach in order to mitigate such issues. In the second, we will define relevant improvements and innovations that would grant us to reach the prefixed goals, thus defining those set of action needed to improve these markets, meeting our work's objectives.

More specifically, the first chapter will introduce and analyze how the European cereals markets are structured, their core characteristics, the underlying pricing mechanisms, and the current regulatory framework. This will set the base for our subsequent analysis of the core problematics present in this market. In the second chapter, we use relevant theory to analyze what observed in the previous chapter and to identify critical issues. Since each of the identified problematics is backed by a consistent amount of previous research, in this section we merge the observations we made with relevant literature on the topics. Given the identified issues, the last part of chapter two is devised to set a series of sub-goals, specifically tailored to meet the problematics encountered. The final chapter

represents the core of our discussion, as we delineate specific solutions to reach the various sub-goals identified in the previous part. In particular, we will focus on five central innovation packages that, implemented all together, should mitigate the current issues present on the European cereals markets, allowing us to reach our final goal.
Due to the wide array of topics touched in this study, we will rely on equally diverse sources in accordance with the argument covered. In the following figure (1.1), we present a visualization of the structure we will follow along our analysis.

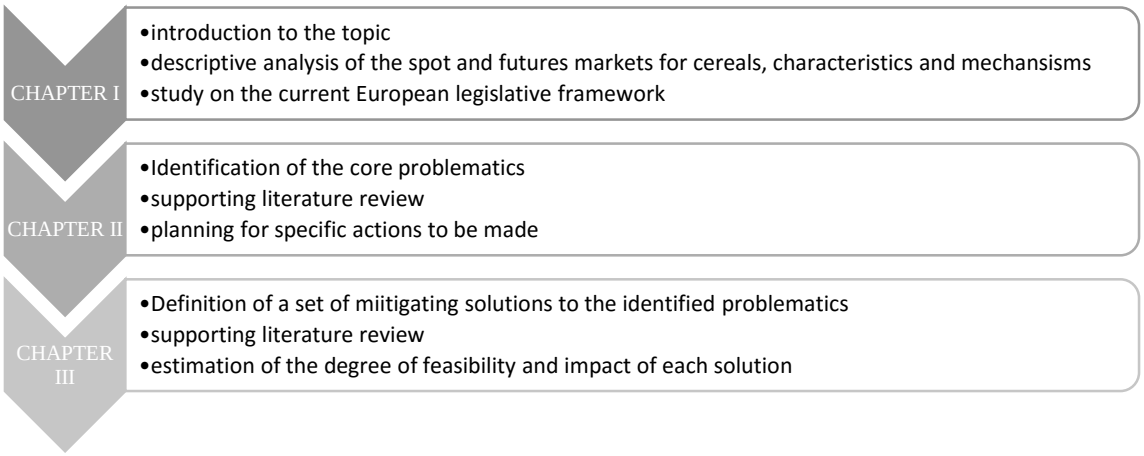

Figure 1.1 (Source: elaboration of the authors)

First, we will start by introducing a general overview over our topic.

General Overview

From the orange juice we drink to the petrol we use to heat our homes and power our vehicles, commodities tend to have a strong impact on our daily lives. The Oxford dictionary has a simple yet meaningful definition for them: “A raw material or primary agricultural product used in commerce as an input in the production of other goods or services”. Such resources can be found all over the world, and are traded, in the majority of cases in a global, yet fragmented marketplace as part of a diversification investment strategy. In fact, over 100 billion dollars are invested in commodities every month worldwide (UN Comtrade Database). The array of tradable resources is broad to say the least. Given such a wide variety of products, a complete categorisation, risks being far too extensive. However, it is possible to simplify matters by grouping commodities according to the similar characteristics they share: below we will illustrate the most common categorization adopted by trading firms.

Soft commodities

These products tend to be grown, rather than extracted or mined. So-called "soft" tend to be particularly volatile in the short run, as they're quite easily susceptible to spoilage, which in turn can result in sudden and acute price variations (Morrison, 2011). Producers are those that tend to be heavily involved in such market, as they're often keen to minimise their production risks by locking in prices for their produce, through hedging strategies. Alongside external forces, there also is the natural growing cycle of these commodities to be taken into account, which in itself creates seasonal price fluctuations (Pinnington, 2010). Typical examples include:

1) Agriculture crops - The most common commodities in agriculture in terms of production volume include: wheat, corn, maize, soybeans, rice and barley. They are traded in the North American region on the Chicago Board of Trade. However, they are also major trading centres within Europe, such as the Risk Management Exchange and Euronext. Within Asia, The Tokyo Grain Exchange remains the point of reference (The Economist 2013).

2) Animals and Animal Products - Within this category we can find a variety of goods ranging from, cattle feed, fresh or frozen pork bellies, beef, and even eggs. Similarly to agricultural commodities the most prominent markets for such products are:
the Chicago Mercantile Exchange, Euronext, the Risk Management Exchange, and the Central Japan Commodity Exchange (The Economist 2013).

3) Bio-fuels - This category is relatively new. Generally speaking, bio-fuels are being experimented with as an alternative to fossil fuels with various degrees of success. This rapidly upcoming commodity is now being traded on a few select markets: the Brazilian Mercantile and Futures Exchange, the Chicago Board of Trade, the Bursa Malaysia, and the New York Board of trade, Europe will be soon to follow (The Economist 2013).

Hard commodities

This category includes raw materials that are typically mined from the ground, or derived from other natural resources after refinement: i.e. oil is refined into gasoline. However, there also are some agricultural products, such as cotton, that fit within this categorization, as they don't incur the risk of rotting quickly and their use is predominantly industrial

rather than for providing nutrition. Given their nature, hard commodities tend to be easier to handle than "softs", and can more easily be integrated within industrial processes (Pirrong, 2014). This particular cluster of commodities is a particularly popular choice for investors: cyclical commodities like oil provide a useful tool to increase market exposure while anti-cyclical commodities such as precious metals ensure protection against economic downturns (Lu & Neftci, 2008). Going more into detail we can find other subcategories such as:

1) Crude Oil and its derivatives - Unsurprisingly in our vastly mechanized world, the most commonly exchanged commodity is crude oil, from whom gasoline, heating oil, and diesel are also derived. The main trading hubs for such products are the New York Mercantile Exchange, the Central Japan Commodity Exchange, and the Dubai Mercantile Exchange (The Economist, 2013).

2) Metals - Aluminium, nickel, copper, lead, iron and other various types of ore are the less glamorous metals upon whom various large construction and industrial development activities depend upon. Such resources have gained prominence in the headlines especially given their high demand from emerging economies such as China, Russia, and South Korea. Therefore, we should not be surprised to find the Shanghai Futures Exchange as one of the points of reference for such commodities. Non-Asian trading facilities can be found in America at the New York Mercantile Exchange and also in the Hedge Street Exchange [in California], but also in Europe at the London Metal Exchange (The Economist, 2013).

3) Precious Metals - The noble brothers of the category mentioned above. This commodity cluster is often sought after as a refuge investment, especially in times of crisis given its anti-cyclical correlation with the market. The most commonly traded metals within this category are, but not limited to, silver, gold and platinum. Where can they be acquired? The Dubai Gold and Commodities Exchange, the Brazilian Mercantile & Futures Exchange, the National Commodity Exchange Limited, and last but not least the ever-present New York Mercantile Exchange (The Economist, 2013).

Emerging commodities

This category is in itself a non-category. Let us explain. Within this group, there are commodities that major investors and trading houses expect will be booming markets in the next few years. There is a catch though, as they are presently unavailable to trade as commodity futures. The only way to trade these products is by buying stock in companies that operate in these fields. A few pertaining examples include: Water, water rights, ethanol (Collings, 2008).

Out of the many commodities categories outlined in the previous section, the focus of our research falls upon agricultural commodities. Yet within the agricultural cluster, there are many different subcategories of commodities, including cereals, cattle, diary, livestock and many more that all have their own relevancy. For this reason, we will dedicate a relatively ample section to explaining our choice regarding the cereal segment.
First of all, what are cereals? According to the FAO (Food and Agriculture Organization of the United Nations) cereals are members of the grass family, in particular, grains, commonly referred to as 'cereal grains' or simply "cereals" are the edible seeds of specific grasses belonging to the Poaceae family. The FAO definitions cover 17 primary cereals. Each definition is detailed with a particular code, botanical name, and a brief description. The actual cereal products either derive from processing the grain through one or more chemical or mechanical operations, or from the processing of flour, starch or meal. Each cereal product is listed after the cereal from which it is derived. With such a meticulous classification there is no room for error when stipulating economical contracts based on such resources. Now that we have clarified what cereals consist of, we need to outline why cereals play a determinant role in the world in regard to the economies of both developed and underdeveloped nations. Here beneath we present four of the most prominent reasons that convinced us to focus our research on cereals.

Primary source of nutrition

The three most important food crops in the world are rice, wheat, and maize (corn). The three cereal grains directly contribute more than half of all calories consumed by human beings. In addition, other minor grains like sorghum and millet are particularly major contributors of overall calorie intake in certain regions of the world, particularly semi-arid parts of Africa and India (Awika, 2011). The overall importance of the major cereal

grains to the world food basket is crucial. Close to 60% of calories in developing countries are derived directly from cereals, with values exceeding 80% in the poorest countries. By comparison, approximately 30% of calories in the developed world are derived directly from cereals. However, even in these more affluent societies that rely less on direct cereal consumption, cereals remain the most important food commodity, since they supply most of the nutrients for the livestock that form a major part of diet in these regions (Awika, 2011).

Cases of economic dependence

There are cases where exporters of goods like wheat and rice depend heavily on the revenue from agricultural goods. From a strictly macro point of view, crop revenues can represent a major source of government funding, while on the micro level millions of households depend on farming and growing crops for their livelihood (Dunn, 2013). As we can see such commodities can be the economic drivers of leading exporting nations, however, the price of the traded assets can be very easily prone to volatility, and the effects of this variability can be far reaching. Just consider a scenario where a sharp and sustained drop in demand from a key importer is not counter-balanced with a change in production. Suddenly there is an overflow of produce, prices plummet, economies begin to show signs of strain, and if the situation persists in the long run, the results could be catastrophic (Easterly & Rodriguez 1994). I.e. The most recent oil price crisis has severely damaged oil dependant economies such as Venezuela, Saudi Arabia, Iran and Russia to name a few. Forcing states to slash expenditures on welfare and citizen services while also driving out the weaker players within the industry leading to further consolidation.

The ethical dilemma of trading/speculating on such products

As we very briefly mentioned previously, agricultural trading has the potential to increase the resilience of agricultural businesses as it provides a way for farmers to lock in constant prices for items on future dates, through future contracts. By removing this option, farmers would be placed more often in the position of suffering financial losses. However, only 4% percent of futures contracts end in the delivery of the physical commodity (Jarecki, 2011). Instead, commodity futures are usually traded before their "expiration

date", or in more simple terms the delivery date of the underlying good. This implies that futures contracts tend to attract investors who are not interested in the product itself, but rather traders who are keen on the gains obtainable from speculation. In fact, commodity futures have become increasingly appealing to non-commercial investors as their returns appear to be negatively correlated with returns on bonds and equities. Thus constituting an attractive vehicle for portfolio diversification (Porte, 2012). This process may cause increasing volatility in market prices, which in turn severely impacts the living standards of the less developed parts of the world.

Sustainability (ethanol) vs primary needs (feeding the population)

There are instances where the demand for a particular agricultural commodity can at times largely outstrip the suppliers' replenishment capabilities, due to very specific local conditions. In particular, there are countries where biofuel experimentation is particularly developed and advanced, as is the case for Brazil (Lapola et al. 2009). How does that interest the cereal market dynamics? Well, it turns out that corn is a key component in ethanol, which has often been hailed as one of the most promising biofuels to tackle the world's dependence on fossil fuels (Peskett, 2007). Despite all the best intentions of such initiatives, we should not forget that this commodity's primary use, is as feed for livestock. With countries having placed ambitious agenda's for implementing alternative energy programs in the name of sustainability, negative situations have arisen as mandates for the use of corn-based ethanol in bio-fuels intensify. The primary concern is that such initiatives put additional strain on farmers to balance the demands of livestock and the energy sector. Asides from the individual choices that have to be made, there simply isn't a sufficient amount of farmland to cultivate enough corn to satisfy the needs of all the engaged parties. According to a confidential World Bank report obtained by The Guardian, biofuels have forced global food prices up by 75% in the 2002 – 2008 time period, far more than previously estimated. Additionally according to the estimates of the World Bank, the rise in food prices have pushed at least 100 million people worldwide below the poverty line, and have sparked riots in countries such as Egypt and Bangladesh. Government ministers have begun describing higher food and fuel prices as "the first real economic crisis of globalization."

II. AGRICULTURAL COMMODITIES - CEREALS

The most important cereals

The cereal commodity market encompasses a great variety of products, ranging from the most common "oats" to the more extravagant "hard red spring wheat". However out of the many cereals which are traded, the one's with most substantial global production and trading volumes are five. These "big five" are: wheat, maize, barley, oats and rice (Oxfam 2012). The following paragraphs will provide better insight into each of the aforementioned cereals. Through a four-pronged structure, which includes general characteristics, common uses, values and relevant markets, we will make sure that each cereal has a proper contextualization and that the economic intricacies of each product are adequately showcased.

1. Wheat

Wheat is one of the most important, if not the most important global agricultural commodity. This resource is a dietary pillar in both emerging and developed markets, as it is the main input in the preparation of a wide variety of food produces, from pasta to bread to other baked products. In terms of quantity produced, it is second only to maize and is then followed by rice as the third most produced food grain in the world. As we will see later in the charts, The EU, India, USA and China are the largest producers of wheat, and approximately two-thirds of all the wheat produced is used for food for people. The rest is used for animal feed and some industrial applications. To try to put in numbers, over 560 million tonnes of wheat are consumed each year worldwide, with the European Union, the United States, India and Russia being amongst the most prolific consumers (Oxfam, 2012). Given its extensive use in the production of food, wheat has often appealed to investors as a hedge against inflation since it tends to have a correlation with the economic cycle. Furthermore investing in commodities usually has lower costs and presents tax advantages (Larue, 2008). Despite the steady increase in crop yields through the years, the market never seems to reach the point of saturation. This is even more surprising given that wheat markets benefit from the fact that production is quite simple compared to other grains, as wheat crops are fully capable of thriving in many different

climate conditions, and can be harvested in quite brief spans of time (Martinez & Zering 1992).

In terms of value, the prices of this commodity have historically shown significant volatility, much of these fluctuations are to be blamed on the supply side of the equation, which finds itself facing significant disruptions from unpredictable weather patterns or in the worst cases, from natural disasters. Of course, wheat demand can also fluctuate depending on the health of the global economy. However, the variations tend to be less drastic in this part of the equation (Commodity, HQ). In an extreme example, wheat futures on Chicago's commodities exchange saw a 126% surge on a yearly basis in October 2007, going from $3.96 a bushel to about $9. So what drove up wheat prices? Not just a matter of supply and demand. Inclement weather, including a string of hurricanes, caused significant shortages of the produce in quite a few American states, but also a set of other factors played their non-marginal role in defining such an extreme scenario[1]. Interestingly another problem compounds its effect upon the shortage, some farmers are now switching to grow corn because of the skyrocketing demand for the ethanol-producing grain (McKinsey, 2012).

The most relevant markets are:

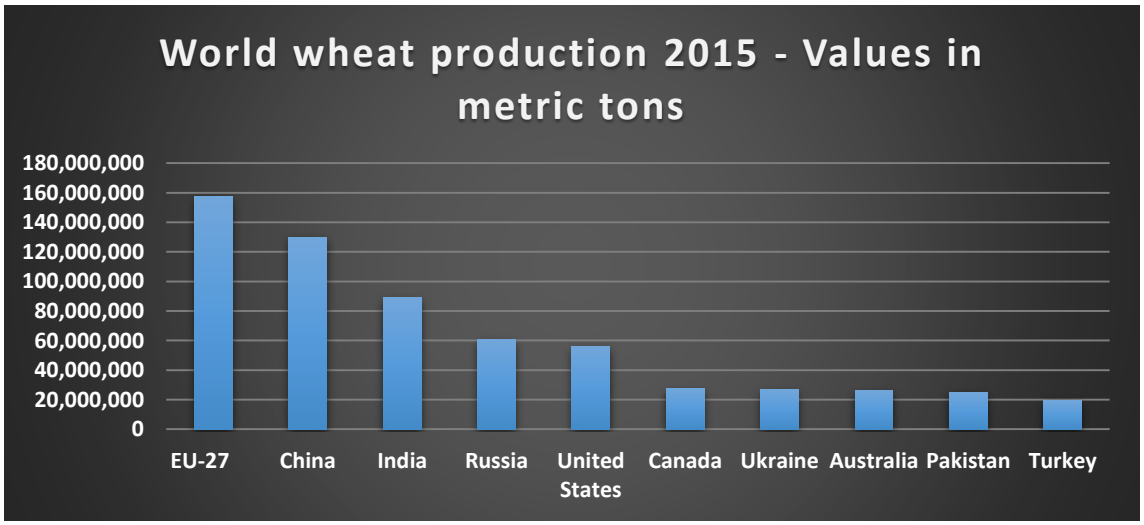

Figure 2.1. (Source: Index Mundi 2016)

[1] For further information, see Appendix A.1

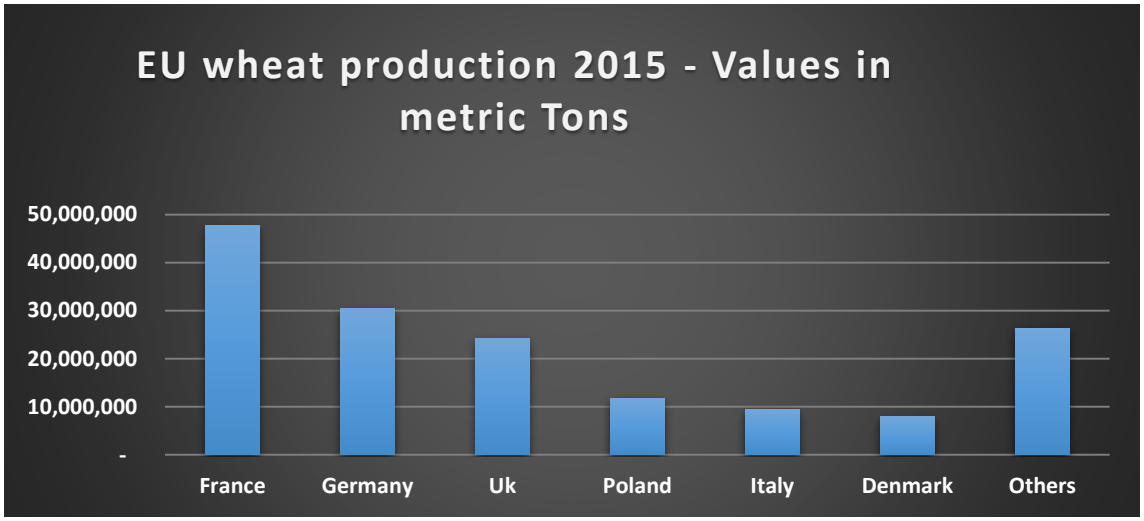

Figure 2.2. (Source: Index Mundi 2016)

2. Corn / Maize

One of the key characteristics of corn as a commodity is that it is among the world's most versatile agricultural products in terms of broadness of uses. For this reason, over the years, it has often been colloquially referred to as 'yellow gold' by the members of the industry. The most common variety traded on the market is known as dent corn, or in simpler words field corn. This particular type is high in starch and low in sugar, which makes it very well suited for industrial application, as we will soon discover. One bushel of field corn weighs approximately 56 pounds, and if it isn't used directly for livestock feed, it is likely to be exported or made into ethanol that is used to fuel cars. Each bushel can potentially produce 2.8 gallons of ethanol, 14 pounds of corn gluten pellets and 17 pounds of carbon dioxide which is used for dry ice, the beverage industry, water treatment facilities and other applications (USDA report, 2016). Major corn buyers also include companies that process it, in order to obtain corn oil. Corn oil, in turn, has multiples applications ranging from the manufacturing of food products such as margarine to industrial production of paint and even glue (Capehart, 2011). Sweet corn, which is the variety for human consumption, despite gaining in popularity in the last decade, accounts for less than 5% of global corn produce (Capehart, 2011). Overall the largest producing macro regions are Europe and North America. Global 2015/16 corn supplies amount to a record 733.1 million tons (USDA report, 2016).

The price of Corn as a commodity can be, like all crops, affected by a wide range of factors. However, there are two that stand out from the crowd. **i) The weather**, as an

overly dry or wet season, will reduce the yield of the crop whereas even exemplary weather may prove to be problematic: this condition will make yields much larger, decreasing corn's price, especially in less structured markets (Meersman et al 2012). **ii) The worldwide trend in energy prices**, as a result of corn being used in the production of ethanol. But just as ethanol became the cheapest biofuel, in the near future we may indeed witness the advent of a cheaper alternative, which in turn will usurp ethanol as the fuel of choice, demand for corn at that point will subsequently decrease, creating further imbalances in the market (Meersman et al 2012).

The most relevant markets are:

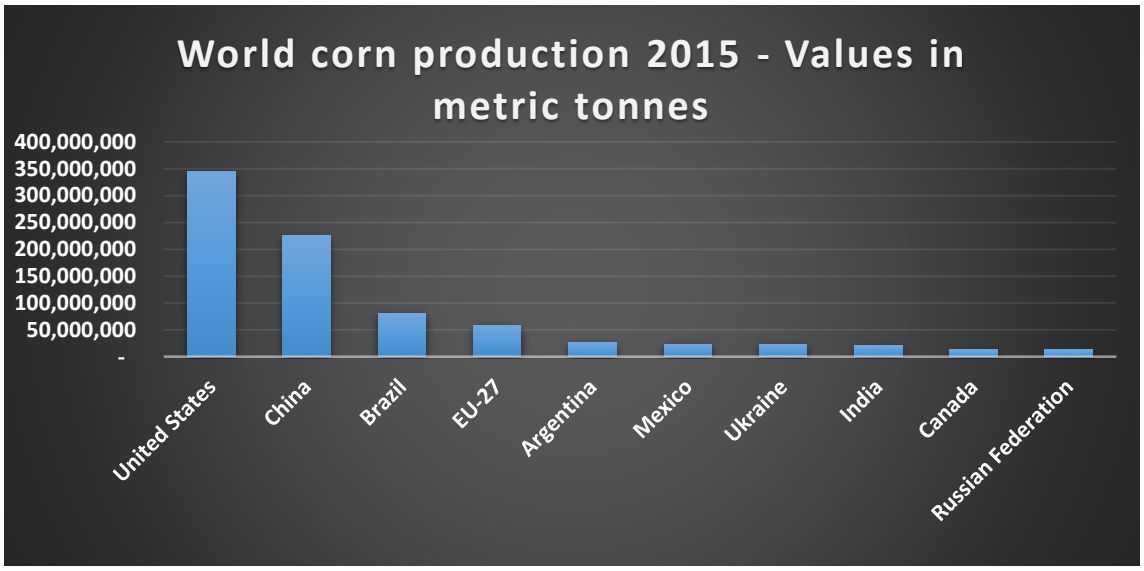

Figure 2.3. (Source: Index Mundi 2016)

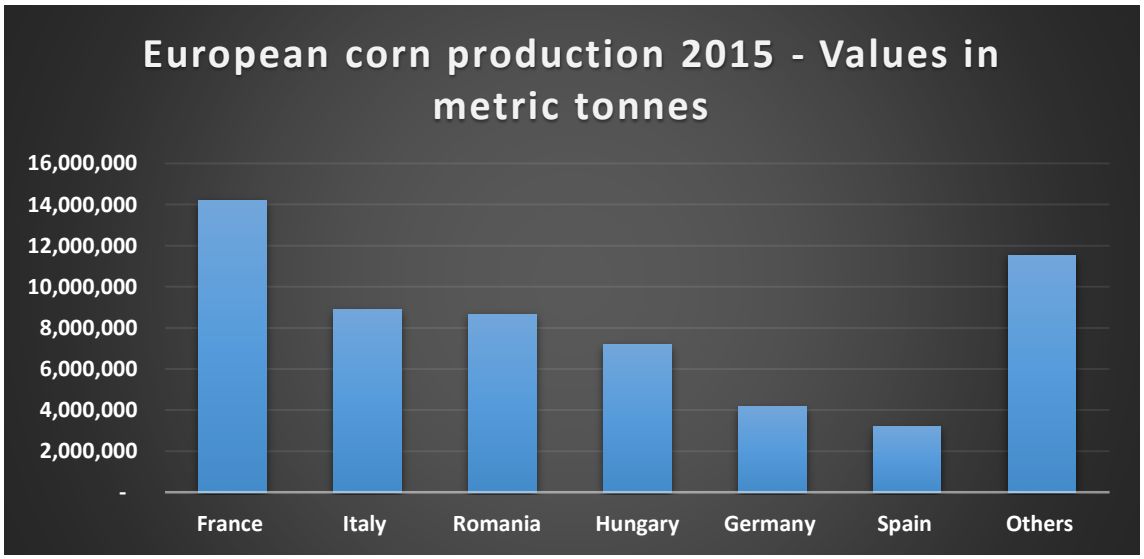

Figure 2.4. (Source: Index Mundi 2016)

3. Rice

Rice is a cereal grain belonging to the grass family of the 'Poaceae'. In order to grow in optimal conditions, it requires both moisture and warmth. Therefore rice is typically grown as an annual plant, although in some tropical regions, it is also grown as a perennial plant (FAO, 2015). It is one of the few crops that is non-glutenous and non-allergic, which increases its business potential greatly especially among people with strict dietary restrictions (necessary or self-imposed) - a market that is poised to grow exponentially in the next decade (Forbes, 2014). However, according to the U.N. farmers need at least 2,000 litres of water to make just one kilogram of rice, making it one of the highest-cost plants to grow. The most important feature of rough rice as a common commodity is that it is the primary source of food and nutrition for a large percentage of the world's population (over half), especially in the emerging markets region. The main markets are concentrated within China, Vietnam, Thailand, India and Indonesia which collectively produce an astounding 70% of the total world yield which by 2015 had seen an increase of 1.1% on the previous year, reaching 749.8 million tonnes (FAO, 2015).

Despite such a massive output, only a very small fraction of the rice produced is available for export, as most of it is consumed within the borders of the producing countries. This implies that only a small number of producers have control over how much produce is made available to the export market. I.e. the United States provides less than 2% of the world's total rice output, and yet it accounts for almost 12% of the world's exports. Such a situation significantly opens up the possibility of substantial price swings and above average levels of volatility.

Rice commodity prices can also be affected by other factors. Overall demand is still considered to be increasing, particularly in India and China, in turn, this drives the prices of rice futures upwards. Official data estimates that demand has risen by 40% in the last thirty years (Clarete et al. 2013). Rice futures can also fluctuate in price, as is with most agricultural commodities, by changes in weather cycles. In particular, rice is very susceptible to the levels of precipitations, as it requires a relatively large amount of water to flourish. Similarly, changes in the price of fertilisers can lower or also drive up the costs for growers, which in turn will have a direct impact on both spot prices and futures prices (Clarete et al. 2013).

The ticker code for the trading of rough rice futures is RR when the contracts are traded on an open auction, and ZR when they are traded electronically. The main markets are:

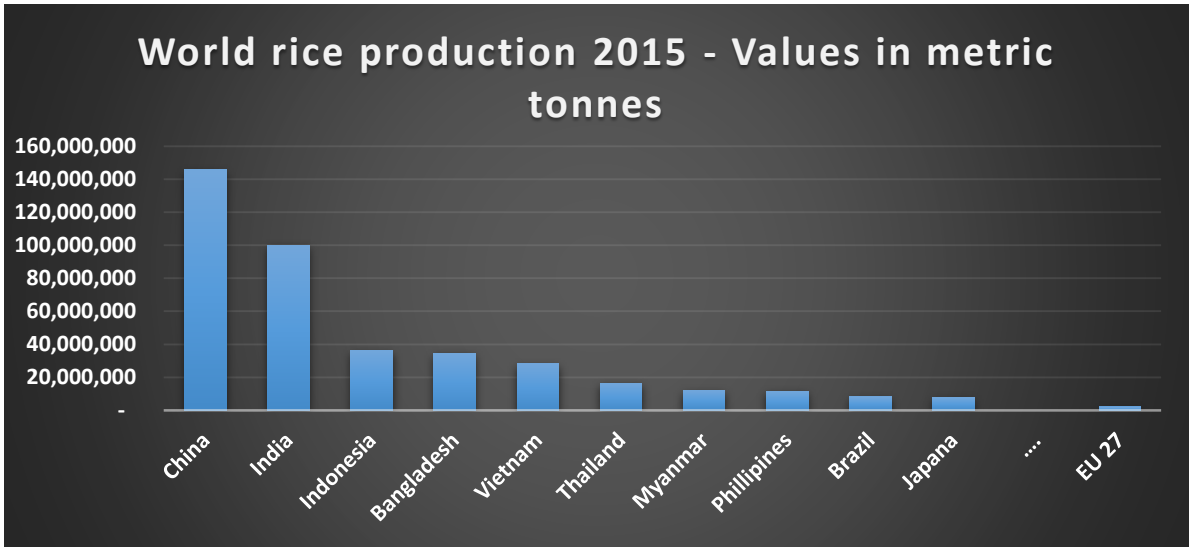

Figure 2.5. (Source: Index Mundi 2016)

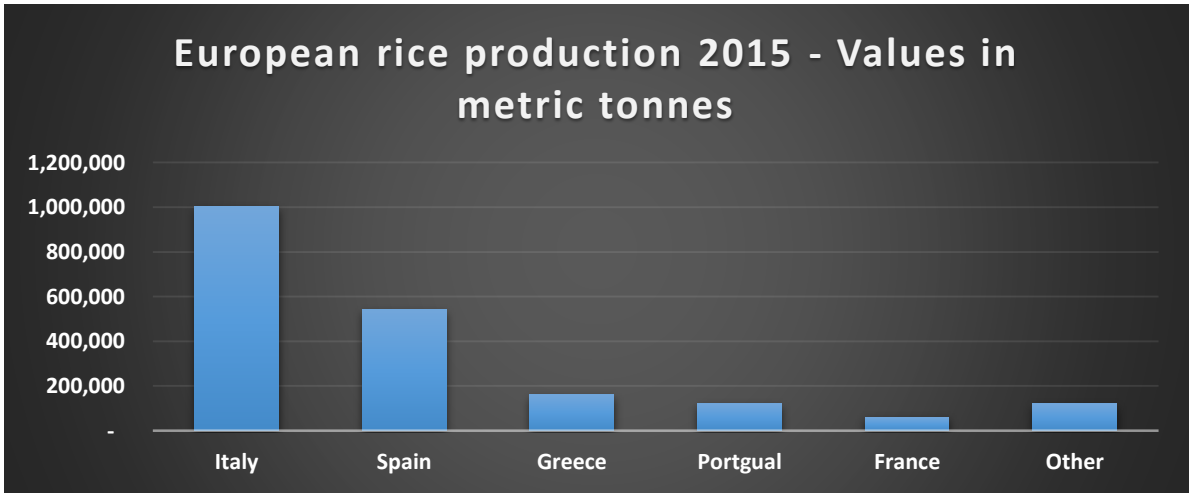

Figure 2.6. (Source: Index Mundi 2016)

4. Barley

The crop is in itself very hardy while simultaneously being able to adapt to climates that are temperate, and those that are tropical (Bilodid, 2007). In essence, it is capable of surviving many adverse weather conditions to whom other crops would capitulate. This greatly helps producers limit their risk exposure in case of uncontrollable or unpredictable

weather patterns. These reasons help to explain why barley is the fourth largest cereal crop after maize, rice and wheat with 132 million tonnes produced annually. However, the crop's endurance and resiliency does not necessarily translate in stability of prices, since the global pattern of production has fluctuated considerably over the years. World Barley production doubled in the period from 1961-1979, reaching its peak in 1991 at 170 million tonnes. Since then production had declined to 132 million tonnes, 78% of its peak (Copa Cogeca, 2015).

The main business and consumer markets for barley are primarily centred on the food and drinks industry. Barley is an essential ingredient in the production of both alcoholic beverages such as beer, and different varieties of bread in many countries. Both of these products are very well renowned and therefore have significant commercial value. Aside from human use, this crop finds its greatest demand from the livestock and animal feed sector (Harapiak, 2000). Such common applications, ensure that it is most likely that barley prices will, for the most part, be quite attractive, simply due to the sheer amount of demand present within the market. Although we mentioned previously how barley is a very resilient crop, it can still suffer if the weather conditions become extreme enough. However in such instances, this could also mean that as other crops suffer even more from such events, barley may become a "last survivor" rendering it the only available option to buyers, therefore increasing its demand even more (Harapiak, 2000). The latter is empirically proven as, when considering the price of barley over the last 30 years, we can observe a consistent upwards trend, that has seen astronomical peaks in 2008 and 2012, to then settle at more moderate pace from 2013 onwards (Index Mundi, 2016).

Other price determinants that affect barley prices are more or less similar to those that affect all agricultural commodities: fluctuation in the levels of consumption across the globe. However in this specific case, demand is currently believed to be at an all-time high, given a substantial increase in available revenue in developing countries, while production has not quite caught up in terms of output to offset this uptick in demand (Economist, 2014). Finally, even the price of ethanol can take a toll on barley. If demand for ethanol keeps on increasing, farmers may be tempted to cut other crops in favour of corn. This could subsequently decrease the supply of barley and drive up the price of barley futures.

Barley is traded under the ticker symbol of AB and the main markets are:

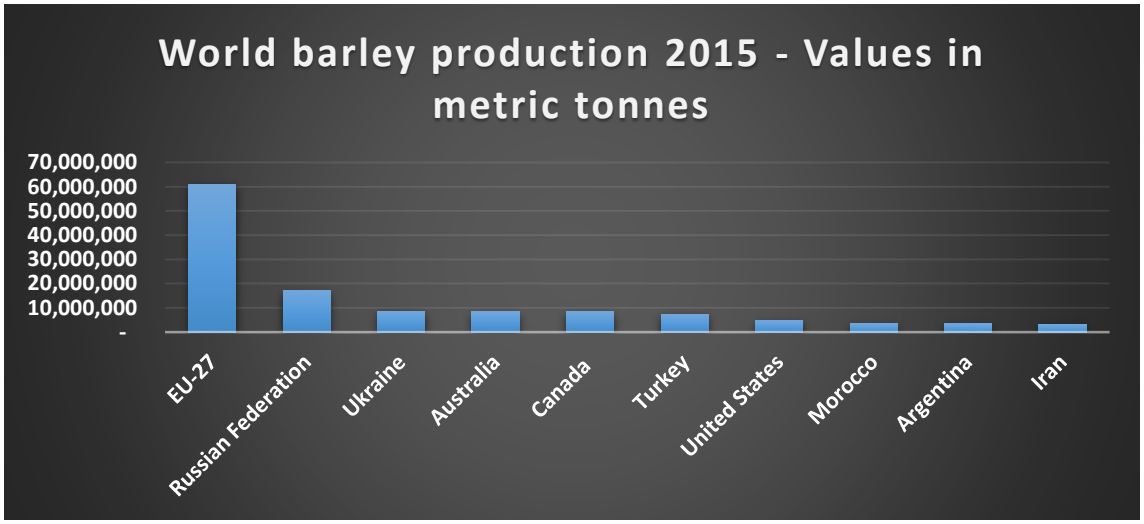

Figure 2.7. (Source: Index Mundi 2016)

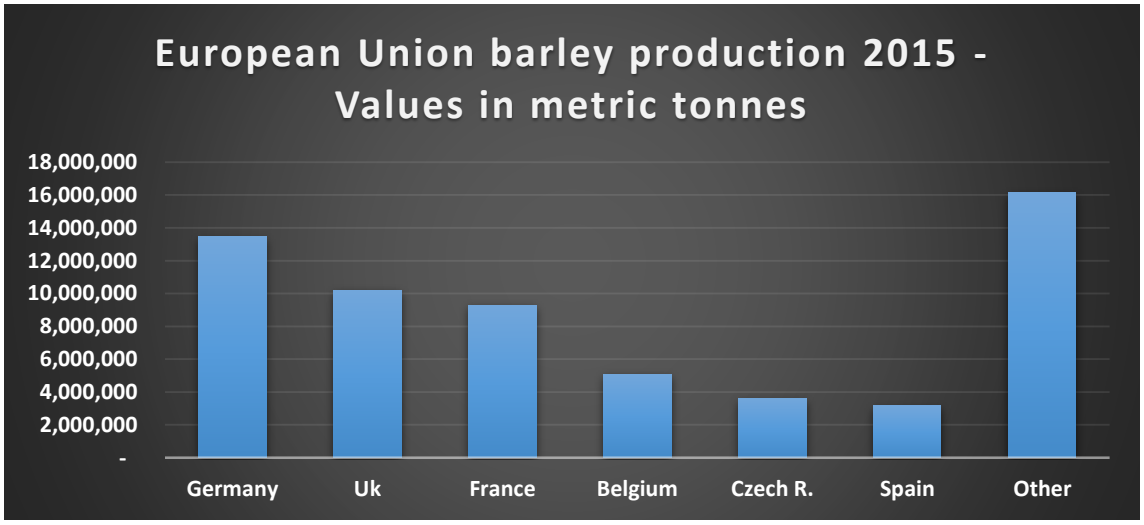

Figure 2.8. (Source: Index Mundi 2016)

5. Oats

Oats are very resistant and can be grown in a variety of climate zones around the world: abundant crops have been registered in Australia, Iceland as well as in west Europe. Oats are considered capable of tolerating cool, wet summers and have a tendency to lie dormant under extreme heat (Reid et al. 2010). Oats remain an important grain crop for people in marginal economies throughout the developing world, and in developed economies for specialist uses. Typically oats are grown for use as grain as well as for forage and fodder, straw for bedding, hay, silage and chaff. Despite the many uses, livestock grain feed is

still the primary use of oat crops, accounting for an average of around 74% of the world's total between usage in 1985 to 1994 (Welch, 1995)

Oats have a largely untapped commercial potential. Besides they are the only other cereal, together with soybeans, to have a protein range of 12-24%. For this reason, they have been deemed by the WHO (World Health Organization) to be equal in quality to eggs, meat, and milk regarding protein nutrition properties, making them a top seller for vegan oriented diets – a rapidly emerging trend in the most developed countries. The annual global production of oats is about 22.5 million tons harvested off 9.7 million hectares. World oat production has decreased over the last few decades, and is now at 45% of the 1961 production figure. In terms of value oats are not particularly "glamorous" cereals on their own, furthermore in today's globalized world, the rising popularity of soybeans and corn, particularly in ethanol production, has seen oats having a tougher time finding their place in the market (Yara, 2016).

Some future trends that may influence market structure and prices are the following. The health benefits from oats and oat products have been well documented and began with the start of the "oats craze" in the late 1980s (Weipert 2006), however it is hard to predict whether this supportive industry trend will continue to hold, whatever the outcome there will be robust repercussions on the demand side in the near future. Similarly the development of 100% oat flour bread is also underway and recent studies have shown that oats can be tolerated by most people suffering from celiac disease. This in turn would open up a new market, which is currently valued at 4.63 billion USD (Statista 2016).

The main markets are:

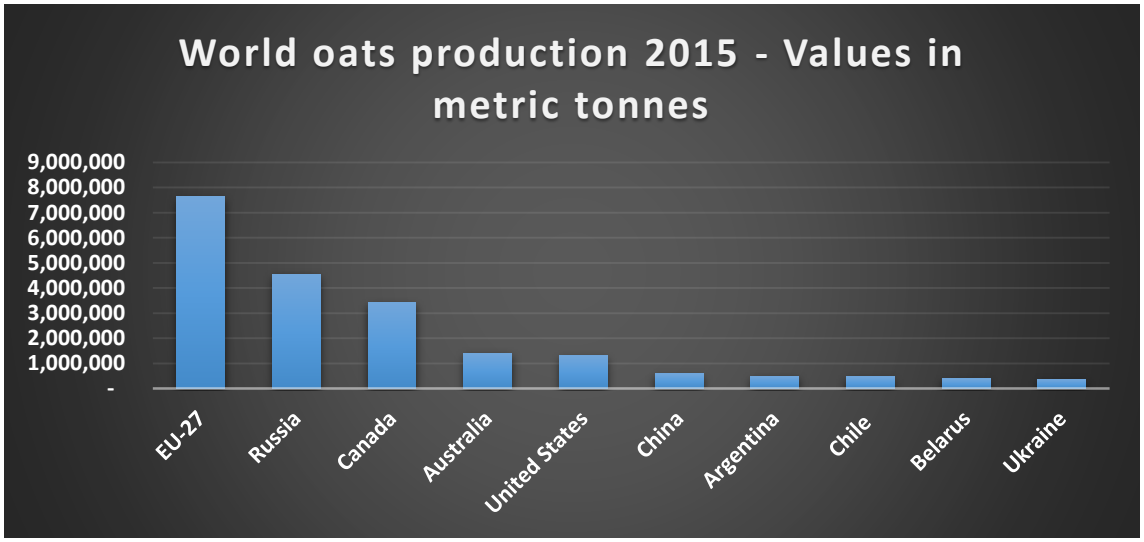

Figure 2.9. (Source: Index Mundi 2016)

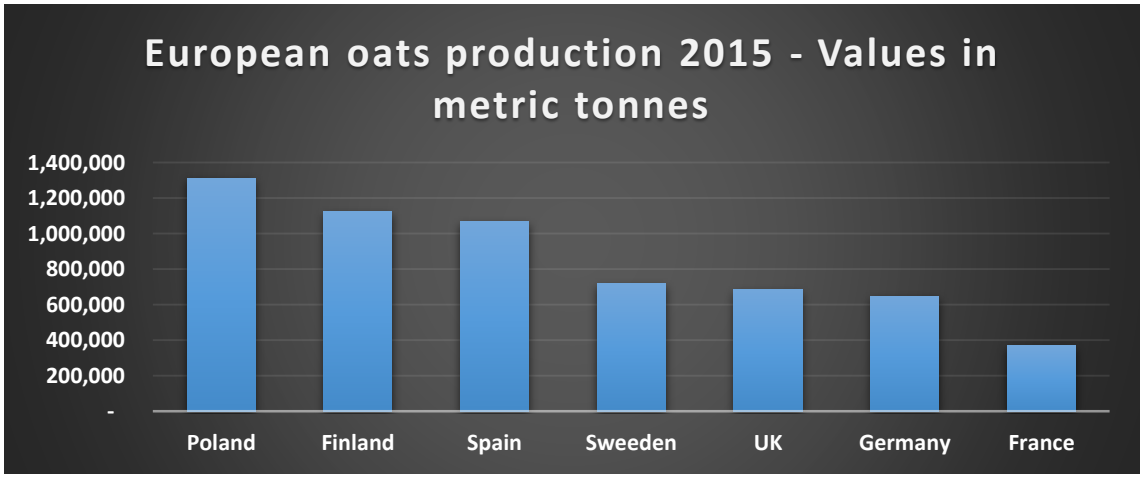

Figure 2.10. (Source: Index Mundi 2016)

Now that we have defined and categorized commodities, especially in terms of the importance of cereals within today's world, it is time to give a few highlights about the markets and the purpose for trading.

III. THE EUROPEAN SPOT MARKET FOR CEREALS

After having outlined the characteristics of the main cereals, we will now proceed to analyse the features of the cereal cash market. This section is constructed so as to give a clear and concise view on the topic. Our primary aim is to give an overview of the spot

market and its major trends – though we will also briefly mention future contracts and their purpose. Then we will follow up with three key sections: the industries' demand side, the industries supply side and finally which market forces are most prominent in today's competitive environment.

Commodity trading at a glance

Historically the strength of an empire was somewhat proportionate to its ability to create, sustain and manage complex trading systems. If states were not capable of securing the trust of ancient investors, traders and suppliers would just go elsewhere for their financial ventures (Greer & Sigh 2000). Nowadays the situation is not that different. The latter attributes still remain paramount for a well-functioning market, however the buying and selling of commodities in present days can also occur on virtual exchange platforms where contracts rather than actual commodities are traded. Let's outline the two primary trading options.

- *Spot contracts*: A contract that involves the purchase or sale of a commodity, security or currency for immediate delivery and payment on the spot date, which is normally two business days after the trade date. The spot rate, or spot price, is the price quoted for the immediate settlement of the spot contract (Investopedia 2016). So for example you buy a ton of wheat through a spot contract, you will take ownership of it in the exact moment the trade occurs.

- *Future contracts*: contractual agreements, to buy or sell a particular commodity or financial instrument at a pre-determined price in the future. Futures contracts detail the quality and quantity of the underlying asset. They are standardized to facilitate trading on futures exchange. Some futures contracts may call for physical delivery of the asset, while others are settled in cash (Nasdaq 2016). For the sake of coherence we will maintain wheat as the example: two parties agree to either buy or sell a ton of the product at a price that they set on that day (the strike price), however delivery of the previously mentioned wheat and payment occurs at a future date. In practice, most commodities are traded in this form. Such contracts carry the potential for acute market fluctuations, but they also offer profitable opportunities for those investors willing to accept the increased market volatility. (Forex 2014).

Goals of commodity trading

One might think that as is with most types of investment, the goal of commodities trading is purely to buy low and sell high. However, this line of thought is misleading. The fact is that commodity trading is not just done purely for profiting and speculation, there is at least one other primary reasons why non-financial firms get involved in such markets (Fung 2001).

Futures and Hedging

Futures markets allow producers, processors, and users of commodities, a means of passing the inherent price risks in their businesses to traders who are willing to take on these risk levels. In other words, commercial users of the markets can adopt what is called a "hedging strategy". Which implies in this specific case to enter into an equal and opposite transaction to reduce the risk of financial loss due to a variation in price (Cox & Schwebach 1992). By doing so, the cost of doing business is lowered, and the risk of unforeseeable losses is reduced to a minimum. This results in a more efficient marketing system and, ultimately, lower costs for consumers (Shimko 2006). Why are such strategies adopted? Because commodities can become a risky investment in very brief lapses of times since they can be affected by events that are difficult, if not impossible, to predict let alone control. These include natural disasters, epidemics, unusual weather patterns, and man-made disasters.

Thus, commodity exchanges are also regularly used by service providers and manufacturers as part of their core budgeting process. The markets potential ability to normalise expenses through the use of forward contracts reduces a lot of cash flow-related headaches. The over-arching point is that without the use of futures and hedging techniques, the inherent volatility in commodities exchanges could cause severe disruption, and in the worst case scenarios, even to the point of bankruptcy for businesses that require predictability in managing their expenses (Petersen & Thiagaraja 2000). For instance, the emergence of India and China as new economic superpowers has significantly contributed to the decline in availability of industrial metals, such as copper or steel, for the rest of the world (Financial Times 2008).

"Major Trends"

Global trade regarding food products continues to expand at a rapid pace, as the ramifications of globalization gradually take shape and come into effect. However, the patterns and structure of trade differ significantly depending on geographic region and commodity type. Key drivers of supply and demand, including macroeconomic policies and trade, shape such patterns in different ways, with the potential to have important repercussions on food availability and security (UNCTAD 2014).

Following upon the last point mentioned, greater participation in global trade is inevitable for most countries' national trade strategies if they wish to improve their economic conditions. However, the transition from a closed economy to one that is more open will need to be appropriately managed, as its consequences are far reaching (Wilson, Otsuki 2001). Especially in the European Union's case, the new members that joined from 2004 and onwards will need to make a substantial effort in order to catch up with already member states.

Microeconomic shocks such as food price spikes should not be taken lightly as their potential negative impact on food security is not negligible. Since when it rains, it pours, weather and geopolitical uncertainties, as well as misguided government responses, are often likely to exacerbate these episodes in the short to medium term, furthermore increasing the chances of trade flow disruption. The likelihood of price spikes, although episodic and hard to predict, needs to be factored into long-term decision making regarding the management of agricultural products and in particular food staples.

To put things into perspective, within Europe, the cereal crops sector is broken down into three segments: rice, wheat, and coarse grains, that include barley, oats, sorghum and other lesser grains (MarketLine 2015). The volume present on the market reflects consumption in each country, calculated as production output, plus imports minus exports. Cereal crops are valued at producer prices. In the most recent years, the trajectory of the cereals market has been uncertain, to say the least, with the value of the market stagnating and growth levels tumbling, as can be seen in next figure.

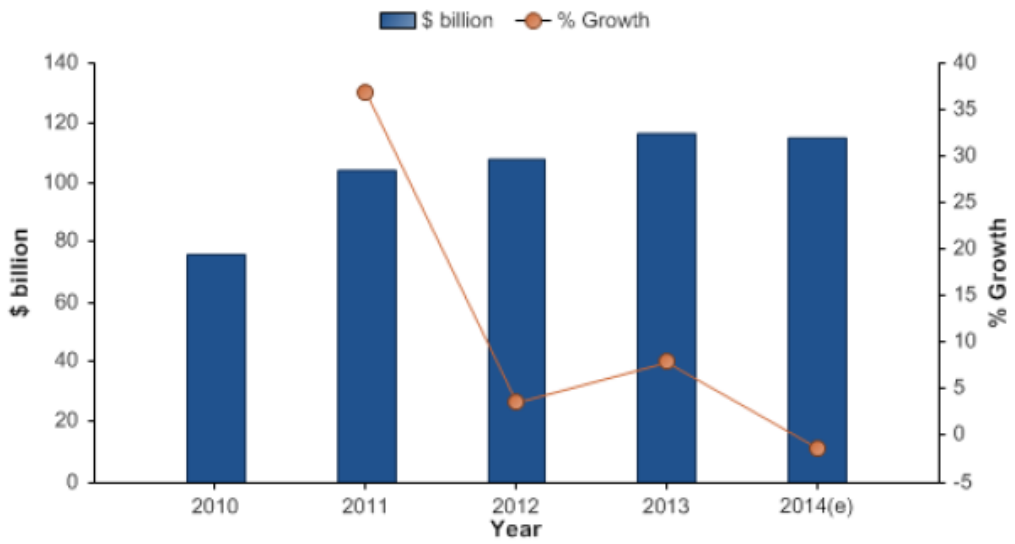

Figure: 3.1. European crop industry worth and growth (Source Marketline report 2015)

To better understand the meaning of the graph and give some content to the mentioned numbers, we will now analyse the overall buyer & supplier status, and then conclude by outlining the main competitive forces present.

Buyers

Cereal grains are an important part of most people's diet; they are eaten regularly and provide a significant proportion of energy and nutrient needs. Tight global supplies and increasing world population mean there is always demand for cereal grains. In developing nations rice, wheat, millet, or maize constitute a majority of daily sustenance. In the more advanced countries, cereal consumption is more moderate and varied, but still substantial (Nonhebel 2002). Industry players include large agri-business customers, smaller, privately-owned farms and individual consumers with small holdings. The major buyers of products requiring processing, such as cereal grain, are wholesale dealers and food processing companies. Such buyers are usually large-sized and are therefore able to purchase in bulk, boosting their power.

Prices of cereal crops can fluctuate greatly depending on factors including speculations in agri-commodities, currency exchange rates fluctuations and relatively low ending stocks leaving the market open to price instability. The fact that prices are set on the world stock exchanges increases the power of arable farmers against wholesale grain dealers and food processing companies (OECD report 2013). Arable farmers often sell such produce through hedging, which protects their business from dramatic reductions in grain

prices. Additionally, the existence of such contracts may increase buyers' switching costs (the negative costs that a consumer incurs as a result of changing suppliers, brands or products) if they wish to terminate a contract early (Anderson & Ibendahl 2008). However, hedging may also positively affect buyer power in the context of protection from dramatically increasing grain prices, for example due to unfavourable weather conditions (OECD report 2013).

Products in this industry are largely undifferentiated, which increases buyer power. However, limited possibilities of differentiation exist in certain cases, for products which are fair-trade, organic or sourced domestically for example. Some consumers may favour some products grown nationally if there is an increasing consumer trend towards locally sourced, seasonal and organic agricultural products.

Summing up the various forces that we have identified, it is hard to say that buyer power is disproportionate. In the market there appears to be a significant process of counter balancing, which induces us to conclude that overall, within the cereal crop industry, buyer power is moderate.

Suppliers

The main suppliers within the cereal crops industry include farmers, fertiliser providers, manufacturers of farming equipment and land suppliers, amongst others.

Farmers sell their crops in limited geographic markets. Because transportation costs are very high, most farmers sell their output to grain elevators within about 25 miles of their farms. The area around a grain elevator from which farmers come to sell their crop is called the draw area (Brown, Oli 2005). There are opportunities for farmers to exploit, with the arrival of supermarkets, especially if they are organized into larger cooperatives. Consumers can be leveraged so as to demand local content and fair prices for farmers. If the government provides an adequate legal framework, contracts also offer the potential for risk sharing between producers and buyers, therefore removing some of the price uncertainty that can lead to unsustainable debt levels for small growers. Unfortunately, the dominant pattern to date is of exploitation rather than cooperation (Hendrickson 2005).

Fertilisation products on the other hand are typically supplied and provided by large chemical companies. High demand for such products allows chemical companies to

control prices, which are largely dependent upon the price of inputs into their manufacturing processes. For example, the price of nitrogen-based fertilisers, such as ammonia and ammonium nitrate, has increased dramatically recently, in line with the spiralling cost of natural gas. Similarly, a global shortage of phosphate has led its price to increase dramatically (O´Brien, Doug 2005). However, fertiliser products are typically relatively simple chemicals and thus lack differentiation, with a relatively consistent quality available from a large number of suppliers. Alternatives include the use of animal waste as fertiliser, or organic farming practices, which eliminate the use of artificial fertiliser products. The increased demand for organic products in some countries may slightly reduce the power of chemical companies (O´Brien, Doug 2005).

Developed countries, having fewer cost constraints, tend to harvest cereal crops mostly through machines, the most classic set up includes using a combine harvester. Agricultural machinery manufacturers tend to be large sized companies; they are usually global players with moderate reputations. Such suppliers have established globally recognised brands: for example John Deere manufactures all its machinery, from tractors to lawn mowers, under the same name, creating a high level of brand identification and loyalty (Heasman & Lang 2004). Due to varied requirements of different buyers, manufacturers can differentiate themselves by offering products answering to specific customer needs.

All these factors combined boost the supplier power within this industry, which we asses to be moderate to low overall.

Forces Driving Competition

Agricultural markets do not self-adjust easily. The first land to go out of production is the marginal land with the lowest yields per acre. Farmers generally cannot afford to miss a year's crop or to absorb the cost of maintaining idle land and storing equipment that depreciates annually (Sonka 2003). The pattern over the past century in developed countries has been a simultaneous dramatic reduction in the number of people living directly from production agriculture and increased overall yields, with the amount of land in production staying relatively unchanged. Individual farmers cannot affect overall supply through their production choices because they do not grow enough to affect total supply in the market, even locally, let alone at the global level. Economic logic thus dictates that farmers maximize their production whether prices are high or low (Sonka

2003). High prices bring new producers (and, especially, new land) into production, but low prices are slow to push existing producers out, or to reduce production. The opportunity costs of exiting are high because there is no quick way back in and because most agriculture ventures takes years to show a return. Agriculture is not a sector for quick profits

On the other side, the demands of processing to conform to an increasingly centralized and highly regulated food distribution system (increasingly dominated by a few retail firms in most continents) reduces the number of farmers that can hope to share in the greater profits that accrue to selling a more refine product to a wealthy consumer base. Indeed, the majority of farmers in the world cannot afford even something as simple as on-farm storage for their crops, nor can they afford to hold back production at harvest time in the hopes of higher prices later in the year. The mounting costs of more complex input and storage needs are affecting farmers in the EU too: it does not take hundreds of thousands of dollars of investment for a farmer to find his or herself with high input costs relative to final sales price. At the household level, farmers are often better off with lower output and lower cost technologies, which create fewer environmental problems for them long-term and which generate higher net income levels for them by eliminating production costs.

Finally the existence of farming subsidies increases the likelihood of new entrants and alleviates rivalry, as it helps to control the price of crops and ensures farmers have a consistent income. Some governments provide subsidies and support programs for agricultural producers, in order to keep a country free from food supply dependence upon foreign countries. For example, the Common Agricultural Policy (CAP) is designed to protect European producers from cheaper products outside the EU. This is achieved by deterring imports from outside the EU with a stiff system of import tariffs which is simultaneously reinforced by a subsidization program for through the "Single Farm Payment". However the program during the past decade has been significantly wound down, and now plays a much smaller role in European context.

It is for these reasons that we consider the forces driving competition to be not particularly strong. However we would be remiss to not mention that this competitive context is ripe for consolidation.

IV. FUTURES MARKETS FOR CEREALS

Like all the other commodities, cereals have a flourishing derivative market backing them. In particular, the most common contracts written on agricultural commodities are futures and forwards. The difference between the two types of derivatives lies in the characteristics of the agreement, where futures are standardized contracts commonly traded on the major regulated stock exchanges while forwards represent tailored agreements between two counterparts (traded over the counter). Despite various kinds of derivatives such as options or swaps are available on the market, we will focus our analysis essentially on the futures, as they represent the most relevant instrument linked to the price of agricultural commodities.

Futures contracts

Futures contracts represent the simplest category of derivatives available on the market since they are linked to the underlying assets by a linear relationship. Any future contract is defined by a set of standardized variables that specify the purchasing and selling obligations. First, stated elements are the **i) quantity** of a specific commodity that is being traded (e.g. 100t EU common wheat) and the **ii) quality**. In fact, same typologies of agricultural commodities can be characterized by different degrees of quality, thus entailing different prices. This characteristic is not shared between all commodities; for instance, currencies do not suffer from this problematic. The third element specified in a future contract in the **iii) price basis** which essentially specifies which measuring units are being used (e.g: $/bu; €/MT; £/lbs). Last specified variables are the **iv) delivery time**, stating when the contract will reach maturity, and the **v) delivery method**, indicating where the physical delivery of the underlying commodity will take place. In addition to these elements it is also possible to find further specification such as **vi) criteria for closing the position**, **vii) limits to price variations**, and **viii) negotiation time** for the instrument (Fabrizi, Pomante, Saita, and Zanotti, 2011).

Thanks to the standardization of such contracts and the presence or regulated markets, futures obtain multiple benefits. In particular, the presence of a Clearing House (CH) allows the operators on the market to avoid the risks related to the insolvency of the

counterpart and closing their positions before stated in the contract. Such institution acts as a counterpart in every future contract.

For instance, given a subject *A* (long position) and *B* (short position) decide to enter a future contract exchanging a specific commodity α in date *T* for a price *P*, this is what occur (Figure 3.1)

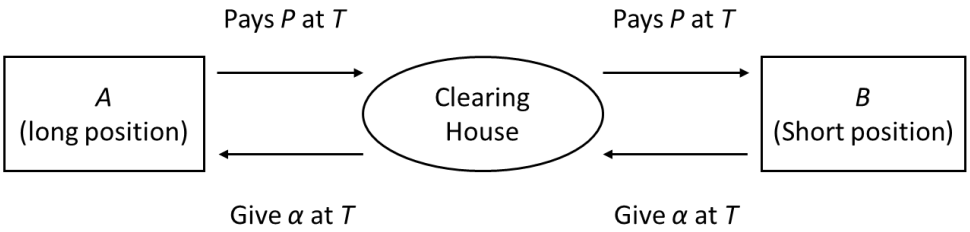

Figure 3.1 Source: elaboration of the authors

The Clearing House never takes any open positions on the underlying asset by assuming two equal positions on the same contract. For this reason, it is never subject to gains or losses due to the change in prices of the underlying asset. Nevertheless, the CH is still liable for the risk that one of the two counterparts will fail, and extending this risk to all the transactions made it is clear that the CH could become insolvent. For this reason, every subject taking a position on a future is required to set an *initial margin*, a financial deposit to the CH, with the scope of preventing the insolvency of each counterpart. Additionally, such deposit requirements change on a daily basis according to the value of the underlying contract with a procedure called *marking to market*. In the scenario where one of the subjects involved in the future contract becomes insolvent, the CH is allowed to take the required money from the deposit.

The relationship between grains futures and spot (cash) markets

General overview

As we already described, future markets differ consistently from the markets where their underlying assets are being traded. We identify as *cash (spot) markets* the places where the physical commodities are traded, in contrast to the derivative markets where the contracts written on such assets are being exchanged. One basic difference lies in the nature of the deals made: in the cash markets transaction occur in the present, while in the future markets the deals involve a transaction occurring in the future, as one would

expect. Nevertheless, it is interesting to point out that, generally, future markets are characterized by being more efficient and transparent than the relative cash markets. In particular, information on the specific transactions is more available and the products characteristics are being displaced more efficiently, due to the fact that such markets are strongly regulated. Also, prices are more transparent as they are updated in a constant way (15 min delay); on the contrary, most of the European cash markets for cereals update the listing prices of the commodities only once a week, reducing the amount of information available and transparency, thus leading overall to less efficient transactions. Also, the market landscape appears to be much less fragmented; while the European cash markets are dispersed across the entire EU, even showing multiple trading places within the same country, the future exchanges are much more concentrated and organized. In Europe, the leading institution for the trading of commodities (included instruments written on cereals) is the Euronext LIFFE. This organization was founded in 2000 and it is structured as a federation of the major stock exchanges of Paris, Amsterdam, Lisbon, Brussels and the English LIFFE index. For this reason, it presents high capitalization levels and higher liquidity of the instruments traded, included commodities. Such organization also allows for a much better integration among the different countries in the Eurozone, allowing more efficient trading for the operators on the market. In the end, everything considered, future markets enjoy higher levels of liquidity, a larger number of transactions, transparency and regulations, making them more efficient than the respective cash markets. Nevertheless, future markets are also more subject to phenomena such as speculation that, despite increasing the volume and the information available on the market (Von Braun and Tadesse, 2012), also act as distorting forces especially volatile periods.

Pricing dynamics

To the extent of this work, we are also interested in knowing the relationships existing between in the prices formed in financial and spot markets for agricultural commodities. In general, such connections can be generalized to most of the futures written on the various asset classes, but with some specific differences related to the inner characteristics of the commodities we are studying.

As a general rule, we refer to the *Spot-futures parity theorem* (3.1). This basic theoretical relationship states that the futures price F_0 must be equal to the value of the underlying

asset S_0, capitalized to a risk free rate r_f and diminished by the eventual dividends (d) payed by the original asset (for commodities d do not exist). Mathematically:

$$F_0 = S_0(1 + r_f - d) \tag{3.1}$$

Such theorem is also called *cost-of-carry relationship* since in the formula the difference between the futures and spot price is determined by the intrinsic cost of buying the underlying asset and keeping it in the portfolio until the maturity date of the relative future contract. In essence, buying futures or acquiring the underlying asset and keeping it until the maturity date of the future should theoretically be the same. Nevertheless, this general theory must be adapted to the specific case of agricultural and grains commodities. For what concerns this kind of assets, things get slightly more complicated as we should also take account of a series of other distortive factors such as storage, insurance, transportation, financing and opportunity costs (Cinquegrana, 2008). In light of such consideration, it is evident that buying futures on a commodity would be cheaper than acquiring the underlying asset, as one would incur in the above-mentioned costs of carry. For that reason, under normal market conditions, physical commodities' spot prices should be lower than the relative futures prices since the strategy of buying the commodity and holding it until the futures maturity date would entail additional costs (Garner, 2012). To be more precise, we also mention the fact that in case of exceptional market conditions, such a dramatic shortage of food stocks and inventories, spot prices could rise over the futures values, offsetting all the costs we identified before; anyway, this would only be true in an extreme scenario and it does not represent the standard market conditions. Indicating with c all the additional costs of carrying a commodity in inventory, we can rewrite the previous formula in:

$$F_0 = S_0(1 + r_f + c) \tag{3.2}$$

The difference between spot and futures prices is called *basis*, and it must equal to zero on the maturity date, otherwise an arbitrage opportunity would arise. In theory, if the basis would not vary along time, futures and spot prices would be perfectly correlated entailing the possibility of hedging perfectly any open position (Geman, 2009). In reality, all the costs related to keeping a commodity into the inventories shift along time, entailing constant changes in the basis value. For this reason, anyone willing to close its position

before the maturity date supports a "basis risk", which is the risk that futures and spot prices will not move in perfect lockstep all the time.

Now, we should also take into consideration how futures prices relate to expectations about the specific underlying instrument.

On a general note, commodity's futures prices should reflect expectations about the future value of the underlying asset for the day when the delivery is planned. According to the basic *Expectation Hypothesis* (formula 3.3), the futures price F_0 equals the expected value of the future spot price of the asset $E(P_T)$, so that:

$$F_0 = E(P_T) \rightarrow E(P_T) = S_0(1 + r_f + c) \tag{3.3}$$

Assuming that all the operators on the market are risk-neutral. Following this theory, we would expect that all participant in the market would agree on a futures price, thus leading to zero profit for all the parties (Bodie, Kane, and Marcus, 2011). In reality, this is not what actually occur, especially when we consider two markets characterized by strongly different levels of efficiency, transparency and liquidity. There are two outstanding theories that try to relate futures and spot prices in the commodity sectors, both relying on the widespread presence of speculators on the derivatives markets.

The first theory is referred to as *Normal Backwardation* (formula 3.4) and is based on the assumption that every commodity (grains in the first instance) has a number of natural hedger that are willing to protect themselves from risks by entering into futures contracts. Specifically, this category is composed of the producers of such commodities which, theoretically, would be willing to pay a premium to protect themselves from fluctuations in the future spot prices. According to this view:

$$F_0 < E(P_T) \rightarrow E(P_T) > S_0(1 + r_f + c) \tag{3.4}$$

Producers sell futures contracts to speculators with a discount, to make the deal appealing to this typology of investors. In backwardation, futures prices are lower than the spot prices.

The second relevant theory referred to as *Contango* (formula 3.5)start from the opposite assumption that are buyers willing to protect themselves from price fluctuations in the future spot prices. As a result, we assume that investors taking long positions are willing to acquire futures with a discount, paying speculators a premium for the operation, resulting in:

$$F_0 > E(P_T) \rightarrow E(P_T) < S_0(1 + r_f + c) \tag{3.5}$$

Under a contango situation, future prices are higher than spot prices. In the following figure (3.2) it is possible to see a visualization of what we just described.

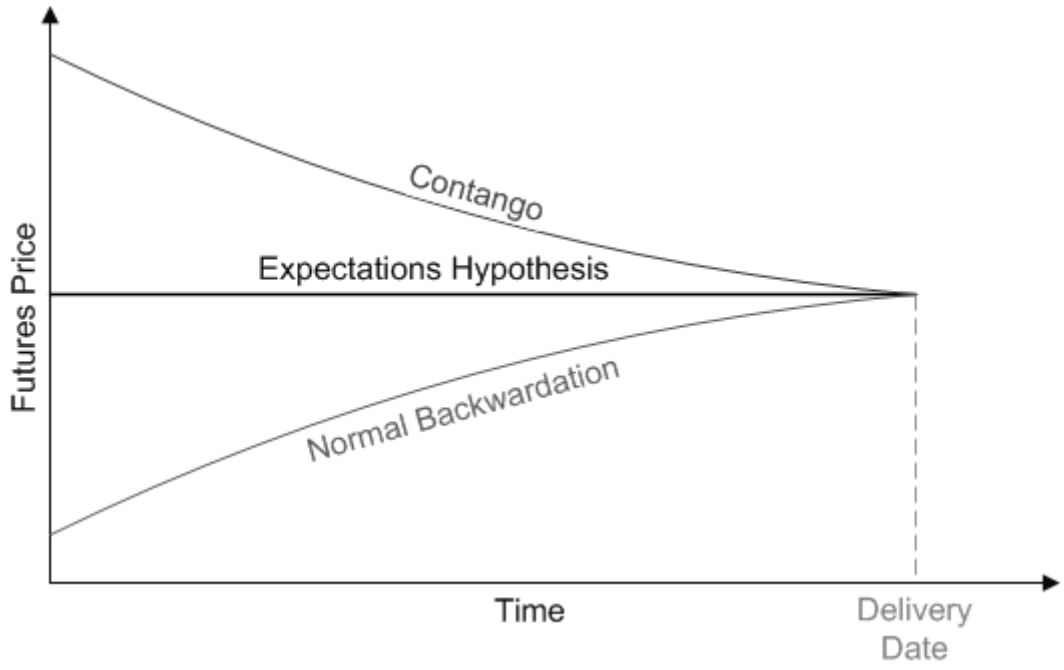

Figure 3.2 Source: Bodie, Kane, and Marcus

Clearly, as the maturity of the contract approaches, the futures prices get closer and closer to the expected future spot price, at the point of becoming totally equal to it at the maturity date. If such relationship does not hold, arbitrage opportunities would arise, thus bringing back the equilibrium in the market. In the end, from what we said before, the commodity futures generally trade in a contango situation (whenever the basis is positive), while backwardation situations can occur only during short periods characterized by high levels of market turmoil (in this case the basis would be negative).

Further considerations

In the previous section, we briefly considered the most relevant characteristics and theories that can ultimately be generalized to all the commodity's futures. Here we would like to discuss a couple more issues specifically true for the European agricultural commodity spot and futures market.

The key concept around which we want to build our argumentation is the wide difference between the European futures and spot markets for cereals. As we described before,

derivatives on grains are mostly being exchanged in a centralized and integrated structure (Euronext LIFFE), characterized by discrete levels of liquidity, a fair amount of transactions, available information and open to a wide range of investors. Thanks also to a precise regulation, the players on the market get access to a wider range of information, benefit from higher levels of transparency, and the presence of a Clearing House protect them from specific risks. On the contrary, the spot exchanges are organized as OTC markets, where regulation is essentially absent, transactions are opaque, and available information is fragmentary. Another fact that gains critical importance in that sense is the high degree of dispersion of these markets. Lacking a centrally organized marketplace and clear guidelines, further issues arise incrementing problematics such as transparency and liquidity. Additionally, European spot markets are generally self-regulated private or public institutions. For this reason, these organizations follow different internal rules that affect also the way prices are determined locally, increasing the overall issues related to transparency, data availability, and data clarity. As a final consideration, EU grains markets are precluded to the vast majority of investors: only professionals and authorized people can access and use these marketplaces, further increasing the issues related to liquidity and availability of information.

At the end of this comparison, we see a clear division between the efficient futures market and the dispersed OTC market for cereals. In general, futures market should be tied to the underlying asset's markets, but in this situation, the first marketplace dominates over the second. In particular, multiple studies (e.g. Tomek and Kaiser, 2014; Hernandez, and Torero, 2010; Cinquegrana, 2008) observed how futures markets play a key function of price discovery, which is the identification of the correct price for an asset by analyzing and merging all the information currently available. Such predominance of the financial over the physical markets has the result of having futures influencing the spot prices, a fact that can have both positive effects, both negative as we will discuss further on in our work.

V. THE PRICING OF THE INSTRUMENTS

During the past decade, the global and European markets for cereals showed extreme volatility and changes in prices difficult to forecast. In particular, due to the extreme rise in the global cereal prices that occurred in 2007-08 shortly followed by a price drop, a consistent amount of literature grew at the time, trying to explain the root causes of such phenomenon. As a result, multiple factors and events were uncovered to be directly linked to the pricing of such commodities, ultimately including financial speculation phenomena. If we take into consideration also the consequences that too high or too low prices of food commodities can have on the overall level of poverty and on the economic growth of certain countries (Benson, Minot, Pender, Robles & von Braun; 2013), we can get an idea of how important this aspect can be. Thus, to better understand the most relevant characteristics of such instruments, we need to further discuss the underlying mechanisms that regulate the way their prices are formed. For this reason, we aim to analyze and debate the core forces that influence the price formation of such instruments, what is their impact, their degree of predictability, and the implications for our research. Since global forces play a strong role in shaping the prices of cereals within the European Union, we will also take into consideration the world markets in our analysis. As we will discuss later in our research, the only key difference between global and European prices is due to a market distortion generated by the presence of import tariffs among the main global players (Europe in particular). In the following analysis, we will base our structure on a general classification (Algieri, 2013; Von Braun and Tadesse, 2012; Roache, 2009; Gilbert, 2010) that frames the most relevant variables in few main categories: the global demand-supply trends, the macroeconomic factors, the government policies and market conditions.

Demand-supply trends

Under a classical point of view, the price of any asset or good should be driven exclusively by demand and offer, given that the markets are functioning correctly (Sanders, Irwin, & Merrin; 2010). Under this perspective, the only causes that result in shifts in the cereals prices should be identified among the factors that directly influence either the demand or the offer of such products. For what concerns the offer side, it is possible to identify some

key aspects in the existing literature that affect the amount of cereals and other food products offered in the market: the weather condition, the seasonality of the production and the current level of stored products.

Weather conditions & seasonality

Cereals are a type of commodity extremely sensible to variations in humidity levels and temperatures throughout the entire growth process (Serra, Zuppiroli; 2009). Not surprisingly, the meteorological conditions in the different parts of the world play a crucial role in determining the quantity and the quality of the cereals commodities available on the markets. Particularly adverse weather conditions can result in a substantial drop in the production of important market players, thus increasing the overall prices due to a shortage in the offer. The opposite could result in the case of particularly favorable conditions, increasing the availability of cereals and diminishing the prices (Roache, 2010). This variable has also been identified as one of the sources of the unusually high volatility of the cereal markets in the past decade as extreme weather conditions were reported more frequently across the globe (Von Braun & Tadesse, 2012). Despite the fact that many weather-related events occur with a certain degree of cyclicality, forecasting environmental conditions can only be done in the short-term of few weeks, making this variable in part unpredictable in the long run.

Again strongly related to the intrinsic nature of cereal commodities, we can identify a powerful pattern in the seasonality of the production, shaping the prices in the world markets. In that regard, Koekebakker and Lien (2004) run an analysis to build a trading model able to take account of the seasonality characteristics of the agricultural commodities, demonstrating the ability to outperform other existing models that do not take account of such factor. Nevertheless, this aspect is considered less relevant due to the fact that world supplies are constantly replenished thanks to the production in different zones of the globe that, overall, maintain an almost stable flow, mitigating the seasonality issue.

Stock reserves

The preexisting levels of cereals stored in the warehouses have been proved to have an important role in shaping the prices in the markets, especially in the presence of specific government policies (Gilbert and Morgan, 2011; Williams and Wright, 1991). In the case

of prices rising too much, having relevant reserves allows balancing the markets by increasing the offer on the market, thus reducing the prices. This was particularly true in Europe thanks to the Common Agricultural Policy program before the last reforms. The previous system allowed precisely to use the stock reserves to balance against too high prices rising, as we will explain better later. Multiple evidence shows that the presence of a consistent amount of stored products reduces considerably the volatility on the markets, positively influencing stability (Williams and Wright, 1991; Roache, 2010; Algieri 2014). Additional evidence can be seen during the price spike in 2007-2008, the same time when the world stocks were the most depleted[2]. Contrary to weather conditions, the world stock amounts are known, despite such information is not always accessible to any operator.

Considering now the most relevant factors on the demand side we can identify two core drivers of the global demand: the rising needs of an increasing population, especially in the developing countries, and the energy prices.

Global demand and economic activity

Again, a pretty much straightforward variable to consider: the levels of global demand influence the price levels for agricultural commodities. What it is interesting to see is that at least in the 20 past years, despite facing a constantly increasing population worldwide, the agricultural production has been able to grow at even higher rates (Serra, Zuppiroli, 2009), as it is possible to see in figure 4.1. In particular, developing countries like China and India pushed the growth rate of the global demand for food products (Gilbert and Morgan, 2011; Algieri, 2014).

[2] For further information about the food price crisis see the Appendix

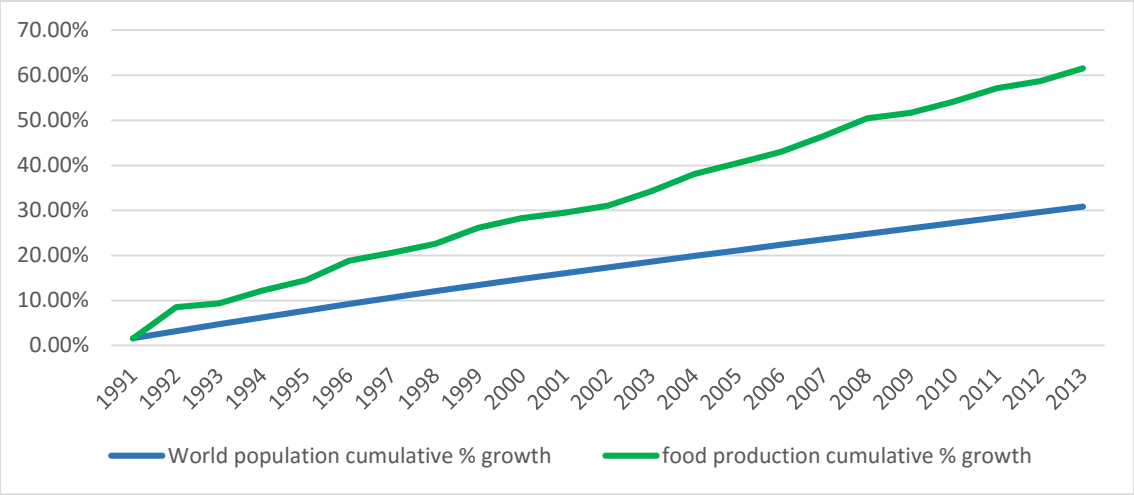

Figure 4.1 Source: elaboration of the authors using The World Bank data

Also, GDP effects are relevant, and positive increases in the value of this measure are found to be related to a higher demand for (agricultural) commodities (Frankel, 2006). Nevertheless, this variable has been observed to be most relevant in the long period, as it has a very small effect on the short and medium term volatility of global prices, thus reducing its importance in predicting prices developments in the narrow horizon.

Energy prices

Contrary to what might appear, this variable represents one of the most relevant elements that influence the prices of the global agricultural commodities exchange. It doesn't simply affect the variable costs of the production, but most importantly, it is a strong indicator of how much the demand for alternative sources of energy will increase. What is most important is the demand for bio-fuels that inevitably rise whenever traditional energy sources, like petroleum, become too expensive and alternatives become more economically interesting. Further increasing the global demand for biofuels are the national policies incentivizing the consumption of this substitute of the oil that increases the burdens on the quantity of products available to be consumed as food. The importance of such element is backed by multiple studies on the price surge occurred since 2002 to 2008. Evidence of this fact has been found by Mitchell (2008), Sariannidis (2011), Roache (2010), Gilbert and Morgan (2011) and is analyzed and confirmed in a series of additional researches on the price volatilities of food commodities (Algieri, 2014; Von Braun and Tadesse, 2012; Serra, Zuppiroli; 2009). These studies also observed a strong increase in the correlations between the agricultural commodities prices and the energy

stocks during the price hikes of 2007-2008. In the following figure (4.2), it is possible to see how energy and cereal prices are strongly linked together.

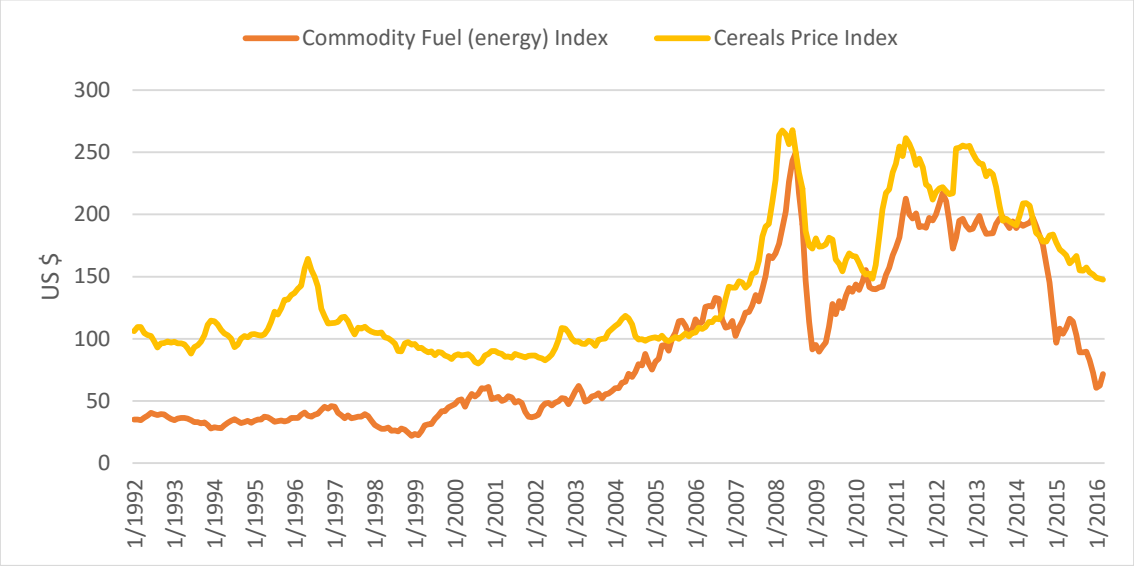

Figure 4.2 Source: elaboration of the authors; data from FAO Stat and the US. Energy Information Administration

Finally, the forecast made on the growth of biofuels consumption predict a further increase in the demand for such product, becoming one of the most critical drivers for food prices in the long term, even more than the population increase.

Ultimately, oil and energy prices directly affect the production costs of the farmers and the related transportation costs, so that the higher their cost, the higher will be the price for cereals, as they will be more costly to produce and because there will be an increased demand for biofuels.

Macroeconomic factors

According to a different point of view, the prices of agricultural commodities are also subject to macroeconomic forces, specifically the exchange rates, the inflation, the current interest rates and yield curves. Monetary policies can have a relevant impact on the demand and supply dynamics, especially whenever international trades are included. Nevertheless, estimating the precise macroeconomic effects on the food prices have always been a complex issue (Roache, 2010) and many approaches were used. In the end, the vast majority of the literature confirms the relevance of such forces in shaping the prices of the cereal commodities.

Exchange rates

Since most of the world commodities' trade, including cereals, is denominated in US$, even small changes in the dollar's exchange rates could have relevant effect in the international markets and trade dynamics (Gilbert and Morgan, 2011; Sariannidis, 2011)). Specifically, a USD depreciation would reduce the commodity price for foreign nations with floating exchange rates (e.g. EU; Japan; South Korea), thus increasing their overall demand. On the contrary, a USD appreciation would lead to more expensive products, diminishing the overall demand from these foreign countries. Nevertheless, it is important to state that if uncertainty raises, both the demand for dollars and commodities will rise, resulting in higher commodities prices. (Algieri, 2014). As Serra and Zuppiroli (2009) explain in their book, such dynamics helped the Europe facing the global crisis in the market price of cereals in 2007-2008. The strong euro compared to the USD and the other main currencies helped the EU by reducing of an estimated 25% the overall increase in prices that was occurring everywhere else. Changes in exchange rates also affect the producers' margins as even many products used directly in the production and transport process are denominated in USD (Roache, 2010). Such factor is even more relevant for those developing countries that are strongly dependent on food exports and imports. They are increasingly liable to US exchange rates as even small changes could have sizeable repercussions on their trading balance (Von Braun and Tadesse, 2012). In the end, studies conducted on the volatility of the commodity prices (Gilbert and Morgan, 2011) identified the exchange rate variability as a source of the volatility of these markets.

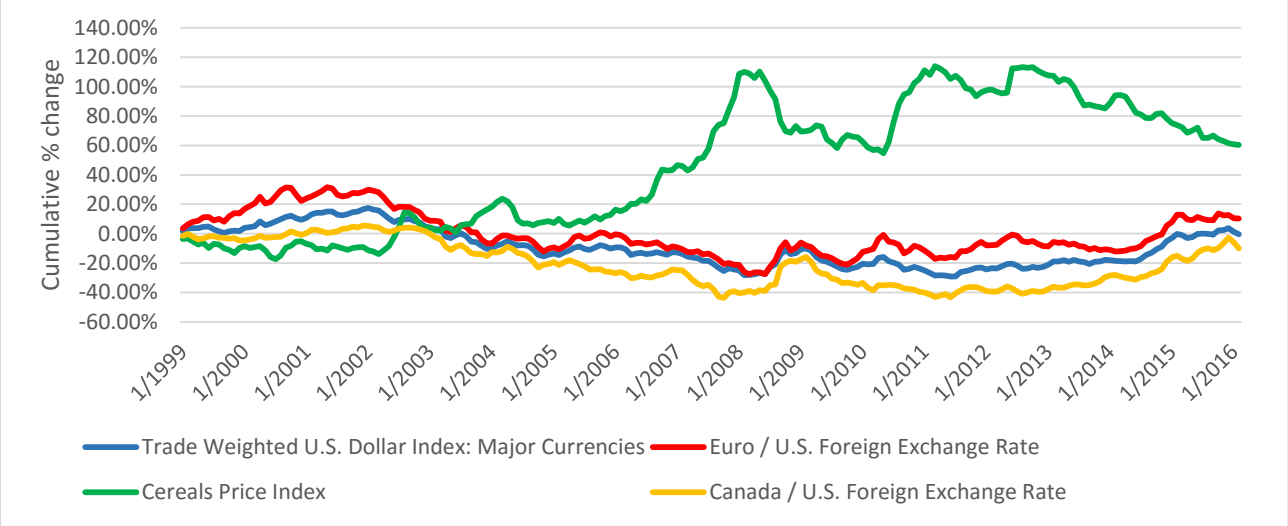

Figure 4.3 Source: elaboration of the authors on FAO Stat and Federal Reserve Bank of St. Luis data

In the preceding figure (4.3) we presented the cumulative percentage change in the Cereals Price Index with the cumulative percentage changes of the E.U. / U.S., Canada /U.S. exchange rates, and another index showing the relative strength of the Dollar compared to the other major currencies. We identify a negative correlation between these values and world cereal prices in the order of respectively -0.22 (E.U. / U.S.), -0.21 (Canada / U.S.) and -0.25 (Major Currencies / U.S.).

Interest rates & inflation

Several studies conducted by Frankel (2006, 2012, 2013) showed multiple aspects of the importance that interest rates can have on general commodity prices, including cereals. One way this relationship occur is due to the costs of inventories: as interest rates decrease, the prices of storable commodities would increase. This results from the fact that lower rates increase the demand for inventories, thus reducing the overall offer. Interest rates are also linked to financial and speculation aspects as the lower these interest are, the more the commodity sector appeal to investors. Clearly, more bullish positions entail higher prices. On the contrary, higher interest rates shift speculation to treasury bills instruments, lowering the pressure on the commodity sector and thus reducing the prices. In the end, Frankel (2006) found consistent evidence of a negative correlation between interest rates and commodity prices; we presented a comparison between the cumulative percentage change in the Cereals Price Index and the 3-month LIBOR interest rates in figure 4.4, also spotting a correlation of -0.19. Nevertheless, it is much less clear if this variable can be accounted as a source of short-term volatility in the commodity sector and will be likely linked to the expectations of the market operators (Roache, 2010). Switching the analysis to the inflation rates, we observe that this variable is considered to impact the value of the commodities due to their nature as value-storing goods (Algieri, 2014). In periods characterized by high levels of inflation, commodities are generally considered a good investment able to preserve their value during troubled periods. Thus, financial investors tend to increase the amount of commodities held in their portfolios, hedging their position against spikes in the inflation rates (Roache, 2010). On the reverse, high food prices can have the opposite effect of increasing the inflation rate in countries that heavily depend on food imports and exports (Von Braun and Tadesse, 2012). Nevertheless, since we are generally talking about smaller developing countries, their impact on the global markets is still minimal.

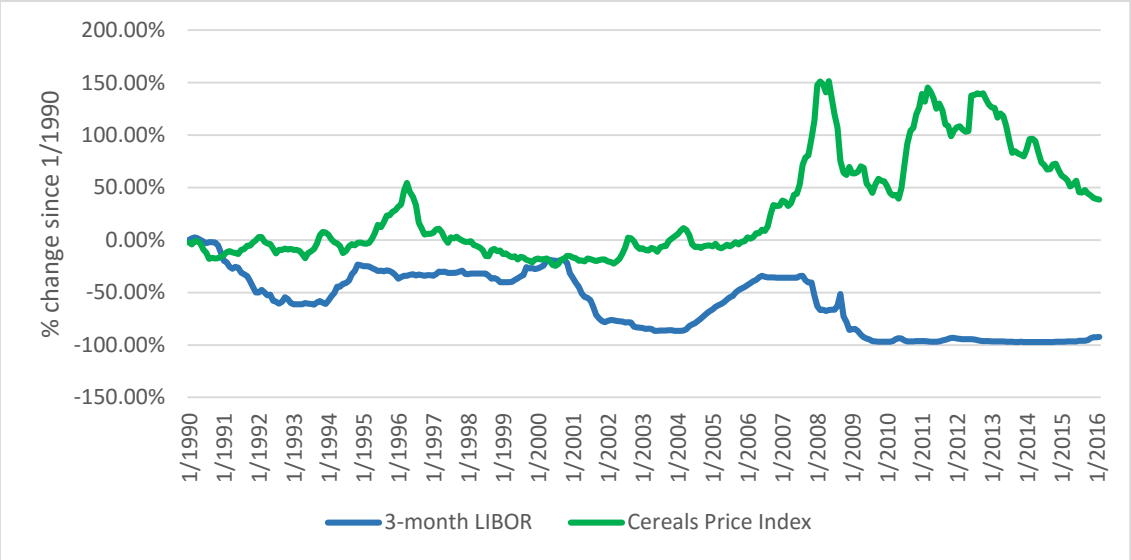

Figure 4.4 Source: elaboration of the authors on FAO Stat and Federal Reserve Bank of St. Luis data

Policies & Market conditions

As the last macro-category identified, we analyze the relevant policies and general market conditions that act as pricing forces in the cereals markets. They are also an important factor to take into consideration as barriers or incentives to trade as well as who owns the major bargaining power, have an impact on the cereals current prices.

Regulation

Critically important, regulation can affect the pricing of commodities in many ways, more generally by distorting the markets with a set of fees, tariffs, and subsidies. In particular, the agricultural sector is one of the most restricted by regulations, as food supplies are strategic commodities, crucial in maintaining a nation's equilibria (Von Braun and Tadesse, 2012). For instance, as we will discuss later, the European Common Agricultural Policy posed many restrictions to food imports and subsidies to food exports for more than 40 years. The presence of tariffs for inbound products entailed that cereal prices were kept higher than in the presence of standard market conditions to protect the internal producers from international cheaper competition. Similar happened, in a reduced way, to the European food exports that were subsidized by the EU to make them more appealing on the international markets (Ledebur and Schmitz, 2012). In addition, the presence of import tariffs has been linked to the shift of bargaining power from the exporters to the importers (Carter and Schmitz, 1979), changing established equilibria.

Additional evidence of the key role played by regulations on the cereal prices can be found during the crisis in 2007-08. At the time, many countries banned or restricted food exports, and applied protective schemes to shield their economy from the global crisis that was occurring. As a result, the global offer of cereals decreased and lead to increased overall prices (Von Braun and Tadesse, 2012).

The United States – Canada duopoly & market concentration levels

Prior to the recent exponential growth of the literature concerning the main drivers of pricing and price volatility in food commodities, most of the studies focused on the world power balances as the key driver for international cereal prices. Studies conducted by Alaouze, Watson, and Sturgess (1978), Sekhar (2002), Lavoie (2005), Bessler, Yang, and Wongcharupan (2003) all agrees on the fact that a relevant share of the wheat and other cereals prices are affected by the world balances between the top producers. In particular, the countries that hold most of this power are USA, Canada, and Australia, despite most of the studies focuses just on the first two. Specifically, these countries that represent the major players in the field, hold a lot of bargaining power over the world cereals markets since they are in the position of influencing the prices simply with different stock-holding and output policies. Under this scenario, the threat of a duopoly/triopoly can be considered a severe force that could eventually shift, even considerably, the prices of food commodities. Nevertheless, other studies (Carter and Schmitz, 1979) find evidence that other countries can mitigate this issue by instituting a set of tariffs and restrictions to the imports, protecting themselves from the market leaders' decisions.

Similar issue occurs in the private sector, where few players and companies concentrate most of the bargaining power in their hands, as we described in the previous chapters. Specifically, every single type of cereal has its own market leader and co-leader that retain most of the bargaining power over it (Serra, Zuppiroli, 2009). Generally, every other player in the market is substantially distant from the first ones. These market leaders (CHS, Cargill) retain even stronger positions if we also take into consideration that they are deeply integrated along all the production chain, from production to transport, storing and marketing, and they built strong barriers to entry. In such environment, prices and trading of the main food commodities are subject to pressure from the decisions made by these big players, defining an oligopoly situation.

Market volume & stock market performance

Another relevant variable in shaping not just the price of agricultural commodities, but essentially affecting any existing market, is the volume of the outstanding trades. The volume of a market is a measure of the number of transaction occurring and the outstanding liquidity levels and for the cereal commodity sector is calculated as the ratio between imports and exports of a specific commodity, divided by the global consumption (OECD, 2008). A low-volume market generally implies higher volatilities in the prices (illiquid markets). Algieri (2014) analyses this specific dynamic in agricultural commodity trading, and observes that the most likely cause for such illiquidity lies in the protectionist and restrictive policies adopted by the various governments. In the end, instead of affecting the price formation, a low trading volume mostly entail higher bid-ask spreads, increasing the transaction costs of each operation and augmenting the market price volatility.

Sariannidis (2011) also analyzed how the wheat market relates with broader indexes, such as the S&P 500. He finds evidence that the broad stock market does influence the wheat market. He spots two reasons behind this: the first attributes this link to the high levels of integration occurred between the financial and commodity sectors, thanks to portfolio strategies that involve leveraging commodities to find the adequate risk-return balance. The second reason spots a more direct relationship between the two markets: a broad index such as the S&P 500 is also a good approximation of the general financial wealth. High levels of this indicator entail higher consumption levels, higher demand for food products and higher prices for agricultural commodities.

Speculation

The last factor we discuss has been strongly debated since the crisis in 2007-08, as it has been accused to be one of the major sources of high prices and high volatility registered in the strategic food markets, to the point of being considered the major or only cause (Ghosh, 2010). Almost all the researches after that period dedicate a small section to considerations on the topic. In general, speculation occurs through the purchase and sale of derivative contracts on commodities, generally futures or options (Algieri, 2014; Gilbert and Morgan, 2010). Despite being commonly acknowledged that speculation phenomena can help the market reaching higher liquidity levels (Gilbert and Morgan,

2010; Roache, 2010; Robles, Torero, & Von Braun, 2009; Algieri, 2014), they are still considered as bringing mostly negative effect on the markets. Here is an example of how the speculation forces on the derivative market can influence the commodity trading prices: in a bullish market, speculation forces increase the number and the volume of long positions, driving the future prices higher. As a result, also, the expected future spot prices increase their value. This act as an incentive to anyone in the cereals production chain to hold his stocks, waiting to sell them at a higher price, because expected prices are actually higher. Clearly, this determines lower levels of products offered to the market, further increasing the prices of the food commodities (Von Braun & Tadesse, 2012). Roache (2010) analyses the relationships between the commodity futures and the food prices, identifying evidence that shows positive relationship between the volumes of derivatives traded and the volatility of food commodities, showing existing strong linkages between the two markets. Still other authors argue that such relationship between the two markets is not that clear, providing contrasting evidence on the topic according to the different methodology used. Also, Serra and Zuppiroli (2009) identify connections between the financial crisis of 2008 with the agricultural commodities' price and volatility increase, as investors and speculators used this sector to protect themselves and make gains during those troubled days for the global financial sector. The following figure (4.5) provides with a visual comparison of the world cereals volatility in the years 1991-2000, compared with the last decade 2006-2015. The monthly cereals price standard deviation in the first period was equal to 3.48% while in the latter reached the value of 4.87%, thus registering an increase in volatility of almost 40% between the two considered periods.

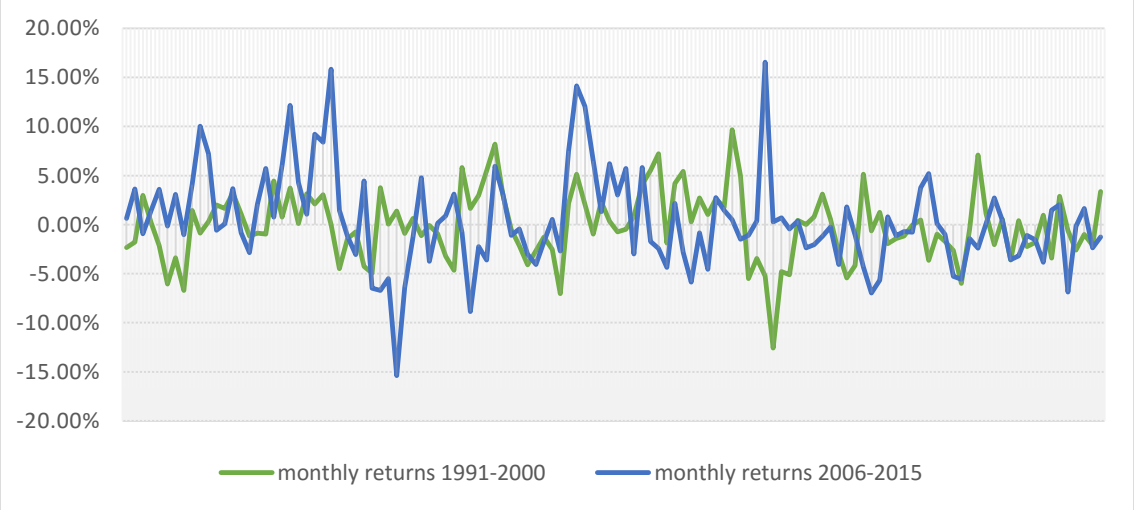

Figure 4.5 Source: elaboration of the authors using FAO Stat data

Concluding, from the discussion we conducted before, we can say that speculation does alter the prices of food commodities by acting on the expected returns of these assets.

At the end of this analysis, we identified a wide series of factors that impact the international price formation and volatility of the cereal sector, and not all of them do have to occur at the same time. We did not further deepen the insight on the subject by making additional analyses, but we essentially relied on what was already discovered on the subject. In the next section, we will make some further considerations on how prices differ in the internal European market and how the various countries influence each other.

European market integration, spatial arbitrage and the Law of One Price

Despite considering the major forces that shape the agricultural commodities prices in international markets and trade, we still overlooked the internal dynamics occurring within the European Union. As we described in the previous chapters, cereals, and the relative derivatives are traded in specialized commodity exchanges dispersed across Europe. What is interesting to observe is that standardized products sharing the same quality are priced differently not just between the various countries in the Eurozone, but even in different marketplaces within the same country. That is not simply due to different methodologies in assessing the commodity price, but also to other existing dynamics typical of this sector. According to the classic theory of the law of One Price (LOP), any homogenous good traded in different locations should not differ in price by more than the transaction costs implied in trading it among the various locations. Given a hypothetical market 1 where the price of a homogeneous good is P_1 and another market 2, where the price for the same good is P_2, the LOP states that:

$$P_1 = P_2 + K \tag{4.1}$$

Where *K* represent the transaction costs (Balcombe, Bailey, and Brooks, 2007; Bakucs, Bojnec, and Fertő, 2015). Essentially, according to this theory, price differences of a homogenous good can be explained only by the presence of transaction costs (in particular transportation and handling costs). This mechanism relies on the concept of spatial arbitrage: if $|P_1 - P_2| > K$ a trader will be incentivized to sell the specific good on the market where he can get the higher return, once taken into account for the implicit costs of such operation. Thus, spatial arbitrage, which is the possibility of leveraging arbitrage opportunities in spatially separated markets, theoretically allows the LOP to hold. This

rule has been recognized as the most important factor influencing the price differences among nearby regions. Since the validity of this mechanism is ensured only when market are truly efficient and all arbitrage opportunities are exploited, validity tests on the LOP were used as a check on the level of market integration among different regions. Higher degrees of market integration have been often related with less opportunities of spatial arbitrage and improved market efficiency.

Another important phenomenon to consider in relation to a higher integration among markets are price transmission dynamics between different regions, which is how price characteristics shift from one region to another (Rapsomanikis, Hallam, and Conforti, 2006; Perez-Pascual and Sanz-Carnero; 2010; Brosig, Glauben, Gotz, Weitzel and Bayaner, 2010). Price transmission phenomena should occur constantly in highly integrated and developed countries (Gilbert and Morgan, 2011). Whenever in the presence of incomplete price transmission mechanisms, the main result is a reduction in the level of price information available on the relative market, leading to inefficient decisions and outcomes for the economic agents (Rapsomanikis, Hallam, and Conforti, 2006). All these considerations are relevant in a European context as an explanation of the price differences observed within the Common Market and for the degree of market integration reached by the Member States in the agricultural commodity sector. This is particularly true if we consider that intra-EU cereal trade accounts for an 80% of the whole EU cereal trade (Bakucs, Bojnec, and Fertő, 2015). Specifically, theory suggests that transaction costs and size of the market are the main causes for price differences within the EU. Like described before, a number of transaction costs do affect the prices showed in various regions, but this has a major implication concerning the integration level of the various regions. In fact, following the LOP, higher transaction costs (higher *K*) result in less available opportunities of trading between spatially separated locations, resulting in an overall lower grade of interactions, diminishing price transmission phenomena and reducing the outstanding information available (McNew, 1996). Additionally, other relevant factors in determining the integration level of agricultural commodity markets are the sizes of the considered regions. Studies conducted by Brosig, Glauben, Gotz, Weitzel and Bayaner (2010) observed how the relative dimension of the regional market is a driving force for integration, and transaction costs influence this relationship. They point out that larger markets are less negatively influenced in by higher transaction costs than smaller ones, thus identifying a positive relationship between

market size and integration. Interestingly, specific studies on price and market integration in Europe appear to be missing while such phenomena are more analyzed in developing countries and in the US-Canada trade relationships. Nevertheless, we can get some conclusions concerning our case: first, the fact of dealing with spatially separated markets entails different prices for the same homogenous product, and this is mostly due to transaction costs and the relative size of the market. Second, prices transmit differently from country to country according to the relative market size and market power, resulting in different levels of integration among the various countries. Despite inefficiencies still persist, European markets are broadly considered to be quite integrated, even if specific evidence is missing.

VI. REGULATION ON CEREALS TRADE AND THE COMMON AGRICULTURAL POLICY (CAP)

Since its foundation, the European Union (EU) gave maximum priority to the creation of a common economic environment for all the Member States. As ratified in the Constitutional Treaty of the Union (Art. I-3; 2004), specific objectives of the EU are the creation of an internal market where competition is free and undistorted, balanced economic growth, price stability, and the promotion of economic cohesion among the Member States. All these goals are perfectly represented in the much-debated Common Agricultural Policy (CAP), acting as the main regulatory framework for the European primary sector. In fact, its main goals are to establish a set of common rules for a single market, safeguard competition and provide a single communitarian counterpart in the global trading landscape, instead of many fractioned national partners.

Due to its critical importance in shaping the trade, the commodity's prices, the markets, and ultimately the whole agricultural industry, the CAP represent an important step in our analysis, allowing us to better understand the underneath dynamics of the current market functioning and prices formation. On an ending note, this discussion gains relevance also in light of the proposed research question; suggested final alternatives for innovation in the current European cereals markets will necessarily take into account the limitations and the objectives of the current legislative landscape.

History

The original CAP (1962)

Introduced in 1962, the CAP was originally meant to pursue multiple objectives. Central ideas of this policy were the increase in the overall agricultural productivity, stabilize markets, assure availability of supplies, ensure fair living standards for farmers and affordable prices for the consumers (Howarth; 2000); *food security* was the key concept on which the agricultural regulation was initially based on (European Commission, Department of Agriculture and Rural Development). In practice, the regulators structured a system that prioritized the protection of the producers against downward price fluctuations and against the international competition, by instituting in 1967 the Common Market Organization (CMO cereals). This entity's main existence reason was to grant farmers a minimum price for the products they were selling. In its first form, the CAP resulted as a form of *price support* and the required funds were directly taken from the EU yearly budget.

The price support plan of the CMO cereals was based on two mechanisms: one to regulate and maintain the equilibria within the European internal market, and the other to manage the trading activity with other international partners. The correct functioning of the first mechanism was assured by the creation of country-specific organizations whose scope was to buy the agricultural products (cereals) at a minimum price decided by the CMO, whenever a producer would make a request for it. This system implied that farmers would continue to rely on standard market transactions whenever general prices were higher than the minimum granted by the CMO (figure 5.1). Once this threshold was surpassed, the nationally instituted agencies offered a better counterpart than the market, and producers could sell their products directly to these government-owned organizations, storing everything in specific warehouses. On the contrary, in the case of prices rising too much, the Commission could decide to sell the products acquired, thus, increasing the market offer and lowering the prices. This mechanism also implied that agricultural prices within the EU could not fall down or rise over certain levels determined by the Commission (price stability).

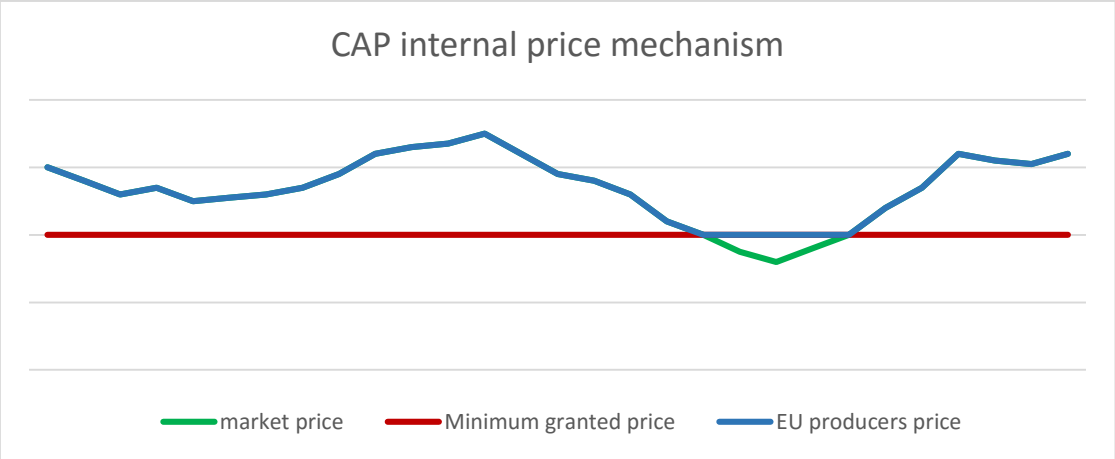

Figure 5.1 Source: elaboration of the authors

The second mechanism was intended to regulate the exchange of agricultural products between the EU and its international partners. Since internal prices in the Union were fixed too high compared to the rest of the world (due to a wrong overestimation), there was the risk of great cheaper imports to occur from outside Europe, damaging the internal producers. As a result of this issue, the OCM imposed a set of variable import fees whose goal was to keep the price of foreign agricultural products in line with the ones produced internally. These variable fees were calculated on the difference between a fixed threshold price, decided by the EU, and the world market price. Next to this measure, the Union structured an incentive scheme for those products that were not intended to be stored or accumulated. The subsidies granted were equal to the difference between the EU internal price, and the world prices as shown in figure 5.2.

Despite being successful in achieving most of the pre-stated objectives, this first version of the CAP presented some major drawbacks that required a set of subsequent reforms. Unsurprisingly, it became evident at a certain point that the policy, as it was structured at the time, presented a strong incentive for the farmers not just to increase the output, but even to overproduce as minimum selling prices were always granted. Additionally, strongly related to this issue, the financial needs of this program rose with the output increase, resulting in massive monetary requirements for EU. In the late 60´, the CAP accounted up to 2/3 of the European budget (European Commission, Department of Agriculture and Rural Development).

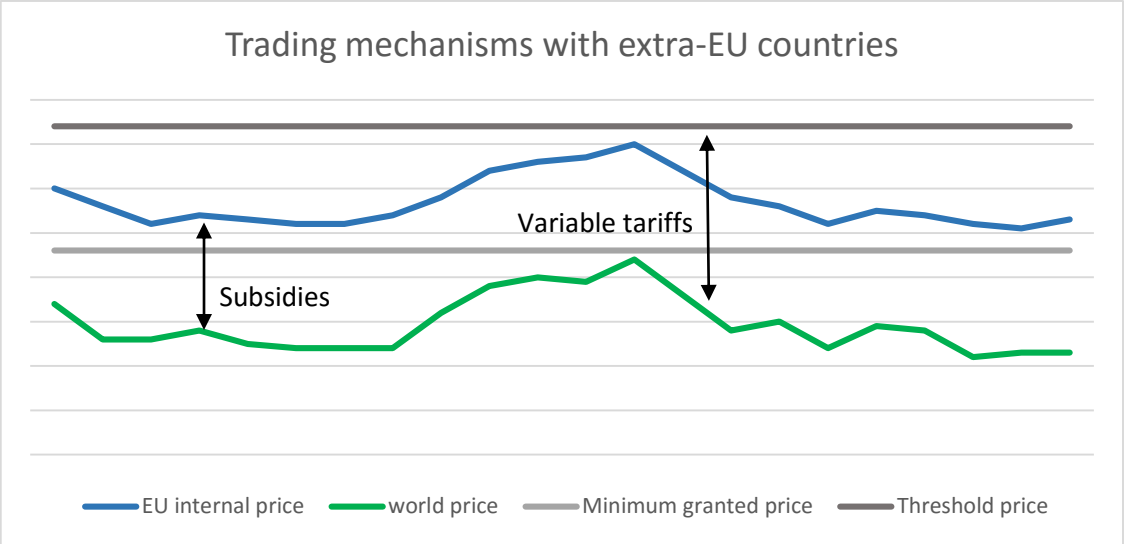

Figure 5.2 Source: elaboration of the authors

This policy acted as an evident market distortion, as prices were artificially kept over a threshold and import tariffs distorted the international trade. Not surprisingly, this system also negatively influenced the relations between the EU and other international partners, as import tariffs made foreign products less competitive and thus, it became more difficult for them to penetrate the subsidized European market.

As we discussed before, the original CAP was able to meet the objectives of increased supplies, productivity, and market stability, but had contrasting and not clear results over the other desired goals, a fact that fueled a harsh debate over the appropriateness of this policy. Especially critical was the distortion of the European agricultural prices that resulted in higher values compared to the rest of the world; even if this system helped the producers and shielded them from prices fluctuations and international competition, the consumers suffered from this policy as prices were artificially kept higher than standard market conditions. Ultimately, taxpayers and consumers held the costs of this policy (Howarth; 2000).

From these premises, it followed a troubled decade commonly referred to as "the crisis years" (European Commission; 2014) characterized by overproduction, high costs of the program and international frictions. Multiple attempts of reforms soon followed acknowledging the issues present at the time, but not all were successful (e.g. Mansholt Plan). For almost 30 years the CAP maintained its original characteristics that were never removed. The first real change started to realize in 1992 with the MacSharray reform.

MacSharry Reform (1992-1993)

Thanks to the Common Agricultural Policy, the European Union was able to shift its position from a net importer to a net exporter in the global landscape. But this came at high costs as this situation could occur only thanks to the presence of relevant subsidies and defensive import policies. Thus, the goal of this reform was to solve the two main issues that plagued the CAP since its first years: the huge budgetary needs and the frictions within the international community. Before proceeding, we must precise that this reform did not apply to the whole agricultural industry, but only to few segments, including the cereal cultures (the reason why it is relevant for us). This policy updating was essentially based on three key changes of the original plan. The first was the substantial reduction of the minimum price granted to the producers in the order of 35% for the cereal sector (Swinbank; 1993). The main goal of this change was to align as much as possible the internal prices with the global market prices. In this way, the EU could mitigate the tensions with the other international partners as foreign products became more competitive within the European market.

Additionally, this change allowed to reduce the overall spending for the CAP, and producers had reduced their incentives to overproduce. The second key point of this reform was the introduction of a compulsory set-aside of a variable amount of agricultural land for every European producer. This policy was implemented to concretely reduce the overall European production, diminishing the unnecessary high offer that characterized the period between the introduction of the CAP and this reform.

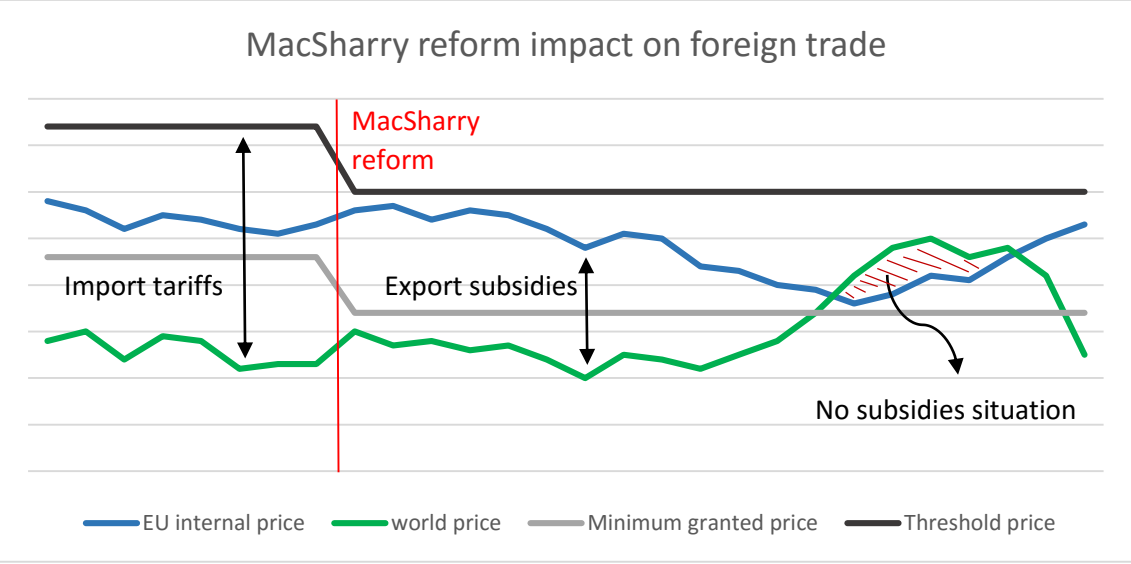

Figure 5.3 Source: elaboration of the authors

Despite mitigating some of the most critical issues, these two first changes in the existing regulation were essentially damaging the producers, as their protection mechanisms were essentially lifted (international competition and price guarantee).

For this reason, the MacSharry reform also included a third key point of change, introducing a set of direct payments to the producers no more linked to the amount of their production, but directly commensurate to the extension of the land owned or managed.

After a short time this reform succeeded in achieving its goals, realigning demand and offer within the European agricultural market. This happened also thanks to an increase in the general level of products consumption of those years, especially in the animal feeding industry (Serra, Zuppiroli; 2000). Nevertheless, further issues appeared with the introduction of the common currency, as the States Member of the EU lost their capability of using the monetary policy to sustain their agricultural industry in the European and international landscape. In particular, there was the necessity to further reduce the expenses of the CAP and further align the European agricultural prices to the ones applied worldwide. In this scenario was introduced the "Agenda 2000", an additional rural development policy, essentially created to improve the alignment between the CAP incentives and the market prices, improve the competitiveness of the European market, and firstly addressing raising environmental concerns (European Commission, Department of Agriculture and Rural Development).

The Fischler reform (2003-2005)

Starting from the premises of the "Agenda 2000", the Fischler reform officially ended the time when prices for agricultural products were artificially determined by the existing policies, substituting the previous mechanisms with a market-oriented approach. An important innovation concerns the "decoupling" of the monetary subsidies to the producers. While with the previous MacSharry reform these incentives were linked directly to the amount of land used by the single farmers for a specific production (e.g. cereals), with the Fischler these incentives were totally assigned exclusively on the basis of the land extension used, independently from any decision about which culture to grow

. This resolution was valid also in the case that the producer decided to not cultivate any extension of land at all: subsidies were always granted. On a second note, this reform also

incremented the relevance of environmental factors, introducing the concept of "cross-compliance": financial support to the producers would be granted only whenever farmers respected a basic set of rules concerning the environment and sanitary legislation.

The CAP today (post-2013)

Over 50 years after its first implementation, the CAP result strongly different in its mechanics from what it was. Nevertheless, the key objectives are still the same as before, enhanced with the increased importance of issues such as the environment and the sustainability of the European agricultural system. The present legal framework of the Common Agricultural Policy was designed in 2013 as a transition process to occur during the remaining part of the current decade. Additionally, the regulators started a simplification process that allowed defining the majority of the CAP rules under four specific set of regulations (European Commission, Department of Agriculture and Rural Development). These core topics covering most of the current policies are **i) market measures** (Regulation 1308/2013), **ii) direct payments** or income support (Regulation 1307/2013), **iii) rural development** (Regulation 1305/2013), and **iv) "horizontal issues"** (Regulation 1306/2013).

Market measures

As we described before, the strong market intervention that characterized the early-stage CAP was gradually lifted in favor of a more market-oriented approach. Nevertheless, the policy still has an important role in defining and regulating the European agricultural markets and, ultimately, those for cereals. In particular, a topic of major concern is the volatility of the prices in these markets. In the original version of the CAP, price stability was ensured thanks to a number of national organizations lead by the OCM that used to buy agricultural products (cereals) when the offer was too high, and sell them in the opposite scenario. But, due to the subsequent reforms and the complete deplete of the stockpiles of these national agencies in 2008 (European Commission, Directorate-General for Agriculture and Rural Development; 2014), this mechanism could not be used anymore. In the new set of regulations, market and price support is granted only under those circumstances that can be addressed as exceptional or as emergency situations, ranging from a damage in consumer confidence due to plant or public health risks

(Regulation 1308/2013), or similar circumstances disturbing the correct functioning of the market.

In the occurrence of such scenarios, the new CAP includes the possibility to access extra covering funds from a Crisis Reserve appositely constituted, financed through reduced annual direct payments. In case such reserves are not used, they will be returned to producers the next year (Directorate-General Agriculture and Rural Development; 2014). Only the Commission, assisted by the CMO committee can decide to allow such measures of public intervention. Nevertheless, the old buying-in system still survives only for the common wheat and up to a maximum specified quantity, as an exception to the general rule.

Second important market support measures cover the bargaining power of the producers, clearly disadvantaged from the presence of big and concentrated players both in the suppliers and buyers' side. For this reason, the EU extended the compulsory requirements about written contracts as a tool to protect the producers along the food chain. Furthermore, as an additional measure to improve their bargaining power, the new regulation enhance the capabilities of producer organizations to negotiate directly contract terms, including the ability to set the prices (Matthews; 2011).

Under the same topic of market measures, we include a brief digression over the regulation of the trades with third countries and these include both imports and exports. For the first category, there are several measures to avoid imbalances for the European markets starting from the requirements of **i) import licenses** (Regulation 376/2008 and 1342/2003). More sizeable intervention from the regulators realizes in a series of **ii) import tariffs** that were structured to make the European agricultural sector more competitive compared to foreign products, as we described before. Nevertheless, the EU do not have complete discretion over these measures as all these tariffs are subject to the international treaty "General Agreement on Tariffs and Trade" (GATT) that poses limits to duties due in international exchanges. For the presence of such constraints, the regulators divided the tariff system in 1*) variable import duties*, and *2) fixed duties* and shifted most of the importance from the first to the second (Directorate-General Agriculture and Rural development). The current variable duties are essentially the result of an agreement between the EU and the United States and dispose that this kind of tariff should be based on a set of world reference prices available for precise types of cereals. These variable duties generally apply to the highest quality products imported and their

values are additionally adjusted to take into consideration the freight costs between the two counterparts. On the contrary, the fixed duties apply for all the other trades that do not involve the USA and whenever lower quality products are involved. The specific values of these tariffs are agreed in the GATT. Last import measure is the presence of **iii) tariff quotas** that essentially constitute maximum quantities of a specific agricultural product that can be acquired from outside. This policy serves the scope of limiting the imports in response to too large previous transactions or to defend a particular production from extra-EU competition (e.g. low and medium quality wheat; barley; maize). Nevertheless, these limits remain variable and subject to further changes according to the Union needs.

For what concerns the exports, the regulation is obviously much less restrictive. Before the GATT agreement was signed, the EU was subsidizing its agricultural products abroad, accounting up to 3.1 billion € expenditure in 1992. As international agreements were agreed on, these supports were gradually lifted and completely abolished in 2007 for all cereals. Now the European regulation for exports only requires **i) export licenses** for most of the trades with third countries. In the case of exceptional or emergency situations, the regulations allow the payment of **ii) export refunds**. Finally, in the case that EU agricultural prices get close to the ones in the international markets with the risk of seeing a too large quantity of products leaving Europe, the Commission is allowed to institute **iii) export controls** that can range from the imposition of an export tax to a total ban on export licenses.

Direct payments

This section of the current regulation is the most relevant in financial terms, as it accounts for over 70% of the overall CAP expenditure. The section dedicated to the direct payments represent all the "common rules on payments granted directly to farmers under the support schemes listed (in the policy)" (Regulation 1307/2013). These subsidies to the producers are differentiated and structured among different measures, some of which are voluntary, at the discretion of the single national regulators. Currently, the most relevant direct payments provided to farmers are managed with two mechanisms: a Single Payment Scheme (SPS) and the Single Area Payment Scheme (SAPS) which result as a derogation of the first system for the new Member States in the EU. The SPS is the one originally drafted in the Fischler reform (2003). It subsidizes farmers on the basis of the

extension of land managed and not on the basis of their production, under the compulsory requirements of a set-aside of portions of the land they own and the meeting of the Cross-Compliance requirements. On the other hand, the SAPS was created as a solution to administrative issues and lack of historical information in the new countries that recently joined the EU (2004 -2007). This system differentiates from the previous one due to the possibility of applying a flat-rate area payment that should replace almost all the other granted agricultural subsidies in these countries. As it is conceived as a temporary policy, the SAPS will be applied only until 2020, when will officially expire. To ensure the correct functioning of these systems and prevent irregularities, the EU instituted the Integrated Administration and Control System (IACS) financed by the European Agricultural Guarantee Fund. In addition to the due direct payments, the current regulation allows a set of voluntary national and EU-level aids to the producers. These range from a voluntary transitional national aid and redistributive payments for countries switching from the SAPS to the SPS, to payments for young farmers and those operating in areas with environmental and natural constraints. The new direct payment system also allows for some financial flexibility in the budget. This policy acknowledges the wide diversity of the European agricultural sector, but it is strongly regulated and supervised to ensure that all the players in the internal market are "playing at the same level" converging towards the commonly stated objectives. Finally, the new post-2013 CAP has a set of rules to improve the efficiency and the targeting of the sustaining measures, making the overall policy relatively more effective.

Rural Development & "Horizontal Issues"

Despite being less relevant within the scope of this work, we still include a brief description of the measures used to incentivize the investments in the agricultural sector and to deal with other problematics. Their relevance is confirmed by the fact that they account for a relevant amount of the CAP annual budget and in a measure consistently superior to the market support. The rural development of the EU is funded by the European Agricultural Fund for Rural Development (EAFRD) (Regulation 1306/2013). Main goals are the improvement of European agricultural competitiveness, sustainable management of natural resources and achieving a uniform and balanced development of rural areas. These are pursued by the presence of local Rural Development Programs (RDS; 118 in total), that assess the current state of the agricultural sector and the

environment in the territories posed under their supervision, by conducting SWOT analyses and using indicators provided in the main regulation. This system allows for a lot of flexibility, as every region gets targeted funds on the basis of the most compelling needs. Such funds can be used for investments to improve the productivity, for marketing and processing, and other environment-related subsidies. Nevertheless, such incentives are not automatic, as whoever wants to reach these benefits must apply to the local RDP to achieve it (Regulation 1305/2013). For what concerns the monitoring, the Commission evaluates financial and performance indicators for the RDSs in a continuous way. In the end, this policy concretizes in further additional funds for the Member States to incentivize the adoption of national measures that helps the Union reaching those stated objectives and a set of additional European priorities in the agricultural field.

The other main part of the CAP regulates a set of other issues that are not included in the previous sections. These cover guidelines about the financing of the total expenditures for the CAP, which defines the European Agricultural Guarantee Fund (EAGF) and the EAFRD as the main sources of funding, setting also constraints to their expenditures. A set of rules concerning the farm advisory system, a series o initiatives with the scope of advising the beneficiaries of the subsidies on land and farm management. Multiple guidelines for the management and control systems that the Member States must put in place, and the detailed functioning of the Cross-Compliance system, including penalties whenever irregularities are found (Regulation 1306/2013).

Conclusions

From what we previously described, we can draw some conclusions about the current common regulation over the agricultural sector, and to what extent it influences the trade and the markets of the cereals within and outside the European Union.

The first thing we can observe is that the current CAP act as an enabler factor more than a source of constraints. The entire policy is built to provide sustain and subsidies to the whole industry, both with the use of direct incentives to the producers, both with the implementation of defensive policies. These have the ultimate objective of making the European products more competitive in the internal market and abroad, adding tariffs to extra-EU imports and subsidies for the exports. What is interesting to point out is the fact that the CAP almost do not regulate any aspect related to the organization of a common agricultural (cereals) market on an operational level. Interestingly, it only sets a long

series of bureaucratic requirements about the criteria on the extent and on how to manage the subsidies, and the rules to apply in international trade. On a more practical level, there are no laws about how the relative internal markets should be structured and managed, leaving *de facto* total discretion on the subject to the single governments or the private sector. This entails a not homogeneous way on which these markets function, and we can observe situations, like the formation of the prices, or the transparency in the data, that have different characteristics according to the different countries. Apparently, the EU is trying to create a common market without forcing strict rules on each single member, taking account of the wide diversity present within the Union. To the extent of this work, the absence of a restrictive and prescriptive policy will allow us to move more freely when assessing possible ways in which such markets could be improved and aligned under a single European system.

In the next chapter, we will analyze what we discussed until now under a critical view. In particular, we will be interested in identifying the major weaknesses that characterize the European cereals markets. Subsequently, we will be able to devise a set of goals with the purpose of improving the current state of this markets, by applying a set of appropriate improvements and innovations.

CHAPTER II

In the following chapter, we will discuss and analyze the wider issues that can be spotted specifically within the European agricultural commodity sector. First, we will focus on the issues regarding market performance and the decision-making processes of these markets, as they are the major driver for inefficiencies. Then, we will focus our attention on the trend of "financialization" of the physical commodity sector. The resulting concerns stemming from it will be addressed in depth. Asides from these two main "branches", our research will also leave some space to consider additional factors that we should take into consideration due to their relevance, though they are not directly linked to the two previously mentioned categories.

VII. EUROPEAN GRAINS MARKET PERFORMANCE

So why is it paramount to apprehend and analyze all the major sources of inefficiencies characterizing the cereal commodity markets? Because improving upon them can lead to major improvements. The first thing to take into consideration are the benefits resulting from improved transparency conditions, especially concerning the physical grains markets. By transparency, we essentially refer to the general quality and quantity of information available to the market players. As we described in Section I, these spot exchanges are characterized by high levels of dispersion, different regulations, unclear pricing and reporting, low individual relevance (regional at best), and closeness towards the vast majority of investors, including some of those directly operating in the production chain. All these implications have ramification, the most significant of which we will analyze. In particular, we will discuss the issues arising from the low levels of competition, the bargaining power of the players, the liquidity characteristics of the cereal commodity markets, and the barriers to entry that such marketplaces present for different types of financial or agricultural actors.

Transparency I: sources of inefficiencies

From the analysis we conducted in the previous section, we ascertained how much the "transparency topic" plays a major role in defining the current market equilibria. Within this topic, the balance between the spot and futures markets for cereals is of particular relevance, the same holds true for the quality of the investing decisions made by the players in both the OTC and regulated exchanges. According to the most classical view, the *Blackwell's Theorem* (1953), more information is always associated with ~~a~~ positive value, thus, it would always be desirable to improve the transparency in any circumstances. Nevertheless, contrary to the expectations of most, it has been proved that in many occasions such law does not hold true (Marshall, 1974; Green, 1981), ~~at~~ even to the point where more information was associated with a negative value. In this specific case, we refer to was has been termed as the "*Hirshleifer effect"* (Hirshleifer, 1975; Eckwert, and Zilcha, 2003). Narrowing the discussion down to our specific case, we observe a strong support for the validity of the Blackwell Theorem. Specifically, studies made by Ahlers, Broll, & Eckwert, (2013), Cinquegrana, (2008), and Flassbeck,

Bicchetti, Mayer, & Rietzler, (2011) all agree on the fact that information is not just a critical topic for the (European) commodity markets, but that it is even strongly desirable to see the regulators taking important steps in improving the current uncertainty within the market. Here we will present two key issues related to the transparency topic within the European agricultural commodity sector.

Information availability

In general, relevant data about prices and international trades is easily available to any operator in the production chain. For instance, the European Department of Agriculture and Rural Development publishes monthly data on the prices of the most relevant grains and world level production forecasts. These reports take into account most of the variables we discussed in the previous section regarding the price formation in the cereals markets, such as exchange rates, weather conditions, oil and energy prices, and the production levels in key countries displaying both historical data and monthly forecasts. Nevertheless, there is one major issue in this regard: *timeliness*. As we previously mentioned, information on the spot markets is not immediately available to the single operators/investors. Now let's give some further connotation. In the best-case scenario, data is updated on a weekly basis, while reports on a European scale are published on a monthly basis. Such a situation entails that most of the information available on the spot markets are more useful as a report on the recent past rather than for an analysis of the current trends and fluctuations. In addition, within these markets there appears to subsist a negative relationship between the frequency of the information flow and the quality and usefulness of the above-mentioned reports (Serra, Zuppiroli, 2009). Nevertheless, high-quality continuous data is available for international transactions, but it is only provided by international exchanges and agencies (e.g. Reuters) as specialized service to investors/clients. However, such services do not come in cheap due to the consistent investments required, therefore getting detailed information on such transactions is not for everyone, but rather for a restricted circle. The main impact this has is that the vast majority of producers and the general array of operators on the agricultural side of the transaction do not have access to these high-quality sources of information. As a result, we currently see few operators accessing better information in contrast with the vast majority of other players that rely on more fragmented, lower-quality data. In such situation, it becomes convenient to the majority of the investors to just passively follow

what others do because otherwise independently operating in the market would be too costly for them (OECD, 2008). These considerations hold true for both the spot and the financial market for agricultural commodities, despite it being more relevant than the first. Information availability is also a critical element to take into account whenever assessing the *transaction costs* involved in trading operations. We already described how many other elements like transportation, tariffs, and storage are important in defining the price at which agricultural goods are exchanged and in defining the value relationship between spot ad financial markets for these products. While costs such as import or export tariffs, taxes, and other fees are well-known information, others are more obscure, especially data related to transportation costs. However even in such case, it is possible to obtain some data for trades occurring along the US-Canada and US-EU trade routes, mainly through the Baltic International Freight Futures Exchange (BIFFEX)[3] , while information available for intra-European trade is mostly non-existent. This fact poses multiple limits to the operator's ability to correctly estimate the underlying asset prices, despite the fact that these additional costs do not account for a primary part of the asset's value. As we will discuss later, the difficulty in correctly estimating transportation costs will pose some additional difficulties in correctly spotting spatial arbitrage opportunities within the market. The same can be said for identifying the correct storage costs, especially in regard to correctly checking for the spot-futures parity theorem.

Market fragmentation

When identifying the key determinants of transparency issues, we should take into account the level of fragmentation of the European cereal commodity markets. When referring to market fragmentation, we intend the physical existence of separated marketplaces that operate independently, that show low levels of connection among each other. As previously mentioned, we essentially face a contrasting situation between financial and spot markets. Overall, we see higher levels of integration in the futures market where most of the trades are focused only on a few major exchanges. For instance

[3] According to the BIFFEX, there are six main drivers for transport costs fluctuations. These are i) fleet supply, ii) Commodities demand, iii) Seasonal pressure, iv) fuel prices, v) infrastructure bottle-necks, vi) market sentiment. More info at: www.balticexchange.com

in Europe, the major reference futures market is the "Euronext LIFFE", which takes the lion share of commodity trading in France, England, Belgium, the Netherlands, and Portugal. In regard to the other European countries, we generally observe that they only rely on a single major reference exchange within their. Factors like the presence of specific regulations and strategic synergies incentivize the concentration of most of the trading on a single platform; by consequence, this entails a lesser degrees of dispersion compared to the spot markets. In practice, we see that exchanges for physical commodities are heavily dispersed across Europe, often presenting more than one marketplace per country. Despite the fact that some studies (Edison, Klein, Ricci, and SlØk, 2004; Henry, 2007) observed that market openness and integration might not always be desirable, specific research within the field of agricultural market integration (Hooy, and Lim, 2013) observed robust evidence in favor of the hypothesis that higher integration is correlated with higher market efficiency. In particular, this relationship holds true in the presence of a better degree of market - information efficiency. Thus, more integration is positively related to better information and subsequently, more efficient markets. So what can be said after having reviewed the different theories on the matter? On one hand we acknowledge that the phenomenon of market fragmentation makes it necessary to take into consideration specific regional and local characteristics of the prices, in turn making the reference economy less vulnerable to external shocks. Nonetheless, this dispersion particularly affects the amount of information available on the markets and how easily it is possible to obtain it. Since a central database with information from all European commodity exchanges is missing, gathering reliable specific information about spot prices and fundamentals becomes a challenging and costly endeavor that only a few big operators can sustain. This is also one of the reasons why, on an operational level, international and futures prices are the reference data used as a reference for most transactions, as we will further discuss later. In conclusion, high levels of dispersion of the spot markets imply less availability of information, increased searching costs, and overall promoting less efficient markets.

Transparency II: results of inefficiencies

The general unsatisfactory availability and quality of information available especially in the spot markets have some major repercussions on the efficient functioning of the markets object of our study.

Arbitrage Opportunities

As in most situations, arbitrage opportunities are a key aspect in keeping any market at its equilibrium levels, pushing towards the correct pricing of traded assets. Whenever such an opportunity is spotted by the market operators, it becomes possible to obtain a risk-free return by acquiring the asset where it costs less and contemporary selling it where it has a higher value. Nevertheless, spotting arbitrage opportunities do not occur by itself, but rather it is up to the single trader/investor to identify such a possibility. This can only occur when information about prices and markets are readily available. Certainly, the timeliness issue we previously took into account is valid also in this situation: if information is not constantly updated and made available to the market players, identifying an arbitrage opportunity becomes an impervious task. In particular, by trying to profit from an arbitrage opportunity using fragmentary and outdated data, the operator will risk missing the window of opportunity. Possible results include the arbitrage possibility to have already vanished, or execution of the designated trades under different economic conditions than initially predicted, with the possibility of incurring a loss. For this reason, the correct functioning of the arbitrage mechanism is jeopardized by the informational inefficiencies of these markets, thereby also negatively impacting the efficiency of these marketplaces (referring to the Efficient Market Hypotheses).

Like we mentioned in the previous section, spot markets for grains commodities are also characterized by the possibility of conducting *spatial arbitrage* operations. This possibility arises from the fact that the various spot exchanges for cereals are physically separated markets, which are characterized by displaying different prices for assets of the same quality. Under the hypotheses of perfect markets, such differences between the prices in the various spot exchanges should be determined by the transaction costs needed to transfer the physical commodity from one physical location to other. Once again such mechanism holds thanks to the concept of arbitrage: if it is possible to profit from the acquisition of a commodity on one exchange and then deliver it to another place - once taken into account the transaction costs - then it is possible to profit from a spatial arbitrage opportunity. Nevertheless, in such cases, information plays an even more crucial role. In fact, to identify the possibility of making a profit using such a mechanism it is not just necessary to obtain updated and reliable information from the market, but it also becomes necessary to estimate the transaction costs (especially transportation costs)

required to accomplish the operation. As a reliable, clear and unique source of information about such costs is lacking, especially for intra-EU trades (for US-EU trades some data is available), spotting and leveraging spatial arbitrage opportunities becomes a really challenging task, even for highly experienced and informed operators. This strong lack of updated and reliable information results in an imperfect use of arbitrage and thus leads to imperfect market conditions. As a further consideration, even if an arbitrage opportunity could be spotted, few investors would be willing to profit from it due to the risks associated with a "false positive" situation and the weakness of the data used to identify that profit possibility.

Decision efficiency

The presence of multiple transparency-related problematics clearly affects the decision-making process of the actors on the market. We acknowledge that poor quantity and quality of information result in a subsequent reduction of the quality of the decisions made by the investors. Operating in an environment characterized by high levels of uncertainty means that it is more complicated to take the appropriate actions at the right time. Additionally, as producers of cereal commodities are generally risk-adverse players (… cite…) they are more than willing to avoid such uncertainty. The solution? Transferring the associated risks to other more risk-prone investors. Nevertheless, even this kind of decision requires reliable data, which is not always available.

Here, we will identify two key downsides of having unsatisfactory levels and quality of data. The first concerns the **i) *costs*** required to perform a thoughtful analysis of the current market situation and forecasting future trends. The market fragmentation and the low quality/quantity of data available, makes the entire decision-making process more costly not just in terms of time, but also considering the resources required to perform any evaluation necessary to make wise resource-allocation decisions. The previously described complexity of obtaining and elaborating data, and the risks associated with the usage of unreliable information, further makes this process costly and potentially hazardous. If we take account also of the risks implied in relying on poor quality data, we acknowledge that decisions based on such information could lead to potentially negative outcomes or lost opportunities (e.g. think about the case when data shows an arbitrage opportunity, but as information is updated on a weekly basis, such opportunity could have already gone). A possible way to deal with the problem is to rely on higher quality

information. The fact is that such service is only available through specific organizations for a corresponding fee, relevant enough to make it a not feasible solution for smaller market operators. As updated and high-quality information is hard and costly to obtain, the costs of making a thoughtful decision increase considerably, and only a few professionals on the field can afford it (Serra, Zuppiroli, 2009).

The second important effect that insufficient levels of information and transparency have over the decision-making process are a set of problematics related to the topics of **ii) *trust and opportunism*** in the market. As information and data about each transaction are lacking or characterized by poor quality, the possibilities for a better-informed agent to leverage the situation in his favor increase. This could potentially lead to a scenario where the strongest players on the market take advantage of the situation, damaging the least informed actors. For this reason, it would be particularly desirable to improve the knowledge available to all operators, thus reducing the unbalance between different classes of market players.

As a concluding note, the higher costs implied in searching for reliable information and the increased risks for opportunistic behavior from better-informed players, result in an overall lower quality of the decisions made concerning the trading of agricultural commodities and grains. From this, it is possible to infer that the current situation leads to potentially lower levels of market efficiency, as market operators are forced to take lower quality decisions than the optimal level.

Now we will focus our discussion on the competition characteristics of the European cereals markets, and we will discuss the key problematics arising from the current state of things.

Competition levels

In our analysis, we must acknowledge the relevance of competition forces within the European markets for agricultural commodities as a source of possible problematics related to monopolistic or semi-monopolistic situations for a specific set of products. The presence of a single or few major companies owning a dominant position entail that prices can get manipulated and changed by these organization as they own enough market power In addition, if, in presence of a monopolistic situation, the markets operate under the conditions of maximum efficiency, according to the economic theory of the "*monopoly net loss*" (Katz, Rosen, Morgan, and Bollino, 2011). If the market object of our study,

will resemble a situation of oligopoly, we could incur in other issues, like the creation of cartels. For the briefly specified considerations, it is generally desirable to have higher levels of competition in most markets (this is valid for all those assets that are not classified as "natural monopolies", like railways or the electricity grid), especially in light of the bargaining power and information availability of the various players on the market. Here we will observe the competition dynamics in the European cereal sector, and we will discuss the implications of our observations.

Competitive environment

As previously introduced, the cereals market object of our study is dominated by few companies that retain a dominant position in at least one of the major grain products. These companies own assets and businesses that are highly integrated throughout the entire production chain, from the seeds marketing and production to storage and transportation activities. Additionally, these organizations are the most relevant commercial players on the futures markets, making them important institutions at every level and in every aspect of the grains industry. The major private players on the world markets are Glencore plc, Nidera, Viterra Inc., and Cargill. *Glencore*, multinational with head office in Switzerland, operates in various types of commodities, but concerning the grains business, it supports its business with controlled and not controlled operations of storing, handling, and processing. Similarly, *Nidera*, a European company with headquarters in Rotterdam (NL), operates in the cereals sector with financing, logistic and supply chain services backing their core business. Viterra is a Canadian subsidiary of Glencore, and it is specialized in the cereal sector with three core businesses: grain handling and marketing, agri-products, and processing (MarketLine). Even this company is highly integrated throughout the entire production process. Finally, Cargill is an American multinational active in agriculture, food, financial and industrial business segment. Again, highly integrated, Cargill is structured as a multitude of different companies controlled by a central holding.

In addition to those private-held companies, we find important institutional players active on the world markets. These are the Canadian Wheat Board, and the CHS Inc., both owned directly by the farmers as forms of cooperatives. Due to their vast size, these organizations own a very strong influential effect on the world markets.

Since those are the major organizations without other players matching their relevance, we can infer that we are likely in the presence of an oligopolistic situation. To check for this observation, we analyze the current market structure, with particular emphasis on the producers-multinational relationships. To check for the presence of oligopoly we analyze: i) Size and number of producers; ii) Size and number of the multinationals; iii) Degree of substitutability between products from the various producers; iv) Level of information of the producers about prices and the various available opportunities; and v) How easily it is possible to enter the market (Katz, Rosen, Morgan, & Bollino, 2011).

As we already know, producers do not have any power to influence the prices of the products they are selling. In Section 1, we observed how cereals prices get determined both in the financial and in the spot markets, acknowledging that producers own little or no power in influencing those figures. In addition, the size and number of multinationals have already been observed, bringing us to conclude that both the first two points are perfectly aligned with an oligopolistic situation of the market.

For what concerns the degree of substitutability between the various producers, it easy to observe that it is practically perfect, as traded commodities should be perfectly standardized products, while we see low levels of information among producers, as we will further discuss later.

Finally, an oligopolistic industry is characterized by a certain degree of barriers to entry. Despite the fact that there are not outstanding regulations preventing other companies to step in the market, the presence of highly integrated businesses that seek maximum efficiency and economies of scale (especially for the costs), created consistent barriers to entry (Serra, Zuppiroli, 2009).

From the observations we made before it result evident that the European and international landscape of the grains markets is characterized by having an oligopoly structure. For this reason, we further discuss two key elements that prove to be crucial in the definition of the market equilibria under an oligopoly situation: the information concentration and the bargaining power of the major players

Size and number of producers	Producers are many and only a few of them has relevant dimension compared to the market
Size and number of the multinationals	Few big players and each one of them retains a significant market share.

Degree of substitutability between products from the various producers	Perfect degree of substitutability among the products offered by the multinationals
Level of information of the producers about prices and the various available opportunities	Producers are in the vast majority of cases badly informed on the available market opportunities
How easily it is possible to enter the market	Easy to become a producer, but difficult to be able to compete with established multinationals, as they leverage from massive scale economies

Table 7.1 (Source: elaboration of the authors)

Information concentration

Another major issue related to the general lack of information in the cereals physical markets is the power granted by having higher quality and quantity of data. We already observed how specific organizations (e.g. Cargill, CHS Inc.) detain a position of market leadership in at least one of the various specific cereals (maize, wheat). These institutions are generally highly integrated and operate in multiple businesses within the production chain, from production to marketing, storage, and logistics. As a result, it comes as no surprise that these players detain in-depth information about the cereal commodity sector, allowing them to profit given their competitive advantage compared to the other market actors. In this landscape, we subsequently observe few highly informed players versus a vast majority of under-informed subjects. Taking also into consideration what we observed before - that information in such markets is difficult and costly to obtain - it becomes clear that for the majority of investors there are considerable incentives to replicate other's actions (Flassbeck, Bicchetti, Mayer, and Rietzler, 2011). Such relationship enlarges the issues acknowledged before, in particular, the volatility of the futures and spot prices for agricultural commodities and the risk of overlooking market fundamentals in the evaluation of the prices. What is also interesting to observe is the wide difference in the bargaining power of those that have access to improved information, because, in the majority of cases, they are the same organizations that keep the strongest positions in the production chain. Major organizations actually do have the power to influence the agricultural commodity markets.

By improving the quantity and quality of information available about the market, it would be possible to create a more balanced scenario, where fewer companies could retain a privileged position over a specific commodity. This will also reduce the incentives to

follow up the decisions made by other investors and instead link them to the real fundamental value of the assets.

Bargaining power

Second important topic to consider in an oligopolistic situation is the effect that the presence of few vast, well-informed, and integrated companies have on the market equilibria, particularly taking into consideration the bargaining power of the various actors on the market. In the current situation, we observe that all the bargaining power in the market is owned by these major multinationals. The only way producers can balance the situation is through the creation of cooperatives big enough to compete with the leading multinationals and organizations dominating the market landscape. This is precisely what happened in the case of the Canadian Wheat Board and CHS Inc. where the producers gathered together under a single organization to seize the synergies and opportunities arising from associating under a single union. Shifting the bargaining power from one player to the other do not necessarily improves the market efficiency, but surely it allows to have a wider array of better-informed actors able to take better decisions. Thanks to the creation of major cooperatives, producers in Canada and the United States were able to overcome the unfavorable situation by creating an oligopolistic organization themselves. Unfortunately, this does not change by any means the situation in Europe, where the single producers are still not organized under a single association, wide enough to compete with the other major players. Since a wide process of integration between the various European countries is still missing, so is a unified single structure able to balance the overcoming power of the most important global organizations that own a predominant position in the markets. For this reason, European producers are still in a disadvantaged position, owning less information and, ultimately, less bargaining power.

Market access

Another important fact to take account of when analyzing the potential sources of problematics in the European grains trading are the specific norms regulating the access to the relative markets. Unsurprisingly, not everybody is allowed to trade in the various exchanges, and this is valid for both the financial and spot marketplaces.

Futures markets access

Being heavily regulated as every financial market, only specific actors are allowed to buy and sell futures contracts on the major exchanges like the Chicago Mercantile Exchange (CMEX), the New York Board of Trade (NYBOT) or the Euronext LIFFE. For the case of the European commodity exchanges, the market access is regulated by the Market in Financial Instruments Directive (MiFID). The major accredited players are banks, investment firms, and specialist firms that, sometimes, are exempted from the capital and organizational requirements otherwise mandatory for the other financial actors. Among this last category, we find commercial players and commodity trading firms that, generally, do not pose particularly relevant systemic risks (Cinquegrana, 2008). The general public is allowed to invest in futures instruments and other derivatives only through intermediaries such as banks or investment societies (funds in particular). It is important to acknowledge that producers are not allowed to operate in the financial markets and, consequently, they cannot take short futures positions without the intermediation of specialized commercial or commodity firms. At this point, it is necessary to observe that, as financial markets are precluded to most of the producers without an (expensive) intermediation, only the major players will have an access, usually through an owned subsidiary in the field. Again, we see an unbalanced situation related to the size and importance of the various actors in defining the relative market power and the available opportunities for the different classes of players.

Spot market access

The fragmentary European situation present a vast multitude of spot exchanges, with the related inefficiencies we already discussed. Being self-regulated institutions, the merchant exchanges use different norms in defining the market actors accredited to trade. Interestingly, even in this case, only specific professionals, agricultural societies, and cooperatives are allowed to take positions in the markets. Contrary to the futures market, we don't see banks among the players while investment firms might only have a marginal role (Flassbeck, Bicchetti, Mayer, & Rietzler, 2011). Again, we observe that producers do not have direct access even in the spot exchanges and they must rely as always on third-party intermediaries. Merging these observations with the ones made at the previous point, we find a solid evidence why most of all the transactions involving cereals in European soil involves OTC transactions that are not being recorded in any trading place.

This can also be seen as one of the reasons why grains spot markets show low liquidity levels, as we will discuss in the following part.

Regulation

As the last element analyzed, it is important to realize that a possible source of inefficiencies could lie in the current regulatory framework differences between the financial and spot markets. When looking to the futures markets, we see highly regulated exchanges with advanced mechanisms to reduce risks for the operators and increase the transparency in the trading activities. This regulation also creates incentives to integrate the single futures markets in a single bigger exchange, to leverage from the resulting synergies and compete on a worldwide level. On the contrary, the spot exchanges are characterized by being *over the counter* markets (OTC) with no outstanding regulation specifically meant to make such marketplaces more transparent, efficient, stable, and less risky. In the case of the European Union, what is interesting to observe is that the major part of the annual budget is allocated to the agricultural sector through the Common Agricultural Policy, as we discussed before in a more detailed way. What is relevant is the fact that the entire regulation mostly addresses the mechanisms used to determine the subsidies due to the producers, the international trades, the various bureaucratic requirements, the investment incentives, and the environmental sustainability of the European primary sector. The key concept to acknowledge here is that a complete regulation on the mechanisms that should be used to address the trading of such commodities in a European context has not been developed. Each single exchange is allowed to follow its own rules, resulting in a highly fragmented situation. In such landscape, integration is not pursued, not just for the lack of incentives from the regulation, but also due to the other limitations arising from the lack of easily-accessible information, problematic liquidity levels, and heavily concentrated market. Ultimately, managing to structure common rules throughout the European Union could lead to higher efficiency levels due to shared standards, and improved transparency, even reducing the potential hazardous gap between the financial and cash side of the market.

Until now, we discussed what a series of problematics that we found determinant in reducing current performance levels or increasing the risks for specified classes of investors. In the following part, we will analyze a further trend that appears to be a potentially critical issue. Contrary to the previously-identified problematics, this topic is

not linked to the way markets are structured or perform, but it is more connected to financial innovation practices occurred during the recent years, that still have to be regulated.

VIII. FINANCIALIZATION OF THE CEREALS COMMODITY MARKETS

As we already pointed out, the lack of transparency, information and a different regulatory framework on the cereals markets, results in a strong predominance of the financial sector over all the trading activities occurring in spot operations. Still, such relationship does not necessarily entail negative effects. In fact, the presence of a developed and predominant derivative markets is of fundamental importance for two key reasons we already cited before *hedging* and *price discovery*. Originally, forward instruments were created to allow producers to hedge against high price volatility, transferring the related risks to less risk-averse actors on the market. With subsequent developments, these contracts developed into futures, characterized by higher levels of liquidity, and an elevated number of participants mainly thanks to the improved levels of transparency of such agreements (Von Braun, and Tadesse, 2012). Still, it is important to acknowledge that not every market player was, or is currently allowed to hedge its positions directly through the derivatives markets without a third-party intermediation from a specialized professional. The other fundamental task that futures markets perform is to synthesize all the available information over a specific commodity in a single price. This function gains in relevance especially if acknowledging that the relative spot markets for cereals commodities are dominated by few well-informed professionals that retain sizeable competitive advantages due to their privileged position. Since agricultural financial markets overall benefit from higher levels of efficiency than their spot counterparties, they are also better able to "discover" the correct prices for the underlying products. In particular, futures markets are better able to transmit data on expected and actual supply, demand, and inventories to a wide array of investors, diminishing informational barriers.

New trends in the agricultural financial markets

During the past decade, commodities markets went through a progressive change affecting both the players involved and the trading strategies deployed. Specifically, commodity futures emerged as a new popular asset class among various classes of investors and financial institutions, pursuing investment strategies that differed from those pursued by commercial players. In this regard, when talking about the financialization of the grains commodity market, we specifically refer to the progressive increase in the importance of financial actors and markets in the context of cereals trading operations, with the main purpose of achieving portfolio diversification. Despite the topic is still being discussed, such shifts were also held among the responsible causes for the unprecedented (agricultural) commodities price spike and burst in the years 2007-2009 and a set of other market distortions occurred since early 2000 (Cheng, and Xiong, 2013; Zaremba, 2015; Henderson, Pearson, and Wang, 2015), but literature is still divided on the topic.

Futures and forward contracts were initially meant to provide commercial players with instruments to hedge against risks and, indirectly, have better access to information. Traditionally, also commercial traders like hedge funds were considered as a key class of market participant (Cheng, and Xiong, 2013). Nevertheless, this structure changed drastically with the entry of new players in the agricultural financial markets that were trying to pursue different strategies compared to those followed by commercial actors. In particular, purely financial actors exponentially increased their involvement, at the point of becoming the leading institutions in the field of agricultural commodities (figure 7.1), letting commercial players retain just a marginal relevance in these markets. Funds and other institutional investors started taking increasingly large positions over agricultural commodities, but also financial innovation played a non-secondary role in that sense. With the creation, development and subsequent success of Exchange Traded Commodity instruments (ETCs) and the introduction of other commodity index investors (CITs), a wider array of market participants could easily gain an indirect exposure towards agricultural commodities, thus increasing the overall share, impact and importance of the non-commercial players.

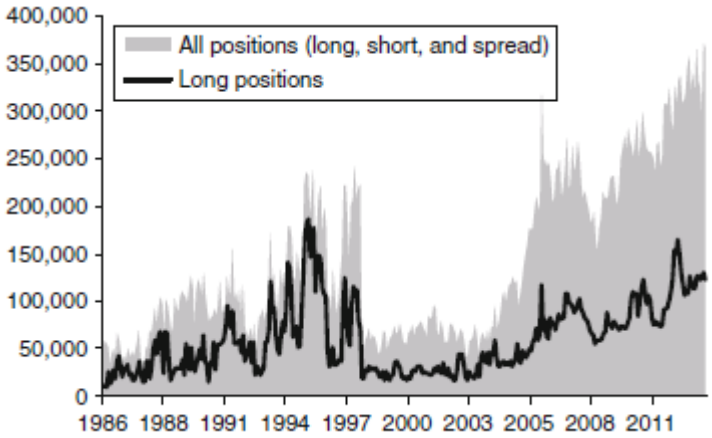

Figure 7.1 Non-commercial players in the CBOT wheat market; source: Zaremba, A. (2015)

Such overwhelming interest toward the commodity sector from a wide array of financial investors was not without reason. By taking various positions on these markets, financial players were pursuing specific strategies, according to their main objectives. In particular they were interested into the special properties of these instruments. If we refer to the most classic portfolio theory (Markowitz, 1952) we can better understand the pattern: commodities (included agricultural ones) have returns that are usually negatively correlated to the movements of most of the other asset classes on the market. For this reason, many investors (especially institutional investors) opened positions on these instruments to benefit from the positive effects in terms of risk management on their portfolio. There is more though; commodities have been found to have interesting hedging properties against inflation and the dollar exchange rates (Flassbeck, Bicchetti, Mayer, and Rietzler, 2011). Additionally, further studies from Gorton and Rouwenhorst (2006) showed that returns on commodities had a lower volatility than those made on bonds or stocks due to their correlation coefficients. These examples outlined some of the reasons why financial investors started taking increasingly relevant positions in commodities, both in financial and (more marginally) spot markets.

Consequences of financialization

As we said, most of these financial investors are pursuing strategies that do not necessarily relate to the fundamental values of the underlying assets. This means that a multitude of investors pursuing a portfolio diversification strategy could lead to a change in the prices of the relative financial instruments, especially if we take into account the market relevance that non-commercial players have secured during the past years. This dynamic

affects various aspects of commodity trading, including price volatility and market size, highly contributing to increased turnover rates (Zaremba, 2015). A report from the United States Senate (USS/PSI, 2009) highlighted that the rise of non-commercial players in the futures market for cereals and food negatively impacted the convergence dynamics that we discussed in chapter 1, between cash and futures prices. In addition, Tang and Xiong (2012), demonstrated that the rise of commodity index investing positively impacted the correlation levels of energy and non-energy commodities. This, related to our case, means that cereals prices saw increased correlations with oil and other energy-related commodities after the surge of financial investors in the commodity sector. From what we just described, we observe that these new trends negatively impact the relationship between prices and fundamentals, as the most important investors take decisions that are based on a portfolio strategy. As further evidence, Henderson, Pearson, and Wang (2015) demonstrate that financial commodity investments taken using a non-information-based decision-making process, produce strong effects on the commodity pricing. In such case, demand-supply trends lose in significance in determining the outstanding market prices, contributing to increasing the risks related to the creation of financial bubbles. As a result of this, commercial players are subject to a greater uncertainty and are forced to rely less on the signals coming from the financial side of the market. Ultimately, trading and investment decisions become more complex, thus entailing higher costs for the commercial players to operate and hedge their positions. For such reason, the benefits emerging from the presence of a developed financial markets for agricultural commodities, in particular concerning the price discovery function, gets reduced. In particular, commercial players are faced with lower value and reliability of the information generated in the financial side of the market, plus a series of further and debated downsides, such as higher volatility and prices less linked to fundamentals.

Connecting this situation to what we discussed before, that spot markets are dependent on the futures markets as an information source, we conclude that the value of the physical commodities themselves is subject to a series of market distortions generated in the financial sector. For this reason, it is necessary to improve the information quality and availability in the spot markets for cereals, in order to diminish their dependence on the financial sector and contain the analyzed price distortions. On the other side, it is also interesting to acknowledge that these financialization dynamics are a recent trend and unsettle the existing legal framework that was created before such changes occurred. In

particular, the distinction between hedgers and speculators in these markets has become more tentative, thus is would also be necessary to update the current regulation to take account of this phenomenon (Cinquegrana, 2008).

Ethical considerations

Until now, we can summarize our discussion on the commodity´s market financialization topic around two key takeaways: first, as already extensively discussed in chapter 1, spot markets are heavily dependent from futures exchange, especially as a source of information about prices and forecasts. Second, emerged recent trends reduced the reliability of financial markets as a source of information about agricultural commodities' prices, increasing correlations with other asset classes, augmenting price volatilities, negatively impacting the convergence dynamics between cash and futures prices, and reducing the relevance of fundamentals. Connecting these two facts together, we observe a potentially dangerous outcome. As current commodity prices are tied to a financial sector that is progressively less linked to fundamental values, food prices could reflect more the decisions and trends developed in the financial world than actual values generated from the encounter of global demand and offer forces.

These considerations gain in relevance especially in light of what already anticipated in the introduction, that the pricing and trading of agricultural commodities (cereals *in primis*) are tied to sizeable ethical considerations. Specifically, can we afford to have food prices linked to the performance and the trends present in the financial markets? Is high food price volatility something we can cope with? Which are the social outcomes of food price distortions? These are just some of the questions that we might pose ourselves, but one thing is clear: contrary to all the other commodity´s classes, trading cereals imply a set of further considerations that do not simply involve economic considerations, but firstly ethical ones.

To present an effective example of the relevance of this topic within the financialization trend we discussed above, we can refer once again to the price bubble emerged in the years 2007-2008 (Appendix 1). According to a consistent number of sources (e.g. Masters, 2008; USS/PSI, 2009; De Schutter, 2010; Baffes, and Tassos, 2010), it was clear that the commodity price spike and market failures occurred during those years could be explained, among the others, by the drastic increase in index traders on the futures markets, as shown in the figure below (7.2).

What occurred at the time was a contextual increase in the prices of both financial and food assets, making it clear how the two markets were indissolubly related. We discussed with more detail this case in the Appendix of this study, giving more information about the economic forces that played a critical role in the event. Here, we will talk about the social effect of this phenomenon, and how financialization of the agricultural markets impacted various economies.

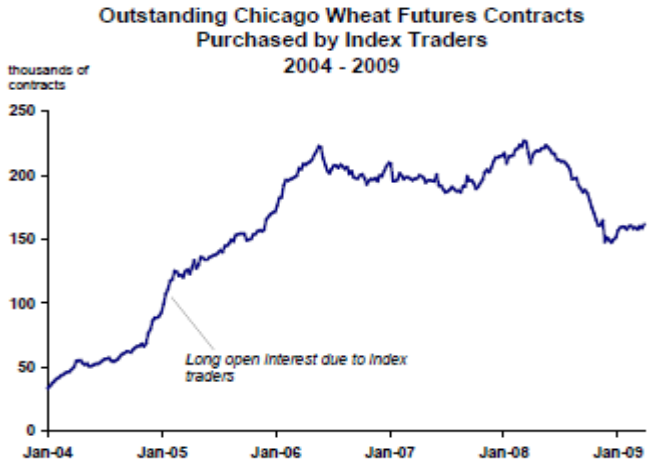

Figure 7.2 Source: United States Senate, Permanent Subcommittee on Investigations (USS/PSI) (2009).

While developed countries were able to cope with this adverse situation mostly thanks to protective trading policies, like in the case of the E.U., many other developing or not developed countries suffered major repercussions. Not simply weaker economies proved to be more exposed, but those countries whose economy was relying more heavily on the primary sector and that were more dependent on food imports proved to be particularly exposed to violent shifts in food prices. In particular, African countries were severely affected, with riots violently surging in Egypt (BBC News, 2008), Morocco, Cameroon, Burkina Faso (Reuters, 2008; Lagi, Bertrand, and Bar-Yam, 2011) and other countries like Haiti, where the PM was forced to resign. Multiple protests about these extreme increases in food prices took also place in Indonesia, Mexico, and many other non-developed countries, to the point that various government had to take responsible steps to mitigate that potentially unsettling situation; figure 7.3 present an interesting infographic on the phenomenon. Despite not being unanimously recognized as the only or major cause of the food price spike, the financialization of the agricultural commodities markets has been the result of economic forces hosted in the developed countries. Interestingly,

drawbacks and problematics originated by this phenomenon were mostly accused by all those other countries that had no part in defining this new financial trend.

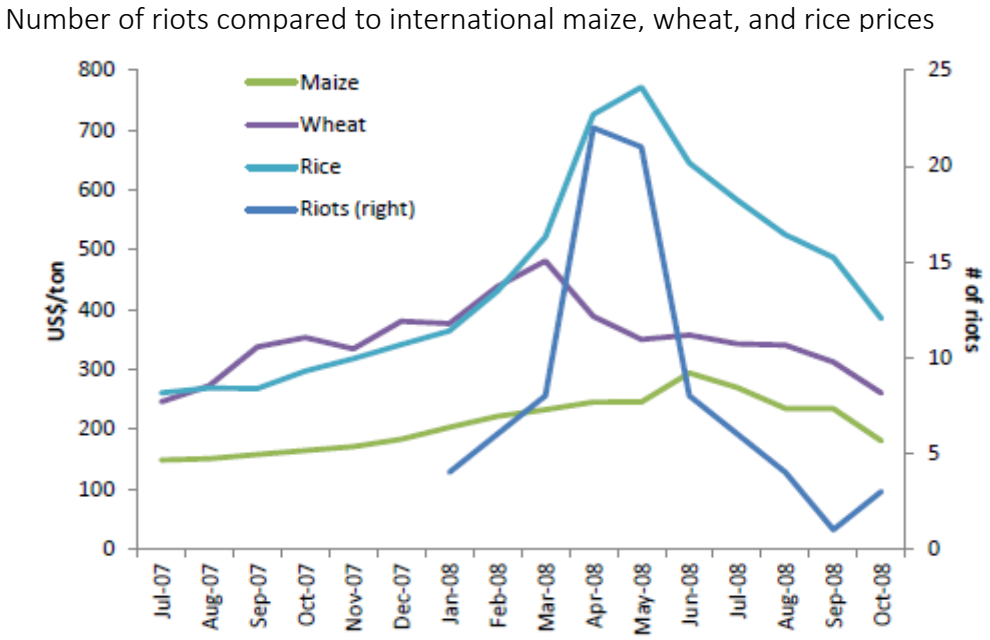

Figure 7.3 Source: von Braun 2009b

Concluding, we identify a sizeable ethical issue in financialized agricultural commodity markets because speculative and other market forces do have a relevant influence over cereals and food prices. To address this issue, an improved financial regulation would be advisable, with the intent to at least reduce and mitigate the problematics and ethical issues arising from this phenomenon.

IX. ACTIONS TO BE TAKEN

Until now, we discussed the major problematics that characterize the European markets for agricultural commodities, despite some considerations ca still hold true for other developed countries and regions. Most of the considerations we made are based on the current organization of these markets, specifically taking into consideration the information flows, the relative bargaining power of the various actors, and the fragmentation of the European landscape. On a second instance, we acknowledged the significance of an external phenomenon such as the financialization of the futures

commodity markets. Here we will present a set of objectives to pursue in order to mitigate the problematics we previously analyzed.

Informational improvement

First critical problematic to address is the structural lack of reliable and ready-to-use information on a European level. As observed before, the European agricultural markets for commodities are particularly plagued by a wide lack of transparency and the presence of information barriers among the various players on the market. It is impelling to improve the quality and quantity of information available for a series of reasons, of which we cite the most important ones.

- Making better decisions
- Reducing the dominant position of few major players
- Reducing transaction costs and risks of opportunistic behavior

Efficient markets can only exist if the actors on the market are able to take correct decisions based on reliable data. In particular, better decisions imply better outcomes and, more technically, allows for a better exploitation of arbitrage opportunities by the market players. In addition, easily accessible and good quality information would serve the scope of reducing the enormous bargaining gap between few highly integrated, well-informed players and everybody else, partially mitigating the current oligopoly situation. Ultimately, an informational improvement would pursue the objective of reducing transaction costs, as it would entail an improved ability by the market actors to have access to a wider array of transaction possibilities and identify the best option among the many. On a side note, better information would also reduce the problematics related to the risks of opportunistic behavior and implicitly further reduce the transaction costs.

Producers' bargaining power improvement

Pursuing this goal essentially means to integrate smaller-sized producers into a unified major organization able to compete with the biggest players currently operation in the market. Achieving this degree of integration would size two key effects that we perceive as being critical in improving the European cereals markets.

- Reducing the dominant position of the major players
- Improving information availability

Clearly, improving the producers bargaining power aims at the key task of reducing the dominant position of few major commercial companies that retain most of the influence over the cereals markets, for the same reasons cited before. The second purpose of integrating the producers into a structure able to compete with the consolidated players is to allow them to have access to better information, otherwise difficult to obtain in a fragmented landscape. In a sort of a loop, higher producers' integration allows for better information that subsequently further improves their bargaining power.

Financialization trend mitigation

As we have seen before, financialization of agricultural markets can come with some relevant drawbacks. For those reasons, it would be important to reduce this phenomenon and avoiding the repetition of situations that could destabilize markets and countries. By mitigating the financialization trend we pursue again two goals.

- focusing financial markets on price discovery and hedging mechanisms
- Solving ethical issues

The most relevant reasons why the financial markets for cereals are useful to commercial players are the price discovery functions and the hedging possibilities. As we discussed before, the financialization trend reduced the ability of financial markets to perform such task for commercial players, thus reducing its value toward this class of operators. For this reason, we see as a necessity to address this problematic in the discussion that will follow. The second important reason why we perceive as mandatory to address this problematic lies in the ethical issues related to the phenomenon. Nevertheless, we acknowledge that financialization of the agricultural markets is a worldwide issue while we will only analyze a solution at a European level. For such reason, ethical issues will certainly not be solved, but at least partially mitigated.

Reaching an integrated structure at a European level

Penultimate goal to pursue would be to develop a single integrated market structure for all the European countries, or at least reduce the wide differences existing in the various country-specific cereals markets. Again, an integrated framework would allow both to improve the information availability and information flows, at the same time, allowing

for a more precise regulation of a single uniformed structure would be easier to regulate than a fragmented one.

Improving access to the agricultural markets

Last among the objectives to pursue, we identify the need to allow to a wider array of commercial players the possibility to access determined financial and structured spot exchanges. This would specifically allow smaller commercial players that are now prevented from accessing these markets to:

- Accessing more trading options and counterparts
- Reducing commercialization costs
- Making spot markets more independent

If smaller players would be able to access directly these markets (especially the financial ones), they would be able to reach directly a set of other major commercial players. This would also allow to reduce their dependence from intermediaries and to put their products in more liquid markets, thus facing overall lower commercialization costs. Ultimate beneficial effect of having more people operating in a structured spot exchange would be to make spot prices less dependent from financial forces, as these prices would be determined within the spot market.

Given our goals and the willingness to achieve them, in the following last chapter, we will present a set of opportunities to innovate the European agricultural market for cereals. In particular, we will look at various possible trajectories and outcomes of each single innovation, observing its strengths and weaknesses and ultimately assessing their degree of feasibility.

CHAPTER III

X. INNOVATION AND PROBLEM ANALYSIS

It is said that necessity is the mother of invention, and we believe in this statement. We strongly agree that a given problem can be a catalyst for a solution, the delicate question we ask is what is the best tool to use? In our opinion, the theme of innovation is the most appropriate as it brings to the table the possibility of breaking down boundaries and give free reign in searching for new solutions.

Overall, innovation can be defined as the process of implementing new ideas to create value for an organization. This may entail creating a new system, process, service, or enhancing existing ones. Innovation can also take the form of discontinuing an inefficient or out-of-date service, system, or process (Yale Edu). But most of all innovation is relative. We often hear the question asked, "Is that innovative? Because I think this other company has done it before." However, we should define innovation as anything new – or different – that changes the rules of the game for one individual company. Leveraging what someone else has done is a perfectly legitimate innovation strategy (Silverstein 2010). We should not rule something out just because we think it does or doesn't qualify as innovative. If it makes a positive difference, then it makes sense to adopt it (Silverstein 2010).

Generally speaking applying innovation to the financial market has been much in vogue especially in the last few years, given the boom in what have come to be known as "fin-tech" ventures. These firms have been trying to capitalize upon the gradual, yet inevitable digitalization of the banking sector. As a definition, "fintech" is usually applied to the segment of the technology start-up scene that is disrupting sectors such as money transfers, loans, fundraising, mobile payments and even asset management.

A report released from Accenture in 2015 found that global investment in fintech has skyrocketed from $920 million back in 2008 to over $12.5 billion by early 2015. Europe, in particular, experienced the highest growth rate, with an increase of 210% to $1.48 billion in 2014. Furthermore, new customer behaviours coupled with the reworking of financial regulations, strongly suggests that this figure will continue its sharp growth in

the coming years. What we are proposing here within our paper is no fintech venture, primarily because we are taking into account such a macroscopic topic as the combined, spot and derivative markets of cereals, however the final impact may just as well be as relevant as a fintech disruption.

In the previous section we have enumerated and analysed various problematic aspects of such markets, it is now time to actually tackle them. Through our proposals for each problem, we shall also introduce different perspectives that the innovation literature provides us, especially when analysing how feasible our policy proposals are. The logic behind our analysis section, strongly relies on the principle that, being the market so vast and complex, a single straight forward solution is a utopia. We rather believe that by finding various ways of applying innovation at a micro or intermediate level, these in turn will stack upon each other and create synergies that will result in a palpable improvement of the market.

The need to improve quality and quantity of information available

Information Asymmetry

Currently, insufficient information makes it difficult for commercial participants to determine whether a specific price signal relates to changes in fundamentals or to financial market events. This lacuna also facilitates the intentional introduction of misinformation, such as "research-based" price forecasts by big banks that have taken financial positions in commodity markets, and can therefore potentially reap financial benefits if those forecasts turn out to be accurate (UN trade and development report 2011). In today's world, the USDA (United States department of agriculture) is the most important source of information for market participants, but in recent years cut costing policies and reduced services are jeopardizing this source (FAO report 2015). On the other hand the "AMIS" (Agricultural Market Information System) - composed by the G20 countries - is growing in importance especially after the extraordinary grain price volatility in 2008 and 2010. Its presence is clearly welcome although it only encompasses information related to four commodities (wheat, maize, rice, soybeans), and information about certain markets i.e. China, Russia needs improvement (Sirajul & Gronlund 2014)

The Group of 20 leaders (G-20) are also aware of the lack of transparency in physical commodity markets and have thus supported a project by the **Joint Organisation Data**

Initiative (JODI) to improve the availability and reliability of data. In essence, the primary goal was not to build a database, but to raise awareness among oil market players about the need for more transparency in oil market data. The first priority was to assess the oil data situation in their respective member countries (Morel 2013). The assessment included the collection of monthly oil statistics from each organisation's member countries through a harmonised questionnaire on 42 key oil data points. Once each countries data had been received, it was then compounded in the "JODI-Oil World Database". So far the JODI initiative is limited to oil and natural gas, and no similar venture exits for agricultural commodities, which are arguably most at risk from geopolitical and climatic shocks (Morel 2013). This is where are our research can make a suggestion.

Dismantling info asymmetry

Point in case: The JODI oil market database could serve as a model for a centralized European Agricultural Data Initiative, that from now on we will call "EADI". However, it would have the additional functions of issuing global food price surge alerts and promoting policy coherence, through a triangular collaboration with "AMIS", the biofuel sector and the International Grains Council. Let us explain, in the next paragraph, we will explain the function of each proposed organization, and how the EU council could aid in coordinating their efforts in order to dismantle or at least severely reduce the information asymmetry within the European market.

- AMIS: An inter-agency platform to enhance food market transparency and encourage coordination of policy action in response to market uncertainty. Established at the request of the Agriculture Ministers of the G20 in 2011, AMIS focuses on four crops that are particularly important in international food markets, namely wheat, maize, rice and soybean (Hallam 2013). This agency would be the main pillar for our proposed "EADI". It will provide a platform to enhance collaboration. It is not a new institution so it used to tackling such problems. The main idea is to build on and complement existing national data systems: improvements in the flow of market information and market outlook analysis could, initially, be achieved through a limited budget. A significant improvement in the ability to monitor world food markets can be realised through collaboration

and improving the synergies within a key set of major producing and consuming countries. In our case, the information gap to close is significant but not too hard to bridge. For food crops such as rice, wheat, coarse grains and soybeans, access to better information on production in just a few countries can go a long way in helping to understand market trends at the global level. Particularly in the case of wheat and rice, less than ten countries account for over 90 percent of world production as we had seen in the tables of section 2 (Index mundi 2016).

- IGC: A London based organization, which focuses on distributing market information on grains, rice and oilseeds to the public by website and by subscription. In example, the IGC's Grains and Oilseeds Index (GOI) is available on a daily basis via the public website, together with supply and demand balances and forecasts for a range of countries and commodities (Bloomberg 2015). The strengths that the IGC could provide to our "EADI" project, mostly include the aspect of the timeliness of the delivery of information: having daily information would prove to be a very significant increase from today's standard monthly market reports. Of course we do not expect IGC to always have daily information on all cereals of interest, but certainly incorporating this faster flow of information within the AMIS platform would make for more precise data for all relevant market participants. Another aspect of interest that would prove of extreme value is the "freight rates" information disclosed. The IGC does have a section on the topic, which is especially detailed for transportation costs between the EU and America, and the EU – Brazil route. Unfortunately at the current time, and for the foreseeable future inter – European freight rates will only have very limited availability through the secondary data of the The Baltic International Freight Futures Exchange. This does not surprise us as we mentioned previously in section three, freight rates/transportation costs have always proved to be elusive information at best. In any case, even such partial data sets, would mean taking a great step towards increased market transparency.

- European BioDiesel Board: The primary grouping of major biodiesel producers within Europe. Despite the typical complaints that production of biofuels distort food markets: i.e. it has diverted grain away from food for fuel, with over a third

of US corn now used to produce ethanol and about half of vegetable oils in the EU going towards the production of biodiesel. First-generation biofuels, which are based on food stocks, seem to have sharply increased the relevance of information on energy for trading in agricultural commodities, and vice versa (Flach et al 2015). We believe that it would be possible for these two sectors to work much more closely together, with the two-fold objective of improving the stability of bio-fuel production and on the other hand improve the transparency and information availability for cereal production. Furthermore as the sector advances, and already we are seeing this happen today, a certification and supply chain traceability system for bio fuels will be put in place. i.e. under the European Union's Renewable Energy Directive (RED), all biofuel feedstock collectors and biofuel producers must demonstrate the sustainability and traceability of their consignments (Flach et al 2015)

Furthermore as producers become larger, their obligations in terms of reporting will grow, both in terms of financial and non financial aspects. This will be particularly enforced through a key EU Directive on "disclosure of non-financial and diversity information by certain large undertakings and groups", which was passed on the 15th of April 2014, that will apply to both listed companies as well as some unlisted companies. Given how the agricultural policy plays such a big role in the EU, it does not take a large stretch of imagination to see how biofuel producers would be subject to these new rules. The combination of these aspects would provide an additional layer of information regarding the cereals and agricultural products used for bio-fuels, especially at the supply chain level and in terms of quantifying costs and quantities on the offer side. Overall this information could help cover any deficiencies or blank areas which are not covered by either the IGC or the AMIS, additionally it could provide meaningful insight from countries that have historically been "prudent" in sharing their data.

Finally the European Union - in particular through its operative arm in the sector: the Agriculture and Fisheries Council - would act an as overreaching coordinator for the EASI initiative. Its primary purpose would be to identify problems and gaps in the collection of data (for example data on stocks). While in collaboration with the three

associations discussed previously, find solutions and give direction to current and future efforts on increasing information transparency. Such a collaborative initiative will strengthen and formalise existing relationship between these international organizations and producer countries, resulting in better data, deeper analysis and quality products. The council of four could meet twice per year to discuss market trends, emerging issues and policy changes that may affect agricultural markets. Such meetings will strengthen the links and synergies between the international organizations, countries and commercial enterprises. They will also be instrumental in overcoming difficulties that some governments or commercial enterprises may experience in relation to confidentiality of data on food stocks.

Degree of feasibility

In particular for this case there are three main questions that need to be addressed.

3.1) what are the chances that these organizations will collaborate with each other?

To this date the following collaborations have occurred.

- IGC & AMIS: In October 2012, the IGC became a member of the Secretariat, a primary operating branch, of the AMIS (Agricultural Market Information System). The collaboration entails contributing supply and demand estimates, and market prices for inclusion in AMIS reports and the AMIS website alongside information from other participants in the initiative (World Bank 2015). So between these two it hardly seems possible that there could be any major misalignment when working together.

- AMIS & EU: Here the situation is different but promising nonetheless. AMIS was established at the request of the Agriculture Ministers of the G20 + Spain in 2011. The G20 group encompasses representatives from single entity nations like: Italy, Germany and Frances, but also from macro area such as the European Union. Given that 20% of the founding members therefore are European, it would be expected that over the last years the cooperation between the governments and the organization has been extensive.

- For what concerns the European Biodiesel Board & EU, these two entities have often worked together in trying to shape biofuel regulation. Most recently, on the 28th April 2015, the European Parliament voted to approve new legislaton, the "iLUC Directive", which limits the way Member States can meet the target of 10% for

renewables in transport fuels by 2020, bringing to an end many months of debate (Bozbas 2008). This has serious repercussions as member states must then include the law in national legislation by 2017, and show how they are going to meet sub-targets for advanced biofuels. Raffaello Garofalo, the Secretary General of the European Biodiesel Board, said the industry welcomed the newly adopted legislation, and it will continue to "improve the sustainability biodiesel, in order to fully contribute to the decarbonisation of fuels in the EU in the next decade". This show of cooperation makes us optimistic on the chances that the "EBB" would take a chance and be part of our proposed EASI project.

Despite our various shows of optimism, overall a lot still depends on the willingness of national countries to be thorough in their analysis and to be willing to share such information with international organizations. If it happened for the JODI oil database, then there is reason to be mildly optimistic about the functioning of our proposed model for the agricultural market. Especially after the price crisis in agricultural products in 2000 and 2007/2008, that should act as a catalyst to speed up the process.

The active and significant participation of the above mentioned actors is also going to be shaped by a significant amount by the future challenges and developments that will occur in the next 5-10 years, within the agricultural sector. In order to assess the possible evolution trajectories, we will combine two innovation frameworks. In particular we would like to take into account the views of (Burgelman 2007) in reference to the changes occurring in the competitive environment and who is determining them. As a next step will put this initial classification in relation with the argumentations of (Courtney 1997) that focus on residual uncertainty, in order to make a more thorough analysis of the current situation.

According to Burgelman there are three different types of industry change:

- *Controlled industry change* = when the firm engage in rule-changing action, meaning that any kind of change is dependent upon the actions of a single firm.
- *Independent industry change* = when the environment/competitors engage in rule-changing action. (E.g. competitor introduce a new technology), which leave you in the position of having to catch up in order to avoid falling behind.

- *Runaway industry change* = when both the firm and environment/competitors engage in rule-changing action. This leads to chaos and thereafter back to either of the two change types above.

These three types of industry transformation can be put into relation with the classification of residual uncertainty made by Courtney which entrails three possible outlooks.

1. *A Clear-Enough Future:* A single forecast precise enough for determining strategy. Traditional strategic tools can be applied at this level since the competitive business environment appears to be rather stationary. Which should be linked to the "controlled industry change situations".
2. *Alternate Futures*: A few discrete outcomes that define the future. Tools can be decisions analysis, option valuation model or game theory. And *A Range of Futures*: A broad range of possible outcomes, but no natural scenarios. Tools: Latent-demand research, technology forecasting, scenario planning. Which can be related to the "independent industry change".
3. *True Ambiguity:* No basis to forecast the future. Tools: Analogies and pattern recognition. Nonlinear dynamic models. Which should be put in relation to the "runaway industry change".

[Matrix] The state of cereal agriculture and the biofuel industry

Combinations	Controlled industry change	Independent industry change	Runaway industry change
Clear Future			
Alternate Future	X (agribusiness)		X (biofuel)
True Ambiguity			

Within our specific context, we find ourselves for the most part locking at the center section of the matrix which is arguably the more fertile context to support EADI. We feel that changes within the agricultural sector are going to be, for the most part, mild and predictable, especially given fresh regulation at the common agricultural policy level and also at the financial level through Mifid II. In terms of Courtney's classification we feel that there are a range of alternate futures that are not unfathomable. Furthermore changes in productivity in the recent years have mostly been linear, cooperatives have emerged

and grown without any ground-breaking changes, and GMO's remain highly controversial. For these reasons we feel that strictly speaking for the cereal agriculture field, the degree of industry change is "controlled".

On the other hand, the biofuel industry may be in a bit of a different condition. In this case regulation is firm but may soon see further changes particularly because the underlying ethical dilemma of producing food vs producing fuel is still raging, especially after the commodity price hike of 2008. It is hard to forecast how world and EU regulation will shape the market, though there are some leads on how things may evolve which ensure that within our classification this does not take us into "True ambiguity" territory. When evaluating the competitive scenario, things are a bit more chaotic since biofuel production is such a young field compared to other more established industries. There is a huge variety in what components are used for the biofuel production, innovation in the production process is rampant , and industry structure keep changing as we see mergers and bankruptcies taking place in increasing amounts all over the world. For this reason, we would classify the industry as being in a state of "runaway change".

Summing up all the various components of our analysis regarding this point, it would appear that the overall level of feasibility of our proposed is above average, as the various forces composing it should encounter limited trouble when collaborating amongst each other, while on the other hand environmental conditions despite non being especially conductive to the project are neither prohibitive or unfavourable.

Give producers higher bargaining power - The Current E.U. state of affairs and cooperatives

In agriculture, producers are typically seen as having little bargaining power or leverage due to the number of sellers in the open market, and as we will later outline this holds particularly true within the European Union. In many situations, it is simply too expensive for farmers to manufacture new and different products or undertake an innovative service, this lack or impossibility of investment ensures that isolated producers tend to lag behind more structured agricultural producers (Kroma 2006). Before considering what can be done to solve the problem, let us take a brief overview of the current situation within Europe. Despite the on-going consolidation process, farming in Europe is still carried out primarily on small or very small holdings. 65% of all farms in the EU-27 work less than

5 hectares (ha) of agricultural land, and only 2.% have more than 100 ha. As a group, holdings in the smallest size classes produce a relatively small share of total standard output somewhere between 18% – 20% (Eu agricultural briefs report 2013).

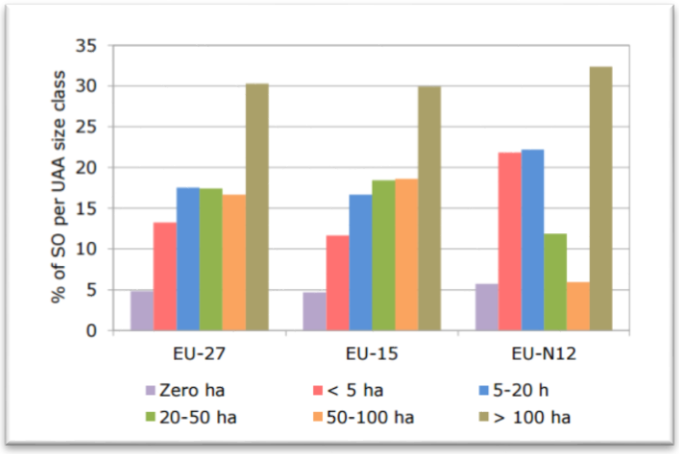

Figure 10.1. - Share of standard output by size class in 2013 - Source: Eurostat, FSS.

In other words, family farming is still the dominant form of organisation in EU agriculture, accounting for practically all small farms and the majority of those in the higher size classes. These farms largely employ family labour and tend to maintain a patriarchal structure (Kroma 2006). To further aggravate matters, many small farms are owned and managed by older farmers who are less likely to invest and innovate. The proportion of young farmers is increasing only very gradually, possibly due to limited access to land. So how can the tide be turned? The answer lies in cooperatives and their further development. Let us begin with the basics, then we can move on to how to improve the current system.

Historically cooperation has been one of the principal means by which small farmers managed to survive. However with the development of capitalism, larger companies began to sell inputs to farmers and buying produce from them. Farmers had a need to protect themselves from being picked off one by one, and avoid being exploited (Christensen; 1983). In today's world farmers' cooperatives play a vital role in helping farmers to capture a higher share of the added value in the food supply chain in all European member states, especially through marketing cooperatives which are the most predominant type, although there is a sporadic distribution of machinery pools and credit unions (Jarka Chloupková 2002). Overall the objectives of cooperative can be briefly

summarized as, but not limited to, improving the bargaining power of their members and letting the latter benefit from economies of scale. Other services cooperatives can provide are reducing transaction costs, providing access to resources, reducing market risks and strengthening farmers competitive position through product innovation and guaranteeing food quality and safety. Also a large number of cooperatives have expanded their activities in downstream stages of the food chain, thus strengthening their consumer and customer orientation. Since most chains are characterised by bargaining imbalances between farmers and their upstream and downstream partners, cooperatives play a strategic role in strengthening their bargaining power.

From an innovation perspective, to some extent we can compare cooperatives to innovation clusters. Traditionally the benefits of clusters have been explained by economists as a means for small companies to enjoy some of the benefits of the economies of scale typically reserved for large ones. Let's put this concept into prospective: in the short term an isolated greenfield site in a depressed region where government grants are abundant may bring a young company immediate benefits. However in the longer term the young company may be better off being part of a strong supportive network in which it can evolve and improve its competencies at a much faster pace. Porter 1998 gives us two fine example, that can also be applied to the cereal growing context we are currently discussing.

The Netherlands would not be the natural first choice for anybody starting a flower-growing related business today, if it were not for the fact that the business is already there. Such an environmental condition makes for a remarkable competitive advantage for a new entrant, who can benefit from such things as the well-funded, the organized flower-growers' associations, the sophisticated Dutch flower auctions system and the country's advanced research centres (Porter 1998).

On the same note: the California wine cluster is another good example. It includes 670 commercial wineries as well as several thousand independent wine grape growers. An extensive complement of industries supporting both grape growing and wine making exists, including suppliers of harvesting equipment, grape stock, irrigation, specialized public relations and advertising firms; with the addition of numerous wine publications aimed at consumer and trade audiences. All such aspects are in turn overseen by a host

of local institutions such as the Wine Institute with the collaboration of the world-renowned viticulture and enology program at the University of California at Davis (Porter 1998). The cluster also enjoys linkages - albeit weaker - to other California clusters in agriculture, food and restaurants, and wine-country tourism. All this to explain what cooperatives can do to support and aid the individual producer if he decides to be a part of the network. More interestingly though, we are now going to outline the current state of affairs within Europe.

A recent study from Cogeca found that, EU cooperatives maintain a strong market presence in the European food supply chain and three macro regions can be outlined, each with their own peculiarities:

- *The Nordic countries*: which maintain high levels of integration and developed into a small number of highly specialised and large scale cooperatives.

- *The Centre and South of the EU*: here high level of «atomisation» is the norm, with limited integration through second degree cooperatives which in turn reduces economic dimension.

- *New Member States*, mostly east European and Baltic States, where development of the cooperative model is lagging behind.

In term of numbers, the total turnover of all cooperatives is currently in the range of some €35 billion, while the total number of cooperatives has decreased to some 21500 (instead of the 38000 figure reported in 2014). This is due to excluding the 10500 CUMAs, as well as the heavy reduction to the number of Greek cooperatives (approximately 6000), as a result of new legal provisions (Copa - Cogeca report 2014). Furthermore, a significant growth trend has been reported by the leading cooperatives: the total turnover of the largest 100 cooperatives has grown by 5% from 2012 to 2013, followed by another 15% growth in the next year. At the same time the growth observed by the TOP 25 agri-cooperatives has proved to be equally impressive, as it has increased by 7% in the period 2003-2008, followed by a 12% growth in the next period ranging from 2008 to 2013. However despite all this upbeat plethora of data, the actual market share of cooperatives within cereals is one of the lowest within the 8 tier categorization we present in the following table.

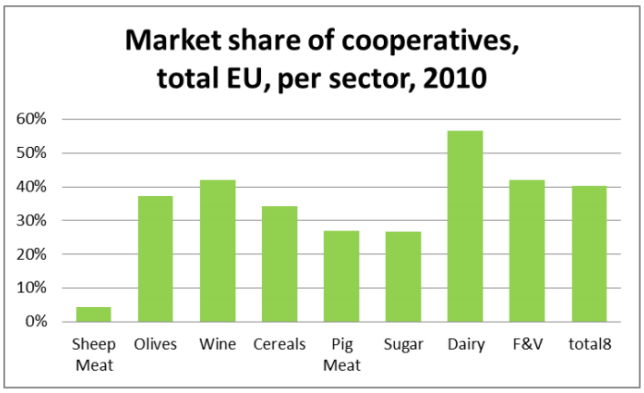

Figure 10.2 Source: Copa - Cogeca annual report 2015

Furthermore data from the same presentation suggests that cooperatives were involved in 74% of cereals produced in France; 68% in Denmark ; 50% in Germany; 35% in Spain; 28% in Italy; 12% in Hungary, 7% in Poland plus other minority stakes in other countries. This goes to show how cooperative tend to have concentrated within a set core of countries, and are still having problems getting involved with more peripheral countries within the EU.

<u>Give producers higher bargaining power - Improving the current Agricultural cooperatives regime</u>

In our view, from a general stand point, additional support measures could potentially benefit cooperatives. Already Cooperatives profit from a flexible cooperative law, single taxation, and clearly defined competition rules (Igual et al 2012). In some sectors cooperatives and producer organisations have benefitted from the CAP and some of its reforms (as was the case with the wine, and fruit & vegetables industries). We recommend that governments - especially at the national level, with coordination of EU directives - develop measures and policies to support capacity building and technical (organisational) assistance, in particular for small sized and start-up cooperatives.

The case of the "Atomisation" in the South of Europe

Addressing this particularly weakness may prove to be a matter of supporting a persistent trend that is already taking shape. Let us delve into more details. The farming sector as a whole is undergoing an important shift in ownership. In the European Union, for example, by 2017 more than half the people who owned a farm in 2007 will be 64 or older, past the age when most people retire (ESMA report 2014). We speculate that with younger people

increasingly reluctant to follow in their parents' footsteps, the farming sector will see an acceleration in the process of consolidation, further increasing the share of large farms out of the total. This shift will also enable the entry of two new classes of owners. The first new class of owners will be individual strategic investors and countries (primarily those that are emerging) looking to acquire foreign land to secure and stabilize their national food supply. The second class of owners will be investment firms and institutional investors lured by the potential returns to be gained from the increasingly scarce availability of agricultural land and the ongoing trend of rising food prices. The advent of such new owners will likely ensure a different agenda in terms of priorities and requirements from those of traditional farmers. Therefore, it is quite possible that they will look to major cooperatives as a source of increasing their business capacity, especially since quite a few cooperatives have build their strategy on regional characteristics, as in developing and marketing regional specialties. It is more than likely that the need for further strengthening bargaining power will lead to more (international) mergers amongst cooperatives, while such mergers are primarily induced by the need to gain economies of scope, we should not forget the strategic value in R&D and branding opportunities.

To support farmers and future owners in this trend, legal definitions of producer organisations and support measures should not discriminate against large cooperatives. Furthermore, national governments need to properly position themselves so as to be able to support this transition and better still expedite it through selective grants programs or by softening legislation for agri-businesses. Finally another option could include the use of private-public partnerships (PPP's) in order to spur rural development, within this option there an infinity of other sub-possibilities, which depending on the effectiveness of the implementation can yield outstanding results.

The case of lagging behind newly joined countries

The situation in the former socialist member states is contrasting and diverse due to differences in historical backgrounds, pre-collectivisation land reforms, post-collectivisation transformation laws, policy streams and socio-cultural contexts. However, all cases have in common that the impact of the communist legacy persists, as lacking trust is an obstacle to cooperative development (Stafford 2000).

In our opinion, the main issue to be tackled is how the rural population requires capacity building. Farmers need to be informed on the cooperative idea and its benefits. In Ukraine this issue was mentioned as perhaps the most important issue by the participants of the All Ukraine Public Meeting "Ukraine on the Eve of the International Year of Cooperatives" (Korinets, 2013). Cooperative Development Centres in the United States are an example of the type of government-private sector collaboration that can accomplish this task. Cooperative Development Centers are non-profit state-level organizations funded by cooperatives themselves and co-funded by the US Department of Agriculture. Their function is to explain the cooperative idea and the specific benefits for those interested, to train in cooperative management skills, and support the public with the business, legal and tax information needed for cooperative start-ups and management. They also offer individual technical assistance by qualified experts, the costs of which may be covered by the US Department of Agriculture grants for the development of cooperatives.

In order to apply the previously mentioned "American Strategy" within the European context, we advise the following. We believe that the three Rome-based United Nations agencies – the International Fund for Agricultural Development (IFAD), the World Food Programme (WFP) and the Food and Agriculture Organization of the United Nations (FAO) – can achieve great results by working closely with struggling EU countries, so as to promote the growth of cooperatives in different, non overlapping ways.

- *Raising awareness of the role of agricultural cooperatives in reducing poverty and improving food security*. Raising awareness of the role of agricultural cooperatives in reducing poverty and improving food security. The three agencies will produce and distribute case studies, documentaries explaining the roles of cooperatives in different agricultural contexts and through the establishment of workshops their impact on the lives of small size land owners. Analysis in pilot countries, such as Poland and the Czech Republic will improve understanding of the different ways in which men and women participate in cooperatives, and the effectiveness of cooperatives in empowering both sexes agri-businesses. Broader scoped research and analysis will ensure that gaps in the data regarding

cooperatives and their impact on food availability, income generation and poverty alleviation.

- *Assisting the development of agricultural cooperatives' capacities*. As already mentioned previously, small producers can - through cooperatives - pool their assets and competencies in order to overcome market barriers and other constraints such as lack of access to natural resources and lack of voice in decision-making. The Rome-based agencies can support small producers in developing links with external policy and economic actors such as other private businesses the research community and central governments.

- *Supporting the development of enabling environments and better governance frameworks for agricultural cooperatives*. The agencies will assist policy-makers in the elaboration and implementation of laws, regulations policies, economic incentives and consultation that take into account the needs and concerns of women and men smallholder farmers, allowing small farmers' organizations to thrive

Degree of feasibility

In conclusion, we are not excessively concerned with the implementation of the strategies for reducing atomisation in cooperatives in southern Europe and bolstering the eastern European markets. Regarding the first, generational replacement within the farming sectors is cyclical and is essentially dictated by time, something that despite our best efforts, still remains vastly outside our sphere of control. We confide in the fact that national governments will be capable of smoothing out this transition, since they will be one of the main beneficiaries if economically sound results are obtained. In short there is a substantial alignment of interest between governments, farmers and international investors, which leads to a particularly fertile context for our proposed solution.

Regarding the second strategy, there is reason for optimism since the three international agencies we mentioned all lie in close proximity to one another (they all have HQ in Rome) which will greatly reduce communication and coordination issue. Most of all though these organisms already have a deep history of collaborating with each other on

very similar projects in Africa. In 2009 within the Democratic Republic of the Congo the Purchase for Progress project was put into action. Jointly implemented by FAO and WFP, the project supported smallholders as they gradually organized themselves into cooperatives: resulting in increased crop yields and obtaining better access to spot markets. While in 2000, FAO and IFAD jointly supported and implemented a project to promote the Farmer Field School (FFS) approach in eight districts of, Uganda, the United Republic of Tanzania and Kenya. The FFS approach enabled farmers to improve their financial decisions, solve problems and acquire new growing techniques and skills through innovative learning and participatory group approaches. If the three agencies have managed to be successful in such a tough context such as the African continent, we feel it safe to assume that their efforts in Europe will encounter less difficulties and obstacles, ensuring that our proposed solution can be executed with relative ease.

However we are not done yet, we need to answer one more key question, is the context supportive to innovation in one of its key components, especially in terms of the farmers? We need to understand what is going on, at the farm level, in order to understand in what conditions the people that are then supposed to make changes to their economic activities are. To help us answering this question, we will take advantage of the Red Ocean vs Blue Ocean perspective.

Red Oceans

The findings of Kim & Mauborgne 2005 that outline a series of "distress factors" that can evidence whether a company is unknowingly competing in a "red markets" which can be defined as markets where "industry boundaries are defined and accepted, and the competitive rules of the game are known. Here companies attempt to outperform their rivals to capture a greater share of existing demand. As the market space of red oceans gets crowded, prospects for profits and growth are reduced. Products become commodities, and undercutting competition becomes the norm. Having described the concept I will present and contextualize their argumentations within the cereal market.

-*Over-Delivery Without Payback*. Which in practical terms can be defined as does the company's market share and profitability reflect their investments? If not, the firm may be oversupplying its customers, through a value proposition focusing too much on elements that add incremental value to buyers. In response the company must take action

in terms of which factors to create, raise, reduce or eliminate, to construct a unique value curve.

- *An Incoherent Strategy*: When a company's value keeps shifting, it signals that the company doesn't have a coherent strategy. The most probable explanation is that its strategy is based on independent sub strategies which are poorly coordinated. This is often a reflection of an organization with divisional or functional silos. We should not be fooled, individually these strategies make sense and keep the business running, however, collectively, they do little to distinguish the company from its competitors or to provide a clear strategic vision for the future.

- *Strategic Contradictions*: are areas where a company is offering a high level on one competing factor while discarding others that support that factor. I.e. investing heavily in making a company's web site easy to use but failing to correct the site's slow loading speed. Strategic inconsistencies can also be found between the value offering and the pricing strategy.

Blue Ocean

The term is an analogy to describe the wider potential of market space that is vast, deep, and not yet explored. Granted that agricultural firms should be poised to be innovative in the future, blue ocean strategies would imply that the firm can bypass competition altogether since BOS eliminates the trade off between cost and differentiation. The main aim of creating higher value for customers and society in general at lower costs and environmental impacts, eventually leading to new market spaces. Since in a new market space there is no product or service to compare with, the focus moves from price to higher value (innovation) product/services provided to customers. This is the main logic of Blue Ocean Strategy (BOS). Rather than trying to gain competitive advantage in existing markets, companies should avoid competition by focusing on unfulfilled demands of existing or new customers. Why should they fight for existing markets if they can create new ones? It is based on customer needs demand oriented strategy, rather than on what competitors do to outperform each other. In other words, it is implemented by satisfying untapped customer demands with new value propositions, no way to make comparisons since they are new market spaces.

Having said this, I consider such an approach to be particularly fitting for the case sector since there are several driving forces behind a rising imperative to create blue oceans. Accelerated technological advances have substantially improved industrial productivity and have allowed suppliers to produce an unprecedented array of products and services with the use of much less land. The trend toward globalization compounds the situation. As trade barriers between national economies and regions are dismantled, information on prices and products is becoming and more available: niche markets and monopoly havens are rapidly declining. Over the years, for the most part, agrarian supplies have been on the rise as global competition intensified, on the other hand however, for the developed markets such as Europe, there is no clear evidence of a substantial increase in worldwide demand. Demographic statistics even point to declining populations in many developed countries, which is in most cases barely counter-balances by the arrival of new immigrant.

In addition to our previous reasoning, we would like to link the implications of blue ocean strategy (BOS) to the strategic posture of the firms involved in the sector, which is defined by Courtney as "intent of a strategy relative to the current and future state of an industry". The reason for this digression is that even though the conditions for innovation may be right, we might ultimately be facing a complacent array of producers, which have no intention of investing in the future of their businesses because of the risks and the requirements.
According to the author there are 3 primary perspective on the matter.

- *Shape the future*: Play a leadership role in establishing how the industry operates by either setting standard or creating demand.
- *Adapt to the future*: Win through speed, agility, and flexibility in recognizing and capturing opportunities in existing markets.
- *Reserve the right to play*: Invest sufficiently to stay in the game but avoid premature commitments. This is the case of the majority of small and rural farmers.

Despite having seen that the context would be supportive to innovation, the majority of individual farmers adopt the third posture as there simply is too much risk involved for them. This factor is a very large red flag when considering the willingness to innovate.

Increase distance between financial and spot market

What we intend by "increasing the distance" between the financial and the spot market, is that food prices should be linked only to demand-offer dynamics and not to the financial trends of speculation. This certainly also pertains to the ethical issue on how rampart speculation can risk jeopardizing the lives on those who depend upon cereal commodities. We are going to approach this issue from a slightly different angle compared to the previous two points, since new legislation is in progress but not concluded yet. The new rules must still be approved by the European Commission. They are due to come into effect in early 2017. Therefore we will go over the most salient aspects of the proposed reform and point out potential drawbacks and improvements that can be made, within the section of commodity derivatives (Ferrarini, G., & Moloney, N. 2012). The new regime – MiFID II "Markets in Financial Instruments Directive" seek to provide a European-wide legislative framework for regulating the operation of financial markets in the EU. MiFID II represents a major overhaul of the existing law, building on and extending the scope of the first Markets in Financial Instruments Directive, which originally came into force in November 2007 (Ferrarini, G., & Moloney, N. 2012). The main developments relate to:

- *Scope – MiFID2 will bring more commodity derivatives within the regulatory perimeter*. A new platform, an 'Organised Trading Facility' (OTF), has been added to the list of regulated platforms which includes 'Regulated Market' (RM), 'Multilateral Trading Facility' (MTF) and 'Systematic Internaliser' (SI), by which instruments traded on the venue will be considered Financial Instruments (C6). The term 'Forwards' has been added to certain definitions by which commodity derivatives (and potentially physically settled FX*) will be treated as 'Financial Instruments'

- *A reduction in the number of exemptions available for commodities dealers*. Until now, commodity firms have largely escaped full regulation under MiFID as a result of broad exemptions made available for commodity trading firms, and other 'non-financial' organisations that use regulated 'Financial Instruments' predominantly for commercial purposes. The changes under MiFID2 are significant in that they remove or limiting the exemptions available to commodity trading and other non-

financial firms, as well as broaden the scope of instruments for both physically and financially settled commodity derivatives, classifying more of them as financial instruments (Rinversi 2015) as mentioned in the previous paragraph.

- *Additionally*, the Article 2(1)(d) exemption (which currently. provides conditional exemption for certain firms who do not provide any investment services apart from own account dealing) has been amended so as not to apply to dealers in commodity derivatives, emissions allowances and derivatives in emissions allowances. The remaining exemption, currently in Article 2(1)(j) is retained for 'ancillary activities', albeit reduced in scope: the exemption won't be available if executing client orders, market making, or employing high frequency or algorithmic trading strategies for commodities (Rinversi 2015).

- *Introduction of position limits and position management controls for commodity derivatives*. The imposition of position limits - The highest number of options or futures contracts an investor is allowed to hold on one underlying security - is likely to cause significant implementation issues. Competent authorities regulating the trading venues will impose position limits on the net position held at any time in commodity derivatives traded on trading venues and economically equivalent OTC contracts (Linton et al 2012). The limits are to be set on the basis of all positions held by a person and those held on its behalf at the group level. A group wide position limit is likely to require complex calculations, which may differ by delivery month. This represents a major implementation requirement for any firm which trades in these markets. Another significant aspect to the legislation relates to the obligation for trading venues to report aggregate positions by class of persons, including daily breakdowns of positions (e.g. by participants, clients, clients of clients) to competent authorities (Liton et al 2012). Firms have to be able to provide that information to the trading venue; a participant may have to get that information from its clients to be able to pass that on, posing a substantial operational burden.

On a more precise note, according to the technical standards, market participants will be able to hold 5% to 35% of a commodity derivative's total open interest - total number of

options and/or futures contracts that are not closed or delivered on a particular day - , but the additional specifics will be set by national regulators. Currently there are no limits on the percentage that a single trader or producer can hold. The new limits are meant to improve market stability and prevent manipulation by a player holding a large position. Second, the new standards also say that if a company's speculative trading business is above a certain threshold, which varies from market to market, it will be subject to financial regulation. If more than 10% of its total trading business is considered to be speculative, rather than intended to manage risk through hedging, the company will also need to be treated as a financial firm for regulatory purposes under the new rules. Third, right now, big traders like Glencore, Vitol and Mercuria Group don't have the same requirements as banks to set aside money to backstop their trading and limit the number of contracts they trade in a given time.

Critique & Improvements

We should all support transparency, good conduct and the ability to manage credit risk and to reduce systemic contagion. But if we import, directly from the financial sector into the commodity sector, inappropriate measures that are designed to protect the global financial system from damage, this may stifle the function of price discovery and risk transfer. Measures such as capital requirements, constrictive position limits and limited hedging exemptions, may discourage trading and cause participants to quit the market. This is particularly the case for small and medium-sized businesses that may end up increasing their risk by no longer risk managing their commodity exposures. With fewer players, market volumes will shrink and price volatility will increase, to the detriment of consumers.

Commodity markets do not need the same regulation as financial markets because commodity trading firms do not pose the same kind of risk as financial institutions, for a number of reasons: Their balance sheets are more robust as they are not as highly leveraged as financial institutions; unlike banks, they are not important lenders; the assets used in commodity trading are readily transferable, meaning that in the event that a trading firm gets into financial trouble, its physical assets, mainly stocks, can be easily redeployed to other firms, thus avoiding disruption to overall industry operations.

Additionally if we make it more difficult for commodity traders to conduct business in the EU by imposing onerous regulations, then we will encourage market players to move their activities overseas, perhaps to Asia, where several financial centres are establishing new competing markets with exponential growth potential.

Another example of a rule that could potentially backfire is the requirement to disclose "proprietary information". Commodity markets are not the same as a stock exchange where all participants can reasonably expect to have access to the same information and where disclosure will not harm third parties or the public, generally.

Consider, for example, that a unit "falls over" at the only Swiss refinery. If the owner were required to announce this event before their risk managers entered the market to make up the product shortfall, the price of gasoline and diesel would rise in anticipation of their sudden demand. It would be a negative, if "unintended" consequence for the consumer.

Position limits can be a useful tool in the oversight by regulators of futures exchanges. But determining appropriate limits is a Herculean task, given the sheer number and extraordinary diversity of the commodity markets. There are literally thousands of potential markets, ranging from the UK's NBP natural gas, the European benchmark, to the rather obscure. We wonder whether a market, such as AOC Spanish gas would be able to survive if participants were barred from holding more than 25% of the available contracts? We therefore must have hedge exemptions - position limits should apply only to market participants who are not engaged in underlying physical or swap market activity. But the devil is in the detail: the current proposal that a trader must apply up to 30 days in advance for a hedging exemption is unworkable.

What we have is a perception by some politicians that the use of derivatives in the commodity markets could damage the financial system or works against the consumer. But physical commodity traders often need to hedge large price exposures that they take on for extended periods when they move goods across the globe from producing countries to consumers.

Degree of feasibility

Despite the ferocious critique and the many calls to make new exemptions to this legislation, it is still very unclear whether the European Union will cave in to the demands of commodity trading giants. What we can assess however is the degree of realism of the

criticism being voice. We would like to do so by considering the impact on investments making a comparison with a case study proposed by Hoffmann, Trautmann and Hamprecht. Regarding the German power industry at a time of regulatory uncertainty caused by the introduction of the European Emission Trading Scheme.

Overall, there are two main branches of opposing views whether companies do or do not postpone investment decisions under uncertainty leading to the research gap addressed:

- One perspective by researchers argue that "decision makers facing a high level of uncertainty apply a wait-and-see strategy and delay investments until they have better planning reliability". This stream of literature is opposed by an increasing number of studies that take a contrary view.
- From an internal perspective and focusing on the companies' resources, these authors argue that decision makers do not necessarily post-pone investment decisions in the light of uncertainty and can even benefit from investments if they gain a first-mover advantage. In flexible regulations managers are not forced to respond to a command-and-control regulation but have the opportunity to develop individual strategies and, thus, decide whether to invest or to wait and see.

We present now the case study results in three steps:

1. Evidence for Regulatory Uncertainty and Discontinuities,

In the case of the EU ETS, these types of uncertainty correspond to three phases:

1) The current trading period 2005–07 with uncertainties related to the current implementation of the regulation.

2) The Kyoto trading period 2008–12 with uncertainty about detailed measures and rules that were still being negotiated at the time of our investigation (2006); and

3) The post 2012 period with uncertainty about the long-term political direction after the ending of the Kyoto protocol in 2012. .

2. Evidence in practice

A wait-and-see strategy appears particularly attractive in the case of uncertainty regarding the long-term political direction in a discontinuously changing regulatory environment, especially until post 2012 regulation is clarified. Yet, we observed only a few examples

of postponing investment decisions. “After several interviews, it increasingly became clear that the initial impression of actual postponement effects from regulatory uncertainty was mostly based only on *intentions* to postpone or the risk of *potential* postponements rather than *actual* postponements.” (p. 1241)

3. Reasons why investments are not postponed

The article identified the three motivations leading to investment regardless of uncertainty.

First, compared to the other motivations proposed in our study, the need to secure competitive resources – “resources that fulfill the requirements for a sustainable competitive advantage according to the resource-based view” - is most closely related to the existence of a discontinuity in regulatory uncertainty. The risk of losing the value of a resource and time pressure did not allow decisions to be postponed.

Second, in contrast to securing competitive resources, leveraging complementary resources has the character of an opportunity rather than time pressure: the possibility to leverage complementary resources makes it easier to invest, despite a high level of regulatory uncertainty.

Third, while securing competitive resources and leveraging complementary resources are motivations based on the resource perspective, alleviating institutional pressure is a motivation that relates to the external environment of the organization. i.e. When Stakeholder expectations can lead to investments despite regulatory uncertainty, as companies try to alleviate institutional pressure.

So having shown a case in practice, we ask ourselves if the big trading firms will really act out of their fears and quit the market? Or will they stay and play and under the new set of rules? Despite blurred regulatory lines, the theory would seem to suggest the former rather than the latter. In our opinion, unless there is a strong cohesion among such firms, that will result in a common position on the matter, firms will not take the risk of being cut out from the market. Creating a power vacuum within the European markets opens up too many possibilities with a strong downside.

Displacement makes very little sense and a power vacuum

Despite much talk on the subject, displacing an entire trading business from one continent to another, which have very little in common, particularly on the regulation side, appears to be an extremely arduous endeavor. Even within the European Union, that is a highly aggregated conglomerate of states whose purpose is to facilitate business exchanges within member countries, switching business location proves to be very challenging in terms of **i) National taxes**, **ii) Different customer needs** and **iii) Human resources** (talent attraction & retention)

These are just three macroscopic factors we take into account to prove our point. However we are more than aware that there is a virtually never ending list of small organizational details that can lead to massive headaches for a company that decides to change its primary country of business. Furthermore while the displacement occurs, there would be significant opportunities for banks, trading venues and market infrastructure providers to capture market share, particularly for those that invest in scalable platforms and are able to reduce operational complexity for their client base. Of particular interest is the case of banks that we will analyse in the next paragraph.

The specific case for banks

In June 2014 Barclays, one of the biggest banks in the commodity business, was the latest to head for the exit. Only a week later it announced it would give up most of its metal, crop and energy trading. Barclays was following JPMorgan Chase, which the month before sold its physical commodities division to Mercuria, a private trading firm based in Switzerland. Morgan Stanley sold its physical oil-trading division to Rosneft, a Russian oil giant, in December, just as Deutsche Bank said it would stop trading most raw materials. Earlier last year UBS decided to shrink its commodities business sharply.

It seemed that banks and commodities had terminated their long lasting and profitable relationship. However in the last 18 months, the investing environment has had to come to terms with an era of low margins. With bond markets returns flattened by the monetary policies of worldwide central banks and extremely unstable stock markets whose valuation tend to be more and more dependent upon a game of expectations rather than the fundamentals themselves.

Furthermore with commodities such as oil, gas and metals seeing massive fluctuations – though with more stable trends - big banks may once again considering strategically re-entering the market. What better news could there be than large integrated trading houses quitting the competitive scene because of incapability, or rather unwillingness to comply with the new regulation system put in place. This possible resurgence of commodity trading by big banks could ultimately prove to be the counterbalance to the pressures regarding watering down the MIFID II regulation.

Improving integration at European Level

One of the main international trends today is the reduction in the number of commodity exchanges and the merging of specialised hubs into universal commodity exchanges (Weber 2000). Most of the mergers that have occurred were pursued to increase the financial competitiveness of the commodity exchanges in the face of European competition and to offer institutional and commercial clients lower servicing costs.

Given we have the EU Single Market, which has been defined by the European Commission as "The Single Market refers to the EU as one territory without any internal borders or other regulatory obstacles to the free movement of goods and services. A functioning Single Market stimulates competition and trade, improves efficiency, raises quality, and helps cut prices. The European Single Market is one of the EU's greatest achievements. It has fuelled economic growth and made the everyday life of European businesses and consumers easier".

This stage of economic integration between the customs union and economic union of The European Union Single Market is: enshrined in the Treaty on the Functioning of the EU (TFEU, Article 26(2)). This is based upon two types of action:

- Negative integration which ensures that members do not erect new barriers
- Positive integration that removes existing barriers through harmonisation or mutual recognition

Despite the integration enacted by the CAP, which we discussed in detail within section III, we think that more can be done from a purely market perspective: homogenizing and if possible integrating the various commodity-trading exchanges.

Experiences of the European Union in Creating a Single Agricultural Market

Our initial suggestion would have been to create a Single agricultural market, but previous attempts to achieve this result have been rejected by the European Union. By the end of 2010 NYSE Euronext and Deutsche Boerse, were poised to merge in order to create the largest commodity exchange for derivatives trading. However the European Commission came out against the merger and blocked the deal on February 15, 2011. In its decision, the European Commission, the EU's top antitrust authority, said the merger would create a "quasi-monopoly" in European derivatives traded on exchanges. The planned new company would have had a 93% market share of such trades (Sudarsanam, S., & Broadhurst, 2012). Deutsche Börse challenged the decision, arguing that the commission should also have considered the swaths of derivatives traded on the so-called over-the-counter market, away from exchanges. This was to no avail. The merger had to be called off.

On the other hand the European Commission has been more forthcoming for smaller scale mergers, notably the:

- Merger of the Paris Bourse SBF SA, Amsterdam Exchanges and Brussels Exchanges. Creation of the single European commodity exchange EURONEXT. In late 2001, the London International Financial Futures Exchange (LIFFE) was also integrated into Euronext, and in February 2002, Portugal's Bolsa de Valores de Lisboa e Porto Exchange merged with Euronext to become Euronext Lisbon.
- The German Commodity Exchange (Deutsche Boerse AG) and the Swiss Exchange signed a protocol merging their subsidiary commodity futures exchanges, in what is today's second largest futures exchange in the world: Eurex.
- The OMX group of Nordic and Baltic exchanges which is the result of a series of mergers between these nations exchanges. It provides financial derivatives, with a volume large enough to make it the world's 15th largest futures exchange

Overall, as we already mentioned in problem 2, there is a need for stronger integration in the markets that have joined the union from 2004 and onwards, especially east European countries. We think it is possible to establish another macro trading zone, similar to those mentioned in the above paragraph taking as a reference, the lessons learned from trying to establish a common commodity market between Russia, Kazakhstan and Belarus in the form of the Customs Union (CU).

Findings

- Legal barriers to the participation of foreign legal entities and individuals in commodity exchange trading are incorporated in the national legislation of the majority of the countries studied. In countries where such provisions do exist, they cannot be implemented nonetheless owing to conditions stipulated in by-laws.
- Settlement procedures on import/export contracts, currency regulation and clearing/settlement procedures for commodity exchange transactions differ in each of the participating countries.
- There is no mechanism for mutual acceptance of electronic digital signatures, even where national legislation has provisions to this matter.
- Each of the participating countries has made significant efforts to guarantee transaction obligations by counterparties and to develop infrastructure and supply logistics. However, meaningful international cooperation on commodity market requires a unified approach to regulation in these spheres.

Applying to East European nations

Exchange-based trading of commodities has developed in several Eastern European countries. The most developed exchange is the Budapest Commodities Exchange (BCE) in Hungary, but exchanges in Bulgaria, Poland, and Romania appear to have developed standardised contracts for a number of commodities and have (or are planning) futures trading as well. Finally, the Budapest Commodities Exchange (BCE) is the most active exchange among those in Central and Eastern European countries with daily trading of futures contracts on numerous agricultural products as well as currencies and interest rates, for this reason we see this exchange as the next eastern European (EE) hub for commodity trading.

It is now time for defining and adopting priorities for the development of an organised interstate commodity exchange. This will require a more detailed analysis of the constraints that affect such cooperation and development of a long-term strategy to create a competitive EE interstate commodity market. It is clear that the differences in legislation on organised commodity trade are a serious barrier to interexchange cooperation. As already mentioned, the regulation of organised commodity markets is much less elaborate than that of the stock markets or the banking sector.

The results of comparative analysis of the legislation of organised commodities market in EE countries could be used to develop a comprehensive commodity exchange model for EE countries, based on common principles of operation, provision of access to professional participants, regulation, trading floor procedures and size of assets, information transparency, contract guarantees and risk management. A large number of issues will need to be addressed in order to achieve the necessary level of legislative unification between the member states. This will require collaborative efforts by regulators, commodity exchanges, industry association and other stakeholders. A special oversight authority dedicated to the sector should be created to coordinate development efforts in the organised commodity market, similar to those established for the stock markets in the EE and EurAsEC regional organisations.

While power trading exchanges have been launched across Eastern Europe with active markets in Hungary (HUPX), Czech Republic (PXE), Romania (OPCOM) and others, problems have emerged. For example, the EU recently brought an antitrust complaint against OPCOM over restrictions on foreign entrants to the market and the banning of bilateral OTC trading of power, forcing all trading onto OPCOM. Furthermore, transmission grid bottlenecks are common across the region and, while a potential source of profit for traders, congestion has become an issue during periods of high demand, and has led to increasing instances of *force majeure* declarations. Given that countries in the CEE region are all moving at their own pace in developing new power markets, trading across the region is a complex activity and requires adeep knowledge of the local markets. While energy licenses can be 'passported' across EU countries, several countries outside the EU require specific licenses to operate, as well as local operating subsidiaries. VAT and import duty complications also exist throughout the region and may arguably be misused by the states involved. Therefore having had the possibility of learning from past, similar experiences, within the region. It would be highly advisable to avoid repeating such issues when developing the grains market hub for the EE region.

Degree of feasibility

Historically there has been an interest in the development of strong reliable commodity exchanges, which makes for a promising base of development. During the mid-1990s,

commodity derivatives exchanges began to emerge in developing countries and in the countries of the former Soviet Union. This broadened the geography of commodity exchange trading. However, the major commodity exchanges are nonetheless concentrated in the world's leading financial centres, due to the presence in those centres of a developed banking infrastructure, capital, an effective system of regulation and better investor protection – in other words, a favourable environment for exchange industry. The industrial enterprises of the eastern European member states found themselves in entirely new economic circumstances. Centralised supply was swept away with the old system and traditional economic links were broken. Commercial relations moved towards a system of free price setting. For producers, the transition to a market economy required economic structures that could support the creation of new cooperative links and new price orientation. In other words, commodity exchanges became not only a reality, but a necessity for the industrial and agricultural sectors. Buyers who were willing to turn their capital into goods and materials at a time of commodity shortage and growing inflation were in an acute need of a trade-facilitating institution. An opportunity to sell excessive stock build-up in company warehouses through an exchange at market prices was yet another factor prompting proliferation of exchange trade. Hence the exchanges which began to appear in the early 1990s helped resolve these issues. Moreover, the exchanges themselves became entities into which surplus cash could be invested.

However in today's world, much has changed. Another important development trend is the commodity exchange's transforming role and function to that of a financial institution. The commodity market has been transformed from a market dealing in goods (spot contracts) to a market dealing in entitlement to goods (future contracts). The universalisation of commodity exchanges and the diversification of instruments traded has led to a significant reduction in the number of transactions involving physical commodities and a lowering of the volume of these transactions as a percentage of total commodity market turnover. The transition from trading in physical goods to trading in their derivatives has altered the primary function of the commodity exchange from organising the sale of commodities to servicing trading operations (Samarin, 2007). The point being that some countries may not have sufficient economic or practical interest in establishing the proposed trading hub. This in turn will strongly affect their willingness to harmonize regulations, which is the crucial aspect of our proposed hub. The prospects

of seeing such extensive collaboration between such diverse countries on such a delicate matter such as regulation, seem rather low if not heralded by an external mediator.

Improving access to the agricultural markets

At the end of this discussion, we suggest a last action to perform in order to obtain more efficient and reliable agricultural markets in the European Union. As we pointed out, access to both financial and structured spot markets can be subject to a series of restrictions. In particular, only accredited financial and commercial organizations can access the first, while only commercial and professional operators can operate in self-regulated spot exchanges. Ideally, we would want to reach a situation where the single producer would be able to sell its products with the least amount of intermediaries and with the smallest costs related. To reach such objective, it is firstly necessary to understand in which ways smaller commercial players could be granted direct access to financial and structured spot markets.

In the late ’80 (despite already starting in 1970) an interesting phenomenon happened in the world’s major stock exchanges. Thanks to the introduction of innovative technologies, it was possible to transfer all the trading activities and information from a physical market to virtual platforms, essentially switching to an indirect holding system, with intermediaries holding records of each transaction occurring. Such phenomenon is referred to as the “dematerialization” or “computerization” of the stock exchanges. This posed to be a major breakthrough in the way financial markets worked. In particular, along with the possibility of executing orders immediately from anywhere and a series of other benefits, it became possible to operate on the main financial markets without a physical intermediary on the spot. What this innovation really changed was the possibility for virtually anyone to operate directly in the market, as the costs of doing so were sharply reduced. Since then, with the help of just an accredited intermediary, anyone has easy access to securities, bonds, ETFs, and other financial instruments.

Among these various investment classes, also agricultural commodities opened themselves to private investments, mainly through the quotation of Exchange Traded Commodities (ETCs, a sub class of ETFs). Despite this opening on the investment side, also considered as one of the major drivers of the financialization trends of the agricultural

markets, trading of agricultural commodities remained a prerogative of only some major commercial and financial operators. In that sense, producers generally do not have jet the possibility of offering their products on centralized or even regional markets, not even any possibility of accessing financial markets to directly hedging their risks.

Despite this second possibility would be mostly pointless to implement, as to operate with derivatives requires highly developed capabilities, we strongly think that giving producers a more direct access to structured marketplaces would allow them to both assess better the opportunities available to them, and reducing intermediation and commercialization costs. In the current system, in most of the cases producers can only sell their products to intermediaries (cooperatives, private, and specialized firms) and they will take care of all the aspects related to the commercialization side. In such system, producers do not have many choices about who to sell their products, as this decision will be made by the intermediary itself. Here we propose an alternative method where are the producers themselves that decide price and counterpart of the exchange, leaving to the intermediaries the role of granting the correct conclusion of the deals.

In essence, we suggest the introduction by the most consolidated players in the market that are currently acting as intermediary organizations between producers and buyers, of "direct participation tools". We would suggest to structure a system that we could call a centralized electronic spot market. Ideally, this would allow the single producers to directly set the prices of its products, without being fully relying on prices decided by others or generated somewhere else.

Certainly, in normal market conditions this new organization would not lead to different prices compared to the now where they are mostly determined in the financial markets. Certainly, this would help preventing negative influences from speculation, and especially high volatility levels, as spot markets would result to be less tied to the financial sector, granting a higher independence.

Integrating this proposal with the ones made before, we can delineate the possibility of creating a similar system to the one just explained at European level. Having a centralized platform where all the European producers could offer their products using their traditional accredited intermediaries as a mean to access the internal market would allow for an even better functioning and efficiency. Integrating every country in this system will allow high levels of liquidity and transparency, as well as increased independence of the smaller producers from decisions made elsewhere.

Chasing this possibility would also allow to concretize our previous stated objective, that is the creation of a more integrated European economic network.

Feasibility

Considering now the degree of feasibility, we might realize that having an integrated system E.U. wide will not be an easy goal to reach, especially as forcing people to adopt it would not necessarily be a good decision. Nevertheless, progressively implementing such trading platform in various countries and subsequently integrating them could result to be more feasible. The proposed solution would not be too complicated to implement *per se*, especially in light of the fact that it would be an addition to the current traditional commercialization channels. Like banks offer their clients the possibility of buying/selling directly on the electronic markets, so professional operators and classic intermediaries in the cereals production and refining chain could offer a similar service to the farmers and other producers not big enough to currently being able to access those markets.

The real problem would be to forecast the adoption rate and the success of this solution among the farmers themselves. Despite currently having very limited possibilities of deciding the prices at which selling their products, producers now benefit from the fact that they don't need to acquire specific competences to being able to correctly operate on a centralized electronic spot market. Now most of the decisions relative to the commercialization and the pricing of the products are retained by the same intermediaries.

Wrap-Up

In this last section, we discussed ways to innovate and integrate the European agricultural markets with the main objective of creating a more efficient system. Here we present a brief wrap-up of all the solutions we proposed along our analysis, including an assessment of their degree of feasibility.

1. Goal: Need to improve quality and quantity of information available

Solution: The JODI oil market database will serve as a model for a centralized European Agricultural Data Initiative:"EADI". However, it would have the additional functions of issuing global food price surge alerts and promoting policy coherence, through a triangular collaboration with "AMIS", the biofuel sector and the International Grains Council.

Feasibility: Medium-high. The Jodi oil initiative was a great success, in a field that is quite more complex than that of grains. International organizations have a history of collaborating with each other making coordination and communication much easier. Competitive landscape conditions despite not being especially conductive to the project are neither unfavourable or prohibitive.

2. Goal: Give producers higher bargaining power through an integration in a common structure

Solution: Break down the atomization of souther european cooperative structures and push towards a more centralized cluster based system. Establish a program to spur the development of cooperatives in easter european countries, particularly those who joined the union after 2004.

Feasibility: Medium-High. Regarding the first suggestion, the conditions are favourable given that in the agricultural sector this is a phase of generational exchange. Governments should be in the position of accommodating this transition through softer regulation, as actions to bolster the current state of affair would align the interests of the latter, the farmers and potential international investors. Regarding the second suggestion, the international organizations called to act not only have consistently worked together, but have pursued similar programs in much more challenging environments: Africa.

3. Goal: Increase distance between financial and spot market

Solution: Analysing the MIFID II, showcasing structural reform weaknesses, but also the possible consequences of the regulation not being modified before it's come into action by 2017. Possible calls for watering down of such rules, are essentially counter-balanced

by the risk of the predominant trading firms being disrupted either by the return to commodity trading of big banks, or by more nimble and tech oriented competitors.

Feasibility: This is not really a matter of feasibility, however we do not expect any significant changes to the MIFID II regulation at least in the short term. It is certainly possible that once the regulation has come into effect and actual empirical data of its effect can be retrieved, the regulatory and competitive context will shift. However in this precise moment it's impossible to come to a significant conclusion for the medium to long term.

4. Goal: Improve integration at European Level

Solution: Given the impossibility of having a unified commodity market for the whole of Europe, we explore the second best option of reinforcing the currently existing macro-trading zones. The area of most interest is the one of the Eastern European members of the EU, and we propose the creation of an East European trading hub centred around the Budapest Stock Exchange, which would encompass the areas of Romania, Bulgaria, Poland, Hungary and the Czech Republic.

Feasibility: Medium. Historically, eastern European countries have faired quite well in the development of commodity exchanges. Furthermore given the developments in the energy commodities sector there is some amount of expertise in how to assemble major trading hubs, however legislation harmonization between so many countries, will very different national characteristics will prove to be very demanding. It will also be very important to gauge the actual level of interest of the countries in such a commodity hub, given the extensive trend of financialization of such markets.

5. Goal: Improving the direct access of producers to the agricultural markets

Solution: allowing producers to trade directly their products in a centralized electronic spot market, having the classical intermediaries as grant of each transactions and structuring the system as an indirect holding system, like the computerized stock exchanges. Ideally, this system would be progressively adopted E.U. wide

Feasibility: Medium. Creating this system would not present itself as a challenge, as it is not going to replace any pre-existing structure but only improving the ones already operating. Nevertheless, the major potential problematic would be the adoption rate of this system by the producers. Without a proper training, these users will hardly adopt this solution as

XI. CONCLUSIONS

Our thesis, has certainly met its first objective in terms of gauging the current state of affairs in the European grains market. Our comprehensive approach has ensured a much better understanding of the importance of cereals both as an economic driver and as a primary staple for the survival of humanity. Furthermore there have been a number of insights we did not expect to find.

First of all, we found that the structure of the market was by far more complex than what we had originally anticipated. The level of fragmentation within the supply side was much higher than expected and we soon discovered how regulation truly shapes the competitive environment, rather than traditional market forces.

In terms of obtaining detailed data for producing countries, especially within the European Union, we experienced many more obstacles than thought. In particular, we observed a marked difference between spot and futures markets in terms of accessing information. We found, especially in the first, strong informational deficiencies both in the access to updated and reliable data, both in the mechanics behind price formation. Additionally, despite the presence of various publications, a proper European agricultural database is currently missing. In fact, in our work, we actually had to rely on data mined from world organizations rather than European databases. We identified information and scale as core sources of competitive advantage in the cereals markets, explaining the current oligopoly situation, where few companies or organizations detain most of the bargaining power on the market.

Another interesting finding lies in the use of commodity derivatives which is now overwhelmingly oriented towards speculation and portfolio management, rather than

being an additional tool in the producers' arsenal. This fact increased prices volatilities during troubled financial periods and augmented the scale of price spikes and bursts.
Thanks to the analysis we made in chapter I, we were able to gain a wide overview on many aspects of the markets pertaining to our study. This allowed us to identify with the support of relevant theories, the major problems currently present in the European context.

As expected, we identified the major issues rooted in the transparency levels, in the bargaining power and scale of the actors on the markets, and in the unbalance between futures and spot markets. We also observed that regulation partially played a role in that sense. Nevertheless, we acknowledge that we focused only on the most relevant ones, overlooking other minor sources of inefficiencies, especially considering country-specific factors.

Additionally, we were capable through our innovation section, to make meaningful suggestions in order to solve the problems we had outlined. What we considered to be the most effective strategy was to center our proposed solutions around international organizations, since they have gained some much prominence since the beginning of our current era of globalization. Furthermore we were able to showcase that meaningful solutions that have been applied successfully in other sectors, might prove to be highly effective when applied to grains market, finding proof to some extent, that cross boundary and recombinatory innovation are the key within our case study. Another strongly recurrent theme within our thesis has been that of clusters.
If we combine the five prospective mentioned in our conclusive paragraph, we can see that we are mildly optimistic about the future of the European market as a whole. There are strong foundations already set in place, now it is more of a matter of improving the edifice built upon such ground. Our proposed solution may, if combined together, give a different shape to the European context, it certainly won't be perfect, but it will mark a strong step forward in the evolution of the European sector. Overall, the most critical element appears to be regulation, as this in turn affects the entire market structure and more often than not shapes the competitive environment and the willingness of the individuals to innovate. Also it the hardest aspect to modify as it required very careful pondering by the legislators. For this reason it also feels that other aspects we have

analyzed such as the need for better market transparency, the promotion of cooperatives and the establishment of platforms to more easily access the spot market are to some extent ancillary to regulation. In other words, if a centralized organization does not act as a supporting force, the other components of our "solution mechanism" will not be capable of operating to their maximum potential.

Future avenues of research

Through the problems & solutions stage, we have broadly examined what we feel are the most relevant issues present, however we are conscious that if we set the analysis in a different time frame the entire research structure might have significantly different. Therefore we strongly encourage other researches to build upon our work in order to identify new problems and better still propose other types of solution.

Furthermore within our research there are two primary subjects that we think would deserve to be studied in more depth. The first one, to whom we have alluded in the previous paragraphs is regulation. In particular it would be interesting to better understand the statistical correlations between changes in regulation and agriculture activity, particularly in terms of size of ownership, as this would shed more light on one of the endemic problems within the agricultural sector.

The second one, is more innovation related, and pertains to clusters of innovation in the agrarian sector. We have provided examples within our research of how the latter can benefit farmers, but we feel that the subject has so much more to offer, and represents a great source of future research questions. A few of them might include levels of dependence between the individual and the conglomerate, or the factors supporting the creation of clusters with a sharp focus on governmental policies.

References

Accenture report, (2005), "Growth in Fintech Investment Fastest in European Market".

Ahlers, C., Broll, U., & Eckwert, B. (2013). Information and output in agricultural markets: the role of market transparency. *Agricultural and Food Economics*, *1*(1), 15.

Alaouze, C. M., Watson, A. S., & Sturgess, N. H. (1978). Oligopoly pricing in the world wheat market. *American Journal of Agricultural Economics*, *60*(2), 173-185.

Algieri, B. (2014). A roller coaster ride: an empirical investigation of the main drivers of the international wheat price. *Agricultural Economics*, *45*(4), 459-475.

Anderson, J. D., & Ibendahl, G. A. (2000). *Risk management tools for dairy farmers: Options on dairy futures*. Cooperative Extension Service, College of Agriculture, University of Kentucky.

Art.I-3 European Constitutional Treaty

Ascher, J., Laszlo, P., & Quiviger, G. (2012). Commodity trading at a strategic crossroad. *International Journal of Economic Development Research and Investment*, *3*(3).

Awika, J. M. (2011). Major cereal grains production and use around the world. In *Advances in cereal science: implications to food processing and health promotion* (Vol. 1089, pp. 1-13). American Chemical Society Atlantic City, NJ.

Baffes, J., and Tassos, H. (2010). Placing the 2006/08 Commodity Boom into Perspective. Policy Research Working Paper 5371, The World Bank, Washington, D.C.

Bakucs, Z., Bojnec, Š., & Fertő, I. (2015). Spatial Product Market Integration between Two Small, Open Neighbouring Economies. *Agribusiness*, *31*(2), 171-187.

Balcombe, K., Bailey, A., & Brooks, J. (2007). Threshold effects in price transmission: the case of Brazilian wheat, maize, and soya prices. *American Journal of Agricultural Economics*, *89*(2), 308-323.

Barrett, C. B., & Li, J. R. (2002). Distinguishing between equilibrium and integration in spatial price analysis. *American Journal of Agricultural Economics*, *84*(2), 292-307.

Baulch, B. (1997). Transfer costs, spatial arbitrage, and testing for food market integration. *American Journal of Agricultural Economics*, *79*(2), 477-487.

BBC News (2008) Egyptians hit by rising food prices. Tuesday, 11 March Edition.

Benson, T., Minot, N., Pender, J., Robles, M., & von Braun, J. (2013). Information to guide policy responses to higher global food prices: The data and analyses required. *Food Policy*, *38*, 47-58.

Bessler, D. A., Yang, J., & Wongcharupan, M. (2003). Price dynamics in the international wheat market: modeling with error correction and directed acyclic graphs. *Journal of Regional Science*, *43*(1), 1-33.

Bilodid, D. (2007). *Price volatility influence on agricultural income instability* (Doctoral dissertation, Economics Education and Research Consortium).

Blackwell, D. (1953). Equivalent comparisons of experiments. *The annals of mathematical statistics*, *24*(2), 265-272.

Bloomberg. 2015. *Future contracts*. [ONLINE] Available at: http://www.bloomberg.com/europe. [Accessed 28 April 2016].

Bloomfield, R., & O'Hara, M. (1999). Market transparency: Who wins and who loses?. *Review of Financial Studies*, *12*(1), 5-35.

Bodie, Z., Kane, A., & Marcus, A. J. (2011). *Investment and portfolio management*. Mc Graw-Hill International Editions.

Bozbas, Kahraman. "Biodiesel as an alternative motor fuel: production and policies in the European Union." *Renewable and Sustainable Energy Reviews*12.2 (2008): 542-552.

Brosig, S., Glauben, T., Götz, L., Weitzel, E. B., & Bayaner, A. (2011). The Turkish wheat market: spatial price transmission and the impact of transaction costs. *Agribusiness*, *27*(2), 147-161.

Brown, Oli (2005): Supermarket Buying Power, Global Commodity Chains and Smallholder Farmers in the Developing World. Human Development Report Office Occasional Paper, 2004/5. UNDP. New York

Burgelman, Robert A., and Andrew S. Grove. "Let chaos reign, then rein in chaos—repeatedly: Managing strategic dynamics for corporate longevity."*Strategic management journal* 28.10 (2007): 965-979.

Carter, C., & Schmitz, A. (1979). Import tariffs and price formation in the world wheat market. *American Journal of Agricultural Economics*, *61*(3), 517-522.

Chase-Dunn, C. (1975). The effects of international economic dependence on development and inequality: a cross-national study. *American Sociological Review*, 720-738.

Cheng, I. H., & Xiong, W. (2013). The financialization of commodity markets (No. w19642). National Bureau of Economic Research.

Chloupkova, J. (2002). *European cooperative movement: Background and common denominators*. Department of Economics and Natural Resources, Unit of Economics, The Royal Veterinary and Agricultural University.

Ciaian, P., Kancs, D. A., & Swinnen, J. (2014). The impact of the 2013 reform of the common agricultural policy on land capitalization in the European Union. *Applied Economic Perspectives and Policy*, ppu016.

Cinquegrana, P. (2008). The Need for Transparency in Commodity and Commodity Derivatives Markets. *ECMI research Report. No. 3* (December).

Claire Morel, Joint Organisations Data Initiative (JODI Oil), (2013)

Clarete, R. L., Adriano, L., & Esteban, A. (2013). Rice trade and price volatility: implications on ASEAN and global food security. *Asian Development Bank Economics Working Paper Series*, (368).

Commodity HQ. 2016. *Grains factsheet*. [ONLINE] Available at: http://commodityhq.com/commodities/. [Accessed 15 April 2016].

Copa Cogeca. 2014. *Development of agricultural cooperatives in the EU*. [ONLINE] Available at:http://zadruge.coop/upload_data/site_files/development-of-agricultural-cooperatives-in-the-eu_2014.pdf. [Accessed 24 April 2016].

Courtney, Hugh, Jane Kirkland, and Patrick Viguerie. "Strategy under uncertainty." *Harvard business review* 75.6 (1997): 67-79.

Cox, S. H., & Schwebach, R. G. (1992). Insurance futures and hedging insurance price risk. *Journal of Risk and Insurance*, 628-644.

Crain, S. J., & Lee, J. H. (1996). Volatility in wheat spot and futures markets, 1950–1993: Government farm programs, seasonality, and causality. *The journal of finance*, *51*(1), 325-343.

David Hallam, (2013) Enhancing international market transparency: the Agricultural Market Information System (AMIS)

De Schutter, O. (2010). Food Commodities Speculation and Food Price Crises: Regulation to Reduce the Risks of Price Volatility. Briefing Note 02 by the *United Nations Special Rapporteur on the Right to Food*.

Directorate - General Agriculture and Rural Development (2012). The Common Agricultural Policy.

Directorate-General Agriculture and Rural Development (2012). The Common Agricultural Policy: A story to be continued.

Directorate-General Agriculture and Rural Development (2014). The EU Cereals Regime

Directorate-General for Agriculture and Rural Development (2015) Europeans, Agriculture and the CAP; *Special Eurobarometer 440*

Dooley, F. (2006). *The effect of Ethanol on Grain Transportation and Storage*. Purdue University, Extension Service.

Dyer, J. H., & Chu, W. (2003). The role of trustworthiness in reducing transaction costs and improving performance: Empirical evidence from the United States, Japan, and Korea. *Organization science*, *14*(1), 57-68.

Easterly, W. R., Rodríguez, C. A., & Schmidt-Hebbel, K. (Eds.). (1994). Public sector deficits and macroeconomic performance.

Eckwert, B., & Zilcha, I. (2001). The value of information in production economies. *Journal of Economic Theory*, *100*(1), 172-186.

Eckwert, B., & Zilcha, I. (2003). Incomplete risk sharing arrangements and the value of information. *Economic Theory*, *21*(1), 43-58.

Edison, H. J., Klein, M. W., Ricci, L., & Sloek, T. (2002). *Capital account liberalization and economic performance: survey and synthesis* (No. w9100). National Bureau of Economic Research.

Etienne, X. L., Irwin, S. H., & Garcia, P. (2015). Price explosiveness, speculation, and grain futures prices. *American Journal of Agricultural Economics*, *97*(1), 65-87.

European Commission (2014). The EU Explained: Agriculture.

Fabrizi, P. L., Pomante, U., Saita, F., Zanotti, G. (2011) *Economia del Mercato Mobiliare*. Egea.

FAO (Food and Agriculture Organization) (2004): The State of Agricultural Commodity Markets. Rome.

FAO Stat. http://faostat3.fao.org/home/E

FAO, FAOSTAT. In http://faostat.fao.org/site/291/default.aspx, Food and Agriculture Organization: 2011.

FCA - Futures Exchange And Contract Authorization Standards And Procedures In Selected Countries (1999)

Federal Reserve Bank of St. Louis. Economic Research. https://research.stlouisfed.org/

Ferrarini, G., & Moloney, N. (2012). Reshaping order execution in the EU and the role of interest groups: from MiFID I to MiFID II. *European Business Organization Law Review*, *13*(04), 557-597.

Flassbeck, H., Bicchetti, D., Mayer, J., & Rietzler, K. (2011). Price Formation in Financialized Commodity Markets: The Role of Information. In *United Nations Conference on Trade and Development (UNCTAD)*.

Food and Agriculture Organization of the United Nations. http://www.fao.org/home/en/

Forbes. 2015. *The turning point that requires innovation*. [ONLINE] Available at:http://www.forbes.com/sites/ronashkenas/2015/03/03/its-time-to-simplify-innovation/#732b634d77bb. [Accessed 1 May 2016].

Forex . 2015. *Commodities and future contracts*. [ONLINE] Available at: http://www.forex.com/uk/forex-cfds/overview.html. [Accessed 4 April 2016].

Frankel, J. A. (2006). *The effect of monetary policy on real commodity prices* (No. w12713). National Bureau of Economic Research.

Frankel, J. A. (2012). Commodity prices and interest rates. *CoBank Outlook Economic Data and Commentary, October*, *9*(10), 1-6.

Frankel, J. A. (2014). Effects of speculation and interest rates in a "carry trade" model of commodity prices. *Journal of International Money and Finance*, *42*, 88-112.

Fung, W., & Hsieh, D. A. (2001). The risk in hedge fund strategies: Theory and evidence from trend followers. *Review of Financial studies*, *14*(2), 313-341.

Garner, C. (2012). *A trader's first book on commodities: an introduction to the world's fastest growing market*. FT Press.

Geman, H. (2009). *Commodities and commodity derivatives: modeling and pricing for agriculturals, metals and energy*. John Wiley & Sons.

Gerbens-Leenes, P. W., & Nonhebel, S. (2002). Consumption patterns and their effects on land required for food. *Ecological Economics*, *42*(1), 185-199.

Ghosh, J. (2010). The unnatural coupling: Food and global finance. *Journal of Agrarian Change*, *10*(1), 72-86.

Gilbert, C. L. (2010). How to understand high food prices. *Journal of Agricultural Economics*, *61*(2), 398-425.

Gilbert, C. L., & Morgan, C. W. (2010). Food price volatility. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, *365* (1554), 3023-3034.

Goodwin, B. K., & Piggott, N. E. (2001). Spatial market integration in the presence of threshold effects. *American Journal of Agricultural Economics*,*83*(2), 302-317.

Gorton G and Rouwenhorst KG (2006). Facts and fantasies about commodity futures. W*orking Paper No. 10595. National Bureau of Economic Research (NBER),* March.

Gov.UK – Department for Environment Food & Rural Affairs

Green, J. (1981). Value of information with sequential futures markets.*Econometrica: Journal of the Econometric Society*, 335-358.

Greer, J., & Singh, K. (2000). A brief history of transnational corporations. In *New York: Global Policy Forum.*

Headey, D., & Fan, S. (2008). Anatomy of a crisis: the causes and consequences of surging food prices. *Agricultural Economics*, *39*(s1), 375-391.

Heffernan, W/Hendrickson, M. (2005): The Global Food System: A Research Agenda. Paper produced for Agribusiness Accountability Initiative

Henderson, B. J., Pearson, N. D., & Wang, L. (2015). New evidence on the financialization of commodity markets. Review of Financial Studies, 28(5), 1285-1311.

Henry G. Jarecki - The Relationship Between Commodity Futures Trading and Physical Commodity Prices (2011)

Henry, P. B. (2006). *Capital account liberalization: Theory, evidence, and speculation* (No. w12698). National Bureau of Economic Research.

Hernandez, M., & Torero, M. (2010). *Examining the dynamic relationship between spot and future prices of agricultural commodities* (No. 988). International Food Policy Research Institute (IFPRI).

Hirshleifer, J. (1975). Speculation and equilibrium: Information, risk, and markets. *The quarterly journal of Economics*, 519-542.

Hooy, C. W., & Lim, K. P. (2013). Is market integration associated with informational efficiency of stock markets?. *Journal of Policy Modeling*, *35*(1), 29-44.

Howarth, R. (2000). The CAP: History and attempts at reform. *Economic Affairs*, 20(2), 4-10.

IFAD (International Fund for Agricultural Development) (2001): Rural Poverty Report 2001: The Challenge of Ending Rural Poverty. Oxford University Press. UK.

Irwin, S. H., & Sanders, D. R. (2011). Index funds, financialization, and commodity futures markets. Applied Economic Perspectives and Policy, ppq032.

Islam, M. S., & Grönlund, Å. (2010). Agriculture market information services (AMIS) in the least developed countries (LDCs): nature, scopes, and challenges. In *Electronic Government* (pp. 109-120). Springer Berlin Heidelberg.

John Harapiak, Rigas Karamanos and Adrian Johnston, High Yielding Barley Production, (2000)

Juliá-Igual, J. F., Meliá-Martí, E., & García-Martinez, G. (2012). Strategies developed by leading EU agrifood cooperatives in their growth models. *Service business*, *6*(1), 27-46.

Katz M. L., Rosen H. S., Morgan W., & Bollino C. A. (2011) *Microeconomia*. Mc Graw Hill, 4 edizione.

Kim, W. C., & Mauborgne, R. (2005). Blue ocean strategy: from theory to practice. *California management review*, *47*(3), 105-121.

Koekebakker, S., & Lien, G. (2004). Volatility and price jumps in agricultural futures prices—evidence from wheat options. *American Journal of Agricultural Economics*, *86*(4), 1018-1031.

Kroma, Margaret M. "Organic farmer networks: facilitating learning and innovation for sustainable agriculture." *Journal of Sustainable Agriculture* 28.4 (2006): 5-28.

Lagi, M., Bertrand, K. Z., & Bar-Yam, Y. (2011). The food crises and political instability in North Africa and the Middle East. Available at SSRN 1910031.

Lang, T., & Heasman, M. (2015). *Food wars: The global battle for mouths, minds and markets*. Routledge.

Lapola, D. M., Schaldach, R., Alcamo, J., Bondeau, A., Koch, J., Koelking, C., & Priess, J. A. (2010). Indirect land-use changes can overcome carbon savings from biofuels in Brazil. *Proceedings of the national Academy of Sciences*, *107*(8), 3388-3393.

Larue, B. (1991). Is wheat a homogeneous product?. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, *39*(2), 103-117.

Lavoie, N. (2005). Price discrimination in the context of vertical differentiation: an application to Canadian wheat exports. *American Journal of Agricultural Economics*, *87*(4), 835-854.

Ledebur, O. V., & Schmitz, J. (2012). Price volatility on the German Agricultural Markets. In *123rd Seminar, February 23-24, 2012, Dublin, Ireland* (No. 122534). European Association of Agricultural Economists.

Linton, O., O'Hara, M., & Zigrand, J. P. (2012). Economic impact assessments on MiFID II policy measures related to computer trading in financial markets.

Lionel Porte - The functioning of the futures markets: challenge & opportunities, (2012)

MarketLine Industry Profile (2015). Cereals crops in Europe. *MarketLine*, February issue.

Markowitz, H. (1952). Portfolio selection. *The journal of finance*, *7*(1), 77-91.

Marshall, J. M. (1974). Private incentives and public information. *The American Economic Review*, 373-390.

Martinez, S. W., & Zering, K. D. (1992). Optimal dynamic hedging decisions for grain producers. *American Journal of Agricultural Economics*, *74*(4), 879-888.

Masters, M. W. (2008). Testimony before the committee on homeland security and governmental affairs. US Senate, Washington, May, 20.

Matthews, A. (2011). Post-2013 EU Common Agricultural Policy, Trade and Development. A Review of Legislative Proposals. *International Centre for Programme on Agricultural Trade and Sustainable Development (ICTSD)*, Issue Paper, 39, 17.

McNew, K. (1996). Spatial market integration: Definition, theory, and evidence. *Agricultural and Resource Economics Review*, *25*, 1-11.

MeerSMan, S., Rechsteiner, R., & Sharp, G. (2012). The dawn of a new order in commodity trading. *Oliver Wyman Risk Journal*, *2*, 1-9.

Mitchell, D. (2008). A note on rising food prices. *World Bank Policy Research Working Paper Series, Vol*.

Morrison, Pinnington (2011): bank and investor risk policies on soft commodities.

Murphy, S., Burch, D., & Clapp, J. (2012). Cereal secrets: the world's largest grain traders and global agriculture. *Cereal secrets: the world's largest grain traders and global agriculture*.

Murphy, Sophia (2001): Food Security and the WTO. International Cooperation for Development and Solidarity (CIDSE). Belgium.

Nasdaq. 2015. *Definition of future contracs*. [ONLINE] Available at:http://www.nasdaq.com/investing/glossary/f/futures-contract. [Accessed 2 April 2016]

Neftci, S. N., & Lu, Y. (2008). *Financial instruments to hedge commodity price risk for developing countries*. International Monetary Fund.

O´Brien, Doug (2005): Developments in Horizontal Consolidation and Vertical Integration. The National Agricultural Law Center. University of Arkansas School of Law. USA

OECD, 2008. Rising Food Prices: Causes and Consequences. OECD.

OECD, Competition Issues in the Food Chain Industry,(2013)

Overgaard, P. B., & Møllgaard, H. P. (2008). Information exchange, market transparency and dynamic oligopoly. *Market Transparency and Dynamic Oligopoly*.

Oxford dictionary 2016

Pérez-Pascual, P. A., & Sanz-Carnero, B. (2011). Law of one price: evidence from the Spanish wheat market. *The Annals of Regional Science*, *47*(2), 329-351.

Petersen, M. A., & Thiagarajan, S. R. (2000). Risk measurement and hedging: With and without derivatives. *Financial Management*, 5-29.

Pirrong, C. (2014). *The Economics of Commodity Trading Firms*. Trafigura.

Porter, M. E. (1998). Cluster and the new economics of competition.

Rana, J. K. (1998). *Guidelines on the collection of structural aquaculture statistics. Supplement to the Programme for the World Census of Agriculture 2000*. FAO.

Rapsomanikis, G., Hallam, D., & Conforti, P. (2006). Market integration and price transmission in selected food and cash crop markets of developing countries: review and applications. *Agricultural Commodity Markets and Trade*, 187-217.

Regulation (EU) No 1305/2013

Regulation (EU) No 1306/2013

Regulation (EU) No 1307/2013

Regulation (EU) No 1308/2013

Rinversi, T. M. (2015). From MiFID I to MiFID II: the evolution of order execution in the EU.

Roache, S. K. (2010). What explains the rise in food price volatility?. *IMF Working Papers*, 1-29.

Robles, M., Torero, M., & Von Braun, J. (2009). *When speculation matters*. Washington, DC: International Food Policy Research Institute.

Sanders, D. R., Irwin, S. H., & Merrin, R. P. (2010). The adequacy of speculation in agricultural futures markets: Too much of a good thing?. *Applied Economic Perspectives and Policy*, *32*(1), 77-94.

Sariannidis, N. (2011). Stock, Energy and Currency effects on the asymmetric Wheat market. *International Advances in Economic Research*, *17*(2), 181-192.

Sekhar, C. S. C. (2003). Price formation in world wheat markets—implications for policy. *Journal of Policy modeling*, *25*(1), 85-106.

Sendhil, R., Kar, A., Mathur, V. C., & Jha, G. K. (2013). Price Discovery, Transmission and Volatility: Evidence from Agricultural Commodity Futures §.*Agricultural Economics Research Review*, *26*(1), 41-54.

Serra, S., Zuppiroli, M. (2009). Il commercio dei Cereali. Edagricole.

Shimko, D. C. (1994). Options on futures spreads: Hedging, speculation, and valuation. *Journal of Futures Markets*, *14*(2), 183-213.

Silverstein, D., DeCarlo, N., & Slocum, M. (2007). *Insourcing innovation: how to achieve competitive excellence using TRIZ*. CRC Press.

Slater, R., Stevens, C., & Dufey, A. (2007). *Biofuels, agriculture and poverty reduction*. ODI.

Sonka, S. (2003, January). Forces driving industrialization of agriculture: implications for the grain industry in the United States. In *Presentation at USDA/ERS Symposium on Product Differentiation and Market Segmentation in Grains and Oilseeds: Implications for an Industry in Transition* (pp. 27-28).

South African Department of Agriculture, Forestry and Fisheries, Oats Production Guidelines, (2010)

Stafford, J. V. (2000). Implementing precision agriculture in the 21st century.*Journal of Agricultural Engineering Research*, *76*(3), 267-275.

Statista. 2016. *Distribution of corn production*. [ONLINE] Available at:http://www.statista.com/statistics/254294/distribution-of-global-corn-production-by-country-2012/. [Accessed 4 April 2016].

Sudarsanam, S., & Broadhurst, T. (2012). Corporate governance convergence in Germany through shareholder activism: Impact of the Deutsche Boerse bid for London Stock Exchange. *Journal of Management & Governance*, *16*(2), 235-268.

Swinbank, A. (1993). CAP reform, 1992. *JCMS: Journal of Common Market Studies*, 31(3), 359-372.

Tang, K., & Xiong, W. (2012). Index investment and the financialization of commodities. Financial Analysts Journal, 68(5), 54-74.

The Economist. 2009. *Clustering*. [ONLINE] Available at: http://www.economist.com/node/14292202. [Accessed 31 March 2016].

The Guardian. 2008. *Biofuels and grain price volatility*. [ONLINE] Available at:http://www.theguardian.com/environment/2008/jul/03/biofuels.renewableenergy. [Accessed 28 March 2016].

Thomas Capehart (2011) Events in the domestic and global corn markets that influence supply, demand, trade, and prices.

Tomek, W. G., & Kaiser, H. M. (2014). *Agricultural product prices*. Cornell University Press.

Trostle, R. (2008). *Global agricultural supply and demand: factors contributing to the recent increase in food commodity prices*. Washington, DC, USA: US Department of Agriculture, Economic Research Service.

The United Nations. 2013. *UN comtrade database*. [ONLINE] Available at: http://comtrade.un.org/. [Accessed 21 March 2016].

The United Nations. 2011. *FAO Cereal Supply and Demand Brief*. [ONLINE] Available at:http://www.fao.org/worldfoodsituation/csdb/en/. [Accessed 23 March 2016]

UNCTAD . 2009. *Overview of the world's commodity exchanges – 2007*. [ONLINE] Available at:http://unctad.org/en/Docs/ditccom20084_en.pdf. [Accessed 27 March 2016].

United States Senate, Permanent Subcommittee on Investigations (USS/PSI) (2009). Excessive Speculation in the Wheat Market. *Committee on Homeland Security and Government Affairs, US Senate Permanent Subcommittee Investigations*, *24*.

USDA-ERS., United States Department of Agriculture: Economic Research Services Food Consumption Database. In http://www.ers.usda.gov/data/foodconsumption/, USDA-ERS: 2011.

Valiante, D., & Egenhofer, C. (2013). Price formation in commodities markets: Financialisation and beyond. *Report of an ECMI/CEPS Task Force, Centre for European Policy Studies, Brussels. Am*, *22*.

Von Braun, J., & Tadesse, G. (2012). Global food price volatility and spikes: an overview of costs, causes, and solutions. *ZEF-Discussion Papers on Development Policy*, (161).

Weber, M. (2000). Commerce on the stock and commodity exchanges [Die Börsenverkehr]. *Theory and Society*, *29*(3), 339-371.

Williams, J. (2013). *Agricultural Supply Chains and the Challenge of Price Risk*. Routledge.

Williams, J. C., & Wright, B. D. (2005). *Storage and commodity markets*. Cambridge university press.

Wilson, J. S., & Otsuki, T. (2001). *Global trade and food safety: winners and losers in a fragmented system* (Vol. 2689). World Bank Publications.

Yale Edu. 2015. *What is innovation*. [ONLINE] Available at: http://its.yale.edu/about/innovation-its/what-innovation. [Accessed 17 April 2016].

YARA. 2015. *Key facts of world oat production*. [ONLINE] Available at: http://yara.co.uk/crop-nutrition/crops/oats/key-facts/world-oat-production/. [Accessed 15 April 2016].

Zaremba, A. (2015). Financialization of Commodity Markets. In *The Financialization of Commodity Markets* (pp. 101-157). Palgrave Macmillan US.

Appendix

A.1 Case study: 2007-2009 food prices crisis and 2010-2013 cereals price spike

During our work, we referred multiple times to the price bubble that occurred during the two harvests in 2007-2008 and 2008-2009, as it presented itself as a new and unexpected phenomenon on the market. The relevance of this event lies in the multiple takeaways and realizations of factors and issues we described along our writing journey. Here we will present in detail what happened during those years and how those events hold relevant as powerful examples of what we analyzed. On a second note, this particular event drew a lot of attention from the academic world, especially after the years 2011-2014, where what occurred in 2007-2009 repeated itself, demonstrating that something extremely relevant changed in the agricultural markets landscape. Despite still being strongly debated, an important part of the academic and professional world identifies the source of these changes in the progressive financialization of these markets, the rise of financial / non-commercial players, and increasingly worryingly speculation phenomena.

Here we will present in detail what happened in the first price spike (2007-2009) as it held the major consequences for markets and countries. Then we will cover more briefly the second spike (2011-2014). As follow you can see the price evolution of those days (Figure A.1).

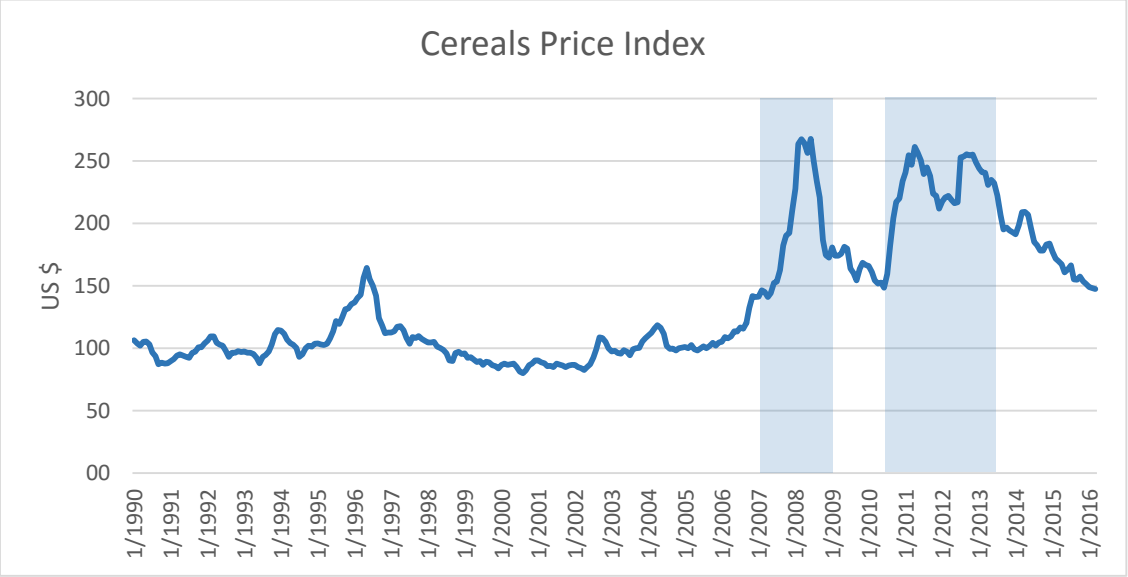

Figure A.1 Source: Elaboration of the authors on FAO Stat data

In April 2007, expert operators in the market were looking at a situation that was not different from the one occurred during previous years. The fact is that a series of chained adverse events of various nature drastically changed the situation in only a few months. First, we will describe environment-related events that occurred particularly violent that year, then we will discuss the other reasons behind what happened those years.

One of the most relevant environmental factors determining the increase in cereals and food prices was the progressive heating of the seas in the Austral hemisphere, called El Niño that regularly repeats itself every 4-5 years. The result of this phenomenon are reductions in the precipitations, leading to periods of draughts first in the Southern Hemisphere (Australia and South America), where it holds it strongest effects, and then the Northern Hemisphere (Mexico, USA, Canada, and Europe). In 2006, this phenomenon had particularly violent effects in Australia, where the production decreased by 60% from the previous year, and lasting longer than 12 months (as happens every 8-10 years). In Canada and the USA in addition to the draughts generated by El Niño also occurred delayed rains very close in time to the harvests, further damaging an already suffering batch. In Southern Europe, the situation occurred similarly, but also in Center Europe were registered water shortages, damaging the final production. Finally, late frosts occurred in Argentina that added to the draughts contributed to further reduce the production output. This series of events drastically reduced quality and especially the quantity of the cereals availability on the markets, considerably diminishing the global offer.

On the other side, a mix of know and unexpected factors contributed to the exacerbation of an already critical situation. First, was observed the increase in the consumption levels of cereals in Asia (food) and USA (non-food/biofuels), increasing overall demand in a period of scarcity. Second, another quite important factor contributed to the spike in cereals prices: the progressive depleting of stored stocks (as we discussed, in Europe this reduction was the result of changes in the regulation). Logically, stocks represent some sort of "insurance" against shortages, helping to maintain the prices at reasonable levels. In the case of wheat, the situation changed from a ratio of stocks/consumptions of 24% in 2006 to 18% in 2007. Another reason for this increase in prices can be identified in the unexpected lift of the Chinese import tariffs that resulted in huge quantities of cereals flowing from Canada and the USA, thus reducing the global offer from these two key

producer countries. On the other side, many other important net exporter countries like Russia and Ukraine applied export tariffs and limitations to put a stop to the "escape" of cereals. Finally, the dollar exchange rate suffered from a particularly violent devaluation that increased the exports from the United States. This meant a more rapid depletion of the American stocks, sooner further reducing the global offer from one of the major exporters in the market.

As the last blow to an already extremely problematic situation, we find the financialization phenomenon generated by the presence of many non-commercial players on the derivative markets. These actors, following different strategies, increased the price bubble also with the creation of new financial instruments with more or less evident effects based on the type of commodity.

In the following graph (A.2) it is possible to see how the prices of the major cereals changed within Europe. Except for the rice (that saw higher levels of volatility, mainly due to its high water requirements), we see that the effect of the world food price crisis was similar compared to other regions or countries, despite some elements of the protective policies and the exchange rates diluted the overall negative effects.

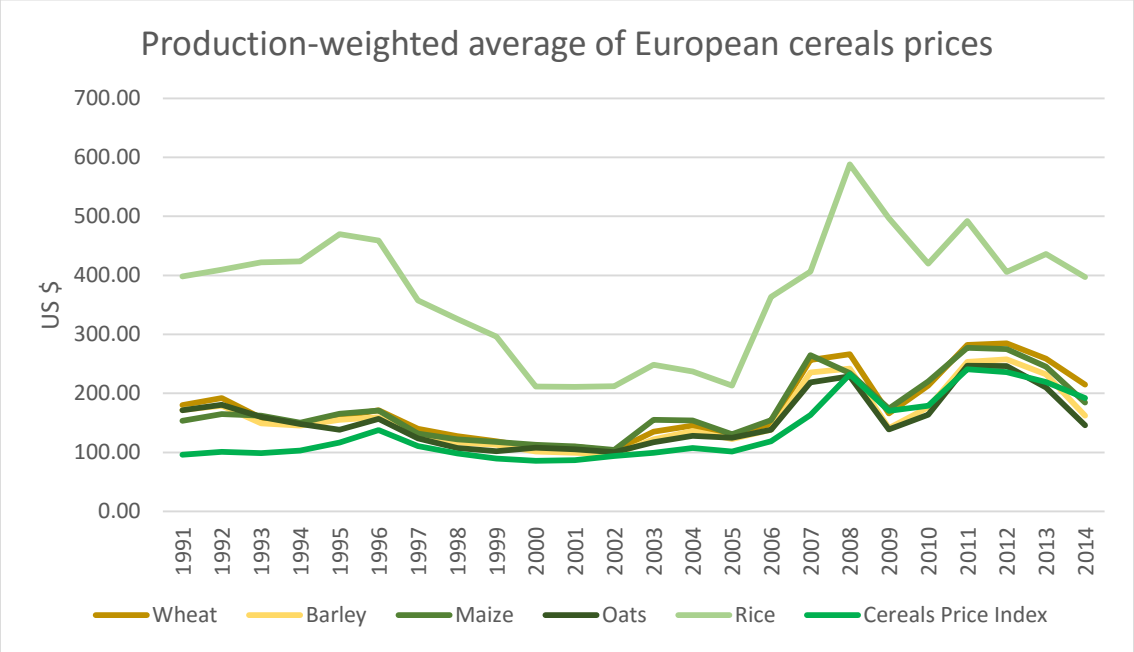

Figure A.2 Source: Elaboration of the authors; production-weighted average of European countries using FAO Stat data

The following year (harvest 2008/2009), cereals and food prices significantly decreased once the conditions that created the price spike were gone. In particular, a primary factor

that contributed to this change of direction was the answer from the farmers on a worldwide scale. Due to the incredibly high prices registered the previous year, producers were eager to invest higher sums of money in augmenting the quality and quantity of products produced, by acquiring more fertilizers, better seeds, using improved chemical treatments, and so on. Also, weather conditions went back to normality, with the end of El Niño and the arrivals of rains, particularly in Australia. In USA and Canada, weather conditions were sill not optimal, but the increased land usage and the deployment of more costly techniques brought to a higher quality production. Similarly in Europe, producers increased their investments that, considering also the favorable weather conditions, resulted in high yields per hectare, as well as very good qualitative standards. Additionally, in the regions around the Black Sea, in particular the Russian regions, where yields were higher than the expectations and export restrictions were lifted, increasing the global cereals offer. In South America and specifically in Argentina, there still were weather conditions definitely not favorable for high levels of production (especially maize). On the other side, China had almost reached self-sufficiency for wheat and maize, while India solidified its position as major Asian exporter, bringing the complex situation of 2007-2008 back to normality.

Certainly, it necessary to acknowledge that initial cereals stocks were almost totally depleted at the beginning of 2008-2009 season, thus markets were still facing high volatility risks. Fortunately, the elevated number of lands cultivated, mixed with good production outlooks avoided any problematic in that sense, and since mid-2008, the world cereals markets started to accuse an excess of the offer, and a general push towards lower prices. Among the non-weather related reasons of this trend we identify a decreased food demand in emerging countries, and a reduction in the world cereals trades, due to the mutated global offer landscape, with most of the world regions being approximately self-sufficient. In additions, depleted stocks were gradually refilled with a complete return to normality, even if the stored cereals in 2009 were still lower to the past ten year's average. If in 2007 the Stock/Use ratio was around 18%, in 2008/2009 it reached again a more reassuring 23%. Another interesting factor we need to take account for is the progressive reduction of the interference generated by the financial world, as both a reduction in prices, both a slow normalization of financial markets pushed investment firms away from commodities. The cost of energy also played a non-indifferent role, as oil became cheaper, reducing the production costs as well as transportation costs. In particular,

shipping costs played a significant role, as in 2008 they reached very low prices, allowing far easier trades especially between North America and Europe. This trend further pushed for lower cereals prices, as related costs were diminished. Ultimately, it is also important to cite the fact that the US Dollar suffered from high volatility levels that, united with a strong Euro, pushed many European players to acquire products from the other side of the Atlantic.

In a context that can be defined as normal, demand and offer saw their role reverted, at the point that in 2009 professionals feared a repetition of the 2004-2005 situation, where prices reached the intervention value of 120 €/ton. Despite not reaching those limit values, prices still showed an opposite pattern compared to the previous year. European producers also tried to reduce the quantity offered by storing major quantities of products, but without evident results.

In 2011, the situation repeated itself once again, in everything similar to the one just previously occurred. Already toward the end of 2010, cereals prices were 1.9 times higher than those registered in 2000 (Food and Agriculture Organization of the United Nations, 2010a; 2010b). The fact is that this second price spike occurred in a similar magnitude and for the same reasons of the preceding food crisis, and was held as a confirmation of the fact that new forces were driving international food prices higher.

Analyzing the 2010 price spike, again a mix of traditional and new forces had a relevant impact. First, we consider are the dietary changes in many developed countries that resulted in higher demand for meat products. This resulted in an increase in meat imports (+6.5%) by these countries and an increase in cereal demand for animal feed (maize, wheat, soy, and barley). As second important element, we recognize the increased ethanol production as one of the major drivers. Since Brazil and the United States are together responsible for 87.1% of the world ethanol production, their decisions have a major impact on this sector. In particular, the U.S., having a strong position in defining the international cereals prices, by a higher amount of production to the creation of biofuels, reduced the global offer of the involved cereals, thus increasing word prices.

Looking now at factors influencing the supply side of the market, it is necessary to acknowledge the extent of agricultural land as one of the factors determining price changes. While agricultural land only increased by 8% from 1967 to 2007, world population and food production increased much more. Since the share of lands devoted

to the growth of cereals destined to animal feed and biofuels production increased sensibly, the market offer of the same cereals destined to human consumption necessarily diminished, thus increasing the prices. In addition to that, other adverse weather conditions affected particularly Russia, Kazakhstan, and Ukraine, reducing yields by respectively 27%, 35% and 19%. As these nations account for 27% of global exports, world prices consequently rose. Other than that, again exchange rates and oil prices had their impact in defining the food price spike, with a stronger dollar and high oil prices linked to higher cereals values.

Finally, once again, speculation effects played their role, despite not everybody still agrees on the fact. As before, financial operators have been held responsible for to a certain extent of the high volatilities and market distortions that resulted in the agricultural markets. Slightly affecting the developed economies, the negative effects of the second food price spike occurred in 2010-2013 had their major repercussions on the developing and non-developed economies, also proving to be one of the drivers of the subsequent Arab Springs in the Middle-East.

In the end, this case study provided a strong example of which factors normally impact the pricing dynamics of the cereals, and which elements result as new forces shaping the agricultural markets. In particular, after this discussion we can draw three main conclusions about these recent trends in cereals prices.

- The progressive financialization of the agricultural markets is certainly one of the drivers of the increased registered volatility in prices
- The production of biofuels, essentially a recent trend, is having an important effect on the cereals and food price increase
- Extreme weather conditions are becoming particularly violent and frequent. Climate change can be held as one of the major reasons for these unusual, yet more common, phenomenon

Further studies could deepen the insights on these conclusions, especially the latter, as events affecting the agricultural markets have a strong and wide range of repercussions that goes way beyond purely economic considerations.

A.2. The Canadian wheat board example

The Canadian Wheat Board (CWB) handles the marketing of all wheat and barley from Canada's Western provinces, grown for human consumption. The Canadian Wheat Board (CWB) was born in the Depression era of the 1930s, when unprecedented drops in the worldwide price of wheat resulted in bankruptcy for many farmers, and threatened the economic collapse of provincial governments in Western Canada.

At the micro level, the Canadian Wheat Board attempts to stabilize the market for individual farmers, protecting them from unanticipated sharp fluctuations in the price of wheat. A broader objective is to prevent unexpected shocks to the Canadian economy.

As with any marketing agency, the Canadian Wheat Board's objective is to obtain the best possible price for its product. Its day-to-day operations are based on three guiding principles: single desk selling, price pooling, and government guarantees.

Single Desk Selling

The Canadian Wheat Board has exclusive authority over the marketing of wheat and barley grown in Western Canada, both for the domestic and international markets. Farmers are not free to sell their grain independently, but must deliver it to the Canadian Wheat Board. This approach is based on the belief that a single organization representing all of Canada's Western grain farmers (a 'single desk') will have more clout negotiating the best price for wheat on the open market than individual farmers. In order to ensure that grain is collected from individual farms, stored, and transported to shipping terminals as efficiently as possible, the Canadian Wheat Board is responsible for overseeing the storage, cleaning, and transportation of the grain to points where it is shipped overseas. However, the CWB does not own any grain elevators or railway cars. Instead, it enters into contractual agreements with grain elevator operators, rail operators, and shipping terminals.

Price Pooling

The Canadian Wheat Board operates as a collective, with the risks and rewards shared equally, or "pooled," among its members. Price pooling operates in the following way:

At the beginning of the crop year, the Canadian Wheat Board sets the price it will pay for a particular grain. The price varies depending both on the specific type of grain and its quality or "grade."

The farmer signs a delivery contract with the CWB, specifying the type, grade, and amount of grain s/he wishes to deliver. However, the CWB is not obligated to purchase the amount of grain specified in the contract. Market conditions will determine how much grain the Board accepts from the farmer throughout the crop year.

Upon delivering the grain, the farmer receives an initial payment for the grain, based on the price set by the CWB for the different types and grades of grain.

The money from the sale of these grains is pooled into one of four pools, based on the type of grain. Depending on sales and whether the price of grain rises or falls, farmers may receive additional payments (called adjustment or interim payments) throughout the year. All excess revenue is returned to the farmers. Each farmer receives a portion of the pool, based on the proportion of grain s/he delivered.

Under price pooling, a farmer receives the same price for his/her grain, regardless of when it was actually sold. Furthermore, the costs incurred with operating the CWB are shared equally among all farmers. From the farmer's perspective, price pooling provides a safeguard against fluctuating prices; the amount s/he receives from the Canadian Wheat Board does not vary depending on when the grain is delivered. On the other hand, combined with the Board's monopoly over selling wheat and barley, it prevents the farmer from taking advantage of any sharp spikes in grain prices.

Government Guarantee

If the total revenue from the grain, minus expenses, is less than the initial payment made to farmers, the federal government guarantees to make up the difference. The Government of Canada also guarantees Canadian Wheat Board borrowing (currently totaling approximately $6 billion), which allows the Board to obtain loans at more favourable interest rates than would otherwise be the case. Finally, if a buyer of Canadian grain defaults on payment to the Canadian Wheat Board, the federal government guarantees to absorb the costs of the defaulted payment.

Of all the federal government guarantees to the Canadian Wheat Board, the initial payment has received the most criticism as being a subsidy to farmers. However, it is important to note that the initial payment is only (approximately) **75 percent** of the expected market price of the grain throughout the crop year. There have only been a few occasions where the federal government has been forced to back up the guarantee after wheat prices for the crop year dropped unexpectedly. The most notable example to date

came in the 1990-91 crop year, when the federal government was forced to pay more than $670 million.

This example wants to highlight a possible alternative system to the one currently used in the European Union. In particular, this can be seen as a strong reference point in defining possible innovations and improvements, allowing us to benchmark our suggestions with a real case and the effectiveness of this system.