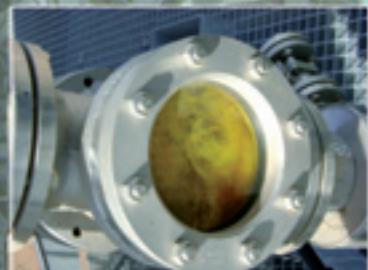


Soy Market and Derivates - Context and Recent Evolution

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Global Assessment of Biomass and Bioproduct Impacts
on Socio-economics and Sustainability

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Soy Market and Derivates Context and Recent Evolution



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March 2011

El Proyecto Global-Bio-Pact (Global Assessment of Biomass and Bioproduct Impacts on Socio-economics and Sustainability <http://www.globalbiopact.eu/>)forma parte del programa marco 7 de la Unión Europea y Argentina por medio del PNB del INTA es uno de los participantes. Su objetivo es el estudio desarrollo y armonización de los sistemas de certificación de producción de biomasa los sistemas de conversión y los reglamentos de comercio a fin de prevenir impactos socioeconómicos y ambientales negativos. Sus objetivos específicos son:

- Identificar los impactos socio económicos de la producción de las materias primas
- Identificar los impactos socioeconómicos de las cadenas de transformación
- Analizar los impactos sobre la seguridad alimentaria
- Investigar las conexiones y relaciones entre los impactos sociales y medioambientales
- Revisar los actuales y futuros esquemas de intercambio comercial
- Analizar la percepción pública de los diferentes temas
- Efectuar recomendaciones sobre esquemas de certificación.

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Introduction

In order to start a complete study with example cases in Argentina within the Global Biopact framework there is a need to pursue a complete analysis of the soybean complex due to its magnitude and importance for the country.

Soybean production is immersed within a productive system that cannot be analyzed in an isolated approach. A number of political and market factors both nationally and internationally explains its development and growth throughout the globe. The analysis of those factors will help to find measures that will implicate a more harmonious development of productive systems.

In Argentina's case the evolution of the agricultural system with soybean production as perhaps the most important asset over the last few years is characterized by a continuous technological improvement.

This evolvement has allowed a substantial development of the whole agricultural system and has set the base that needs to be maintained in order to fulfill the growing requirements environmental and socially wise that societies demand.

In the social and environmental aspects the institutional aspect is crucial from the government and private side. Argentina has developed a very important and sophisticated network of institutions related to agriculture and the agribusiness as a whole. A growth of the influence of several organizations has been significant Just to name the most important ones : INTA, AACREA, PROSOJA and AAPRESID mainly focused on the primary production; INTI,.ACSOJA, MAIZAR, ASAGA, CARBIO & ABH more orientated to the agroindustry and agribusiness.

An enormous evolution regarding sustainable development awareness is in place in the whole agricultural system with special emphasis in soybean production. This materializes in the whole research made by the mentioned organizations.

There is also a parallel concern on social aspects coming from the public side (municipal, provincial and federal governments) and the private sector through new trends in enterprise management as fair trade social enterprise responsibility and certification schemes. The development of this trend has been institutionalized through the Social responsibility institute with specific tools to address this important issue http://www.iarse.org/new_site/site/index.php?put=indicadores.

There are important advances that tend to achieve mechanisms allowing sustainable development premises to be transformed in concrete decisions such as:

- Criteria, indicators development
- Good agricultural and agroindustrial practices
- Certified agriculture
- Certification biofuel schemes CARBIO, GBEP RSB among others

Technological evolution has allowed unquestionable improvements in the preservation of the environment. Just to name a few:

- Reduction of agrochemicals toxicity
- Application technologies (Good agricultural practices)
- Direct seeding technology
- Precision agriculture
- Increment in unitary production that reduced the pressure over the utilization of new lands.

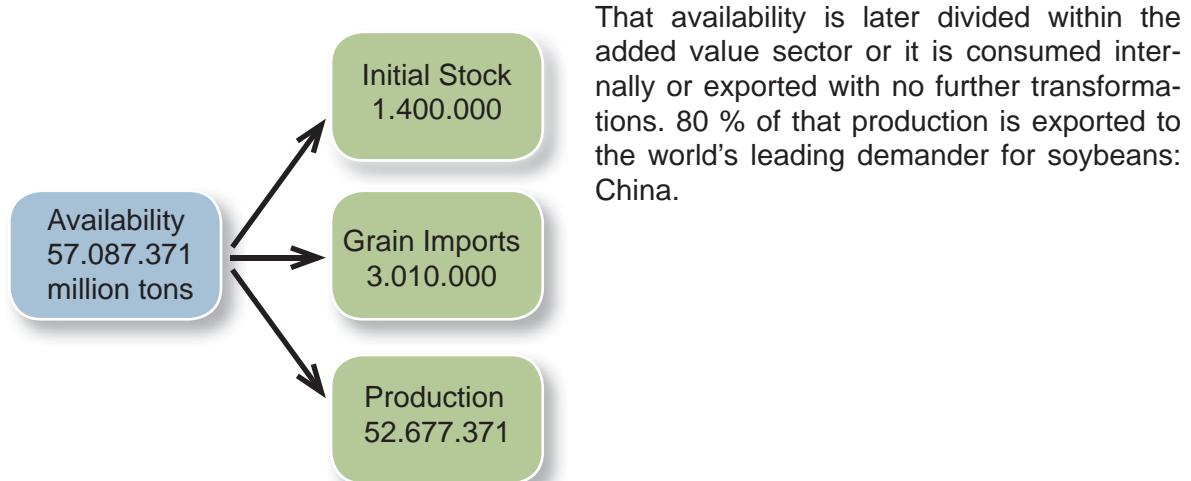
The advance of regulatory context has allowed a better control and the future development of land usage. In Argentina's case the Law of minimum budget is an example towards that direction.

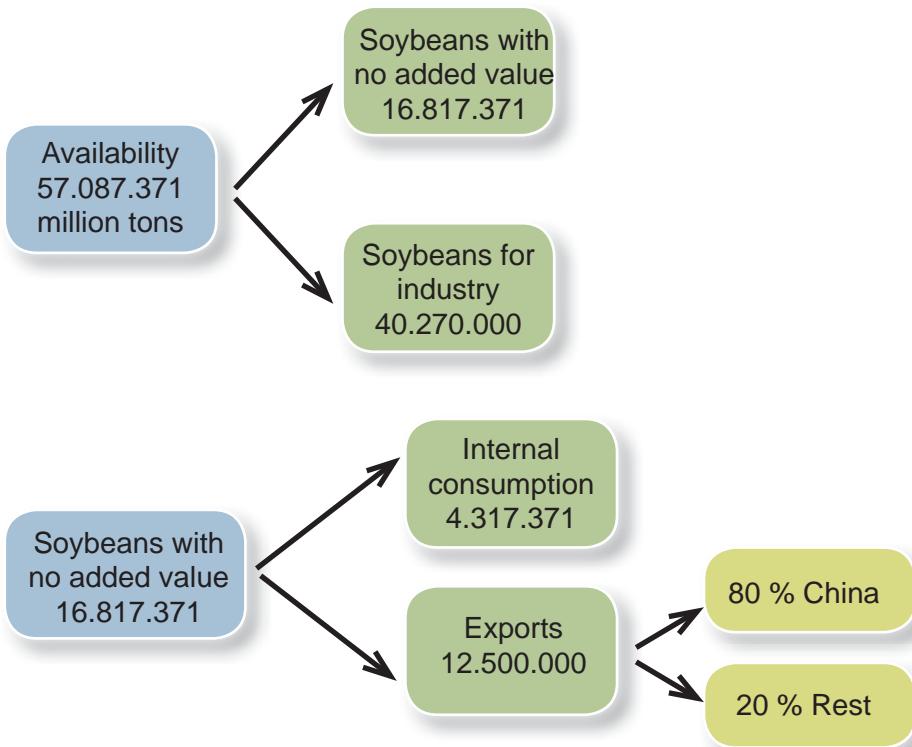
Over the last decades, soybean cultivation has had an evolution with no precedents. Since the 70's implanted areas have grown sustainably representing 37.000 hectares in the 1970/71 campaign to more than 17 million in the present.

The Argentinean soy complex is one of the more dynamic sectors for the economic activity of the country, generating almost 30% of the external currencies income due to the exports and representing almost 30% of the agro industrial sector GDP. Argentina is the world's leading exporter in soybean oil, soy meal and soy biodiesel and the third one in soybeans.

Without a doubt soy activity is an important instrument in terms of development due to the infrastructure built in order to sustain the leading indicators. In the next scheme we present an estimation for the 2010-2011 campaign in terms of million tons produced and exported for the soy chain.

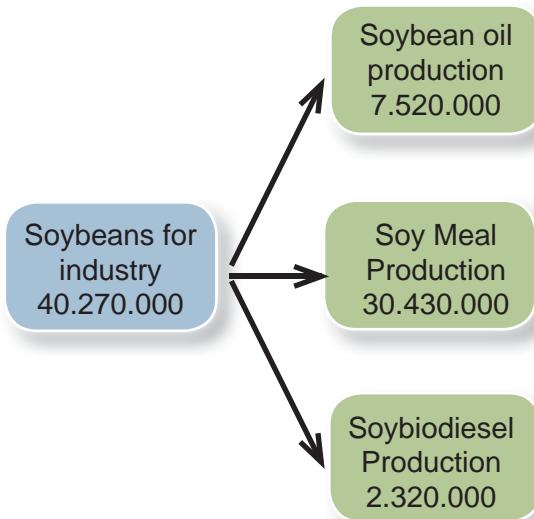
The production is estimated to be near the 53 million tons of soybeans, rounding a total availability of 57 million tons after adding the initial stock and grain imports (in order to fulfill the soybean oil sector demands some soybeans are imported)



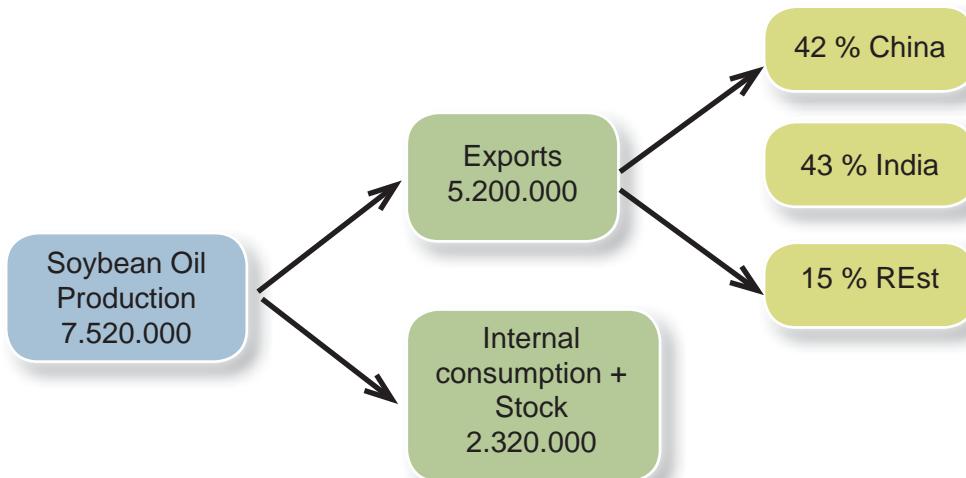


The soybean exports will be close to 12.5 million tons rounding a value of more than 4.6 billion dollars before taxes.

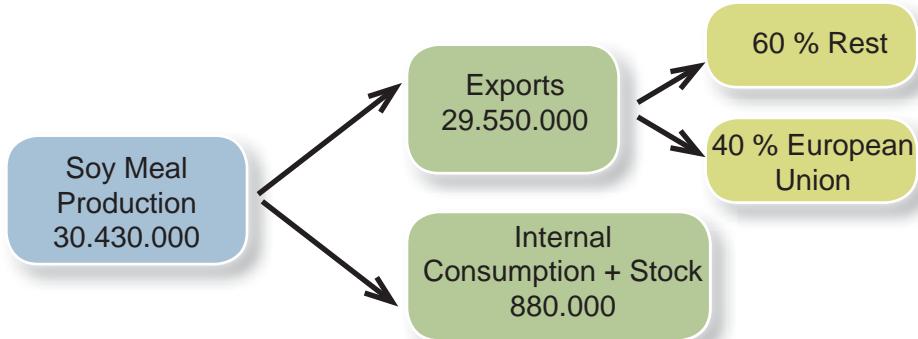
In the added value sector the distribution is as follows



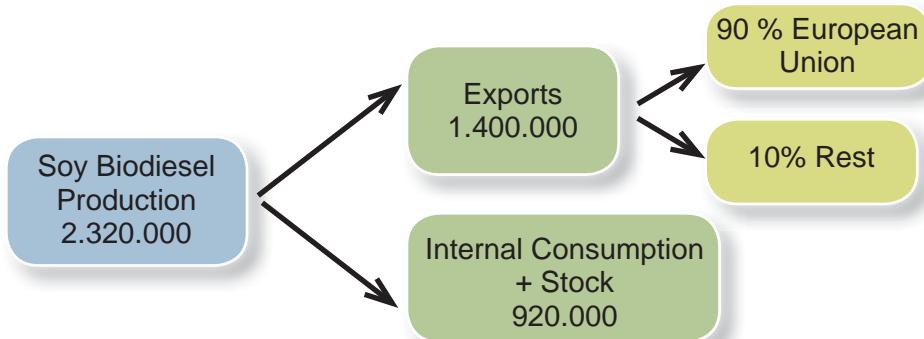
As we mentioned before Argentina is the leading exporter of soybean oil, the production is estimated in more than 7.5 million tons, exporting more than 5.2 million tons rounding a value of more than 4.3 billion dollars before taxes. China and India are the main demanders accounting for more than 80% of Argentina's exports.



Argentina is also the leading exporter of soy meal and the production is estimated in more than 30 million tons, exporting 29.5 million tons rounding a value of more than 10 billion dollars before taxes. The European Union imports near 40% of the soy meal exported by Argentina.



The second transformation industry has in biodiesel one of its main productions. Argentina has quickly became the world leading producer and exporter of soy biodiesel and a production of more than 2.3 million tons is expected. Exports will be near 1.4 million tons (more than 1 billion dollars before taxes) and the European Union imports 90% of those exports.



In order to understand both the Government intervention and the sector situation it is worth to know how the export taxes impact the production weighing the export rate in terms of million tons and in US dollars.

Table 1: million tons and estimated us dollars taxed whitin the soy complex for the 2010/2011 campaing by the government.

Export Tax			
Product	Million Tons	Average FOB Price (Jun09-Jun10)	Estimate USD
Soybeans	4,375,000	374	1,636,541,667
Soymeal	1,664,000	346	575,633,067
Soybean oil	9,456,000	824	7,793,004,800
Soy Biodiesel	238,000	838	199,498,740
Total	15,733,000		10,204,678,273

An important issue commonly described relates the production to social aspects and development in different countries and areas. This impacts are farther large than the local changes in employment and other social indicators. In the soybean case in Argentina the soybean complex delivers such huge amount of resources to the government that its real impact on society is very difficult to measure. According to the last table the Public Sector will be receiving more than 10 billion dollars from the soy sector in terms of export tax rate collection or more than 15 million tons of products.

The estimated USD collected by export taxes represents near 4% of the GDP of Argentina. This is by no means a small number given that for example Argentina's spending in Education totals 4% of the GDP, Health spending is near 5% of the GDP, housing spending is near 0.5% of the GDP and Social Security near 9%.

The latest figures give a comparative dimention of the impact of soybean chain in the country we could choose one of them in order to measure and attribute the effects of the whole change for example Argentinas large and widely spread public education that covers the whole country.

This percentages represents also the magnitude of the soy complex for Argentina's fiscal stability and the indirect social impact of this activity as a whole.

In terms of total tax collection the soy complex transfers near 30% of the taxes collected using export taxes. This states the importance of the sector in terms of the country finances given that those dollars are later bought by the Central Bank and used to keep the exchange rate fixed at the value determined by the monetary authority.

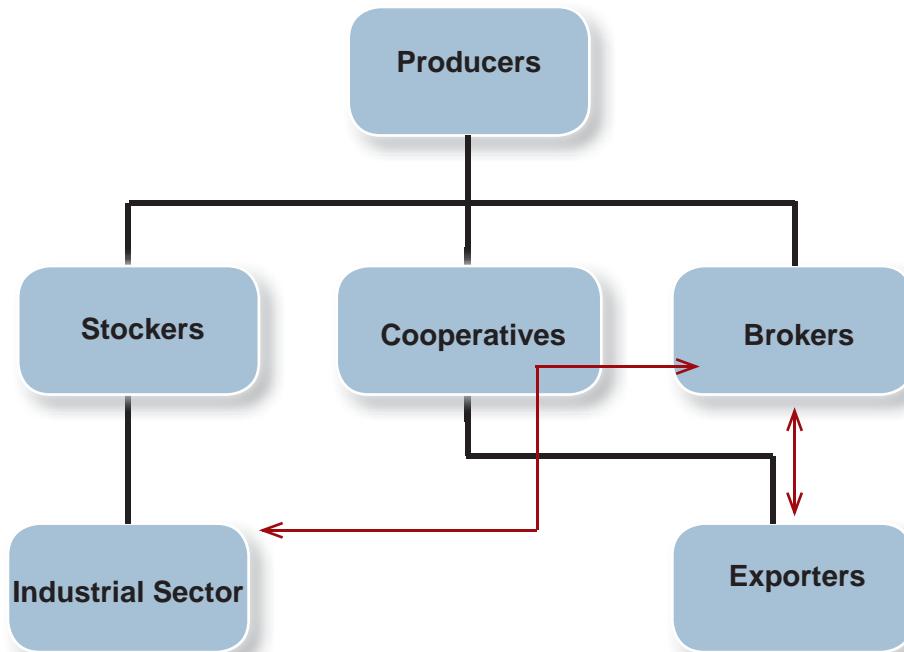
The export tax also contributes to maintain low internal prices for certain food goods with a significant impact in food security for the low income people of the country that depend on welfare.

Agro products commercialization in argentina

Following a research made by the “Bolsa de Comercio de Rosario” The Agriculture products commercialization is quite different than other goods commercialization, such as industrial ones, in several points that determine the further organization of the complex as a whole:

1. Production is spread in thousand of producers
2. Most part of agricultural products are harvested and put in the market in the short term (seasonality). This means that given a steady demand the price of this products tend to decrease during the harvest period and to increase once the stock became depleted.
3. For ecological and profitability reasons agriculture production is concentrated in a region basis
4. Small number of internal demanders (exporters and processors). The participation of cereal brokers enables the concentration of the disperse stocks.
5. Obviously climatic factors bears in the final production and therefore in the final prices.
6. With difference to most of the oilcrop complex in the world as rape seed -,the Argentina oil complex pays taxes when it export its products and in secelral cases also import rates in the destiny markets.
7. Local prices of all intermediate products are freely defines by the difference forces acting in it.
8. The fact that most of the production is export oriented means that internal prices are highly influenced by international prices.

Scheme 1: actors in agro-products commercialization



In the above scheme we can observe an summarized interaction between the different actors in the agricultural production. It does not have to be taken literally but for an informational approach it is a good reflection of how the Argentinean agro sector is structured.

The brokers are an important link in this whole system given that they can interact in the whole chain of commercialization . In the last couple of years the brokers activity has been growing considerably, selling products powered by the producers.

Its retribution consists of a variable commission. They also bring transparency to the whole operation given that they are grouped in a Stock exchange such as Rosario's.

Research Structure

This research is divided in three sections: In the first part we will analyze a general approach in order to understand the dynamics that soybean production has had over the last years worldwide in order to understand the implications over soy biodiesel production. For that matter we will use three stylized facts that will allow the research to analyze the phenomenon analyzing facts.

In the second section the evolution of soybean crop and derivates production in Argentina will be addressed with special attention on how soy biodiesel production has been developing in the country.

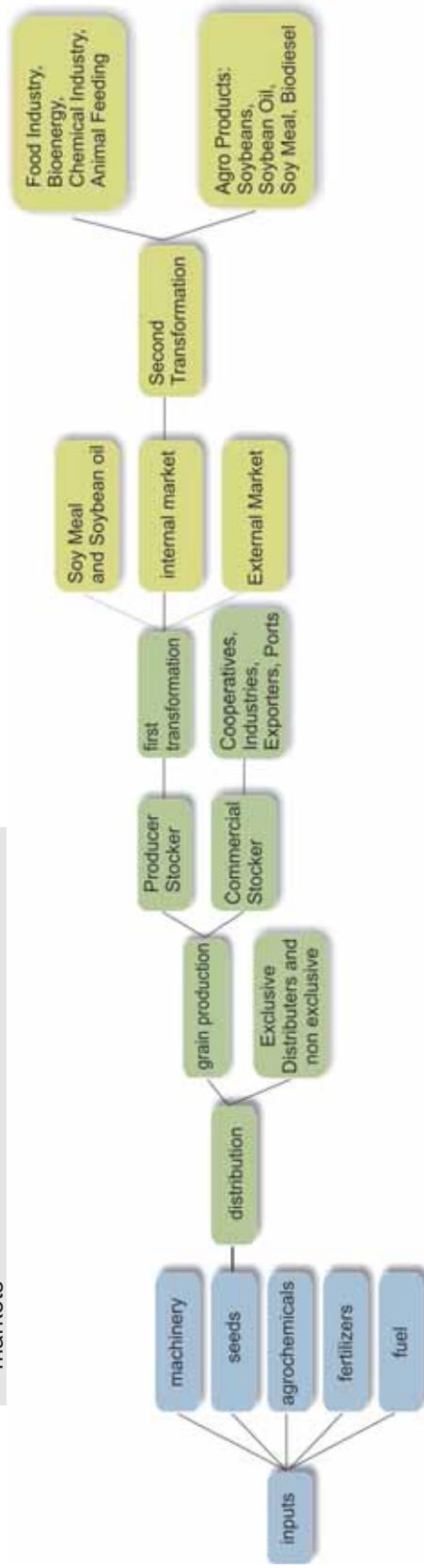
In the third and last section of this research the situation of the Argentina's meat sector will be analyzed in order to understand if the soy boom has had any influence over the diminishment of cattle areas country-wide.

The socio-economic impacts of such boom will also be analyzed and lastly we will observe closely the situation of the soy biodiesel market in Argentina and worldwide in order to understand if it can subsist without government directed policies.

Argentina's soy agrobusiness system

In the following brief schema we can observe the different actors and processes that interact throughout the soy chain.

Red rectangles indicate inputs, green indicates processes, blue indicates actors, violet indicates final products and orange indicates markets



SECTION 1

The goal of this section is to establish a general approach of the whole research in order to analyze the impact of the soy biodiesel production, using soybeans as feedstock. For that this section proposes.

- i) Description and evolution of soy sector, both locally as internationally
- ii) Proposition of possible explanations for such evolution

From this section we hope to obtain, besides a general knowledge from the recent past of the product, a piece of information, ideally in the form of conclusions in order to use it as an input for a better determination and comprehension of the perspectives in the soybean market sector.

International context

A characterization regarding the evolution of the soybean sector in Argentina requires first to understand the international context regarding such sector. As we will see further in this work, the internationalization characterizing the sector requires the knowledge of the international evolution in the period of the study (last twenty years). This evolution has been characterized for three stylized facts:

1. High and sustained growth of production, consumption and international trade of Soybean
2. Elevated prices for soybean and derivates in recent years
3. Demand and Supply concentration
4. Significant technological development in all stages of production

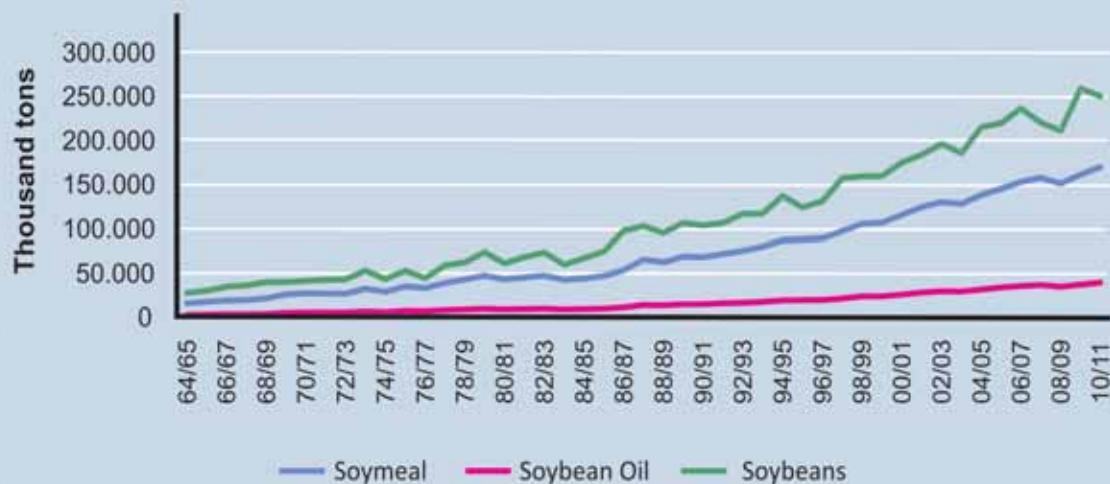
High and sustained growth of production, consumption and international trade of soybean and derivates

Soybean production growth in recent years has emerged as the leading indicator in such market as particular and in commodities markets in general. In the last couple of years soybean production growth has been followed by expansion of the soy biodiesel market.

This work will address such expansion in subsequent sections.

As we can see in the following chart, soybean meal, soybean oil and soybean production growth has been remarkably high.

Chart 1 - Global Production

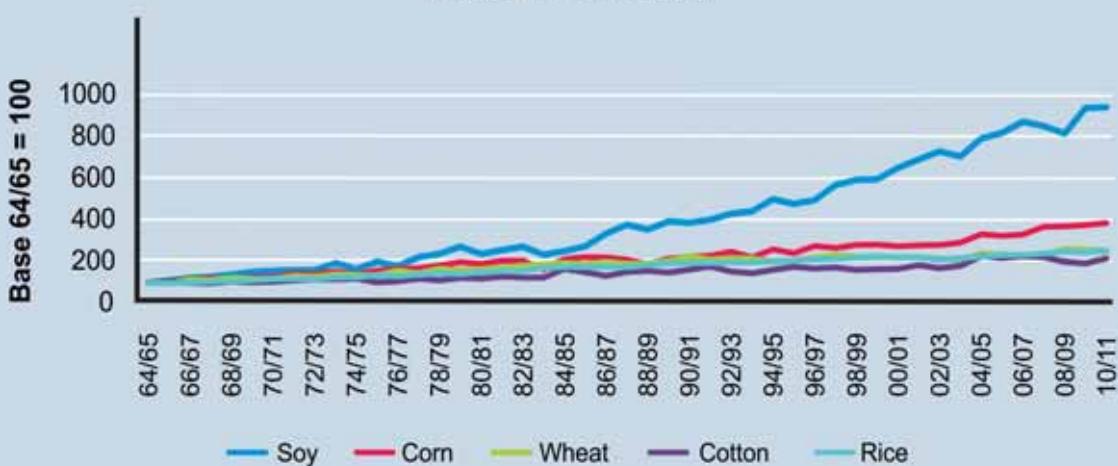


Source: Author's elaboration with USDA's PSD database information

Soy meal production is 134, 6 % higher than twenty years ago. In the same span of time soybean oil has been 139.6% higher and soybean 134, 2%. This implicates an annual growth rate of 4,4%, 4,5% and 4,3% for the three products. To create a dimension of such growth, it means that a duplication of production (maintaining growth rates as observed) would take place every sixteen years. It is important to notice that the remarkable soybean and derivates production growth took place in an agricultural sector expansion worldwide.

Nevertheless, as shown in the next chart, growth of soybean and derivates has been much scaled up than other agricultural products globally. This means that besides the agricultural expansion, other factors must have been in place in order to explain soy growth.

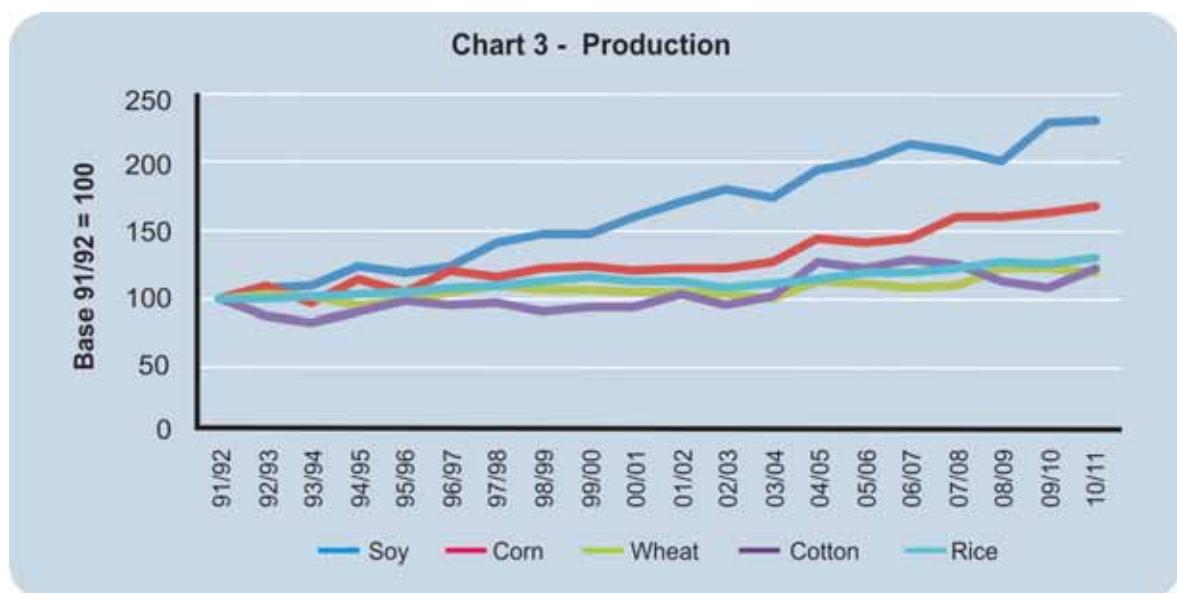
Chart 2 - Production



Source: Author's elaboration with USDA's PSD database information

The biodiesel sector only was introduced in significant figures in the last four years on the same scale of the graph its contribution could difficultly been seen. Overall production of this product is reaching 4 million tons globally

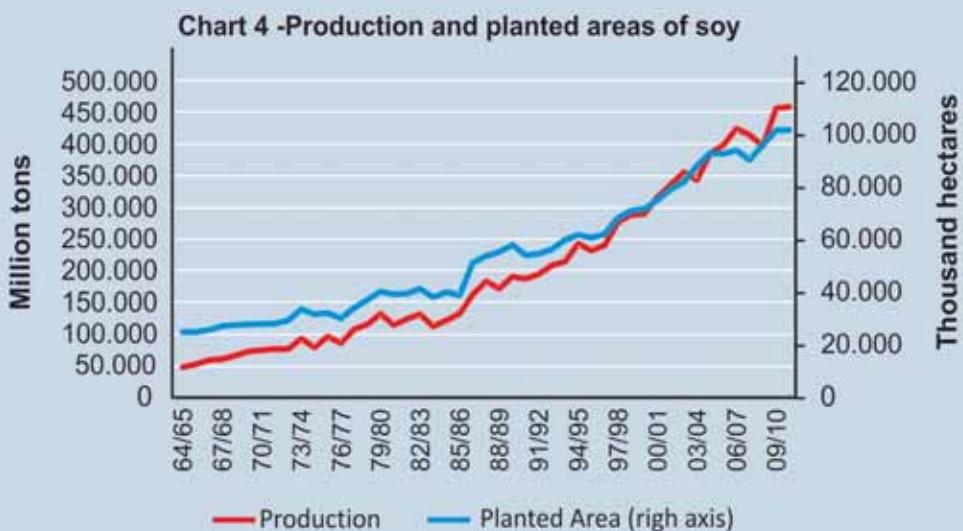
Similar conclusions can been obtained limiting the study over the last twenty years, soybean still shows a much up scaled growth than other products, but not as big as in the latter chart.



Source: Author's elaboration with USDA's PSD database information

Production and implanted areas

The extraordinary growth of soybean production is without doubt correlated with the growth of implanted areas. Nevertheless, it is worth noting that the increase rate in implanted areas has been lower than the growth rate in production as we can see in the next chart. This reflects a success in the average performance of soy implantation and primary production caused by agronomical techniques, genetic material and farm machinery improvements.



Source: Author's elaboration with USDA's PSD database information

As we will see further in this work, the growth of soybean production and derivates has been extremely correlated with demand growth in a global basis for this kind of products. In that sense, Keyzer et al (2005) argues that world cereal feed demand will be significantly higher in the next 30 years than is currently projected by international organizations. Linked with the expansion of meat consumption, it is expected that the world demand for soybean and soy products will increase steadily.

Supply factors as well are in play in order to understand the performance increase of soybean and derivates, making them rentable for agricultural producers. As seen in Shurtleff & Aoyagi (2007), the 1960's has been marked by a technological evolution in agriculture, plagues and weeds control improvement, increased profit margins both for plantation and harvest.

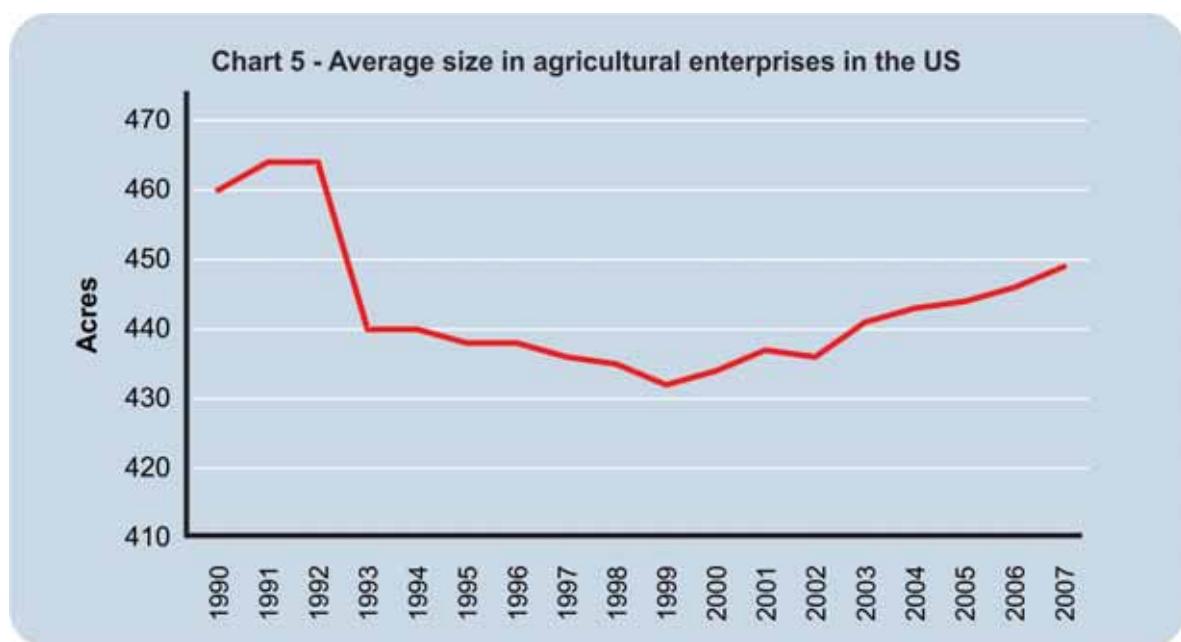
Thompson (1981) provided early support to this hypothesis, saying that "The increase in supply and use of soybeans during the past 40 years has been a dramatic change in world agriculture-the 'Dark Green Evolution'. The driving forces have been expanding population and income levels, increasing demand for protein and edible oils, pressures on other crop prices, and production and utilization research". These factors contributed to form a higher land concentration and a gradual reduction of the importance of small producers.

In Argentina Giancola et al (2009) compares low medium and maximum yield in the diffe-

rent ecoregions of Argentina finding out differences that range from 54 % in the central areas to 155 % in new areas of expansion of the crop north west and ,north east region. This is a relative magnitude measure of the potential increase in production with out expanding the crop to new areas in the country.

Land concentration

The tendency in the growth of the average size of enterprises seems to exceed the soybean market case, for example in the US this situation can be observed in an aggregated level.

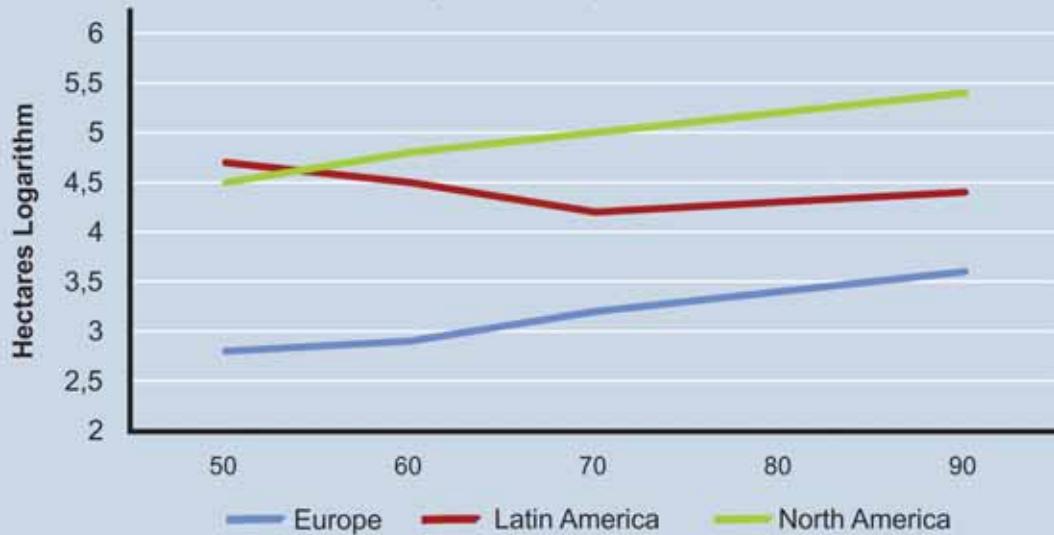


Source: Author's elaboration with USDA's PSD database information

In the long run, in Europe seems to happen as in the US and as in Latin-America, but in the latter the trend is slower than in the former cases. One interesting point that is probably not as clear in the chart is the strong negative correlation between farms size in North America and Latin America. Correlation coefficient between 50s and 90s (last published data) has been -0, 7. It is then clear that the tendency in both regions has been quite different. The same case is observed while compared Europe with Latina America, as long as the estimated correlation coefficient is -0, 65. On the other hand, correlation coefficient between Europe and North America takes an extremely high value (0, 98).

As a consequence, not only trend to land concentration is slower in Latin America, but its timing has been completely different to Europe's and North America's. While a strong trend to land concentration was observed in Europe and North America in 50s, 60s and 70s, the opposite was seen in Latin America. The result is not as surprising as it may appear at a first look; during those decades, populist governments and fall of exchange terms in Latin America may have reduced the incentives to be a land holder, while the contrary may have happened in Europe and North America.

Chart 6 - Average Sizes in agricultural enterprises



Source: Author's elaboration with FAOSTAT

In Argentina's particular case according to the 2008 agricultural census, more than 60,000 farms shut down between 2002 and 2008, while the average size of farms increased from 421 to 538 hectares. The shift to soy has replaced cultivation of many grains and vegetables and even the country's beef production. Let's keep in mind that soy historically hasn't been grown in Argentina. Soy was brought in during the 1960's during the Green Revolution as will see during this research. Transgenic soy has been brought to lands where before cultivation wouldn't have been possible. The low production cost of soy helped this process.

Soy has replaced other crops, gaining areas that were historically for cattle grazing and dairy production...

But one of the breakthroughs in Argentina's case is the appearance of a new model of land possession.

Traditionally the agricultural production model was based in land possession (or rented) destined to the development of a low amount of activities with a high level of integration between them using a high dosage of capital. On the other hand, the new model is based in a "no verticality" way of producing and outsourcing of the production.

It has five pillars:

1. Separation between land ownership and companies that use the land for production purposes. The contractors are the dynamic actors of this kind of model. In parallel a large number of service/input providers appear given the new demands that the companies may have, this means that a new web of producers, contractors and service/input suppliers is formed.
2. Appearance of companies that coordinate financial capitals, decide which activities to develop and hire land and labor associated to production.
3. All the transactions are by contract.

4. Incorporation of state of the art technology
5. Separation between the place where the production is taking place and the territorial origin of the people working in the land. Migrations are high within the country during the farming season generating a high volume of people traveling through the country and in this way helping different regional economies due to the increase in consumption

The traditional way of farming production had an important transformation in Argentina with consequences over the land concentration and organizations of farmers. In the first place to the traditional farmers new actors enter the business renting the land. Owners of the land either cultivate it or they rent it receiving the benefits of the soybean production this has been known in Argentina as a two layer beneficiaries.

There are two groups of rent land actors called “contratistas” the first group owns farm high tech farm machinery and they are in charge of drilling, spreading and harvesting signing contracts for a certain percentage share of the yield. Other group rents the land with a contract of certain amount of grain at the end of the campaign wherever the yield is. The risks in the second case are much higher.

To this traditional actors the evolution of the agricultural production system in Argentina and the good results of the business produced new forms of associations and actors.

Drilling pools are associations of different actors that can be or not from the farming sector. They gather money to invest in farming production and share the net benefits after harvesting.

Common investment funds, new companies with new technology that enables them to efficiently manage great amount of land in different ecoregions search in the financial markets people willing to invest in agriculture. These actors inject a great new dynamism to the rural world since they stimulate all the chain of primary production and enable land owners to receive increasing revenues for renting their land preventing them to sell and loose their participation.

1. Technical advance in soy markets (worldwide and Argentina)

In 1960-1970 the introduction of new soybean seeds marks a breakthrough in the sector, in the final years of the 1970's those seeds began commercializing increasing the performance of the planted areas. Genetically modified seeds became common ever since, accounting for the consistent growth in performance, and doing so, increasing profit margins. For instance, according to the USDA, 93% of planted soybean seed is genetically modified in the US, by 1997 that ratio was only of 8%. In Argentina the phenomenon is quite similar, in 1996 was approved the use of genetically modified soybeans, the Round-up Ready (RR) soy. The use of RR soybean has led to increased yields and expansion of cultivation into areas that were previously considered unsuitable due to heavy weed infestations and high risk of water deficits. Today, GM soy accounts for more than 98% of soybean produced in Argentina. In Argentina's case the changes that explain the clear success of soybean are the results of innovations in the institutional, organizational and technological environments.

The two main technological factors that lead to the spectacular soybean expansion in Ar-

gentina are the no-till farming system and the introduction of genetically modified soybean. Other newer factors are on the pipeline as integrated pest control and precision farming.

In Argentina, the no-till farming system has been developed in the late 1980s. Its first objective was to reduce soil erosion and degradation. This method is a way of growing crops from year to year without disturbing the soil through tillage, a system of conservation that lets in surface the weeds from the preceding crop. This emergent agricultural technique allows preventing soil erosion and degradation, as well as improvements of physical, chemical and biological soil conditions. Moreover it shows great results about the efficiency of the use of water, which is a very important parameter and usually the limiting factor for production. The main earnings of the no-till farming system are (ACSOJA, 2009):

- 96% less soil erosion
- 66% less fuel use
- lower carbon emissions
- higher water quality
- higher biological activity
- increase in soil biodiversity
- increase in soil fertility
- higher production stability and performance
- expansion in less suitable areas
- lower production costs
- lower time use

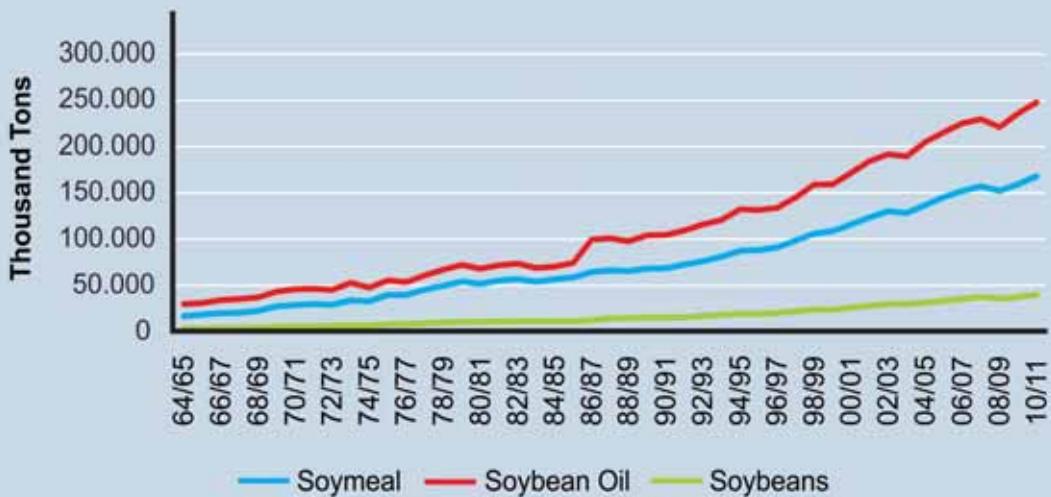
The no-till farming system has been adopted by approximately 85% of the farmers (PAA-FAUBA, based on AAPRESID data).

Biofuels growth, subject that will be addressed in further sections, has been linked as one of the explanation factors regarding soybean advance in recent years. Oil prices over the last decade stimulated the development of alternative fuels, and soybean derivatives have been important in doing so.

Consumption

As was mentioned in former sections, soybean production growth had as an obvious counterpart the consumption expansion. Since the 91/92 campaign soy meal consumption roared 131.3%, soybean oil 126.5% and soybean 157.4%, showing similar values as in the expansion noted in production. Soybean oil biodiesel growth has been very recent with a very high interannual growth at initially relatively low numbers.

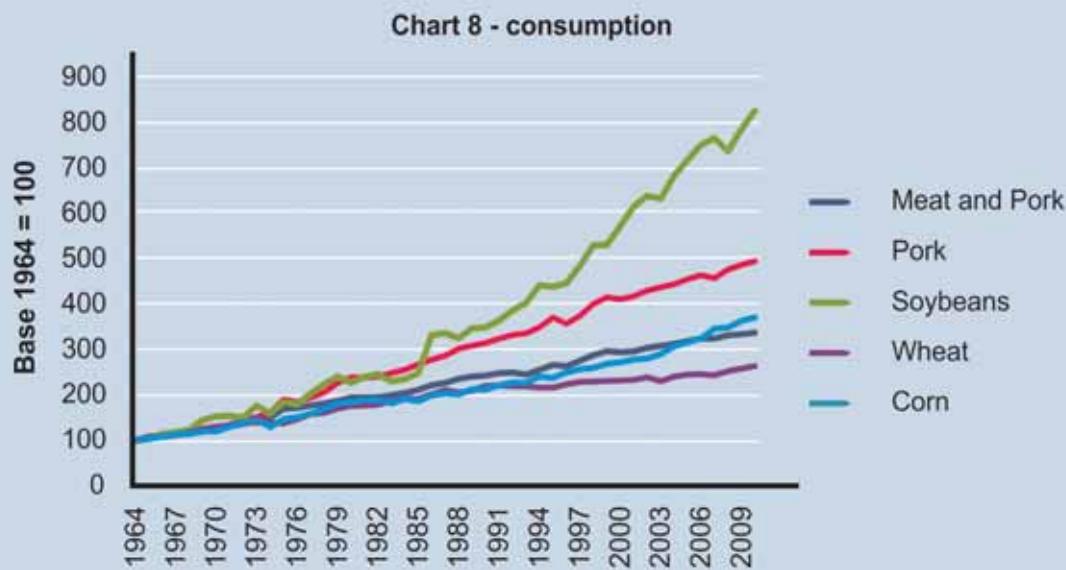
Chart 7 - Consumption



Source: Author's elaboration with USDA's PSD database information

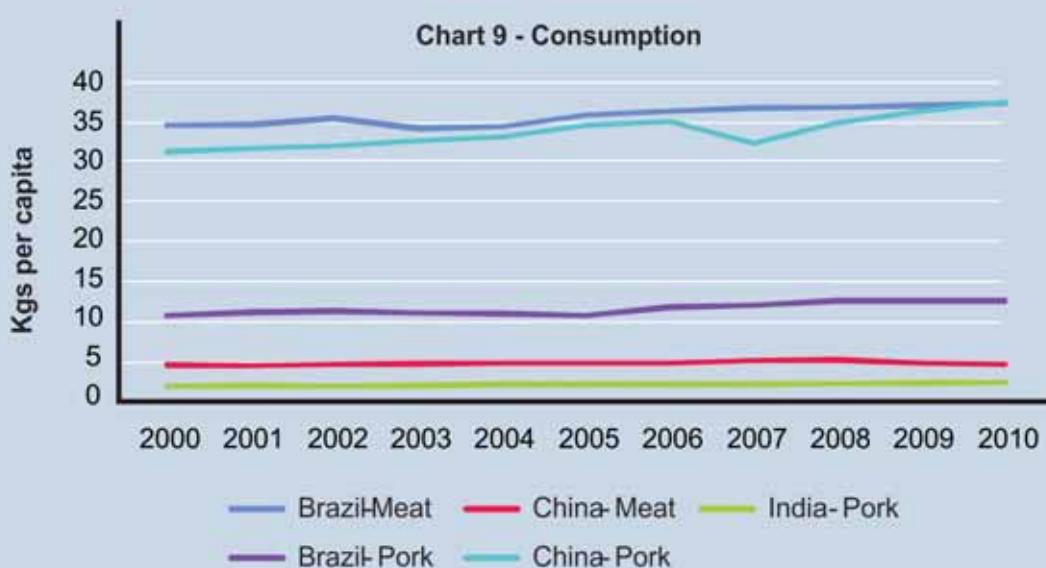
As in the production case, soybean and derivates consumption growth has surpassed other products even though they as well showed an important growth. Between 64/65 campaign and 10/11 soybean and derivates consumption growth was 805%, maize 272%, wheat 164% and cotton 129%. Soybean consumption growth has been driven by the food consumption growth worldwide for the last twenty years (period where food consumption growth rate has been 4.4% per year). The reasons underlying food consumption growth can be found taking into account the emergence of global players as China and India, particularly the former, which quickly became a soybean product demander

An important breakthrough observed in recent years affecting soybean demand is the more weight of animal origin products in human diet, combined with a higher use of soybean for animal feeding opposed to animal products for animal feeding. This has been the case since the "mad cow" disease emerged as a sanitary problem. In the next chart soybean consumption growth outnumbers the growth of other products, including meat.



Source: Author's elaboration with USDA's PSD database information

As was mentioned, meat consumption growth is related to changes in human diet; particularly the growth of life expectancy in some emergent regions (China, India, Brazil, etc) has made a historically expensive product as meat more affordable.

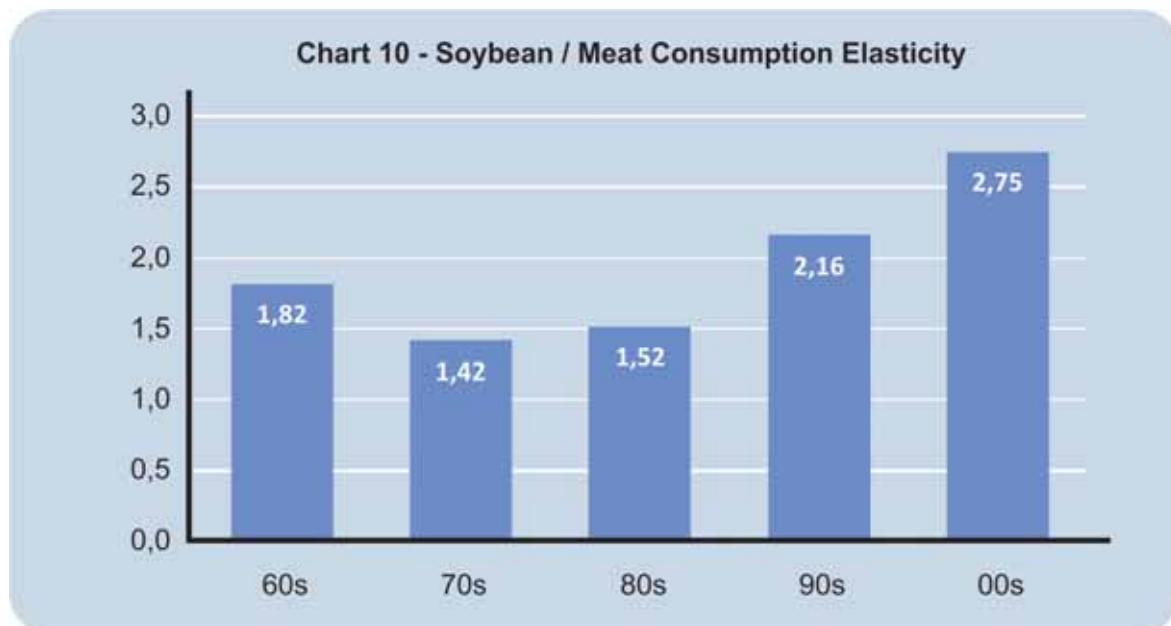


Source: Author's elaboration with USDA's PSD database information

Consumption elasticity study and links with meat consumption and gdp per capita

As a matter of fact consumption elasticity of soybean-meat is 1.91 for the period 1964-2010, which implies that a 1% growth of meat consumption has as a counterpart 1.91% soybean consumption growth. An important note is that such elasticity was 2.75 during the first decade of this century, a number far more important than the one deriving from our analysis. Another important issue to be addressed is the relationship between soy meal and soybean oil consumption elasticity's. That result could indicate the existence of a surplus of soybean oil that could be transferred to the soy biodiesel market therefore elevating the production of fuel. This point will be analyzed within this section.

It can be concluded that in recent years existed an important link between soybean demand and meat consumption. We propose in this research to analyze how the GDP per capita could explain the soybean consumption. In order to accomplish what we first propose soybean consumption-meat consumption elasticity as shown in chart 10. After that, using an econometric approach we will analyze the relationship between GDP per capita and animal protein consumption arriving to elasticity between both inputs. Finally, linking that information we will get the GDP per capita- soybean consumption elasticity and will make some conclusions.



Source: Authors elaboration with USDA's ERS database and Angus Maddison information

Another important note is the relationship between GDP per capita and animal protein consumption. Between 1964-2010 the estimated elasticity has been 1.48. This means that for the last half century every point of GDP growth had as a counterpart of almost 1.5 growth in meat consumption.

Table 2– GDP Per Capita-animal proteins consumption estimated

In_animal	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ln_pib_pc	1.489393	0.05352	27.83	0	1.38146	1.597326
_cons	-1.158798	0.4543534	-2.55	0.014	-2.075089	-0.2425071

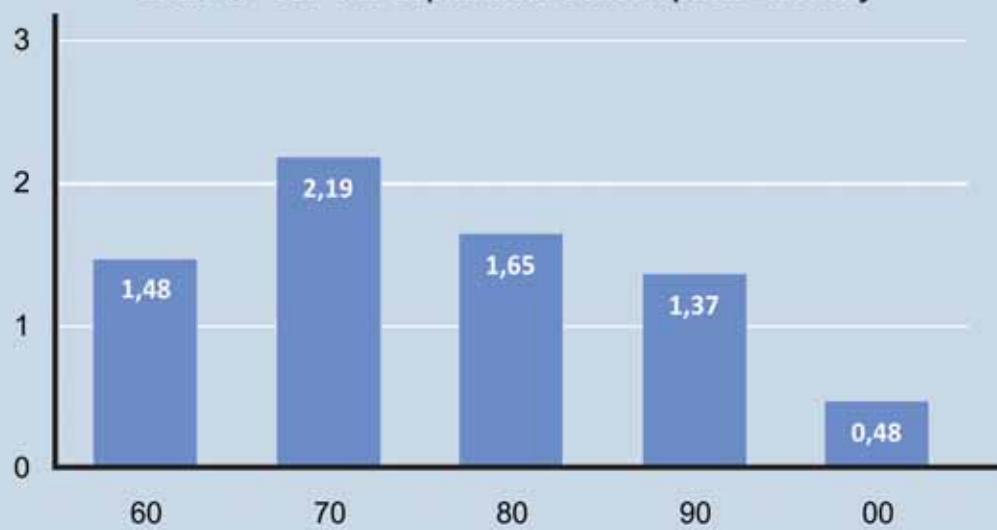
F(1,43)=774.44; Prob>F=0; R2=0.9474, R2 Adjusted=0.9462

Source: Author's elaboration

This result must be accordingly weight because of the downward tendency in elasticity over the last decades. In the 2000's GDP per capita-meat consumption elasticity has been 0.48, 1/3 of the average from 1964-2010. This result is not surprising at all: as economies reach higher levels of development, income growth makes diet changes more plausible.

China is a typical case: in its first period of unprecedented growth a big part of the income growth derived in a food demand growth, once the country's growth became sustained. The standard of living started to change and technology, education, etc became more important in the spending portfolio, losing the elasticity importance.

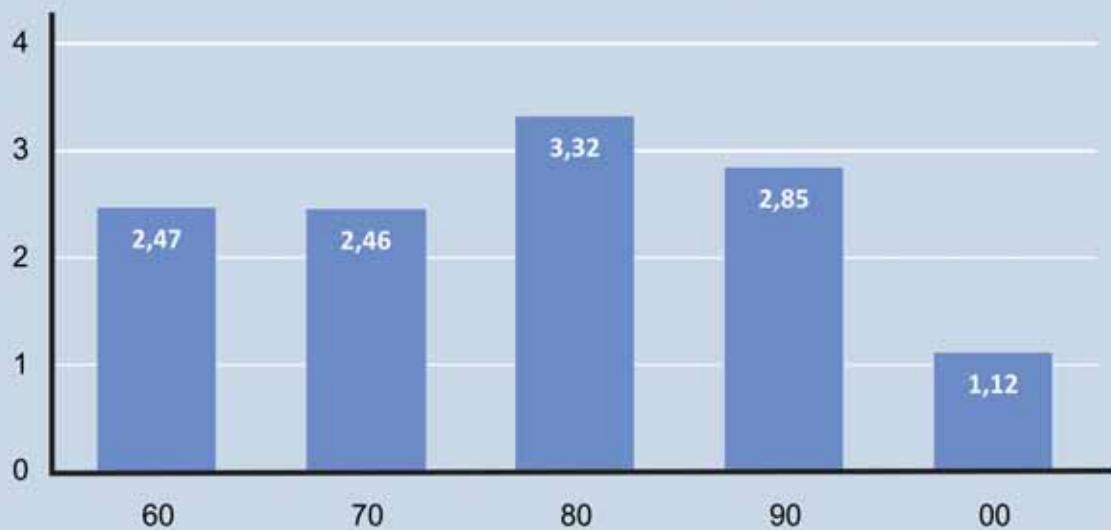
Chart 11 -GDP Per Capita-Meat Consumption Elasticity



Source: Author's elaboration with USDA's ERS database and Angus Maddison information

As a consequence of the evolution of the two elasticity's estimated recently, we can reach the GDP per capita- soybean consumption elasticity, as shown

Chart 12 -GDP Per Capita-Meat Soybean Consumption Elasticity



Source: Author's elaboration with USDA's ERS database and Angus Maddison information

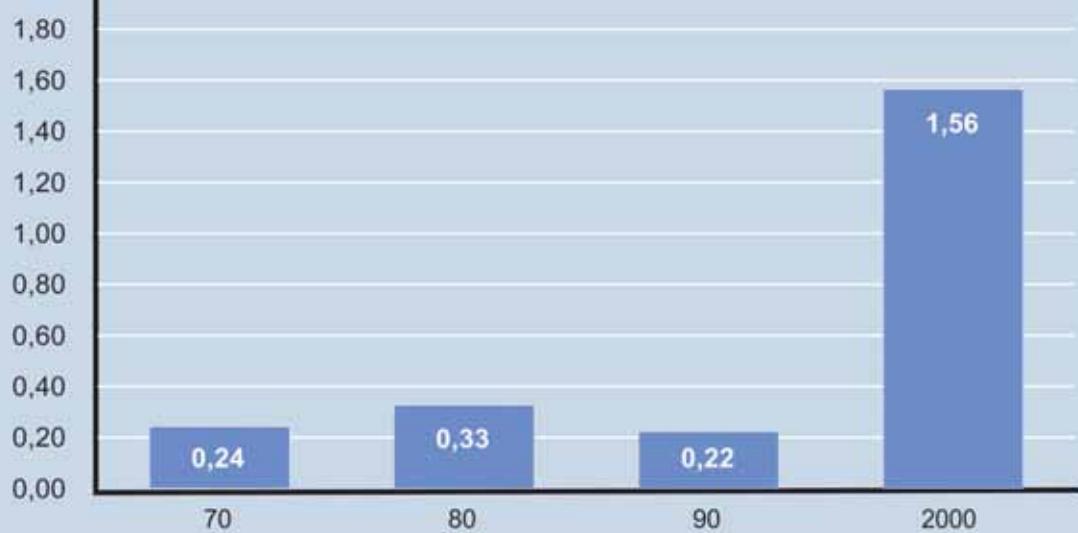
As a recap, soybean consumption growth has been proportionally higher than GDP per capita growth even after the loss of weight of elasticity produced by the change in consumption baskets worldwide.

From this point of view, soybean market perspectives are hopeful. For instance the IMF estimates for 2010-2015 an economy growth rate of 4.5% per year, which would, implies a soybean consumption growth of 5% per year. In other terms soybean consumption would be by 2015 33% higher than in 2009. Global population growth has been 168% between 1950-2009 according to Angus Maddison, this expansion means that demand is still growing which is important as well for soybean market.

GDP Per capita and soybean oil consumption

Using the same approach as before we can estimate the relationship between gdp per capita and soybean oil consumption since this product is having now an additional use as biodiesel in different markets.

Chart 13 - Gdp Per Capita - Soybeanoil Consumption elasticity



Source: Author's elaboration

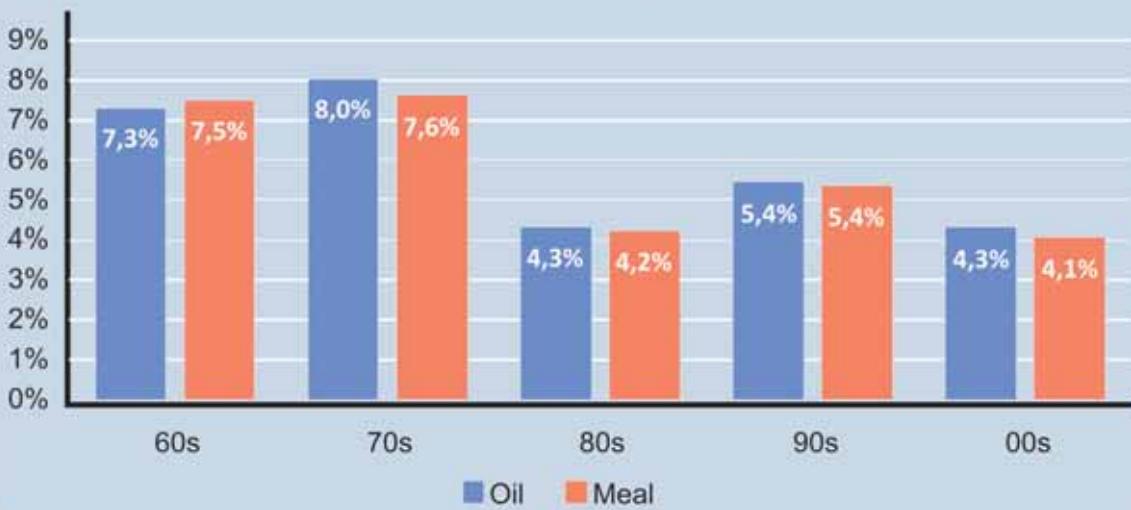
These results are pretty impressive and show over three decades an insignificant relationship between gdp per capita growth and soybean oil consumption. But over the last decade the tendency abruptly changed and shows that the soy boom and the growth in gdp per capita have increased the soybean oil consumption.

Unfortunately there are no statistics differentiating the use of soybean oil but nevertheless the results shows that the consumption is strongly correlated with the economic growth worldwide. Assuming an average of the different decades oil consumption would have a less increase in demand than soybean meals giving the opportunity to the growth to a new industrial use as biodiesel.

Soy meal and soybean oil relationship.

One matter that appears as an important one is the relation between soybean oil and soy meal. As it is known, soy biodiesel is produced with soybean oil, which is the second derivative of soybean just behind soy meal. As can be seen in the following chart, over the last five decades, the average growth rate of soybean oil and soybean meal has been closely related. Indeed, soybean oil-meal consumption elasticity has been 1.6 during the period. It means, of course, that both products tend to grow to almost the same rate.

Chart 14 - Consumption



Source: Author's elaboration with USDA's PSD database information

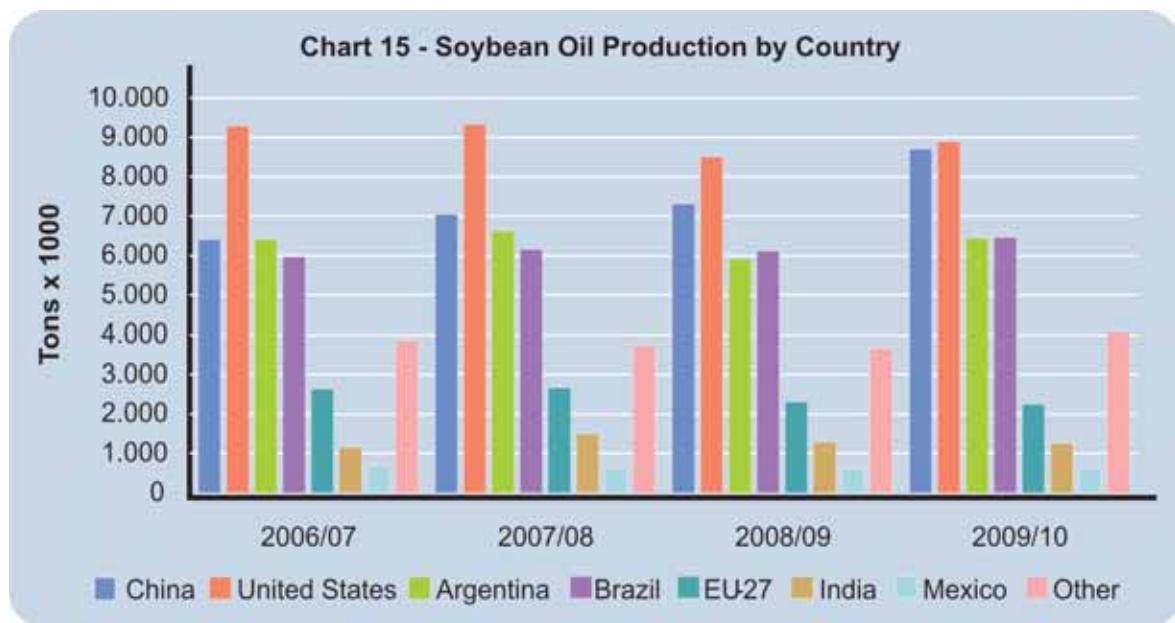
This last point gives some important information for the soy biodiesel market: as long as soybean meal and oil show similar growth rates, the growth of soybean meal would not be associated to the generation of a soybean oil surplus, because its consumption growth rate would be theoretically similar to the soy meal.

We must here state that for each unit in increasing capacity of soybean production the relative growth of soybean meal / soybean oil is 8,2 to 1,8. On the other hand, it is also true that the soybean oil surplus would grow in absolute value, given that production would be larger. The point is, nevertheless, that growth of soybean meal consumption would not tend to generate larger stocks of soybean oil ready to be used on soy biodiesel production, as is sometimes hypothesized.

Both production and soybean consumption growth circled an important expansion on trade. Once again soybean derivates have shown a strong and almost permanent growth.

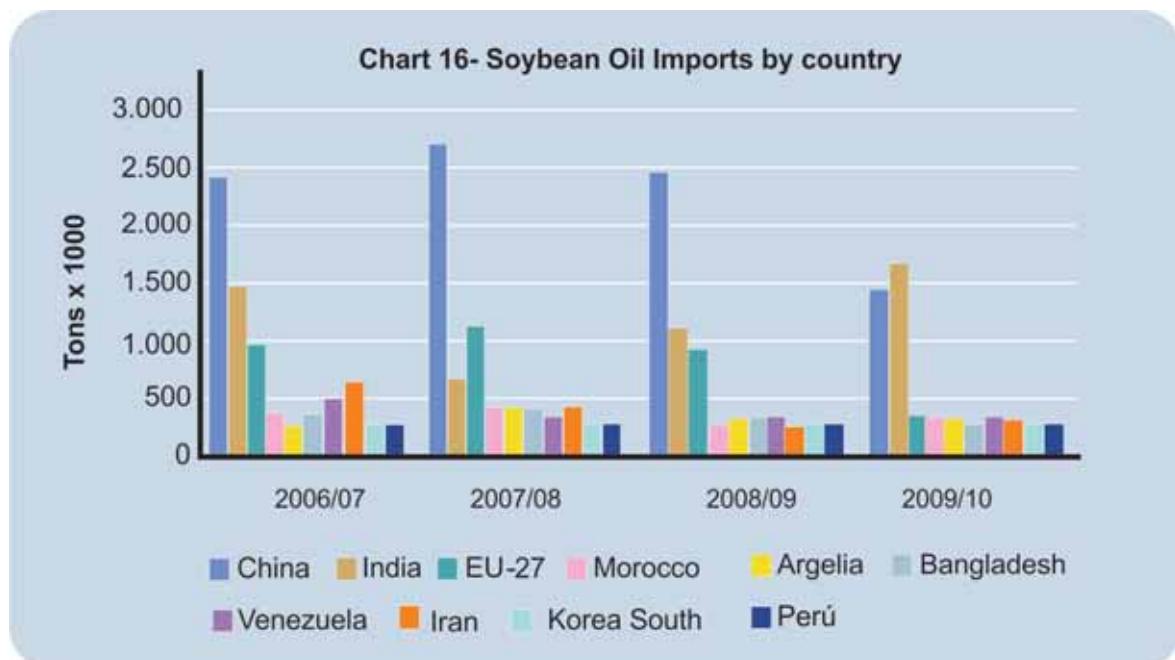
Soybean oil

As the main feedstock of soy biodiesel, one of the main focuses of this research, it is important to observe the trend of soybean oil over the last couple of years in order to understand the final destiny of its production



Source: Author's elaboration using PDS online data from the USDA

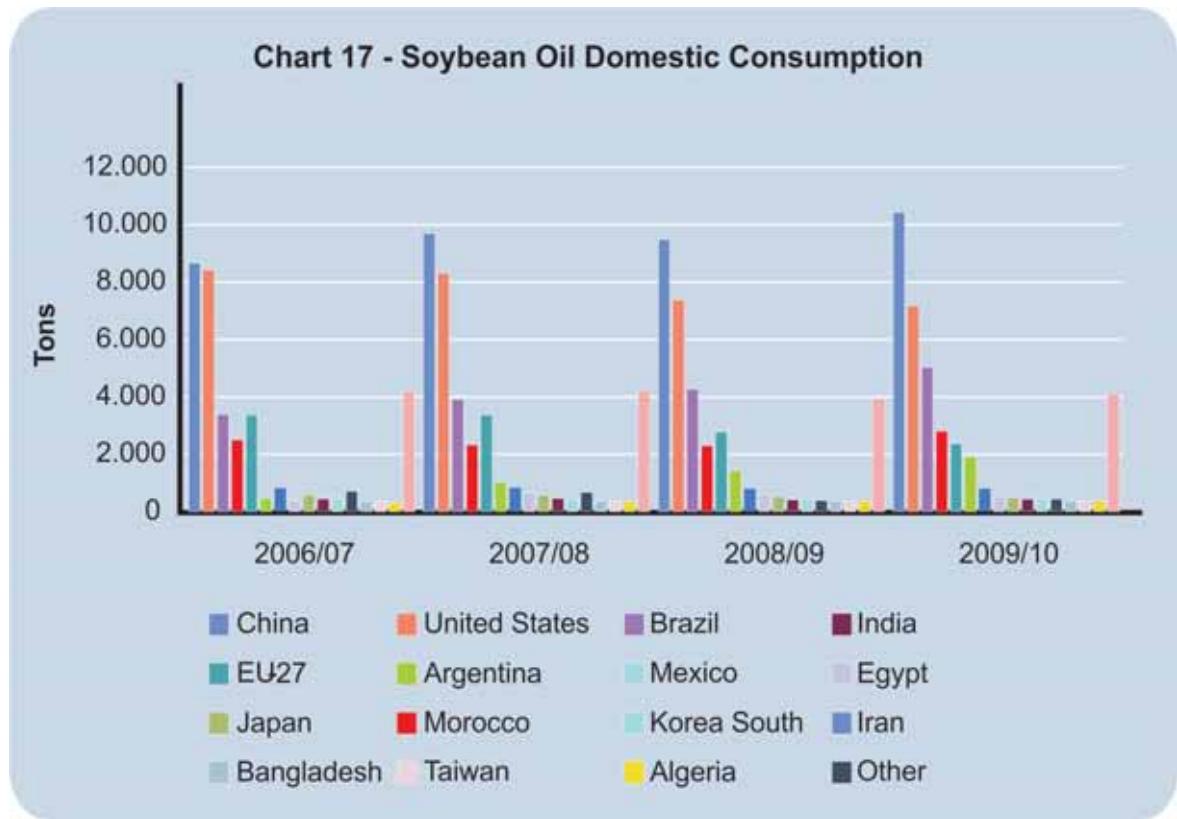
As we can see China and the US are the main producers of soybean oil but in the last campaign (2009/2010) China has made a catch up, stating the growth of China's economy in terms of installed capacity.



Source: Author's elaboration using PDS online data from the USDA

Nevertheless, China's growth in production is also followed by a growth in soybean oil imports. This means that given China's population it will still be a leading demander in terms of soybean oil. During 2010 China had a significant controversy with one of its main soybean oil suppliers based on quality standards difference. Although Argentina's exports dropped sharply during the year the important growth of India supports the theory of a triangulation to reach the demanding market of China at a lower price.

Now let's focus on the main point of this section: Soybean oil usage

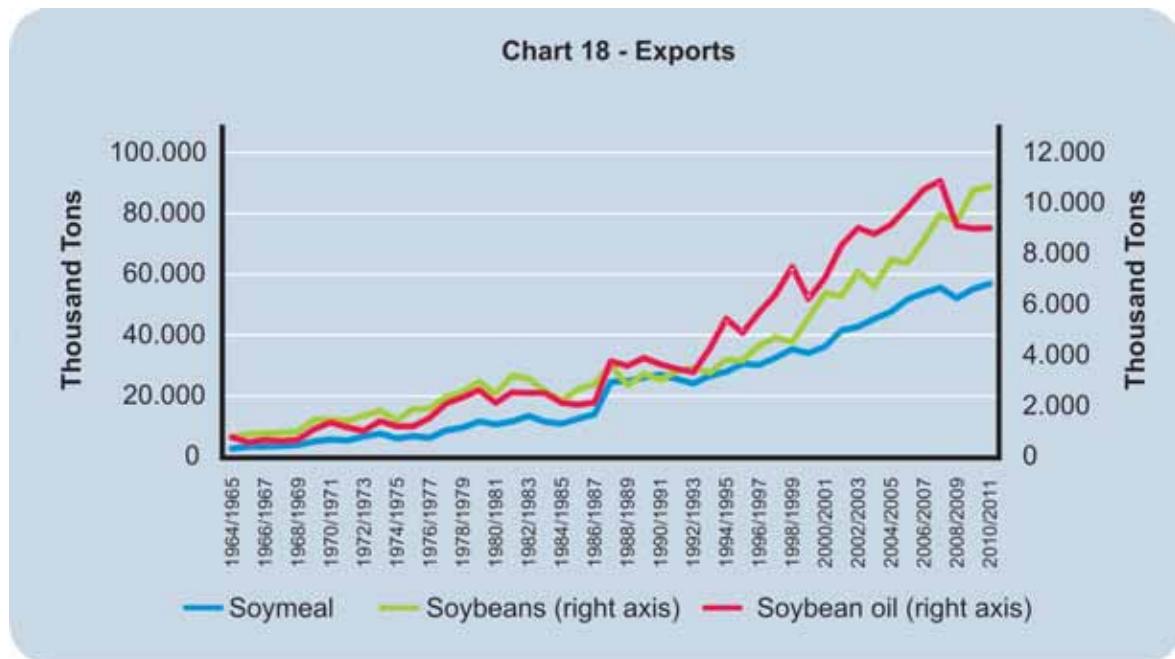


Source: Author's elaboration using PDS online data from the USDA

This chart is important in order to observe that over the last couple of years China dominated in terms of soybean oil usage. The main usage for soybean oil is domestic consumption, mainly for cooking purposes. As we can also observe Argentina participation in terms of consumption is marginal. This gives the country a main advantage in order to reinforce its export orientation as we will see in Section 2 of this research.

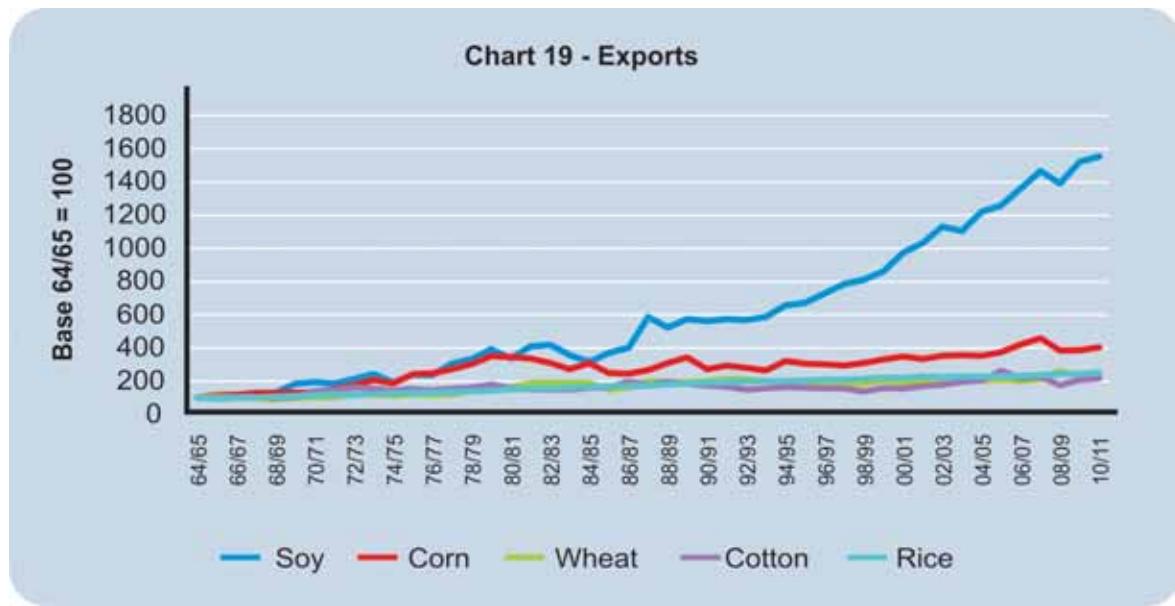
Although there is little information on each country final use of the oil this types of studies are going to be crucial with the possible increase in industrial use of the oil, impact in final prices and consequently impact on people's way of cooking.

Exports



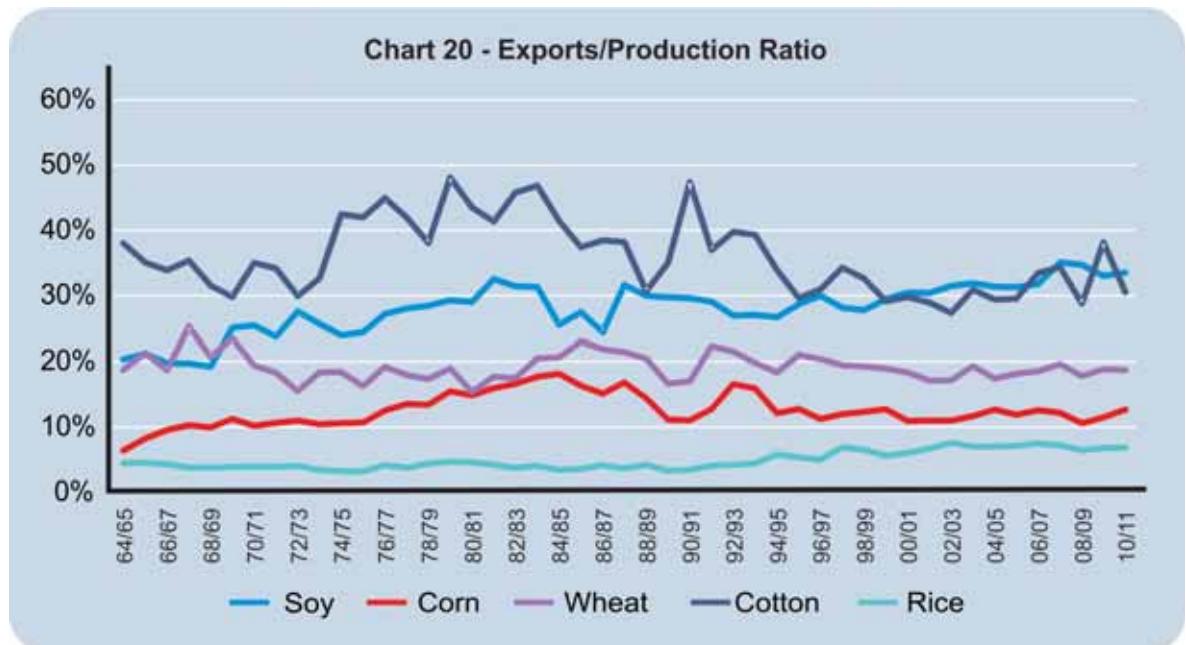
Source: Author's elaboration with USDA's PSD database information

There is a steady increase in the export market of all soybean products in the last forty years, biodiesel as a recently arrived actor plays an increasing role in the last three years reaching a global export trade of 4 million tones. Relatively with other crops soybean trading growth has been clearly higher.



Source: Author's elaboration with USDA's PSD database information

Besides the strong growth experienced by soybean trade it is worth noticing that the crop is becoming to be a leading product trading wise comparing it with the most traded products worldwide. This can be observed in the next chart that tracks the exports/production ratio of the most traded crops. Soybean shows an upward tendency compared to the downward tendency showed by other products over the last twenty years.

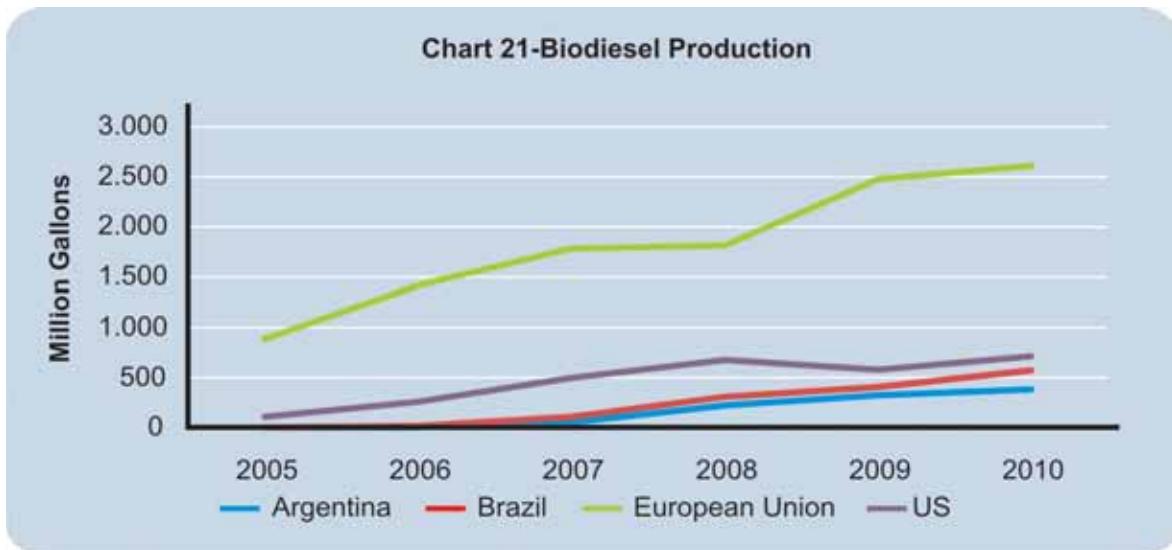


Source: Author's elaboration with USDA's PSD database information

Soy biodiesel

Evidence shows not only that soybean market experienced an extraordinary growth over the last few years but that such growth outlasted other reference crops. Is within that context that Argentina's case must be analyzed. Even though the lack of information is still unavoidable, the soy biodiesel sector has the potential to become a leading one in Argentina.

Soy biodiesel production

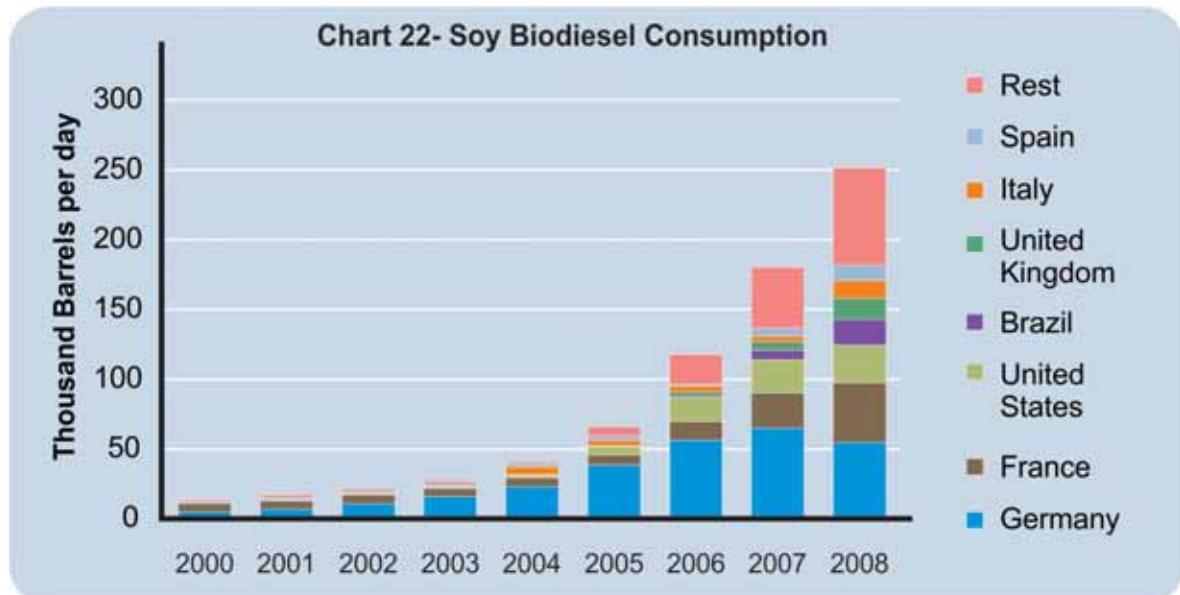


Source: Author's elaboration with EIA database

Nowadays, most part of the soy biodiesel production is concentrated within the EU and particularly, Germany (world's leading producer thru 2009) and France that has emerged recently. Since 2007 two countries have emerged: Brazil and Argentina. By 2008 both countries placed themselves in the top 5 of soy biodiesel producers worldwide. Recent years evolution shows, besides an important growth in production, the appearance of the US, Argentina, France and Brazil in a market leaded historically by Germany. From this point of view geographic dispersion seems to be a stylized fact in the soy biodiesel sector. However it's still a highly concentrated market.

Soy biodiesel consumption

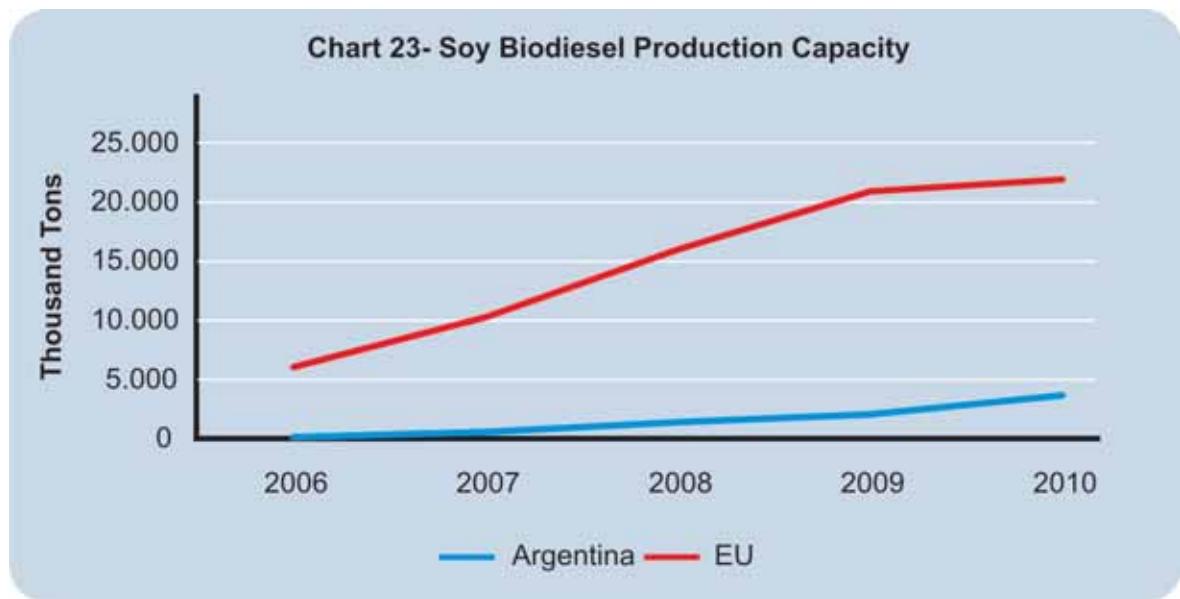
Biofuels consumption has experienced an important growth over the last few years. It is worth noticing that the growth rate of Biofuels consumption has been lower than the growth rate of production, meaning that there must be another incentive rather than the growth in demand, international prices and profit margins expectations could explain such phenomenon.



Source: Author's elaboration with EIA database

Soy biodiesel production and installed capacity

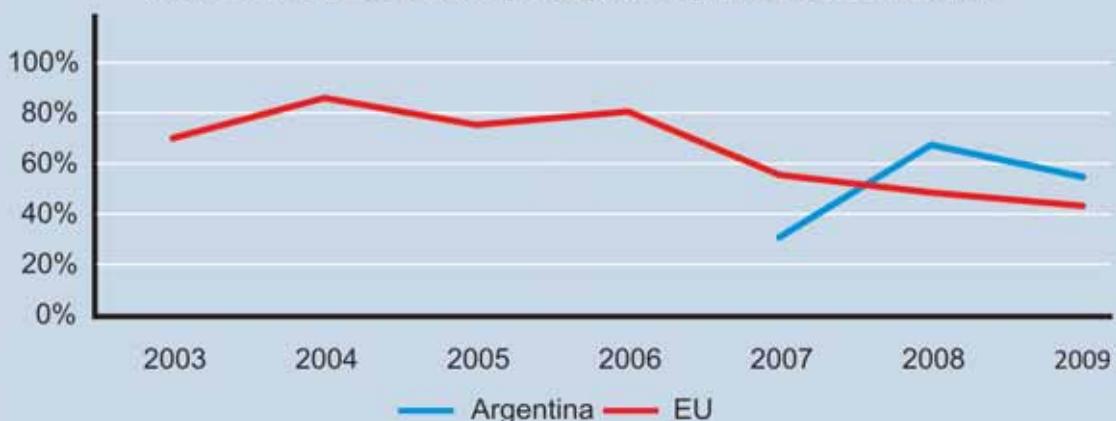
Installed capacity growth rate has been worth noticing, this shows the positive perspectives within the soy biodiesel sector. Only in Argentina and the EU the installed capacity went from 6.2 million tons in 2006 to 23.1 in 2010 (expected)



Source: CADER and EBB

It seems obvious that soy biodiesel sector growth has been notorious over the last few years. The growth of installed capacity seems to back that assessment. There is an important percentage of the installed capacity that is not being used. This is the case specially in Europe with variable numbers between countries. Although Argentina presented a used capacity above 60 % during 2009 this number were significantly increased during 2010 with the internal market new demand due to the mandatory blend. The surplus capacity of Europe is causing great pressure and lobbies form the damaged sector asking for measures to increase their participation. The principal cause of this situation is that Europe is not capable of providing the sufficient feedstock to feed its industry, this one was originally though as n imported of raw materials from abroad. During the recent years a whole industry with put in place on exporter countries as Argentina with a very high efficiency transforming chain low energy demand and low carbon footprint.

Chart 24- Installed Capacity Usage in Soy Biodiesel Production



Source: CADER and EBB

Soy biodiesel trading. Argentina and the us comparison

Soy biodiesel trading has experienced an elevated growth as well. Argentina's and the US cases are illustrative.

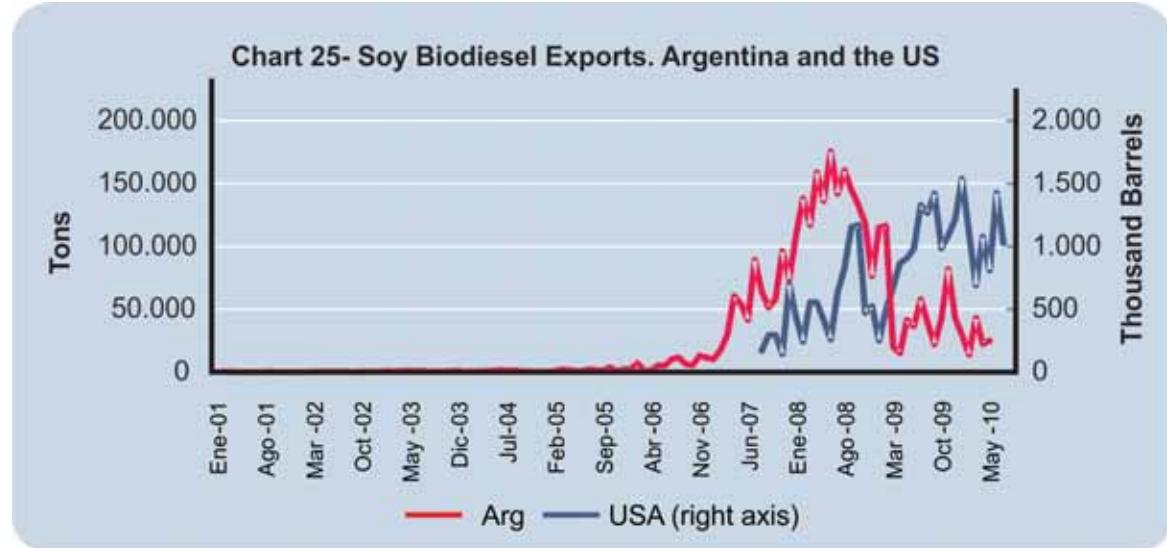
In May 2006 Argentine Biofuels Law 26.093 was enacted. Its focus was the development of a domestic biofuels market, and it established a B5 and E5 requirement beginning January 1st, 2010. However, a global biofuels industry had already been launched by the time the law was enforced, and many large consumers such as Europe and the United States had already established ambitious targets. The Argentine private sector, led by the large oilseed crushers, saw a market opportunity and was among the first to build large biodiesel plants, typically using foreign technology, and focusing on export markets –which ended up being primarily in Europe. Argentina is, in fact, only one of two countries that developed their export markets ahead of their domestic one driven by an abundance of feedstock, comparatively smaller domestic markets, and a desire to generate hard currency through exports.

The Legislative Branch's biofuels law gave the general basis on "what must be done in this matter; the Executive Branch of government was responsible for its regulation or the how the law would be implemented.

Since the different drivers and forces and the multiple factors at a national and international level to be considered, the regulations were slow. Law 26.093 wasn't regulated until late 2007 by Resolution 109/07, but by then a number of biodiesel plants were already operating. Also, a very important resolution referred to the safety requirements. These rulings, along with Resolutions 226/08; 1296/08; 6/10 and 7/10 constitute the basic framework on which the biodiesel industry works at a national level. Although this framework is already in place there are several administrative acts as the update of the reference price that brings up considerable turbulence when delays occur.

Legal and Regulatory Framework for Biodiesel

- **Resolution 129/01:** Defines biodiesel.
- **Law 26.093/06:** Biofuels law. Biodiesel and ethanol mandates. Participating enterprises. Application Authority.
- **Decree 109/07:** Regulations for Biofuels Law.
- **Resolution 266/08:** Registry of universities authorized to perform technical, environmental, and safety audits on biofuels plants.
- **Resolution 1296/08:** Fire safety requirements for biofuels plants.
- **Resolution 6/10:** Quality specifications for biodiesel.
- **Resolution 7/10:** Announces the list of producers that comprise the domestic mandate during calendar 2010, as well as the formula used to determine the wholesale price.



Source: EIA and CARBIO

Argentinas export tax policies

Argentina has introduced different policy measures in order to face one of the most serious economic crisis in the modern history during 2001. Under this framework, in 2002 by National Law 25.561 it was declared a public national social & economic emergency. An important intervention on the financial and exchange rates were implemented with the view to attempt to solve as rapidly as possible the social unrest.

The Government decided to introduce by Resolution 11/2002, export taxes in all products, with the objective to restore public revenues and to protect most damaged social sectors in Argentina. The income taxes are used to expand and strengthen social programs for unemployment and food security and the payment of external debts in due time. Having in mind these goals, there is no date to foreseen a possible withdrawn of such measure.

Those initial levels were lately increased at a different rate for several agricultural and oil & gas products.

Due to the actual discussions with external markets of the Argentina policies regarding the export tax over different products mainly on the soybean transforming chain it is important to analyze those measures enlightened by the WTO standards and regulations.

Multilateral aspect:

- The use of export duties are considered compatible with WTO rules; GATT Article XI.1 states: "No prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licences or other measures, shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party". Export taxes are excepted due to the words "other than".

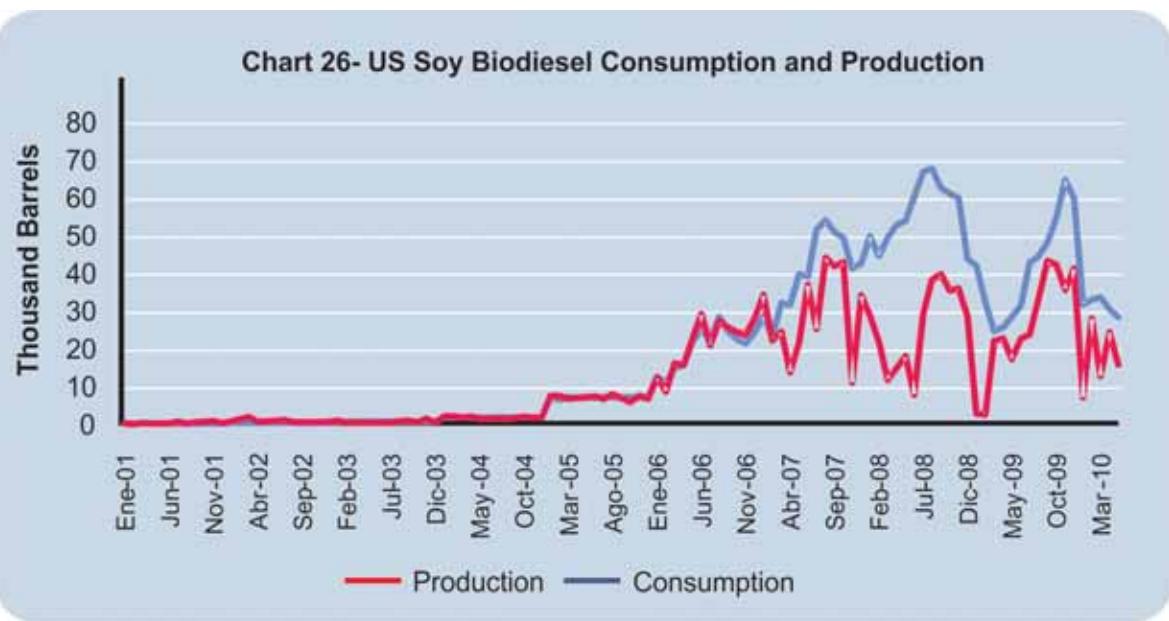
- Export duties are not considered as subsidy for production or export. There are legal precedents at WTO backing this interpretation like Canada - USA in timberland (WT/DS/194/R), particularly because the WTO Subsidy Agreement foresees to consider such practice if there is only a financial contribution from the government.
- Related to differential export taxes (DET), the existence and extensión of such measure is in closed connection with tariff progressivity meaning with that a situation where a raw material has cero or reduced import levy and the end product has a higher duty, in the middle, all the intermediate products have import duties in a scale and progressive level.
- Argentina always supports a full liberalization of agrifood tariff worldwide, the country is ready to accept such challenge if all the countries agree to modify and eliminate tariff protection at border.

The splash and dash in the us

In the graph 25 it can be observed, on one side, the growth of Argentina's exports and on the other side the fall of the US since the pike in 2008. One explanation regarding the US case could be the reduction of export margins due to the increment in domestic consumption and some stability in production. However another case must be followed closely and it is the "splash and dash".

European soy biodiesel producers were the first to protest against the sharp increase in soy biodiesel imports coming from the United States beginning in 2007. The Europeans argue that the only reason U.S. exports have increased was a misuse of the blenders tax credit through a mechanism called "splash and dash." The practice consisted of blending ("splashing") 0.1 percent of U.S. diesel fuel with 99.9 percent of imported soy biodiesel and then shipping ("dashing") the resulting blend to the European Union.

As mentioned by the Center for Agricultural and Rural Development of the University of Iowa "The payoff to splash and dash is large. Consider a 2.5 million gallon shipment of Malaysian soy biodiesel destined for Europe. At a soy biodiesel price of \$4.00 per gallon, this shipment is worth \$10 million. If the tanker makes a port stop in the United States and adds 25,000 gallons of diesel to its load, the company will collect a \$2.5 million tax credit, thereby increasing the value of its cargo by 25 percent. This additional payment potentially allowed imported soy biodiesel to compete successfully with E.U.-produced soy biodiesel. The incentive to re-export imported soy biodiesel was so high that tankers of soy biodiesel produced in Europe were shipped to the United States to receive the \$1.00-per-gallon subsidy."



Source: Author's elaboration using EIA database

Conclusions

- Soybean production is immersed within a productive system that cannot be analyzed in an isolated approach.
- In Argentina's case the evolution of the agricultural system with soybean production as perhaps the most important asset over the last few years is characterized by a continuous technological improvement.
- Over the last decades, soybean cultivation has had an evolution with no precedents. Since the 70's implanted areas have grown steadily representing 37.000 hectares in the 1970/71 campaign to more than 17 million in the present.
- In Argentina for 2010 the estimated USD collected by export taxes will represent near 4% of the GDP of Argentina. This is by no means a small number given that for example Argentina's spending in Education totals 4% of the GDP, Health spending is near 5% of the GDP, housing spending is near 0.5% of the GDP and Social Security near 9%.
- Soy meal production is 134, 6 % higher than twenty years ago. In the same span of time soybean oil has been 139.6% higher and soybean 134, 2%
- The extraordinary growth of soybean production is without doubt correlated with the growth of implanted areas
- In Argentina's particular case according to the 2008 agricultural census, more than 60,000 farms shut down between 2002 and 2008, while the average size of farms increased from 421 to 538 hectares. The magnitude of the change was partially atempered with new actors and forms of organization.
- There has been a shift into soybean production triggered by net income of this crop and the technology involved.
- The two main technological factors that have lead to the spectacular soybean expansion in Argentina are the no-till farming system and the introduction of genetically modified soybean.

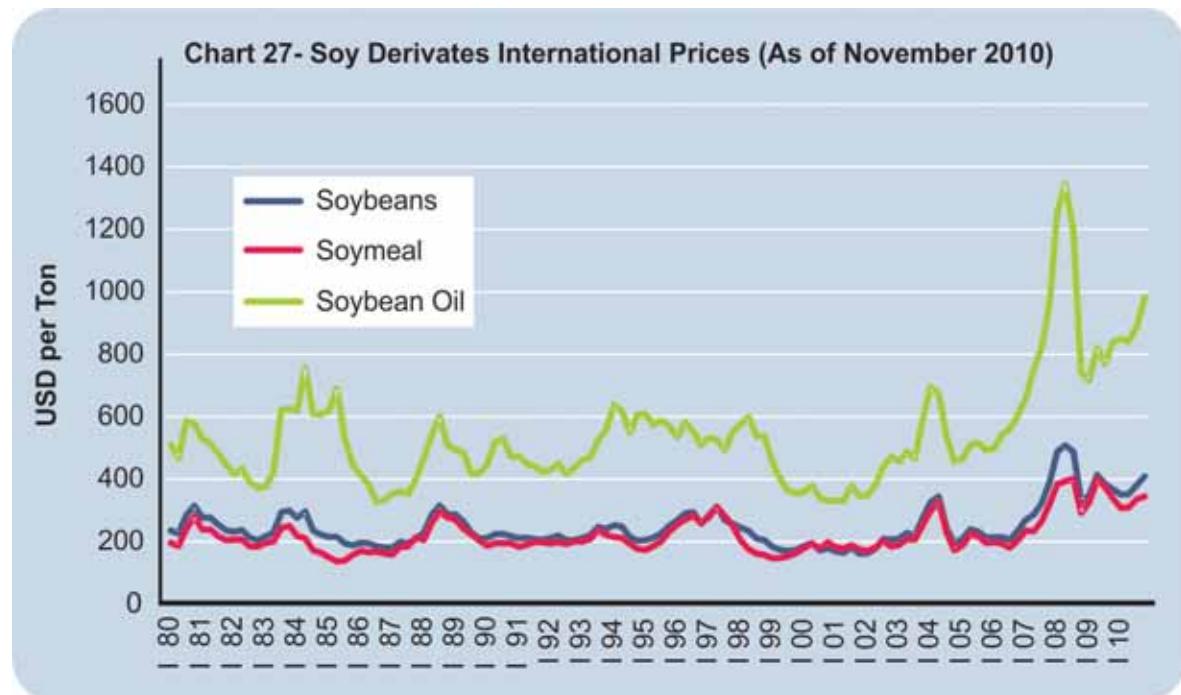
- Regarding elasticity's consumption elasticity of soybean-meat is 1.91 for the period 1964-2010, which implies that a 1% growth of meat consumption has as a counterpart 1.91% soybean consumption growth
- It can be concluded that in recent years existed an important link between soybean demand and meat consumption.
- Soybean market perspectives are hopeful. For instance the IMF estimates for 2010-2015 an economy growth rate of 4.5% per year, which would, implies a soybean consumption growth of 5% per year. In other terms soybean consumption would be by 2015 33% higher than in 2009.

2. High soy and derivates prices in recent years

In this section the fact that the soy derivates prices roused over the last decades is studied and the possible explanation in order to understand why that happened are explored. The focus will be based in two theories that nowadays are used for explaining the commodities boom during the 2000's decade. A brief mention to the US dollar over the period is also addressed over this section.

Prices outlook

It is well known that high prices characterized commodities markets over the last decade. As shown in the next chart, there has been an upward tendency for most of the period, with a pike in 2007/2008.



Source: IMF

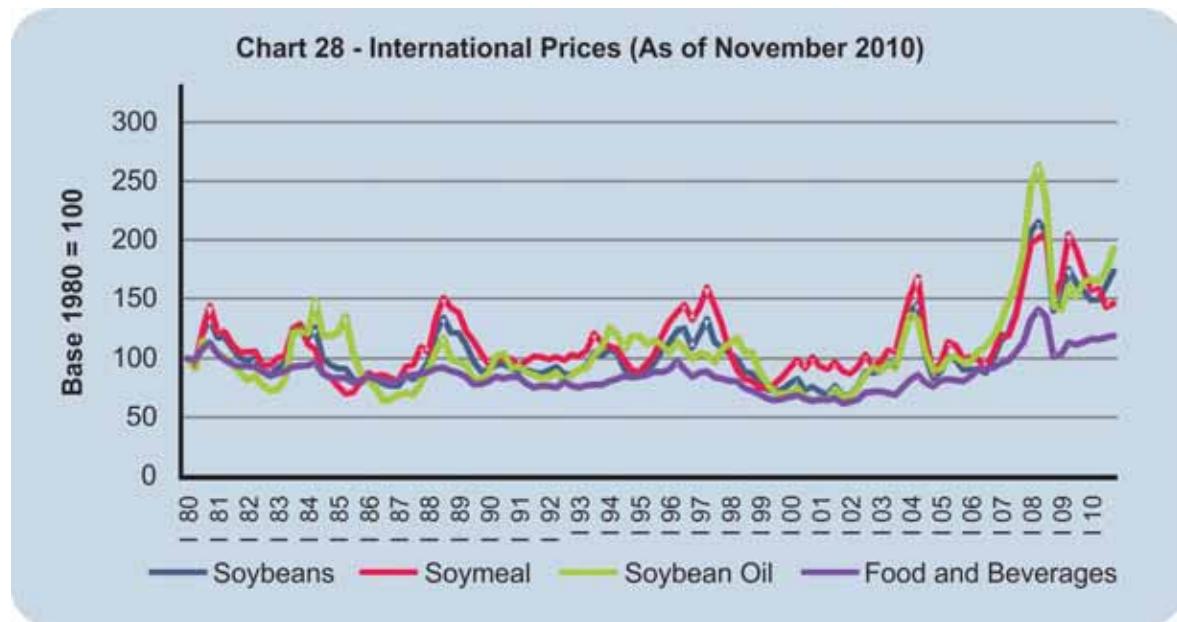
The last five years set a record in soybean prices since, at least, 1980. According to the last chart in first half of the 2000's soybean market did not show a good period, soybean and soybean oil prices were the lowest since 1980. So it is accurate to conclude that the high price phenomenon in soybean and derivates markets is more recent than thought.

Table 3 – Soybean average international price, usd per ton

	Soybean	Soy meal	Soybean Oil
80-84	253	212	518
85-89	223	198	457
90-94	219	199	496
95-99	236	214	522
00-04	210	205	440
05-10 (As of November '10)	327	286	776

Source: IMF

Another thing to keep in mind is that after the prices plummeted due to the 2008 crisis, they have recovered and sustained over the historical average price. In the second trimester of 2010 soybean Price was 44% higher than the average of 1980-2010, soy meal 41% higher and soybean oil 57% higher. The growth in soybean prices happened in a context of high food prices. Nevertheless soybean and derivates prices were higher than the average food prices. This means that another factor must explain the upward tendency in soybean prices.



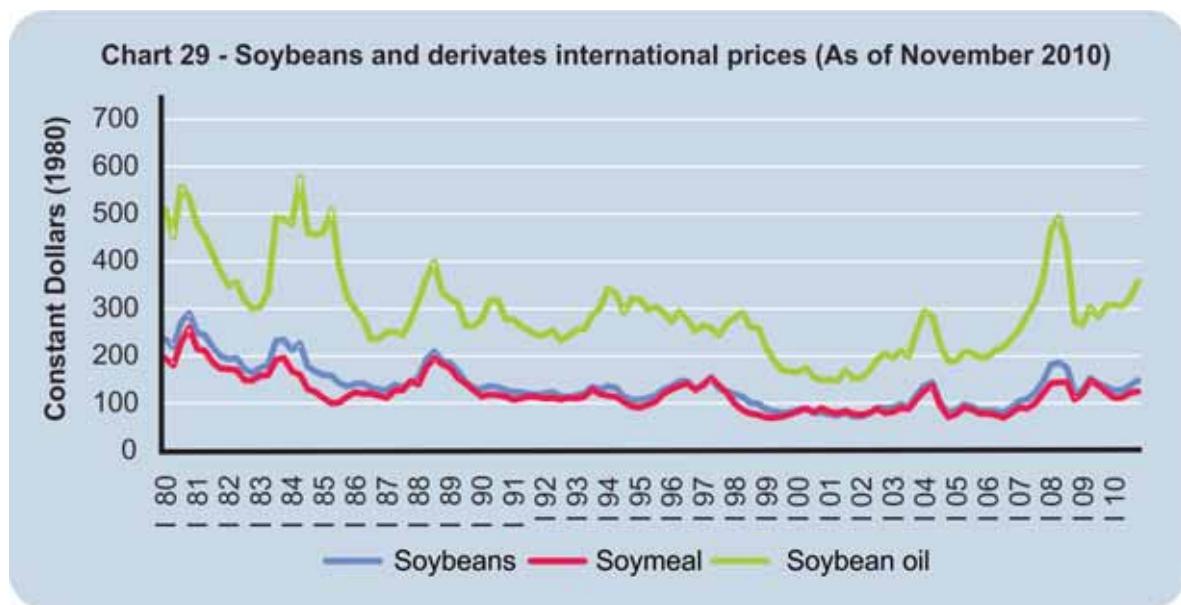
Source: Author's elaboration using IMF database

Before moving on it is worth leaving aside nominal prices and focus on constant prices as shown in the next chart. Surprisingly once the focus is changed we can observe that the actual soybean prices are lower than the prices of the beginning of the 1980's. From this

perspective, the phenomenon of the high prices could lose some steam given that despite the recent upward tendency, the prices did not reach the level of 30 years ago.

From another point of view, the evolution of constant dollars could also be giving some ground to those who think that commodity prices not necessarily should face a contraction period given that the actual prices are lower than the historical average

Based on this analysis and relying on production demand equilibrium the actual prices would not show a significant unbalance production/demand equation in all products.



Source: Author's elaboration using IMF database

Possible explanation. Two theories

Even after the remarks made about constant prices, the evolution of prices has been strong enough as to catch the attention of specialized media. This actors are very important in the role of changing public perception of the different societies and this immediately leads to changes in political desitions. In this line of thought the actual discussions by different government leaders of the European Union as France are eloquent.

There are two opposing views. One of them attributes the boom-and-bust cycle to a simple matter of supply and demand, while the other stressing excessive speculation by index investors.

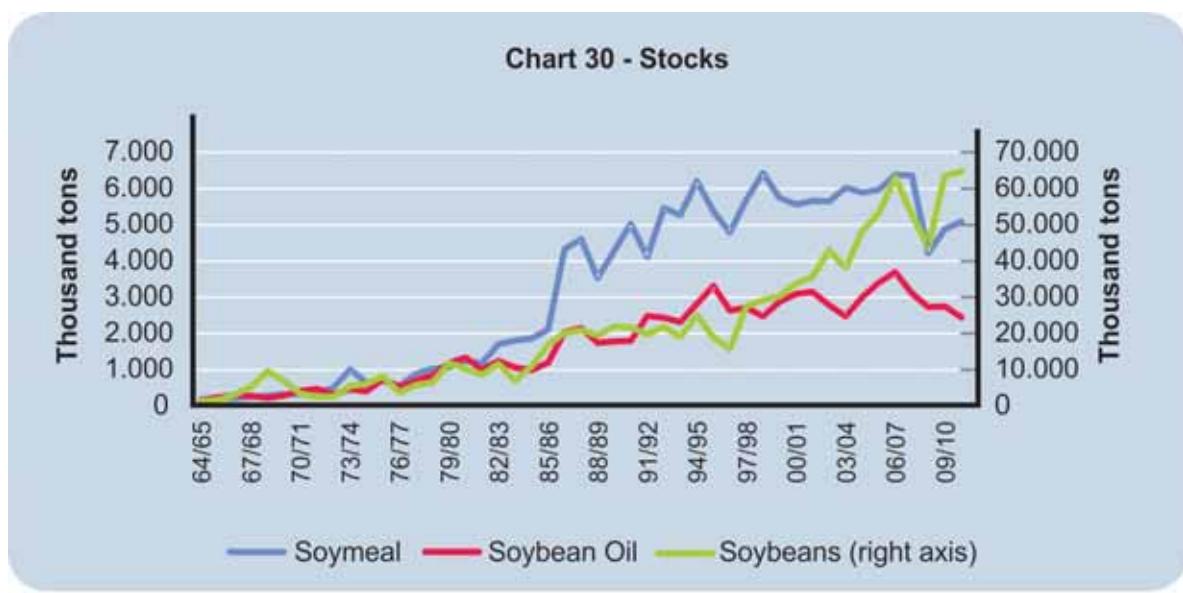
According to the first view (e.g., Krugman (2008), Hamilton (2009), and Kilian (2009)), the rapid growth of emerging economies such as China propelled the quick increase of world demands and caused commodity prices to soar before the summer of 2008. Prices later fell sharply when the world recession caused demands to fade. The second view attributes the large volatility of commodity prices to distortions caused by large investment flow into commodity markets.

The first vision states that the upward tendency of soybean and derivates prices is explained by the push generated by demand. But in the last few years some objections to this theory took place: First the capacity of demand growth to explain such a movement in prices began to be questioned, and on the other hand the demand theory couldn't explain how in a context of economic recession the prices continued its growing tendency.

This motivated the development of a new theory trying to explain commodities prices in general and soybean's in particular, using a financial approach. This theory states that the recent movement in commodities prices had a financial speculation motive. From this point of view, commodities had transformed in a speculation asset. A good explanation of this phenomenon can be found in Frankel (2008), who wrote that in a context of low real interest rates that motivated an incentive in the demand of stockable assets such as commodities.

That demand would only diminish when the investors feel that the price roused too much.

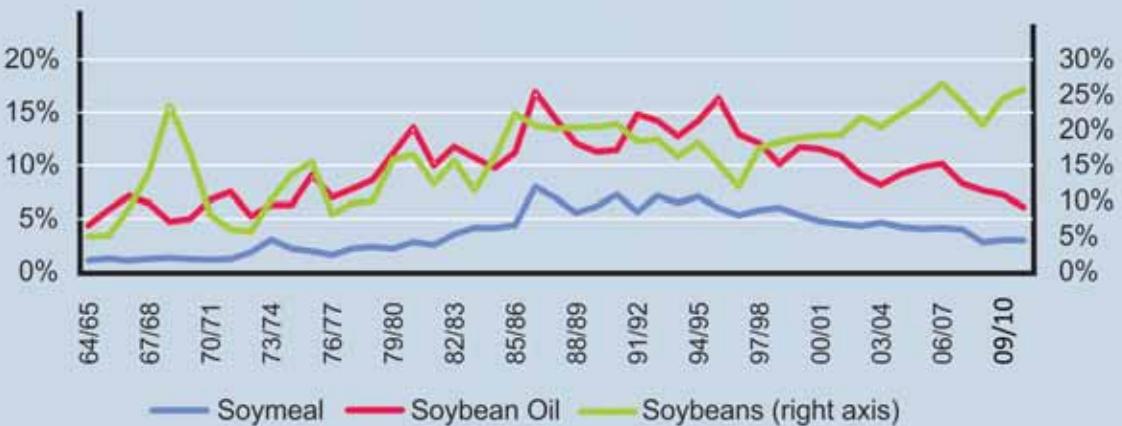
Following a similar approach it has been stated that the securitization of assets over the last decade generated an enormous inflows of capital in the commodities markets, particularly in the futures segment. This theory would explain the link between the financial crisis that took place in 2008 and the subsequent fall in commodities prices. This point of view was questioned by Krugman (2008), who stated, that if true, a growth in commodities stocks would have to take place. The next chart, however, shows that it exist certain evidence to support the growth of stocks.



Source: Author's elaboration with USDA information

In order to analyze the stocks evolution it is important to compare it using production as a benchmark getting the following ratio stocks/production.

Chart 31- Stocks/Production



Source: Author's elaboration with USDA information

The general impression is that these theories are complementary. It is plausible to think that both kinds of demands coexisted for most time, and that the evidence is still not accurate on which one is better than the other. Both kind of demands (real and speculative) coexisted in a context of a decline in the dollar, as we know commodities prices are valued in dollars, and such a decline in the world's leading currency could explain part of the rise in prices.

The us dollar situation

The dollar is the usual currency to be used in economic studies of different products assuming its stability and strength in the international markets. In recent years this was not the case causing several distortions in the analysis of key commodities as grains and petroleum.

Chart 32 - USD exchange rate



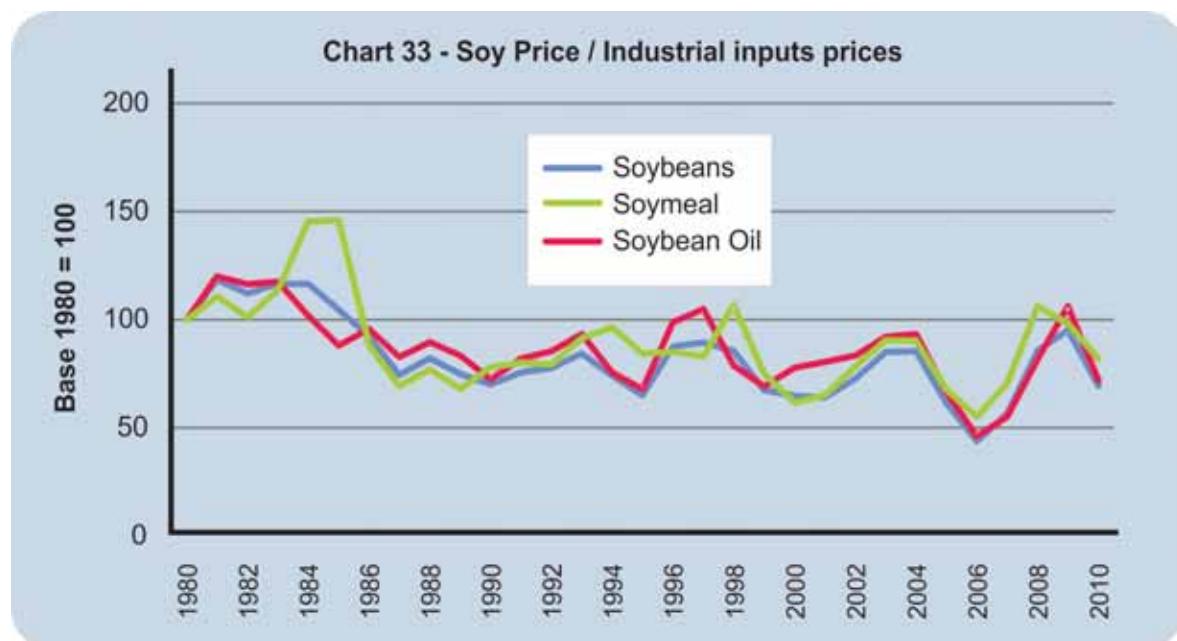
Source: US Federal Reserve

The decline in the dollar could be seen in the next chart where the series is constructed as a weighted average of the exchange rate between USD (Us dollar) and 26 of the most relevant currencies for the trade with the US.

The reasons behind the growth in prices are not irrelevant because there is a link between them and the sustainability of actual prices. If the principal explanation lies in the world growth demands it is expectable that the current tendency would prevail. But if the growth in prices is purely speculative, the prices bubble would eventually burst and the prices would reach the historical levels. In a middle point between the two theories should be the answer.

Soybeans price compared with industrial input prices

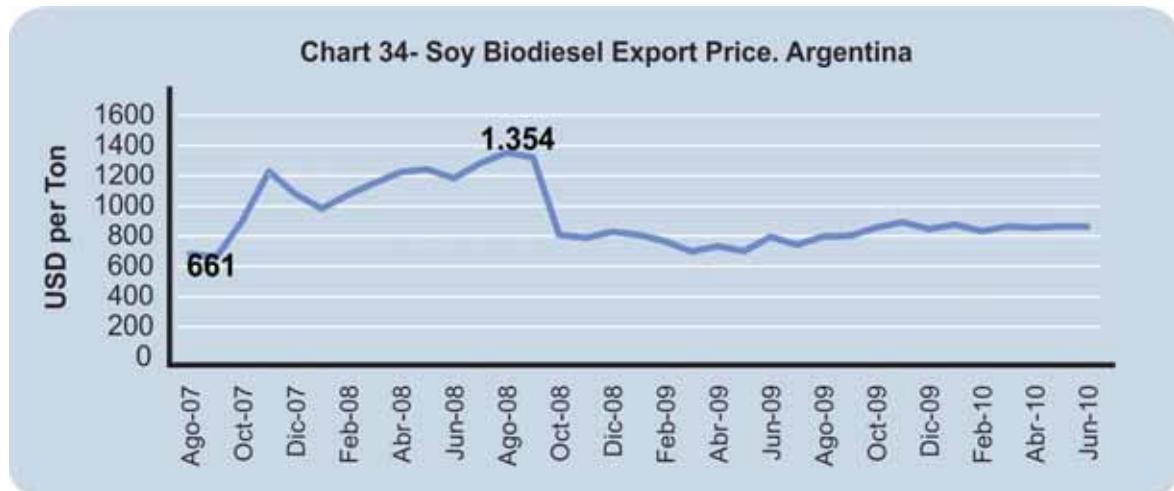
An additional matter worth mentioning is the relationship between soybean – and commodities in general- and industrial inputs. As shown in the next graph, even though the recent growth in prices the tendency has been declining since 1980.



Source: IMF

Soy biodiesel price

Regarding the international price of soy biodiesel it is worth mentioning that it does not exist because it is not a commoditized Price, leaving no benchmark Price as in commodities to look at. Nevertheless, the evolution of soy biodiesel Price could be reached using some domestic series. Particularly, Argentina's could be used because it is the world's leading export country.



Source: Author's elaboration

As observed, soy biodiesel price seem to have followed a certain pattern comparable with the one followed by the commodities analyzed in this work, with an enormous growth in 2008. The fall after the crisis, and the recovery (a small one) could be observed as well. In this case the prices did not reach the pre crisis levels. The resemblance between the behavior of biodiesel prices and commodities it is not random.

First of all, soybean oil is the main feedstock in soy biodiesel production. According to the "Instituto Argentino de la Energía General Mosconi" (2006), soybean oil explains 74.9 % of soy biodiesel cost. The second one would be Metanol only explaining 8.6 %.

Table 4 – cost structure in soy biodiesel production

Input	% total cost
Vegetal Oil	74.9%
Methanol	8.6%
Caustic soybean	1.2%
Sulfuric Acid	0.7%
Cooling Water	0.4%
Vapor	0.9%
Electric energy	0.5%
Hand labor	8.2%
Amortization	4.6%

Source: Instituto Argentino de la Energía General Mosconi (2006)

It is also true that in some cases soy biodiesel could act as an oil substitute so a correlation between oil prices and soy biodiesel's is expectable. The resolution 7/10 establishes the formula that is used to determine the price (calculated monthly and published on the Energy Secretariat's website) for biodiesel. This price is ex-works, i.e., sold at the biofuel producers door and is quoted in pesos per ton. <http://energia3.mecon.gov.ar/contenidos/verpagina.php?idpagina=3033>

The price for the month of December 2010, \$ 4268 pesos/ton, is equivalent to \$4.2 pesos/liter; and approximates international levels. We see here that the approximate spread between the biodiesel wholesale price and the diesel retail price is only about \$ 0,6 pesos/liter for the common diesel and 0,1 for the premium one (about US\$0.04/liter).

The downstream oil & gas companies bear the cost of picking up the biodiesel at the plant and

deliver to the blending terminals – not a small undertaking – as well as the various administrative and logistical matters inherent. This reduced margin may help explain why they have thought to delay the beginning of the biodiesel mandate. Given an annual market for 859 thousand tons of biodiesel (which is likely to be reached in 2011 since we began late this year) and using this month's price of \$ 4,268 pesos/ton, the domestic biodiesel market would reach about \$3,6 billion pesos, or approximately US\$ 916 million dollars, per annum.

There is an increasing interest in going up to a mandatory B10 if agreements are fulfilled with car manufacturers. This broadening of the domestic market will be supplied initially by the Oil Crushers and Large Independents, which have capacity to spare. The challenge will be ensuring that the existing as well as many new small and medium producers might continue to participate in this market. This smaller enterprises face greater challenges when gaps between reference and cost appear and they have also less financial shoulders to support any delays in payments. On the other hand they tend to generate more jobs and distribute wealth better. At current prices, a B7 market would generate about a billion dollars a year in revenue, while a B10 market would generate about US\$1.5 billion annually. Undoubtedly, this market will continue to be interesting for the coming years.

Conclusions

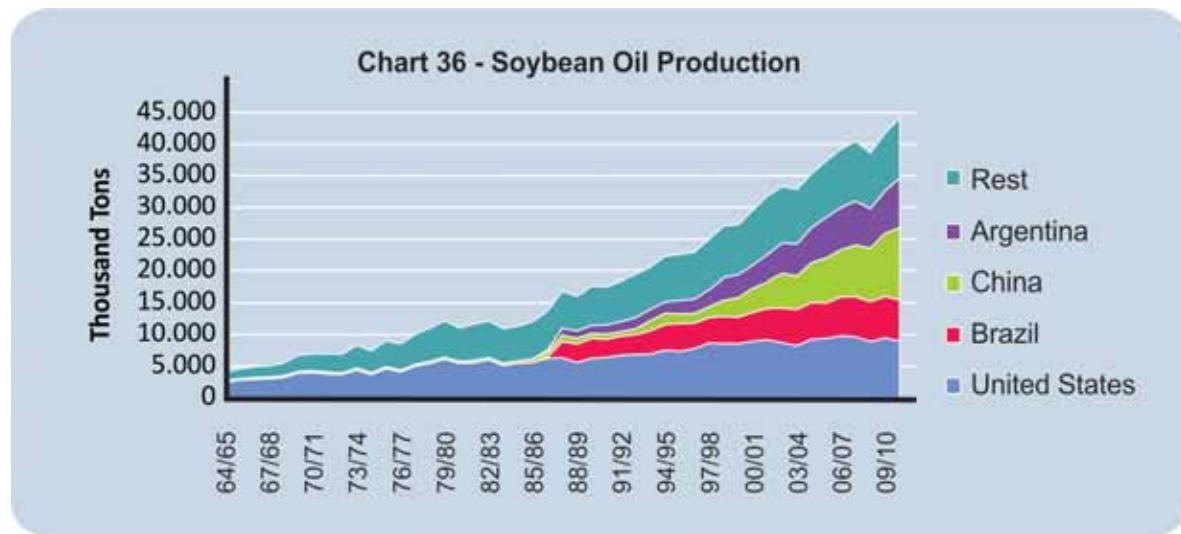
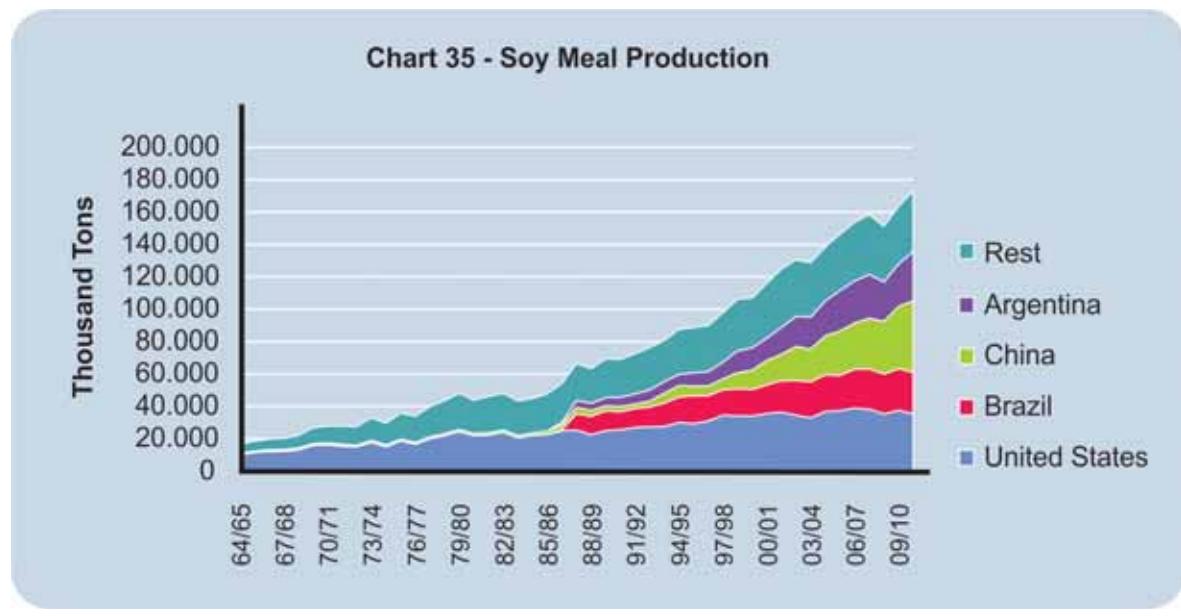
- The last five years set a record in soybean prices since, at least, 1980
- After the prices plummeted due to the 2008 crisis, they have recovered and sustained over the historical average price
- The growth in soybean prices happened in a context of high food prices
- Surprisingly once the focus is changed to a constant dollars analysis we can observe that the actual soybean prices are lower than the prices of the beginning of the 1980's
- Two theories surface among others to explain the commodities prices: One of them attributes the boom-and-bust cycle to a simple matter of supply and demand, while the other stressing excessive speculation by index investors.
- According to the first view the rapid growth of emerging economies such as China propelled the quick increase of world demands and caused commodity prices to soar before the summer of 2008. Prices later fell sharply when the world recession caused demands to fade.
- The second view attributes the large volatility of commodity prices to distortions caused by large investment flow into commodity markets.
- Soy biodiesel price seems to have followed a certain pattern comparable with the one followed by the commodities analyzed in this work, with an enormous growth in 2008

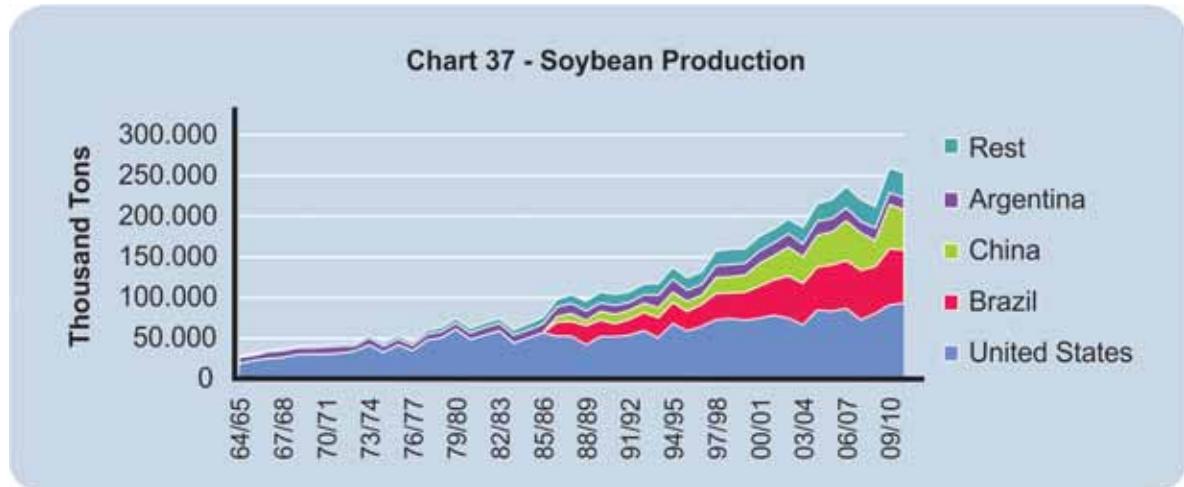
3 .Demand and supply concentration

The last stylized fact that we will address characterizing the soy market is the elevated concentration, both in demand as in supply. As mentioned before, the amount of players of relevant size is specially low in this market.

Production wise it is clear that four countries concentrates most of the production: USA, Brazil, China and Argentina. Soy biodiesel case would be addressed in the final part of this section because the market's "youth" does not resist any long term analysis used for the rest of the products.

Production and consumption





The information provided by the charts is synthesized in the next table. There are some points worth mentioning. The first one is regarding the degree of concentration. In the last campaign only 4 producers account for 84% of the soybean available in the world. In soybean oil that concentration reached 88%. The second one is the fall in US participation due to the advance of Brazil, China and Argentina. In 64/65 the US produced near 65% of soybean and in 10/11 that participation fell to 29%. Over the same period Brazil and Argentina went from 0% to 21% and 19% respectively. Only in the soybean oil market the US managed to keep its participation.

Table 5 – Soy production participation by country

	Soy meal		Soybean Oil		Soybean	
	65/65	0/11	65/65	10/11	65/65	10/11
United States	62%	21%	66%	37%	64%	21%
Brazil	0%	15%	0%	26%	0%	16%
China	7%	26%	27%	6%	4%	24%
Argentina	0%	18%	0%	20%	0%	18%
Rest	32%	22%	6%	12%	32%	21%
4 "Bigs"	68%	78%	94%	88%	68%	79%

Source: USDA

The level of concentration by the demand side appears to be as well even though not at the same level as supply's side. Once again the US, Argentina, Brazil and China are the big players of the market. The elevated participation of Argentina, US and Brazil is explained by the use of soybean as an input of more aggregated level products, this means that household consumption is not considerable in those countries.

Chart 38 - Soy Meal Consumption

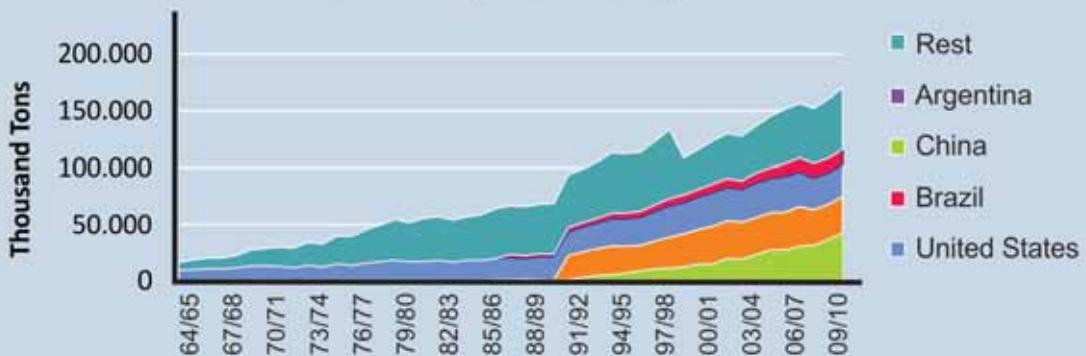


Chart 39 - Soybean Oil Consumption

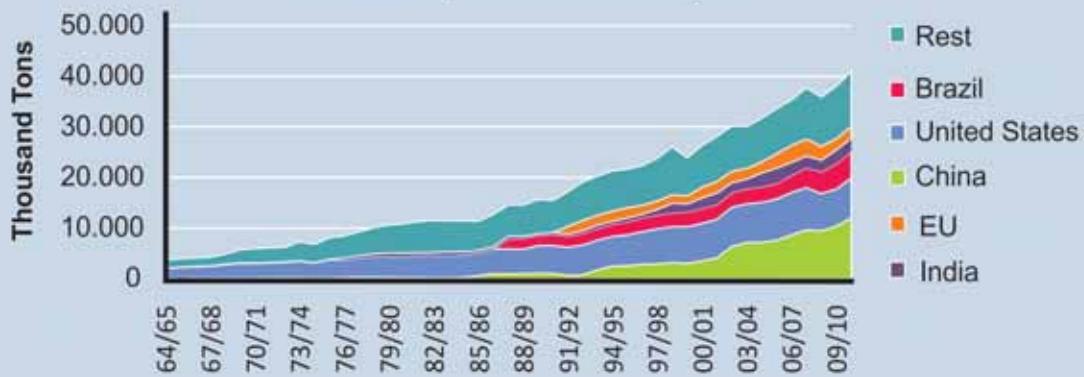


Chart 40 - Soybean Consumption

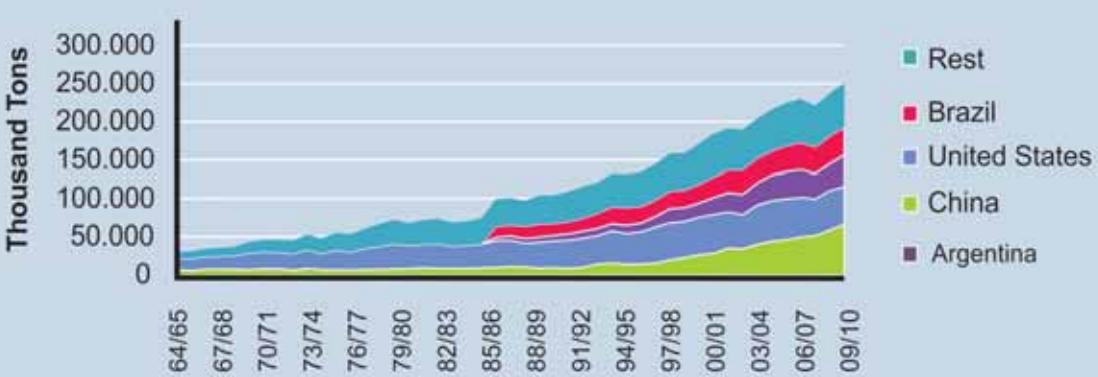


Table 6 – Soybean consumption participation by country

	Soy meal		Soybean oil		Soybeans	
	64/65	10/11	64/65	10/11	64/65	10/11
United States	50%	16%	50%	19%	48%	20%
Brazil	0%	8%	0%	13%	0%	14%
China	7%	25%	4%	29%	24%	27%
EU	0%	19%	0%	6%	0%	5%
Rest	43%	32%	95%	33%	28%	34%
4 "Bigs"	57%	68%	54%	67%	72%	66%

Source: USDA

Exports

Regarding exports, Argentina emerges itself as the leading exporter of soy meal and soybean oil, the US is (despite Brazil's emergence) soybean's leading exporter. The level of concentration, as shown in the next charts and tables, is considerable as expected. That confirms that, production wise; soybean market is a highly concentrated one.

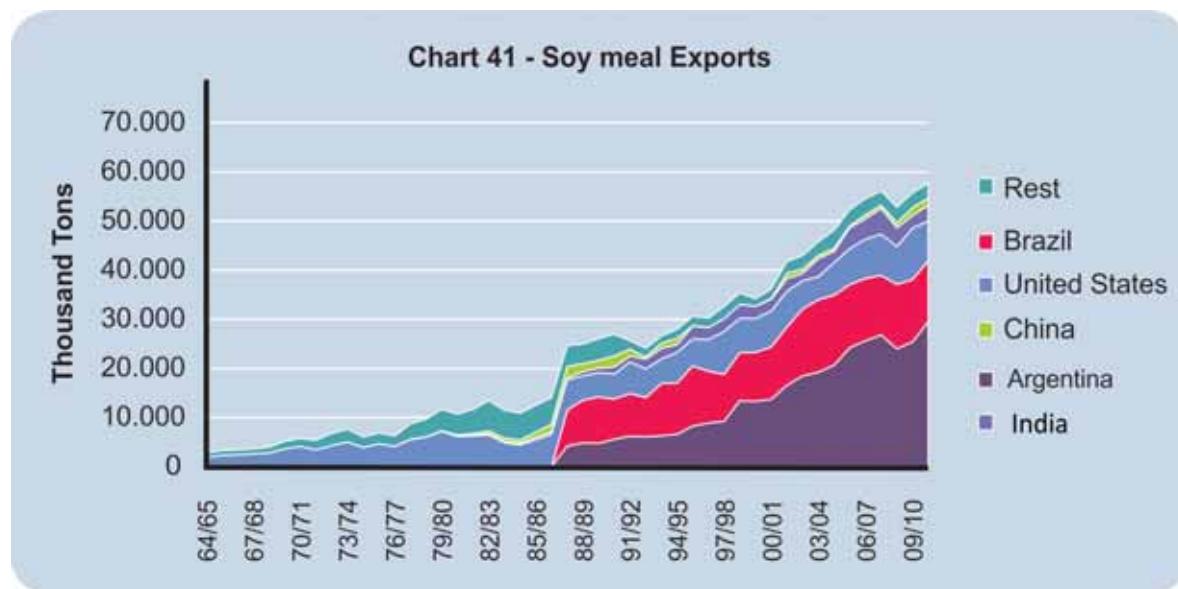
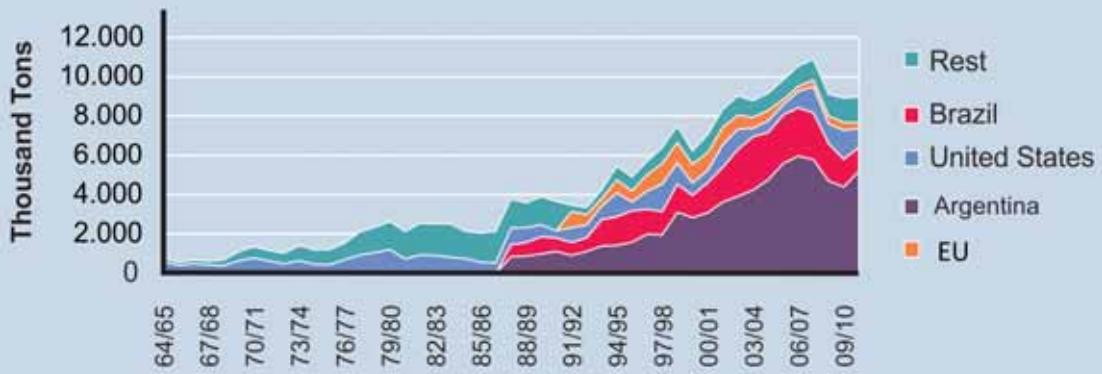


Chart 42 - Soybean Oil Exports



Source: Author's Elaboration using USDA's database

Chart 43- Soybean Exports



Source: Author's Elaboration using USDA's database

Table 7 – Soybean exports participation by country

	Soy meal		Soybean oil		Soybeans	
	65/65	10/11	65/65	10/11	65/65	10/11
United States	68%	14%	78%	11%	89%	43%
Brazil	0%	21%	0%	14%	0%	32%
Argentina	0%	51%	0%	58%	0%	14%
Rest	32%	13%	22%	18%	11% ¹	1%
3 "Bigs"	68%	87%	78%	82%	89%	89%

Source: USDA

According to this data, Argentina shows an elevated participation in exports with more aggregated value than the US and Brazil. This placement of Argentina as the leader of added value contrasts with the composition of all the exports in the country. This is indicative of the differential dynamic regarding the soybean complex vs. the rest of Argentina's economy.

Imports

From the imports perspective a less concentrated behavior is in place comparing it with the former cases even though the presence of big players is still in place. In particular, China appears as the leading importer of both soybeans and soybean oil and the EU as the leading demander of soy meal. Brazil and Argentina, two of the world's leading soybean producers do not appear as strong buyers, confirming the producer-exporter roles we mentioned.

Chart 44 - Soybean Oil Imports

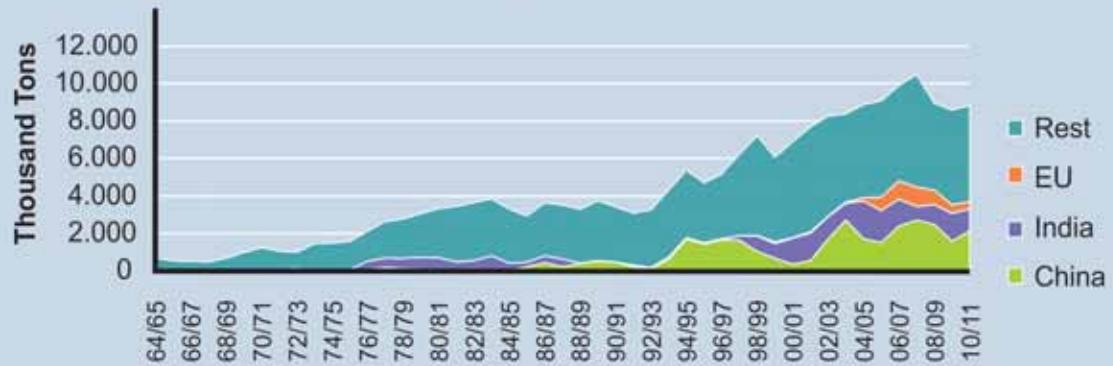


Chart 45 - Soybeans Imports

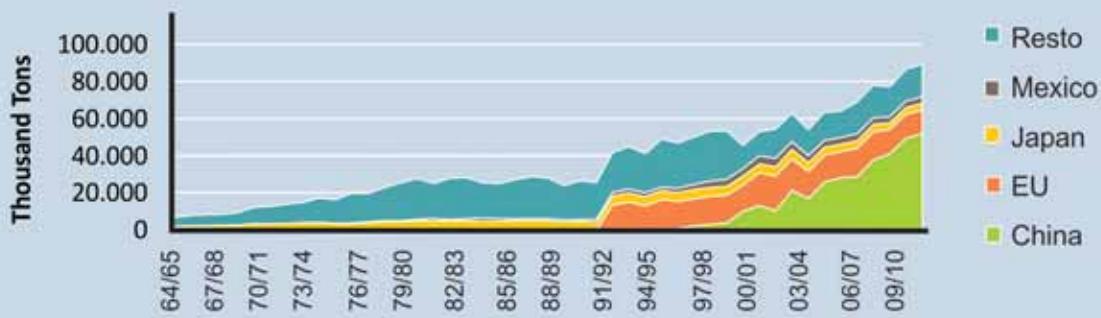
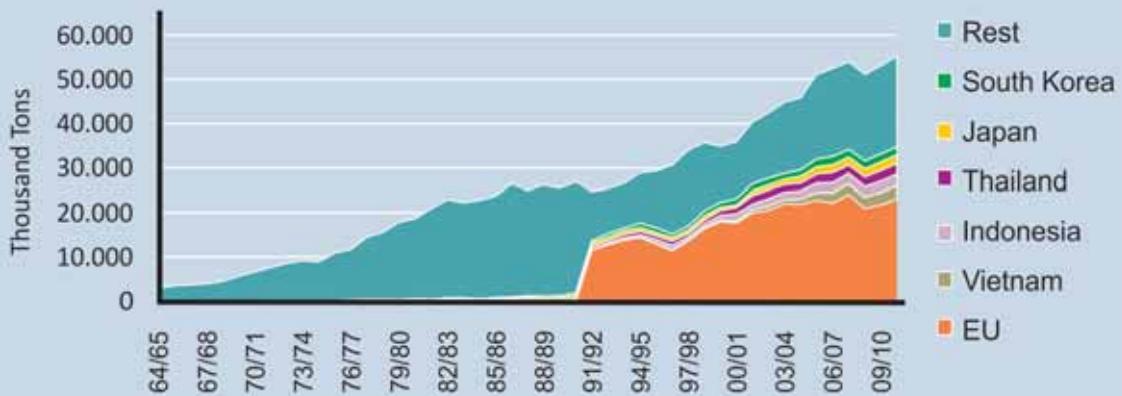


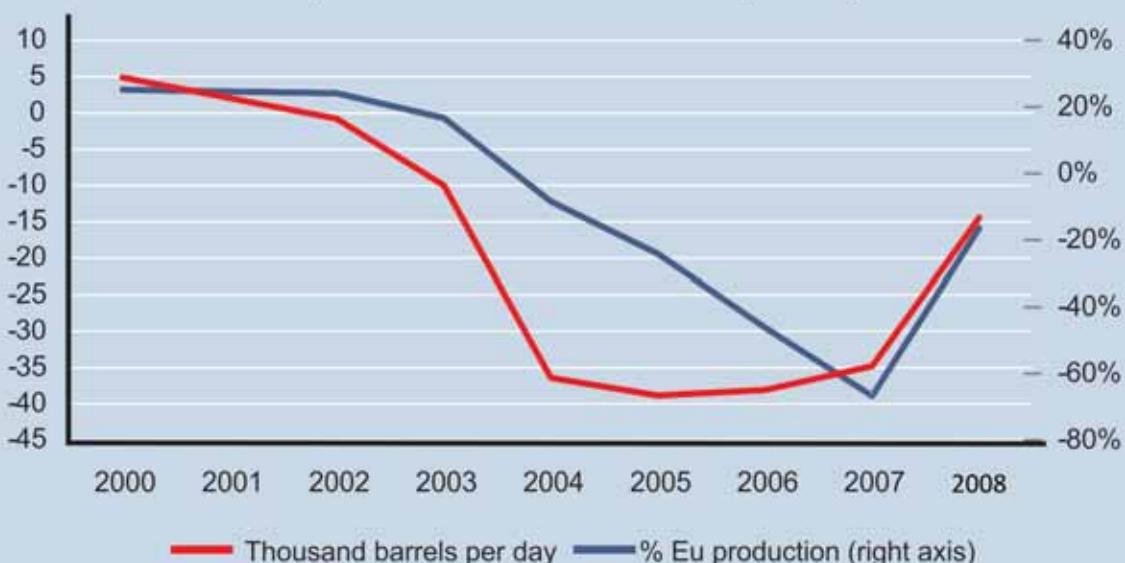
Chart 46 - Soy Meal Imports



In this case a table is not needed given that the situation is simple to understand: The EU leads the soybean imports with 42% of market share and China is the world leading importer of soybean oil with 24% and soybean's with 58%.

The level of concentration within the imports perspective is elevated but does not reach the level observed in the three previous cases. A similar situation can be found regarding the soy biodiesel imports from the EU. Even though that region is a leading producer it is also a leading consumer as shown in the next chart. The gap between production and consumption reached almost 67% of the production, needing imports in order to lower the gap.

Chart 47 - Soy Biodiesel Production - Consumption Gap in the EU



Source: EIA

The increment in the European Union's soy meal imports could be explained by the "mad cow" disease that put an end in the livestock feeding using animal proteins, which translated in a replacement with vegetal proteins as soy meal (Giancola et al. 2009). The behavior of China's soybean oil imports that shows a fall in the end of last century followed by a strong recovery is explained mostly by government decisions. Concretely, the fall was the result of a stimulus policy to the domestic production of soybean oil.

Nevertheless, the impediment to supply the domestic market with local production generated a setback in the policy, enabling a reduction on soy meal imports tariffs, allowing its growth since 2002/2003

Regarding soy biodiesel production we showed that a concentration in the market is in place, but the emergence of Argentina and Brazil as new players or the growth of production in France tended to reduce such level as shown in the next table.

Table 8 – World leading soy biodiesel producers (share in world market)

2000	2001	2002	2003	2004	2005	2006	2007	2008
France (39,6%)	France (30,7%)	Germany (33,2%)	Germany (42%)	Germany (47%)	Germany (43,6%)	Germany (39,3%)	Germany (29,7%)	Germany (18,8%)
Germany (27,9%)	Germany (27,1%)	France (27,1%)	France (20%)	France (15,8%)	France (12,8%)	United States (12,3%)	United States (16,8%)	United States (17,3%)
Italy (10,4%)	Italy (14,1%)	Italy (15,5%)	Italy (15,2%)	Italy (14,4%)	Italy(10,3%)	France (11%)	France(10,4)	France(12,1%)
	United States(3%)				United States (7,9%)	Italy (8,8%)	Italy (4,8%)	Brazil (6,9%)
					UK(1,7%)	UK (2,9%)	Argentina (3,9%)	Argentina (5,2%)
						Brazil (0,9%)	Brazil (3,7%)	Italy (4,5%)
							UK (1,5%)	UK (3,1%)
78%	75%	76%	77%	77%	76%	75%	71%	68%

Source: EIA

In 2000, only three countries explained ¾ or more of soy biodiesel production. In 2001 a fourth country was added but the group returned to three between 2002 and 2004. Since 2005 the number of countries needed to explain 75% of the production started to grow. The leading producers could no longer explain that proportion in 2007 and 2008.

Although it is evident that certain tendency to market deconcentration is in place it should be mentioned that such level is still high given that 68% of the production is explained by seven countries.

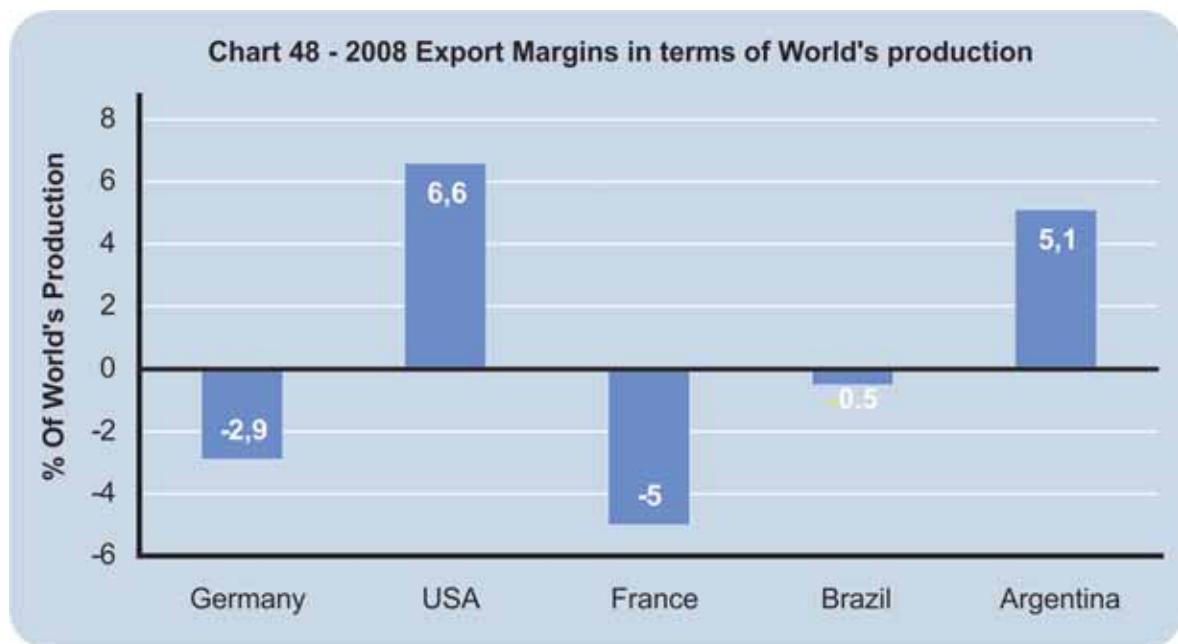
From the consumption side a similar pattern can be observed with a highly concentrated level on the initial years of the series and a slow growth of the countries participating with the emergence of the US, Brazil, Italy or Spain. Nevertheless, the rhythm of deconcentration seems to be lower than in the production case.

Table 9 – Soy biodiesel principal consumers (share in world market)

2000	2001	2002	2003	2004	2005	2006	2007	2008
France (42,9%)	Germany (39,6%)	Germany (49,9%)	Germany (58,4%)	Germany (55,8%)	Germany (58,7%)	Germany (47,8%)	Germany (36%)	Germany (21,7%)
Germany (35%)	France (35,3%)	France (29,2%)	France (22%)	France (15,7%)	France (10,8%)	United States (14,4%)	France (14,2%)	France (17,1%)
				Italy (13,6%)	United States (8,9%)	France (11,4%)	United States (13%)	United States (10,7%)
						Italy (3,7%)	Brazil (3,9%)	Brazil (7,4%)
							UK (3,3%)	UK (6%)
							Spain (3,3%)	Italy (4,9%)
							Italy (2,2%)	Spain (4,6%)
78%	75%	79%	80%	85%	78%	77%	76%	72%

Source: EIA

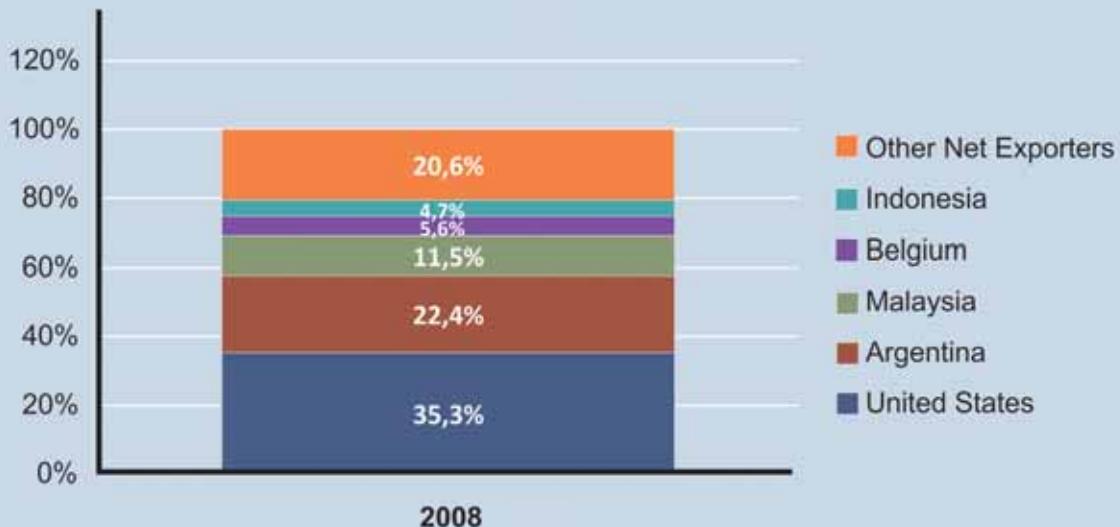
From the latter table it could be presumable that the world's leading exporter is Argentina because is the only big producer that is not as well a big consumer. Germany, US, France and Brazil which in 2008 were the leading producers were at the same time the bigger consumers. In 2008 the world's leading producers showed the following export margin



Source: EIA

The data of 2008 (last year available at the moment of this investigation) showed the following structure regarding net exports, with a dominance of the US and a relevant participation of Argentina, which took the leadership in 2009

Chart 49 - Exports Distribution Nets of Soy Biodiesel



Source: Author's elaboration

From the side of net imports, France, UK and Spain concentrated 64% of the total. Europe is by far the big importer of soy biodiesel given that five of the world's leading net importers come from that continent.

Chart 50 - Net Soy Biodiesel Imports Distribution



Source: Author's elaboration

Wrapping up, until 2008 the world's leading exporters of soy biodiesel were the US and Argentina, in that order. But in 2009 that order changed because of the growth in Argentina's production. A highly level of concentration in soy biodiesel market could be concluded, in line with the conclusions reached with other soybean's derivates. This concentration lies in the small number of countries explaining the market fundamentals.

As a corollary of this section it is evident that soybean's evolution in the last few years must be studied in a context characterized by:

- a) General growth of the crop worldwide
- b) Elevated level Price and some doubts regarding its sustainability.
- c) Elevated level of concentration in production, consumption and trade worldwide

Taking this context into account we propose the study of Argentina's case in the next section. The reason for studying Argentina's situation is its importance in the soy market given that leads the exports of soybean oil, soy meal and soy biodiesel.

It is one of the countries that beneficited the most from the upward tendency of food commodities prices and therefore is crucial for this research the understanding of Argentina's soy evolution.

Conclusions

- In the supply side, in terms of soybean production 4 countries (China, USA, Argentina and Brazil) explain 84% of the worldwide production
- In the case of soybean oil that concentration explains 88% of the worldwide production
- In the case of the demand side the market is also concentrated, even though not as in the supply side.
 - The big players from the demand side are the US, Argentina, Brazil and China.
 - The elevated participation of Argentina, US and Brazil is explained by the use of soybean as an input of more aggregated level products, this means that household consumption is not considerable in those countries.
 - Regarding exports, Argentina emerges itself as the leading exporter of soy meal and soybean oil, the US is (despite Brazil's emergence) soybean's leading exporter.
 - Argentina shows an elevated participation in exports with more aggregated value than the US and Brazil.
 - From the imports perspective a less concentrated behavior is in place
 - A high level of concentration in soy biodiesel production is also observed with the emergence of both Brazil and Argentina as leading producers.

SECTION 2

"Soy production is based in knowledge and information: Biotechnology, new molecules, direct seeding, GPS usage, among other technological innovations.

Global markets are reached, to the point that thanks to soy, Argentina is the first producer of soy bean oil and vegetal proteins worldwide and one of the main assets in order to guarantee the World Alimentary Security.

Furthermore, the whole soy complex shapes a big web of producers, companies and professionals from different activities such as research, production and commercialization, covering a vast range of goods and services"

Ricardo Hara. ACTA and EticAgro President

Soy market evolution in argentina

The characterization of soy market behavior internationally helped gathering a good set of information about the evolution of both soybean production and commercialization in Argentina.

Nevertheless, the situation cannot be studied only taking into account Argentina's participation in the global market. That's why a macroeconomic view of soybean's evolution in Argentina is needed. Over this section we will address a conjunction of aspects that we believe relevant for understanding Argentina's soybean complex.

Even though the main objective of this research is to evaluate the possible impact of soy biodiesel's market evolution over the soybean production and commercialization we consider that in this section a further vision is needed in order to comprehend in a more vast way the soybean's market situation and the determinants of its evolution.

The analysis within this section is divided in phases using the production and commercialization circuit as a division between each phase bases on the approach used in Vilella et. al. Al (2010).

In that research we found the contribution of the soy complex to Argentina's GDP as follows:

Concept	Million USD	Agroindustrial GDP %	GDP %
National GDP	326,474		100
Agroindustrial GDP	71824	100	22
Agrochemicals	955	1.33	
Seeds	456	0.63	
First and Second Transformation Industries	17476	24.33	
Machinery	448	0.62	
Grain Exports	5885	8.19	
Industrial Exports	16145	22.48	
Soy complex exports	22030	30.67	

Source: Vilella et al (2010)

The data used in that research and here reproduced is from 2007, the data of 2008-2009 has the particularity of the worst drought in decades and the internal conflicts of Argentina due to the farm strike that lasted more than 100 days.

Data from 2010 is still being produced.

But the table helps understanding the overwhelming importance of the soy complex which gathers more than 30% of the Agro industrial Sector. A number that is expected to rise in 2010.

- Phase 1: Inputs
- Phase 2: Production
- Phase 3: Transport and storage
- Phase 4: Industrialization
- Phase 5: Trade

Phase 1: inputs

In this phase the most relevant issue is the evolution of costs, a central piece of information in order to determine the rent ability of soy and production decisions. As shown in the next chart (49) the total cost (excluding commercial costs) of soy production has had an upward tendency over the last few years, especially since 2003. Over that period, only in 2005 and 2009 a fall in costs took place comparing it with the immediate previous year. The cost considered in the chart is the optimal in terms of geographical localization and inputs usage in order to gather the best option for the soy producer.

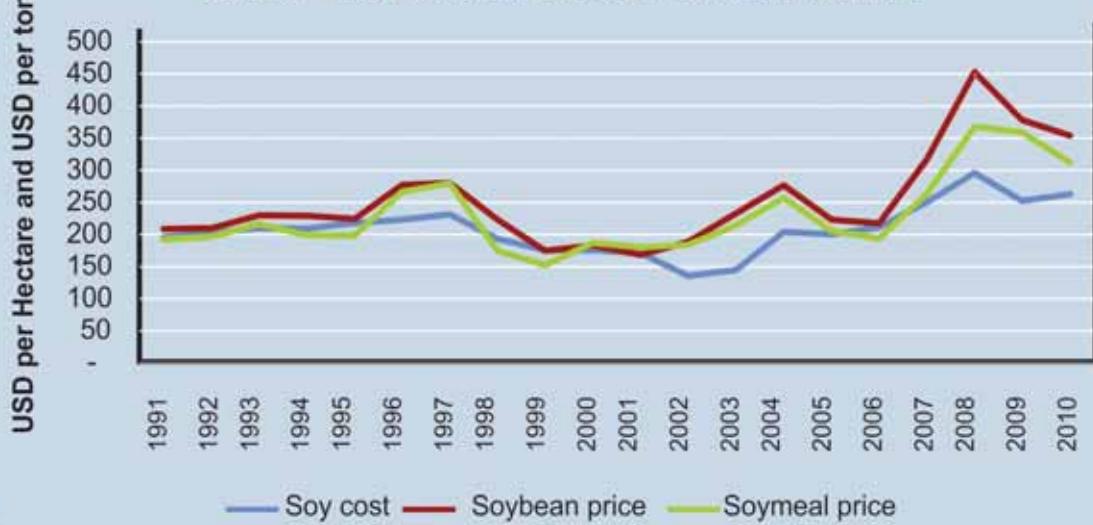
Chart 51 - Soy total costs and performance



Source: Márgenes Agropecuarios

An interesting point lies if we compare the evolution of soy production costs vs. Soy Price. As shown in the next chart (50) a correlation between costs and sale price is evident. Since 1991 costs have shown an 86.6% correlation with soybean prices and 81.5 % correlation with soy meal prices

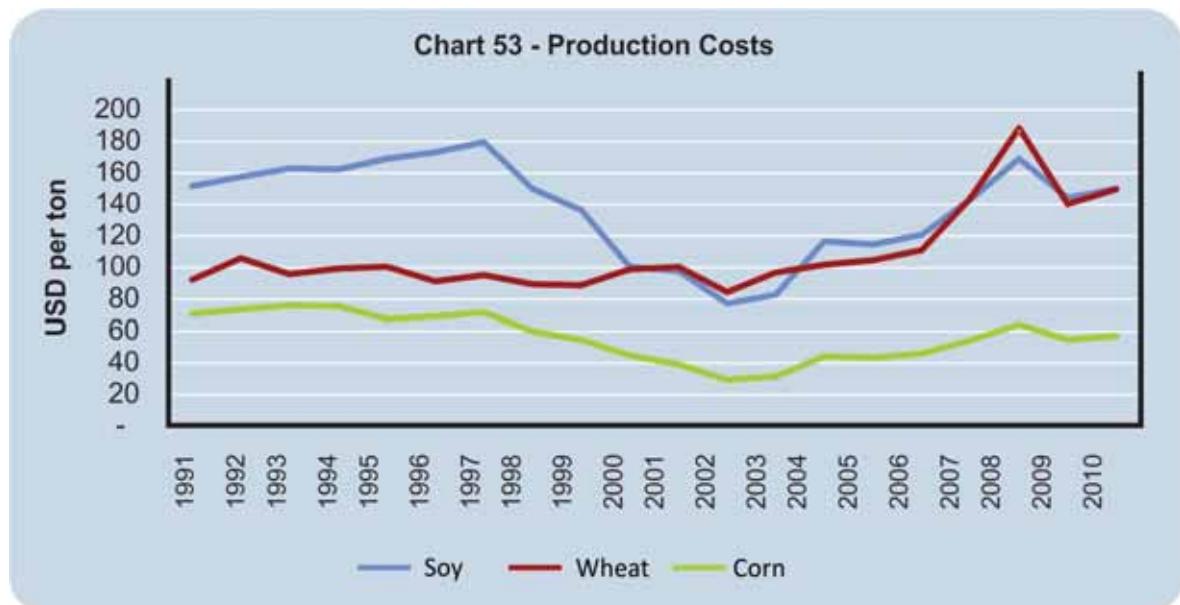
Chart 52 - Soy Production Costs and International Price



Source: Author's elaboration using IMF database

In terms of cost per ton the next chart shows that soybean had an important fall in the mid 1990's. That tendency started to reverse in 2002 and nowadays soy ton is the most expensive to produce compared with the three reference products in the chart.

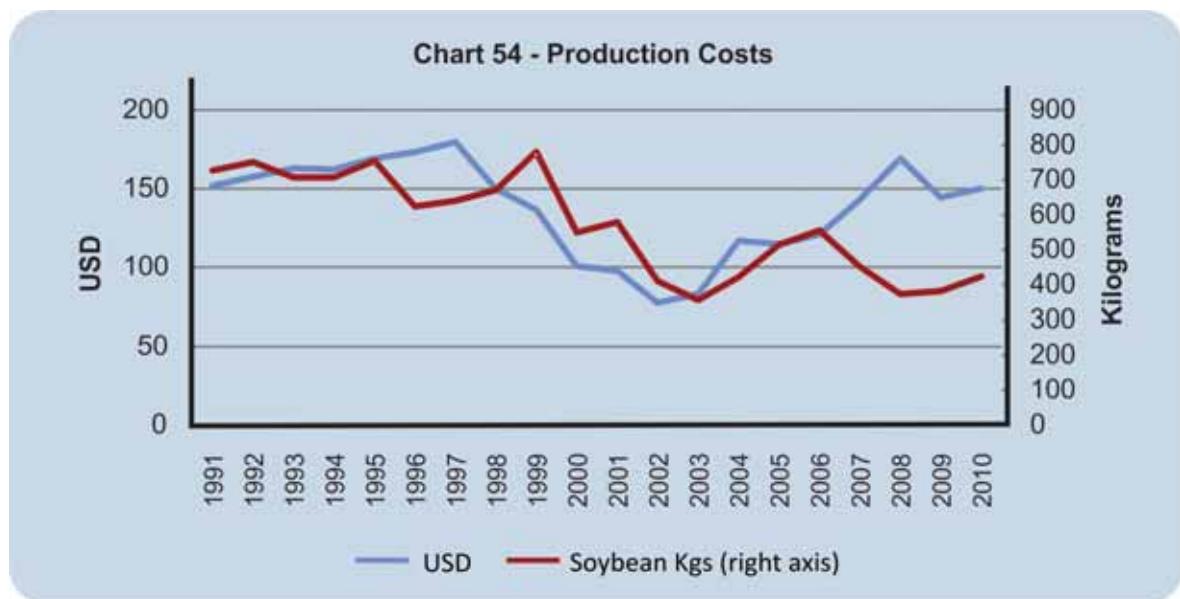
Chart 51 – Production costs, USD per ton.



Source: Author's Elaboration

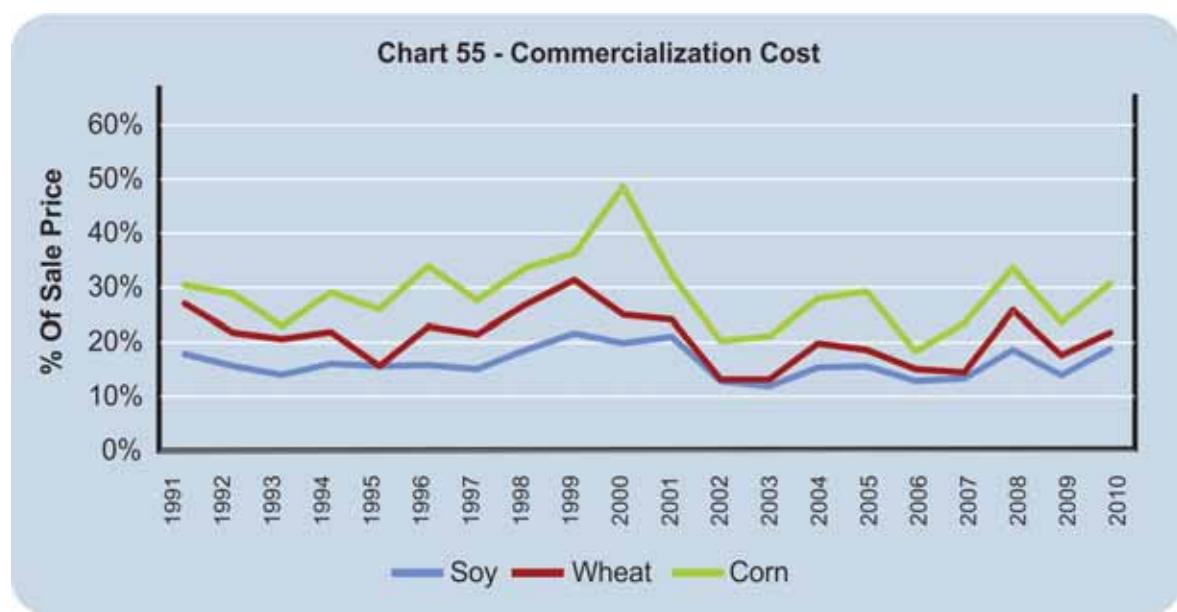
Even though costs have raised since 2003, that increment is not that evident if weighted in terms of soybeans. Concretely, the cost of producing one ton of soybean is approximately less than half a ton and between 1991 and 1999 that cost ascended to 600 and 800 kgs respectively. The fact is that the actual price is a little above the minimum of the series, recorded in 2003 (355 kgs per ton produced). The fall in costs

since the end of the 1990's should be explained by the introduction and generalization of the usage of "RR" soy and glifosate, used approved in 1996.



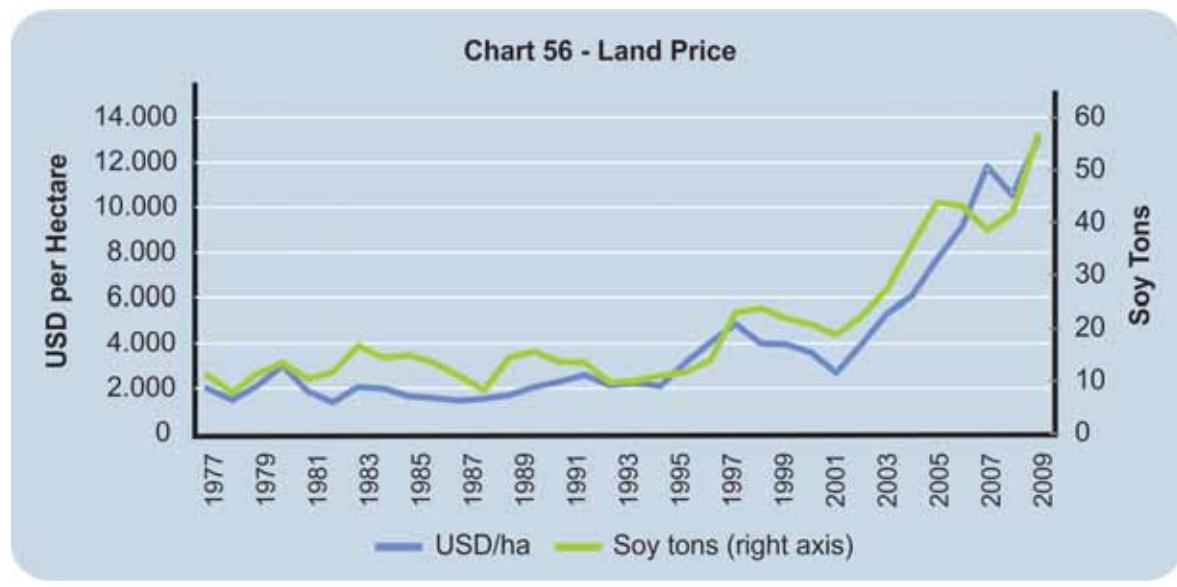
Source: Márgenes Agropecuarios

Besides the production cost, soy producer have to be aware of the commercialization cost. This cost differs between different products and in doing so it determines which crop the producer chooses. Taking into account only this cost soy production is preferred over the other crops and since 1991 it shows cheaper costs basically associated to an inferior cost in transportation.



Source: Márgenes Agropecuarios

Separating different inputs costs a growing tendency related to soy price is observed. Taking an important price as the land price it could be observed in the next chart that since mid 1990's the land used for soy production has elevated its price both in USD as in tons of product. It seems clear that soy production could be viewed as more attractive than other crops for the producers.



Source: Márgenes Agropecuarios

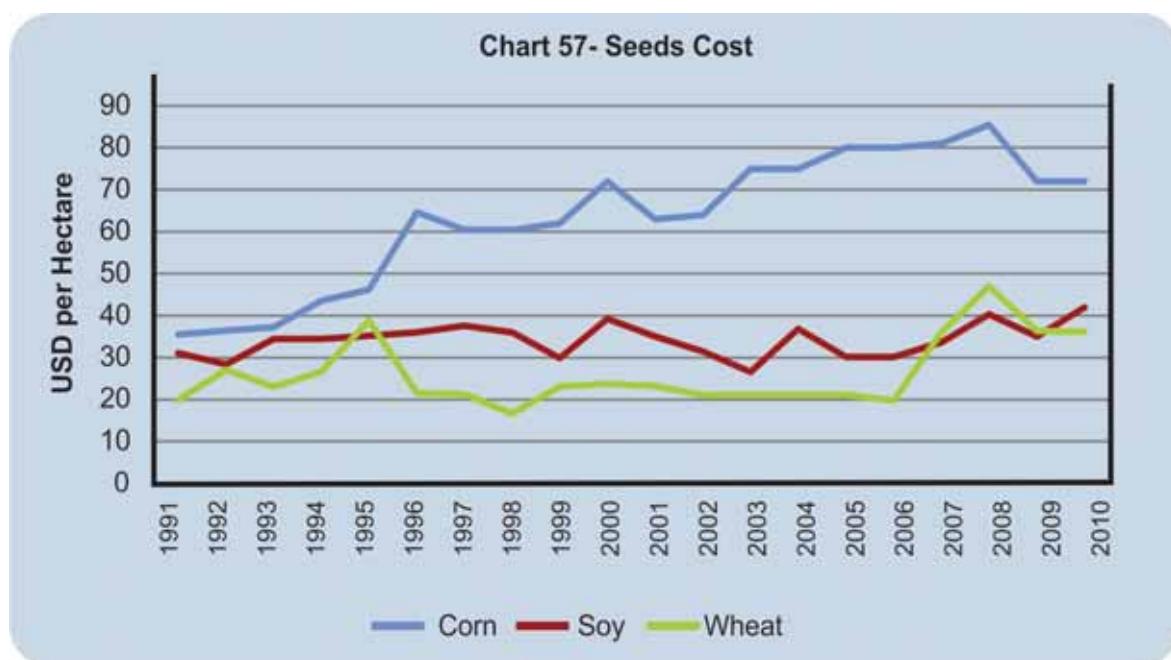
Another relevant cost is the seed's cost. This cost has remained stable for the last twenty years even though the development of more productive varieties as was explained before. In the present the cost per hectare in seeds is around 42 USD for soy production, 72 USD for maize and 36.2 USD for wheat. The stability mentioned happened in a context of elevated spending in seeds for both maize and wheat production.

It is worth mentioning that Argentina's seed industry is based in a differential behavior given if the seed is reproducible or not. In one hand we find the species with hybrid varieties (maize, sunflower, etc). In this cases the demand is fulfilled using "fiscalized" seeds.

On the other hand with plants that don't lose their genetic improvements the producer has the possibility of making his own seed or multiply it for commercial or illegal usage. In that segment, the fluffiness using fiscalized seeds have been falling, particularly in soy and wheat cases. Data from 2004 states that only 29.9% of wheat seed has been fiscalized and in soy case only 21.4%.

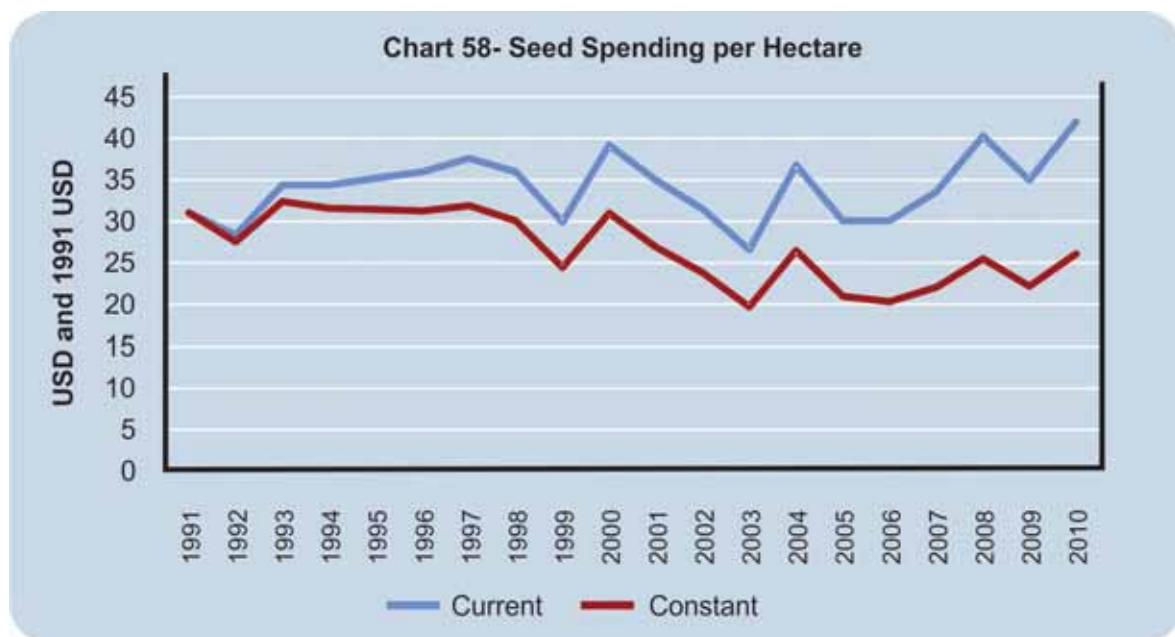
This generates a gap between the industry potential market and what is really being commercialized within the legal circuit. This diminishes the investigations that can help to enhance the production.

But in terms of cost this also has an implication given that in the case of maize production the producer has to buy the seeds for every campaign therefore generating higher costs than in soy and wheat cases.



Source: Márgenes Agropecuarios

Chart 55 focuses on soy case using 1991 constant USD. According to the last information in the chart (2010) seed spending in soy is 16% lower than the value recorded in 1991 and 20% lower than in 1993. Once again, the fact that some species (soy, wheat) have the possibility of keeping the seeds in order to use them in other campaigns has an impact cost-wise that maize does not have.



Source: Author's elaboration

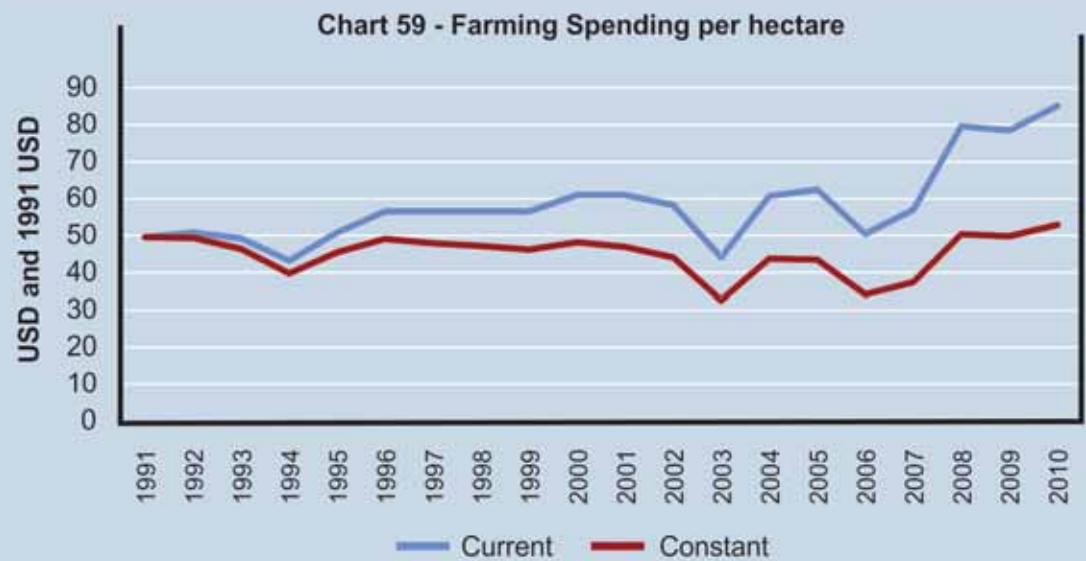
Farming costs have experienced in recent years a rising tendency to the point that the last available information recorded the highest Price of the series. If taken in constant prices the picture is different because the prices are in line with the ones experienced during the 1990's even though a rising tendency seems to be in place.

The fall in farming costs experienced in 2002 and 2003 as shown in chart 56 is associated with Argentina's economical crisis and subsequent currency devaluation. However the recovery since 2007 is undeniable, fueled by Argentina's inflation and the raise in international prices.

This phenomena is also bringing difficulties since as breeders do not receive a return from their investments on genetic improvement there are not bringing and promoting the latest varieties. To this there is also a delay in approving new GMO since Argentina has a more strict policy than the US and Brazil.

The delay in the introduction of the latest genetic improvements could cause in the future a loss of competitiveness of the argentine soybean production.

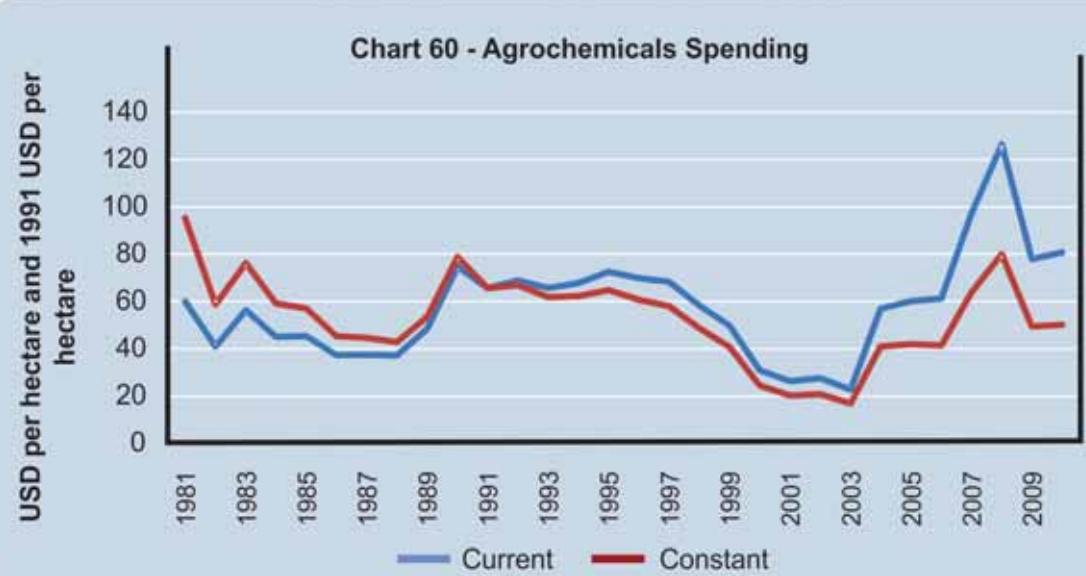
The other important input in the soybean production is the herbicide glyphosate. Although this herbicide was property of Monsanto from the US the product was introduced and licensed by Nidera and liberated by third partners before the patent was established overseas. This brought a cheap crucial input to the system comparatively to the price US farmers had to pay.



Source: Author's elaboration

Agrochemical's costs have experienced in recent years a rising tendency. After the high costs experienced in the early 1990's from the 96/97 campaign to the 2002/2003 a dip in prices surfaced. However going further a pike in 2008 is quite unusual. That extraordinary high value could be explained with the climatic conditions of that year which was characterized by a land drought, the largest in Argentina over the last 30 years.

In current dollars the spending in agrochemicals is similar to the average of the 1990's and in constant dollars the values are lower than the ones experiences over that decade as shown.



Source: Ministry of Agriculture and Márgenes Agropecuarios

Chart 61 - Agrochemicals Spending and Soy Performance



Source: Ministry of Agriculture y Márgenes Agropecuarios

As a conclusion, total costs from soy production are in a relatively lower level if weighed in kilograms of product. Even though nominal costs have been experiencing a rise that has been compensated by the rise in international prices. Besides the cost evolution, an important subject inputs wise is the technical progress experienced in production methods.

Since the beginning of the 1980's direct seeding has been used in Argentina, the reason as mentioned in Giancola et al. (2009) was the high erosion rate of Argentina's soils and the bigger availability of agricultural machines given the economy deregulation of the 1990's.

Regarding soy production the different input structure used since the mid 1980's can be observed in the next table. An important point is that the technification in soy production contributed to lower the role of farming and a higher use of chemical products...

Table 10 – Soy input production structure, south of Santa Fe

1987	1995	2001	2005	2010
Farming (4.85 units)	Farming (3.14 units)	Farming (3.39 units)	Farming (3.89 units)	Farming (3 units)
Fiscalized seeds (80 Kgs/Ha)	Fiscalized seeds (80 kgs/Ha)	RR seeds (70 kg/Ha)	RR seeds (70 kg/Ha)	RR seeds (70 kg/Ha)
Herbicides (1 fumigation)	Pivot (0.80 lts/Ha)	Inoculants (1.40 c / 50 kg)	Phosphate (40 kg/Ha)	Glifosate(4 lt/Ha)
Treflan (2 lts/Ha)	Agil (0.5 lts/Ha)	Roundup Max (2 kg/Ha)	Inoculante + fungicides(1.40 c / 50 kg)	Metsulfuron Metil (0.0008 kg/Ha)
Round Up (0.50 lts/Ha)	Lorsban Plus (0.70 lts/Ha)	Lorsban 48 E (1.40 lts/Ha)	Roundup Max (2 kg/Ha)	2,4 D 100% (0.50 lts/Ha)
Insecticides(1 fumigates)	Fumigates(4)	Cipermetrina (0.15 lts/Ha)	Lorsban 48 E (1.40 lts/Ha)	Inoculants+ fungicides kg)
Parathion 100 (0.50 lts/ha)			Cipermetrina (0.15 lts/Ha)	Phosphate (40 kg/Ha)
			Opera (0.50 lts/Ha)	Roundup Max (1.50 kg/Ha)
				Decis Forte (0.05 lts/Ha)
				Lorsban 48 E (1.40 lts/Ha)
				Cipermetrina (0.15 lts/Ha)
				Opera (0.50 lts/Ha)

Source: Márgenes Agropecuarios

Conclusions

- A correlation between costs and sale price is evident. Since 1991 costs have shown an 86.6% correlation with soybean prices and 81.5 % correlation with soy meal prices.
- Nowadays soy is the most expensive to produce (per ton) compared with the three reference products (soy, maize and wheat)
- But a fall in costs has been taking place since the end of the 1990's and it could be explained by the introduction and generalization of the usage of "RR" soy and glifosate, used approved in 1996.
- The producer has to keep in mind commercialization costs .Taking into account only this cost soy production is preferred over the other crops and since 1991 it shows cheaper costs basically associated to an inferior cost in transportation.
- Since mid 1990's the land used for soy production has elevated its price both in USD as in tons of product. It seems clear that soy production could be viewed as more attractive

than other crops for the producers.

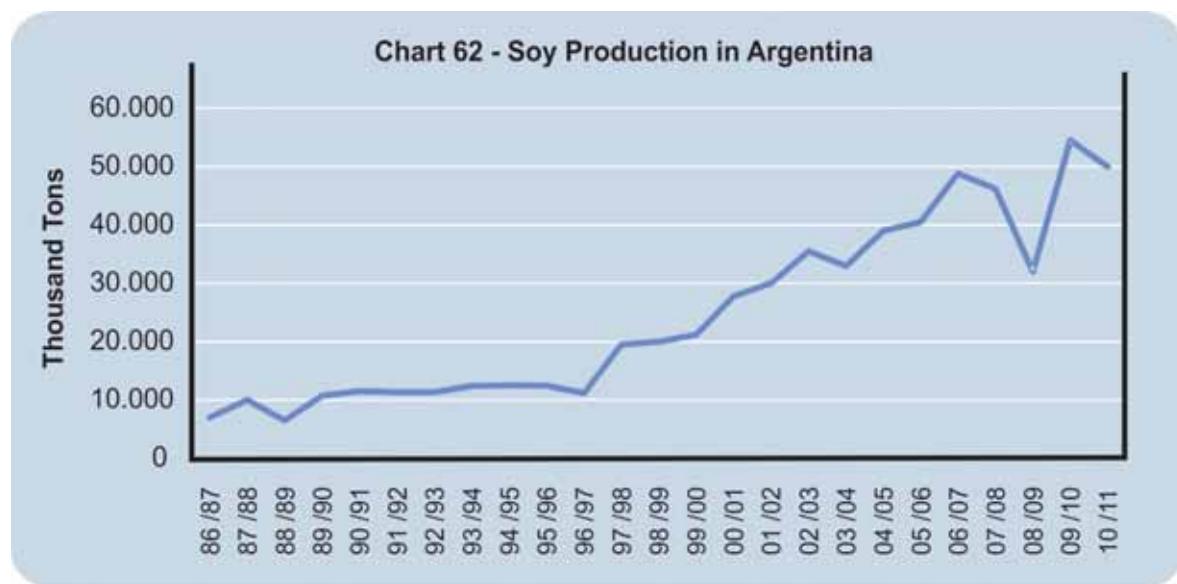
- Argentina's seed industry is based in a differential behavior given if the seed is reproducible or not.
- In one hand we find the species with hybrid varieties (maize, sunflower, etc). In this case the demand is fulfilled using "fiscalized" seeds on the other hand the producer has the possibility of making his own seed or multiplies it for commercial or illegal usage.

Phase 2: production

Soy production

As we mentioned earlier in this research Argentina emerged in the last decade as one of the big players in soy international market. Such emergence was supported by the sustained growth in soy production as shown in chart 59.

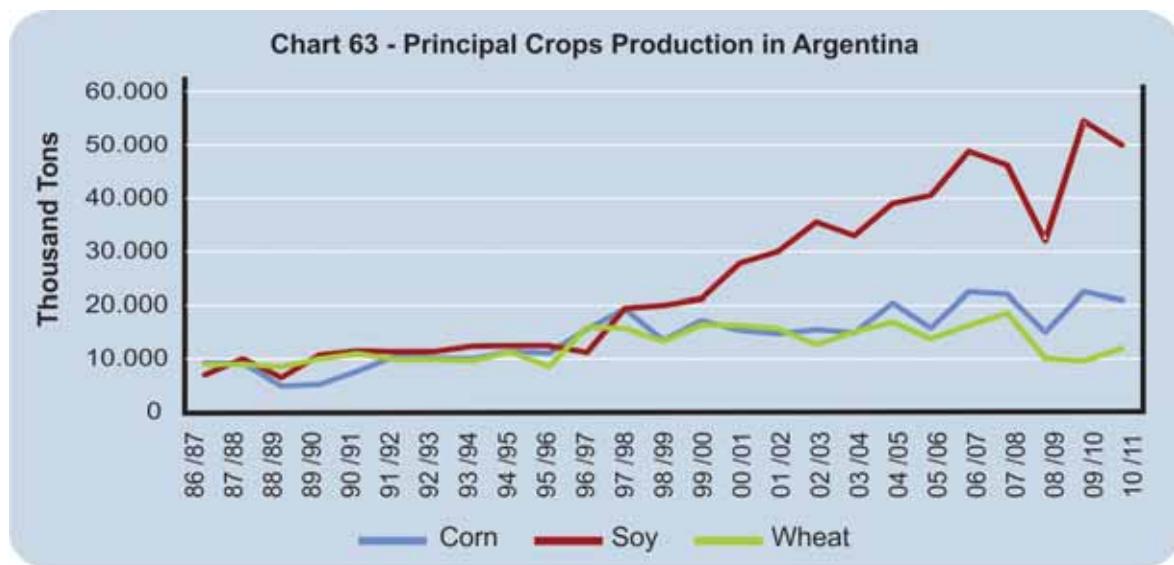
Chart 59 – Soy production in Argentina, million tons



Source: Ministry of Agriculture

From the chart we can conclude that soybean production over the last 25 years experienced an unprecedented growth taking aside minor fluctuations. The fall in production observed in the 07/08 and 08/09 campaigns were associated with the unfavourable climatic conditions and the international economical crisis. Nevertheless the series shows a recovery since the 09/10 campaign.

Argentina also had an internal crisis due to the clash between the Government and the farming sector which led to a farm strike. Such clash was originated by the intention of the government to raise taxes on exports. Comparing with other crops, the increment in soy production is noticeable as shown in chart 60.



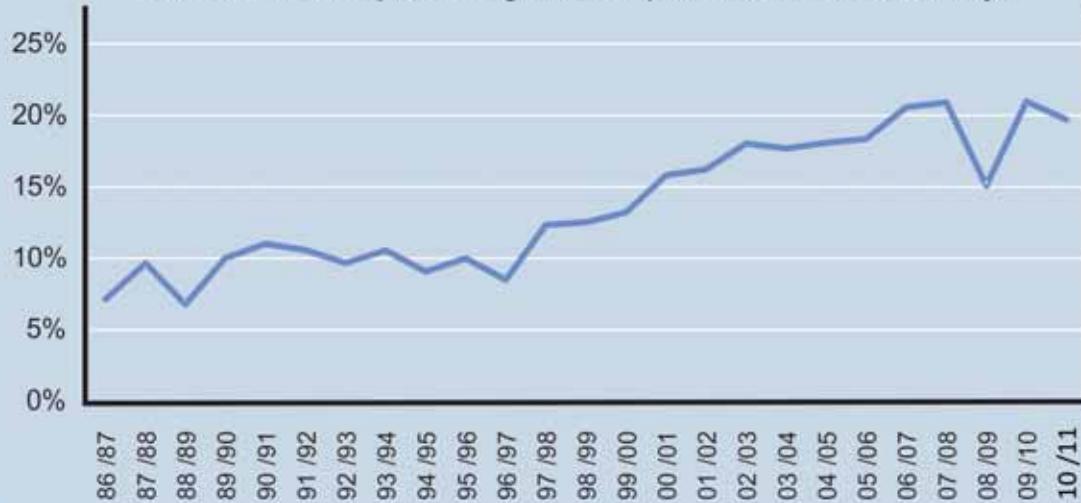
Source: Ministry of Agriculture and USDA

The growth in soy production shows an important acceleration since the mid 1990's explained by the introduction of the combo of "RR" soy (with RR seeds) + glifosate and by the increase of China's demand. Argentina's production is characterized by the use of direct seeding which state of the art technology which implies:

- High density sowing with sower machines that guarantees an adequate seed distribution.
- Diminishment of the row distance which helps covering the soil more rapidly, high germination seeds, preinoculated and/or curated.
- Good weed management, fertilization and herbicide and insecticide treatments.
- Less wear and tear of the machinery.
- Fuel economization

In the particular case of soy crop, a natural symbiotic fixation of nitrogen takes place by the action of rhizobia bacteria, which reduces the demand of nitrogen fertilizers to a minimum. This is why soy can be produced with a minimum or with no need of nitrogen, which is one of the principal fertilizers associated with its production. This makes soy an ideal feedstock for soy biodiesel production given that nitrogen fertilizers are one of the most expensive inputs for agricultural production. That advance in soy production can be summarized in chart 61, where the ratio soy/soy+maize+wheat is represented.

Gráfico 65 - Participación Argentina en producción mundial de soja

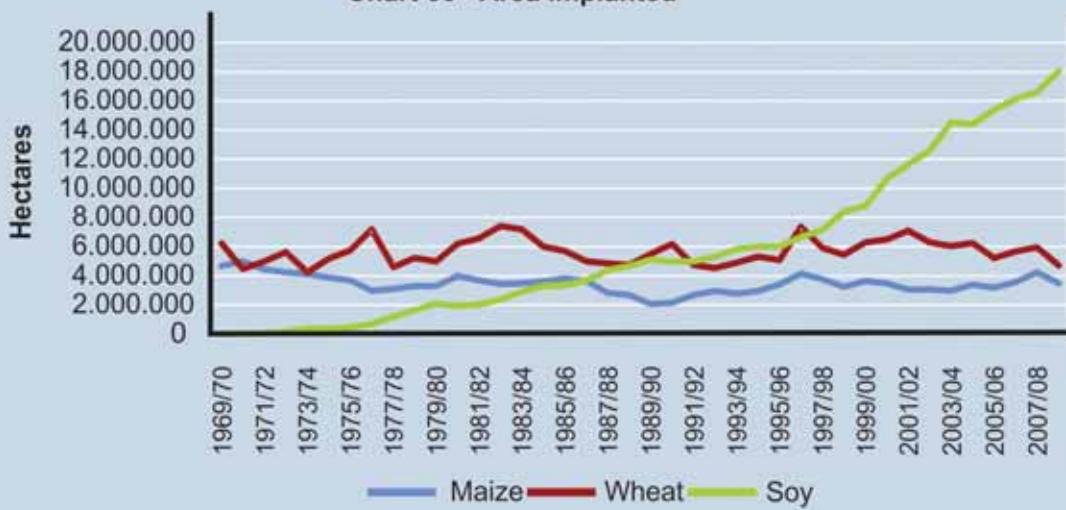


Source: USDA

Hectares implanted and harvested

The growth in soy production is explained on one hand, by the growth in the area destined for soy production and by the growth of the performance of that areas thanks to the technical improvements and the use of agrochemicals as mentioned earlier. The next chart summarizes the situation regarding the area used for soy production. In the present each 69 of 100 hectares implanted are for soy production in Argentina. Ten years ago that relationship was 49 of 100 hectares implanted with soy.

Chart 66 - Area Implanted

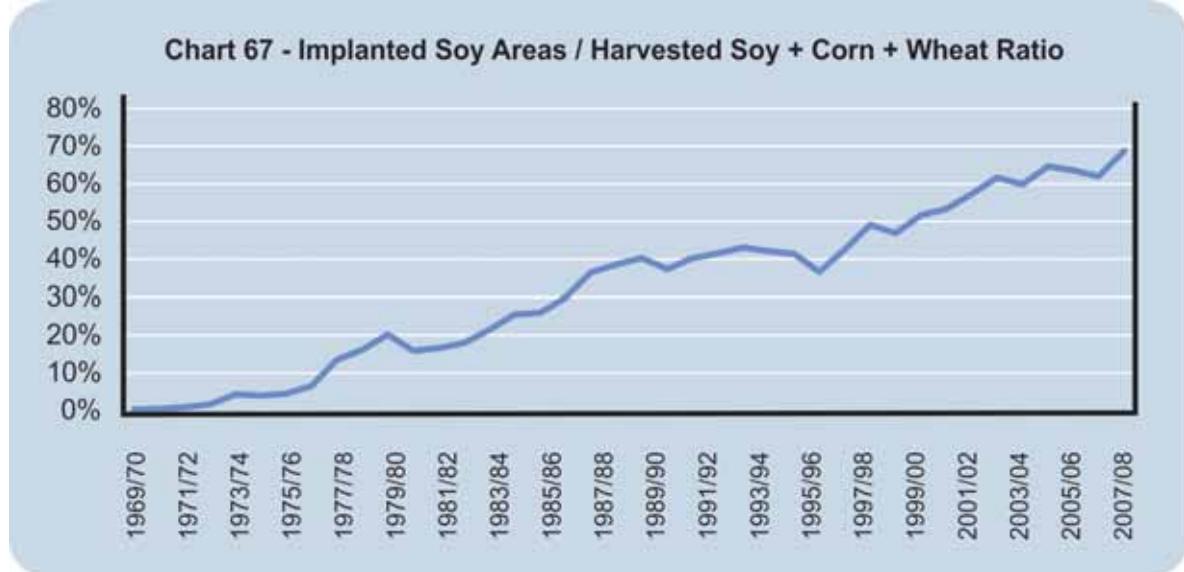


Source: Ministry of Agriculture

The magnitude of the growth in soy production indicates the presence of strong incentives for crop substitution in favor of soy. But it is worth mentioning that the growth in soy production was not against the principal crops (maize and wheat).

The area implanted with wheat and maize shows certain stability that contrasts with soy advance. The coexistence between the different crops production indicates that soy expansion could be because of the expansion in the agricultural frontier, something addressed in agricultural literature.

The way and where this expansion occurs will be dealt in a special chapter. We can say that the growth seen must be explained by a conjunction of factors involving, biological, social and technological ones.



Source: Ministry of Agriculture

Meat sector outlook

In order to understand the relationship between the soy boom in Argentina and the implications over livestock it is important to sum up the recent situation in the beef sector.

The National Animal Health Service (SENASA) recently reported that Argentina's cattle herd (to March 2010) was almost 49 million head, a drop of 8.5 million head from 2008 and the lowest stock level since 2002.

Rebuilding of herds will be slowed by the strong competition of crop land with pasture land, which is one of the main aspects of this research.

High profitability in crop production has resulted in several million hectares of good pasture being converted into soybean production during the last five years. Cattle breeding moved to land not suitable for crop production, and in many cases, with some supplemental feed.

Part of the drop in pasture area in traditional regions has been offset by increased production in new areas, especially in the northern part of the country where developed, with new, highly productive pastures. These new areas are not, however, as productive as more traditional producing areas.

Low or negative returns and the worst drought in the last 50 years forced an extraordinary high slaughter in 2009. The significant reduction of cattle and beef supply and firm domestic consumption made cattle and beef prices increase rapidly in the first months of 2010.

Higher cattle prices have brought greatly increased profitability to the sector. Calf prices increased 130 percent in a year, while returns in a medium breeding operation improved 3 times. Limited supplies and a retention phase have increased expectations of good returns to breeders for the next few years.

Another explanation of the liberalization of pasture lands must be assigned to intensification of animal production in the main agricultural areas of the country where land prices have reached levels not compatible with the open grazing system on cultivated pastures so broadly used .

The local feedlot sector has expanded significantly in the past ten years as the area of highly productive pastures has decreased significantly. There are approximately 2,200 feedlots officially registered in the country. In 2009 the sector accounted for 40 percent of the total slaughter and 70 percent of the slaughter supplying the domestic consumption.

Production from commercial feedlots in 2010-11 is expected to drop, due to small feeder calf supplies and elimination of the government subsidy.

The government recently increased the minimum slaughter weight from 260 to 300 kilos live weight in order to encourage more beef production per head, which could cut into the profitability of feedlot operations. This requirement shortens feedlots' number of cycles in a year. In March 2010, the government eliminated the support program for feedlots. The program was implemented in 2009 to encourage beef production and provided subsidies of US\$60-65 per fed animal. Feedlots currently have a large unused capacity, mainly due to limited cattle availability and lower returns. Most cattle in the sector are owned by beef distributors, supermarkets and some meat packers which need to secure their supply during times of cattle scarcity.

Based on the recent SENASA report, there are 210,000 cattle operations in Argentina, with an average herd of 233 head. In the past two years, the highly productive provinces in the central part of the country have seen variable reductions in their herds, while in the center-north part of the country the number of cattle is expanding.

The government recently implemented a Federal Plan for Cattle and Meat, with the primary objective of improving supply of all meats. Private sector contacts indicate that the program will not, however, have a major impact on beef exports. For beef production, small and medium producers present, through their municipalities or provincial governments, investment plans to obtain funds. There are two tools which producers can access in order to invest in their operations:

- 1) there is a credit line of US\$150 million through state or provincial banks under which breeders can obtain credit to be paid back in 5 years at low rates, with 6 percentage points waived by the government;
- 2) a non-refundable loan of US\$55 million.

Export difficulties

Argentina's government has had a number of policies that resulted in a ban of beef exports in order to reduce local prices that roared.

For example in February 2010 Guillermo Moreno, the interior commerce secretary, imposed new quotas on exports and expanded subsidies on grain to feedlots. While producers agreed that those steps were going to help lower the price over the next they were not pleased with the long term prospects.

Advance over livestock outlook

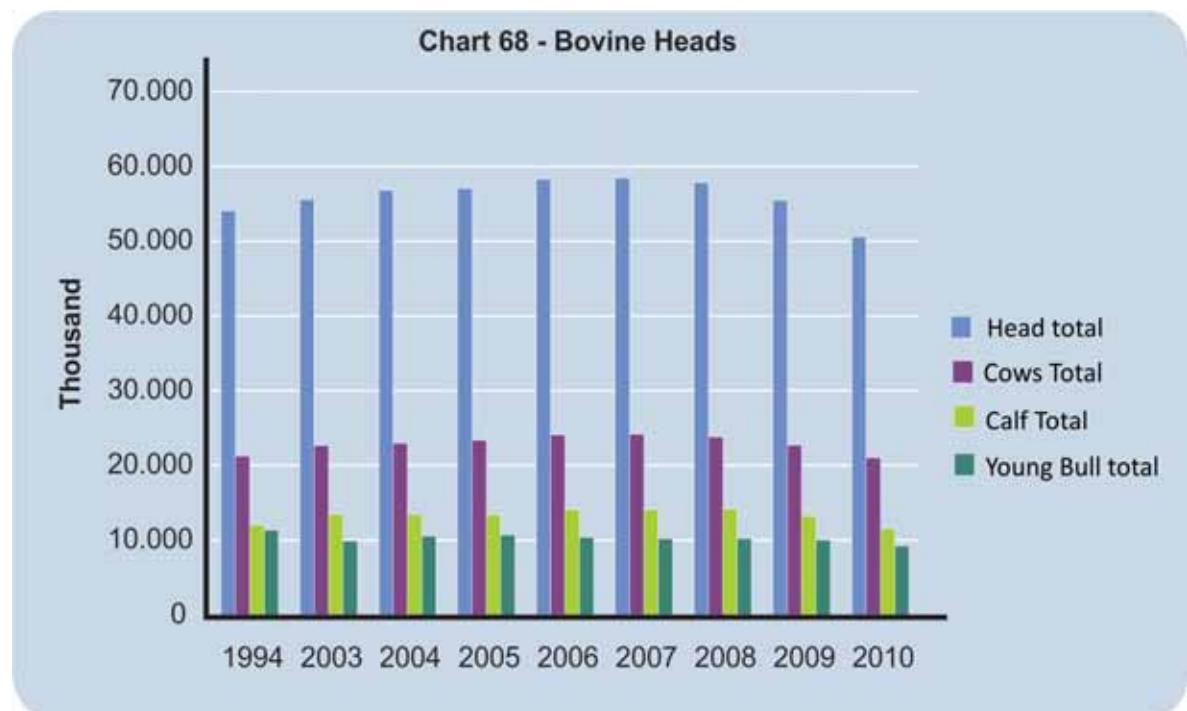
Different studies suggest the idea that soy production growth was over traditionally cattle areas. Since 2001 in provinces as Santa Fe, Cordoba and Entre Ríos such growth was over areas with less agricultural aptitudes historically dedicated for cattle production. In the province of Buenos Aires until 2001/2002 campaign the advance of soy production was over areas traditionally dedicated to other crops as sunflower and maize. But since 2003 an advance over livestock areas took place. It is estimated that over the last 7 years feedstock production gave away 4 million hectares to soy production.

Using a long term view we can observe that over the last 15 years the increment in harvested areas exceeds 13 million hectares, with soy production being the leader. The liquidation of livestock since 2007 responds to an adaption in production given the land increase price and restriction.

Table 11 – livestock heads, thousands

	1994	2003	2004	2005	2006	2007	2008	2009	2010
Head total	54,055	55,558	56,821	57,015	58,270	58,472	57,816	55,432	50,583
Cow total	21,264	22,662	22,991	23,384	24,076	24,163	23,793	22,707	21,018
Calf total	12,003	13,496	13,427	13,381	14,088	14,116	14,175	13,264	11,551
Young bull									
total	11,364	9,892	10,543	10,682	10,380	10,227	10,198	10,055	9,238

Source: SENASA



Source: SENASA

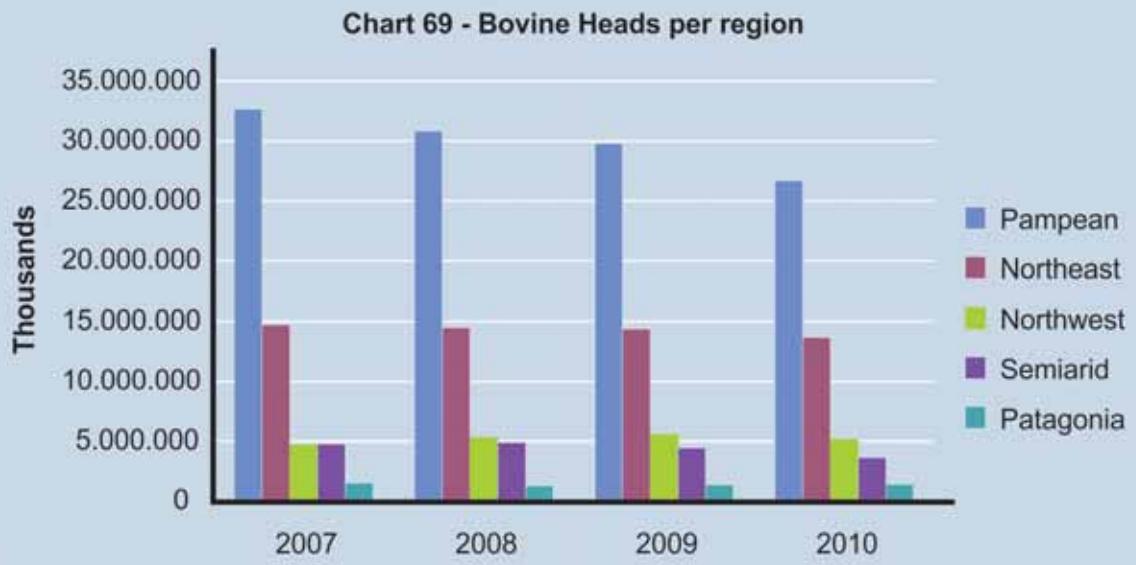
Regional perspective

Using a regional perspective we can observe the next table which represents the fall in livestock quantities. The fall in the Pampean region has been the more pronounced in the country. This indicates that in this region livestock gave away territory to another activity.

Table 12 – Bovine Livestock, heads

Región	2007	2008	2009	2010	Dif 07/10	Dif 07/10 %
Pampean	32,679,882	30,857,734	29,806,085	26,695,480	-5,984,402	-18%
Northeastern	14,747,412	14,485,266	14,388,391	13,678,779	-1,068,633	-7%
Northwestern	4,720,301	5,313,148	5,576,698	5,159,803	439,502	9%
Semiarid	4,761,039	4,907,757	4,449,182	3,642,338	-1,118,701	-23%
Patagonia	1,523,016	1,279,566	1,376,193	1,408,603	-114,413	-8%
Totals	58,431,650	56,843,471	55,596,549	50,585,003	-7,846,647	-13%

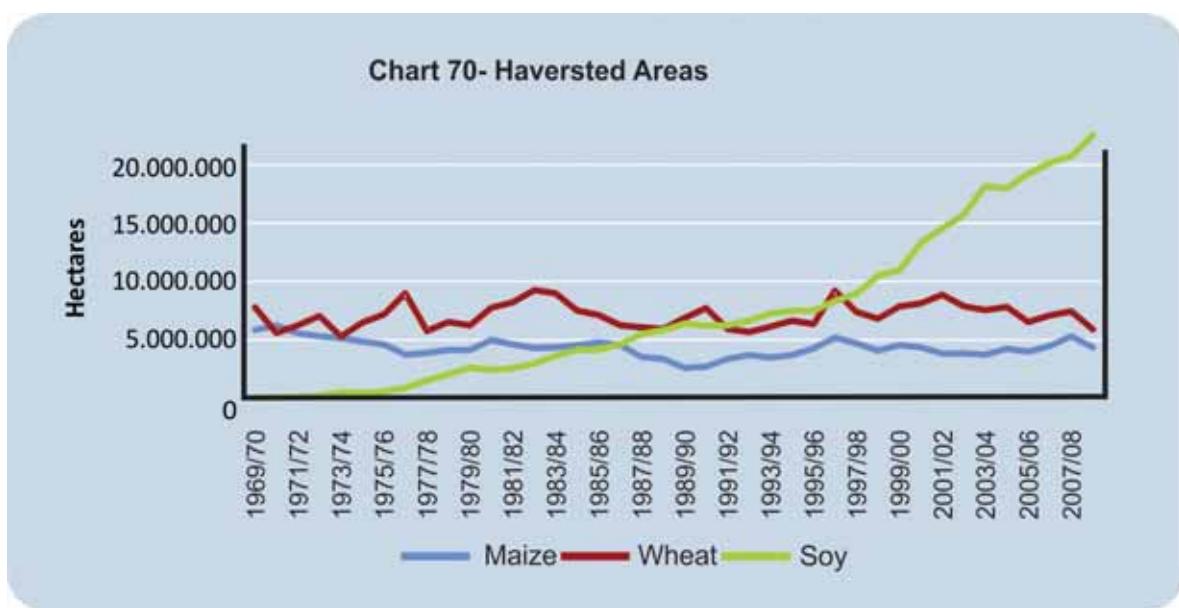
Source: SENASA



Source: SENASA

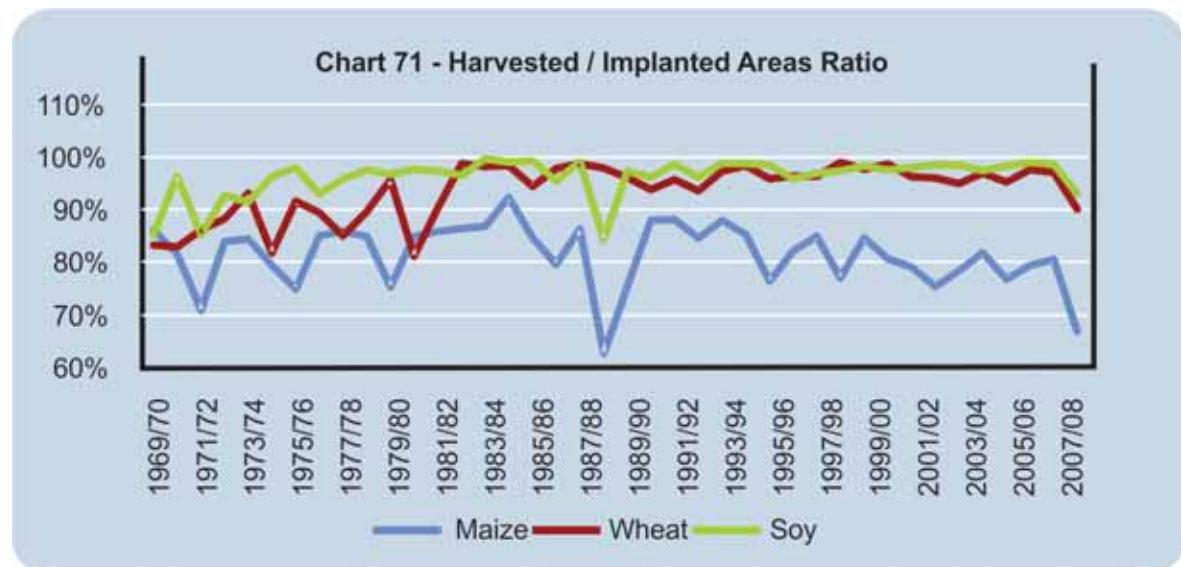
Even though the fall in livestock matches the growth in soy production and soy biodiesel production this correlation does not implies causality. There are plenty of reasons that could be explaining the fall in livestock. We will address this issue in section 3 of this research. The situation in harvested areas is basically the same with soy production showing a growth tendency higher than other crops.

Crops performance



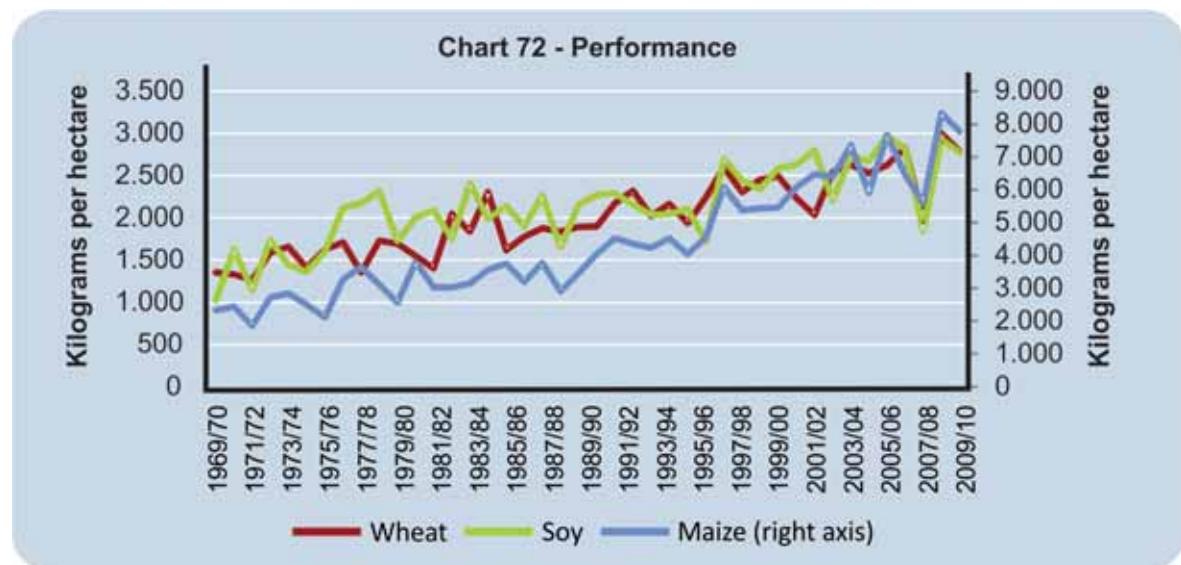
Source: Ministry of Agriculture

An interest point is reflected in chart 68. Soy is in average the crop with higher optimization of harvested area. In the 08/09 campaign 93% of the hectares implanted were harvested. That ratio was 90% for wheat and unusually low 67% for maize. Additionally the growth in the ratio over the 1970's was evident, in line with the technical improvements mentioned earlier. The fact that the ratio for soy is the highest gives another reason for the preference in its production.



Source: Ministry of Agriculture

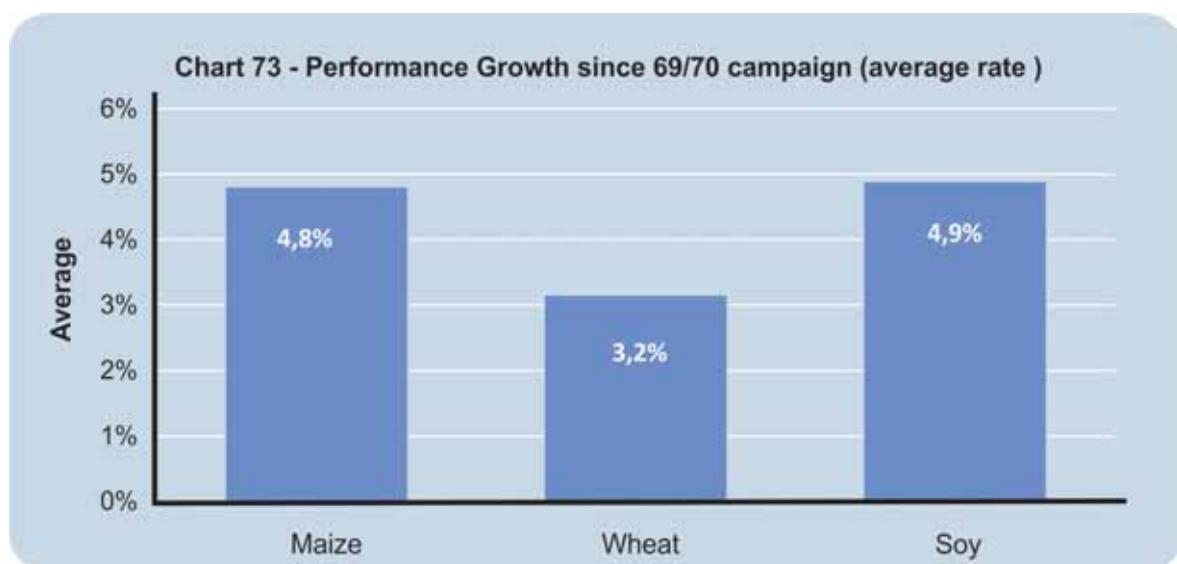
In chart 69 soy, wheat and maize performances can be observed. There are two issues to keep in mind: The first one is that soy performance has shown an upward tendency over the last decades. In the 69/70 campaign 1,032 kgs per hectare were harvested (in average) against 2,791 kgs per hectare. The dip in 08/09 can be explained by the worst drought in the last 30 years.



Source: Ministry of Agriculture and USDA

And important issue surfaced in the last chart is that the growth in soy performance was in a context where wheat and maize performance also has risen. In chart 72 this situation is reflected.

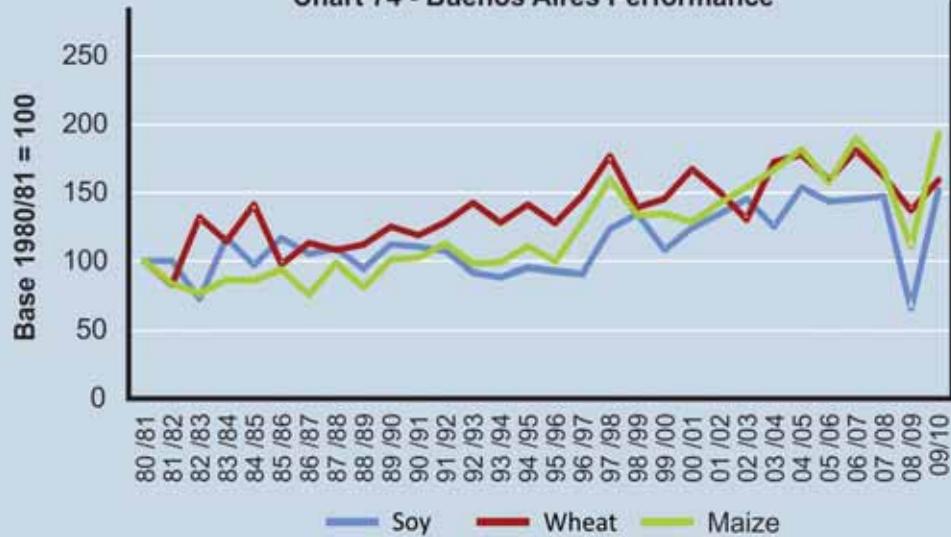
Increase yields are explained by a conjunction of factors agronomical, genetic, farm machinery and general management. There are good perspectives for this tendency to continue in the near future. Soybean BTRR2 specifically developed for the southern hemisphere could generate an increase between 10 and 15 % in yields. This new technology is based in two GMO events compiled with important achievements regarding pest control using less pesticides.



Source: Author's elaboration according to information provided by the Ministry of Agriculture of Argentina and USDA database

Another point worth mentioning is that performance growth happened in a context of agricultural frontier expansion. This could generate some distortions when doing comparisons. That is why we analyze the performance behavior of the principal crops in each province of the "soy core" (Buenos Aires, Santa Fe and Cordoba).

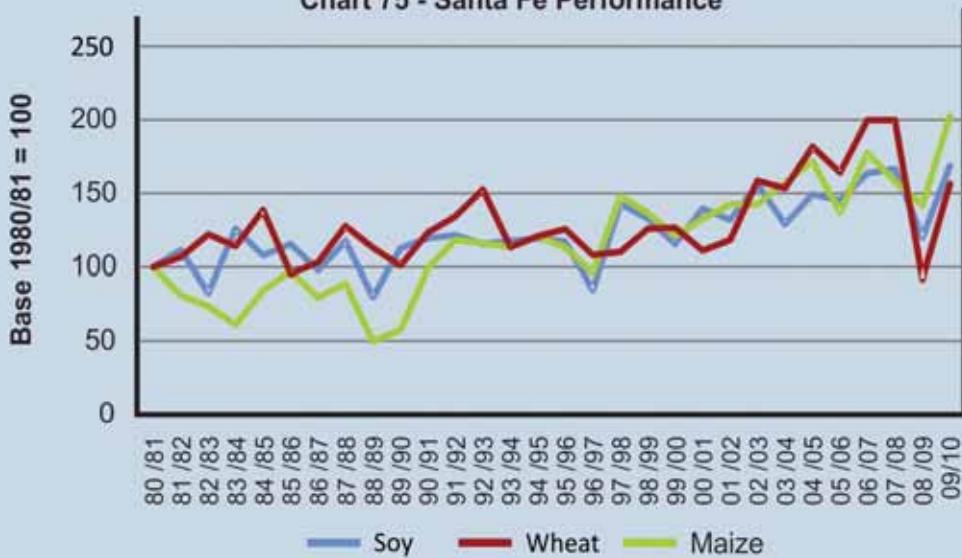
Chart 74 - Buenos Aires Performance



Source: Ministry of Agriculture

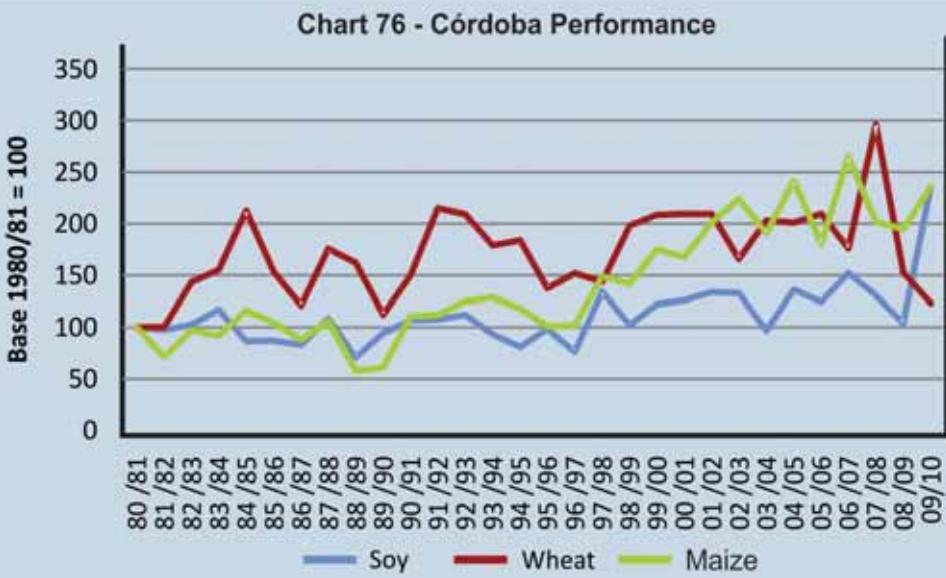
In this case soy performance is lower than other crops performance and recovering from the worst campaign in the period (2008/2009) affected by a mix of drought, internal conflicts and international crisis.

Chart 75 - Santa Fe Performance



Source: Ministry of Agriculture

In this case soy performance evolution is similar to maize performance and both are having breakthrough years, performing as never before after recovering from the conflicts mentioned above.



Source: Ministry of Agriculture

Soy performance experienced a strong recovery from the crisis levels and is in a similar level than maize. Wheat case is the only that is still falling even more than the crisis levels. Given that soy performance in the country was highest than other crops this implies that new areas were annexed to the soy production.

From this perspective the technical advance was especially important in areas outside the soy core. The fact is that evidence suggests that the improvement in soy performance should be an important explanation in order to understand the growth in soy production but not for the explanation on why it growth higher than maize and wheat. In order to explain that divergence we should go back to the issue of the growth of hectares destined to soy production.

Phase 3: transport and storage

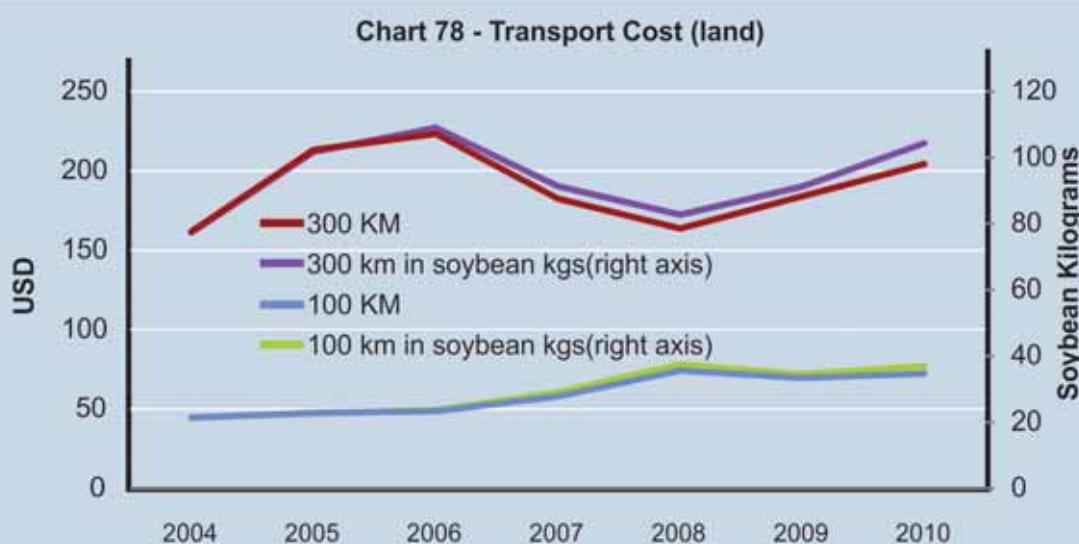
Transport spending is another relevant cost in the soy production structure. The cost of river transport has moved closely correlated with soy international prices reaching the highest value in mid 2008, falling after that in sync with the fall in international prices.

The last data on the series shows certain stability in freight costs. Evidence suggests that river transport costs show a fluctuation that is correlated with the value of the goods being transported.



Source: Ministry of Agriculture

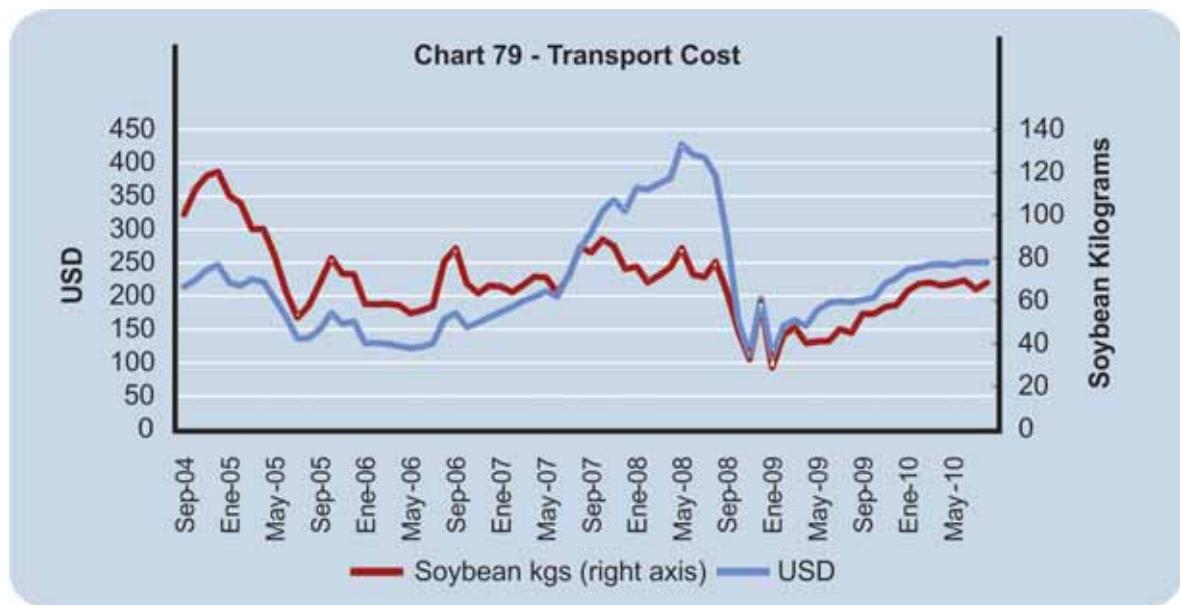
Freight costs show a similar evolution. In chart 75 we can observe the evolution of the land transport costs of grains for distances between 100 and 300 kilometers. Since 2004 an upward tendency surfaces especially for the 300 kilometers transport. As in the case mentioned earlier a certain correlation between transport cost and international price can be found. In terms of kilograms of soybeans a similar situation can be obtained.



Source: Ministry of Agriculture AND IMF

In order to analyze sea transportation we take as reference bulk transportation to China where a behavior linked to international prices can be obtained. As supposed the raise in

soy price impacted in the transportation cost. In 2008 a dip in transportation price can be observed, which was linked with the international crisis which lowered commodities prices. In terms of kilograms of soybeans the transportation cost has been more stabilized even though certain correlation still surfaces.



Source: Ministry of Agriculture and IMF

We now propose a brief analysis of transport logistics. For that we use the last report of the “Dirección de Mercados Agroalimentarios (DMA)” which emphasizes the different characteristics of internal and international grain transports.

Internationally 90 % of the transportations are by vessel and 7% by truck. Internally trucks get 84% of the transportations followed by the rail (14.5%) and small boats (1.5%). The growth of the production is collapsing the road infrastructure and there are important plans to overcome the difficulties caused by the growth of production.

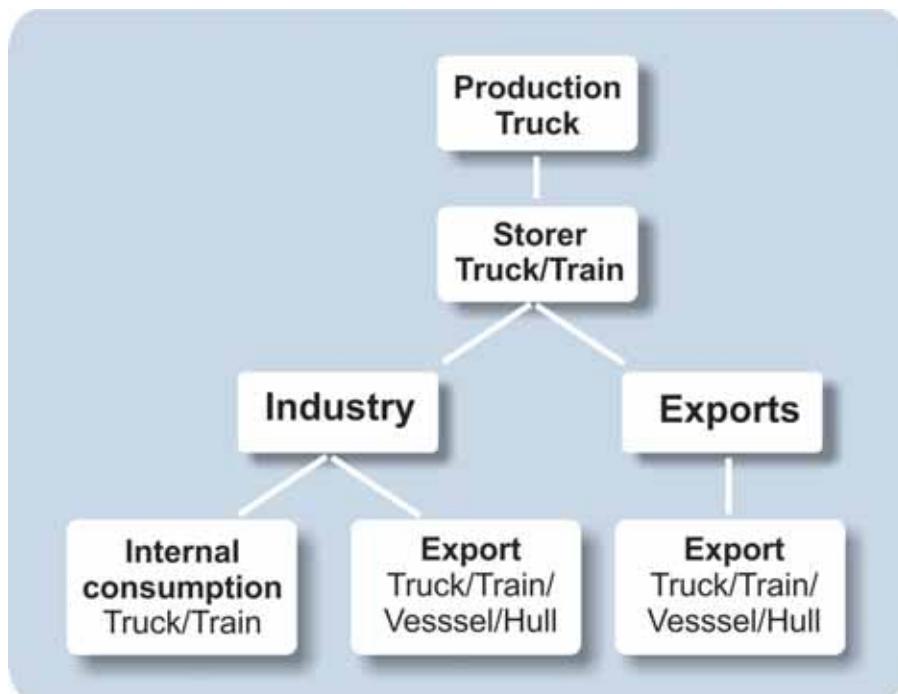
Table 13 – grain transport by type, 2007

Type	Tons	Destination
Vessel	53 million	Export
Truck	63 million	Internal / Export
Truck	12 million	Internal / Export
Small boat	1 million	Internal / Export

Source: Dirección de Mercados Agroalimentarios,
Ministry of Agriculture

In the next scheme the relationship between the means of transportation and destiny of the merchandise can be observed

Scheme 1 – Type of Transportation in grain and subproducts commercialization



Source: Dirección de Mercados Agroalimentarios, Ministry of Agriculture

The DAM establishes in its 2008 report that the main usage of land transportation lies in the fastness and flexibility of trucks and by the short distance between production sites and storage sites. The truck quantities are over 400.000 units with 5.000 units suited for grain transportation and 60.000 units suited after minor modifications. In Argentina the truck union is one of the most important and the number of truck and truckers has been strongly growing over the last couple of years.

Even though in terms of energetic efficiency (due to fossil fuel usage and gas emissions) the massive use of trucks is not good for the environment the usage of trucks contributes to elevate the number of indirect labor employing larger people than in the case of railroad transportation.

Railroad transportation, even though it is deteriorated since its privatization in the early 1990's has been growing over the last years as a consequence of the agricultural frontier expansion out of the Pampean region borders.

In the present Argentina's railroad transportation capacity is above 6500 wagons suited for solid or liquid goods transportation across 28.000 kilometers of rails. River transportation main disadvantage is the lack of suited river routes thru the main production areas. That is the reason why lighters usage is high.

In the next table the loading capacity of lighters in the Mercosur is displayed, as observed Argentina's usage of lighters is modest in comparison with Bolivia's or Paraguay's.

Table 14 – grain loading capacity of lighters and tug boats

Country	Tug boats Number	Lighters Power (HP)	Number	Power (Tn)
Argentina	25	45496	141	211274
Bolivia	17	52250	334	534540
Brazil	19	17650	72	106460
Panamá	3	10800	21	35400
Paraguay	49	127998	393	605594
Uruguay	0	0	12	19200
Total	113	254194	973	1512468

Source: Dirección de Mercados Agroalimentarios, Ministry of Agriculture

Finally, regarding sea transportation its advantages in long journeys are obvious given the costs. Given that Argentina's main buyers are located in South Asia, Japan, China, Russia and Netherlands the advantage of using sea transportation is unquestionable.

The cost of sea freight is related to the size of ships used. Until 1995 panamax ships with a capacity of 60.000 tons could only carry 32.000 since the parana river had 26 feet. This was increased with a private concession of the river parana hidroway to 34 pfeet to 45500 tons completing cargo in Brasil. New plans underway to increase depth to 36 feet will permit full cargo of ships reducing freight costs to roterdam from 70 to 80 US\$ per ton. This new infraestructure investment of Argentina will imply a reduction in costs of 160 million dollars per year increasing the overall efficiency of the soybean complex to export.

Regarding storage capacity, the growth over the last years in Argentina is worth mentioning. Even though information regarding storage capacity is available until 2007 in that year soy phenomenon in Argentina was spread and its consequences over growth in capacity were palpable.

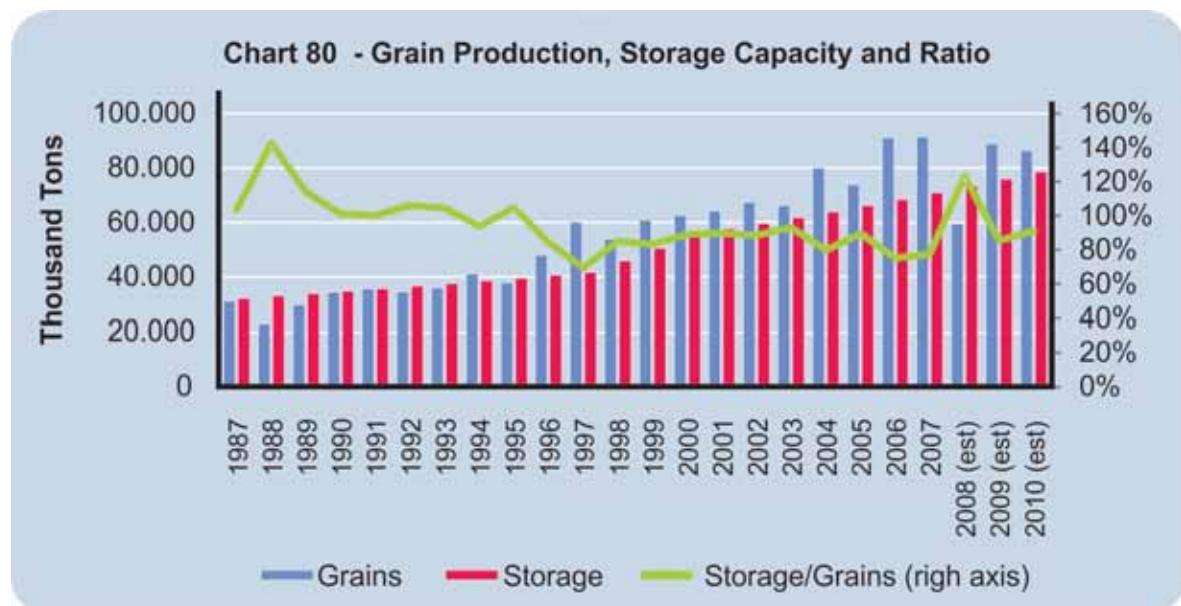
Table 15– grains storage capacity, thousand tons

Distribution per sector	1977	1987	1997	2000	2007
Producers	3434	6307	9000	13817	15900
Traders	14318	25865	32654	41839	55029
Total	17752	32172	41654	55656	70929
Participation					
Producers	19%	20%	22%	25%	22%
Traders	81%	80%	78%	75%	78%
Total	100%	100%	100%	100%	100%

Source: López & Oliveira (2008)

Over the last decade there was a strong growth in storage capacity of 27.4%. Storage capacity within the commercial sector has been particularly high (31.5%) which seems to suggest a decentralization of the storage as a result of the complexity of the production chain and grains trading. Nevertheless, producer's participation in storage capacity remains in levels historically high even after taking into account the reduction mentioned. This reflects the enhancement on infrastructure over the last decades.

Despite the growth in storage capacity it has been diminishing in relative terms compared to grain production as shown in chart 77. Although over the last three years the ratio has been recovering this has been associated with the lower harvest in those years and not with a recovery in capacity. This seems to suggest that an underlying problem is still in place, as a reference the storage/production ratio reached 77.5% in 2005.



Source: Author's elaboration

In terms of storage capacity distribution between the different links in the grains commercialization chain the primary operators stand out (cooperatives) with 54% of the total. Producers are second with 22% and oil mills in third place with 10.8% of storage capacity.

Table 16 – sectorial structure of grain storage capacity

Link	Tons	Participation
Cooperatives	38.204.066	53,90%
Producers	15.900.000	22,40%
Oil mills	7.655.511	10,80%
Ports	4.759.119	6,70%
Flour mills	2.552.024	3,60%
Balancers	785.947	1,10%
Rice Mills	555.827	0,80%
Selectors	517.45	0,70%

Source: López & Oliveiro (2008)

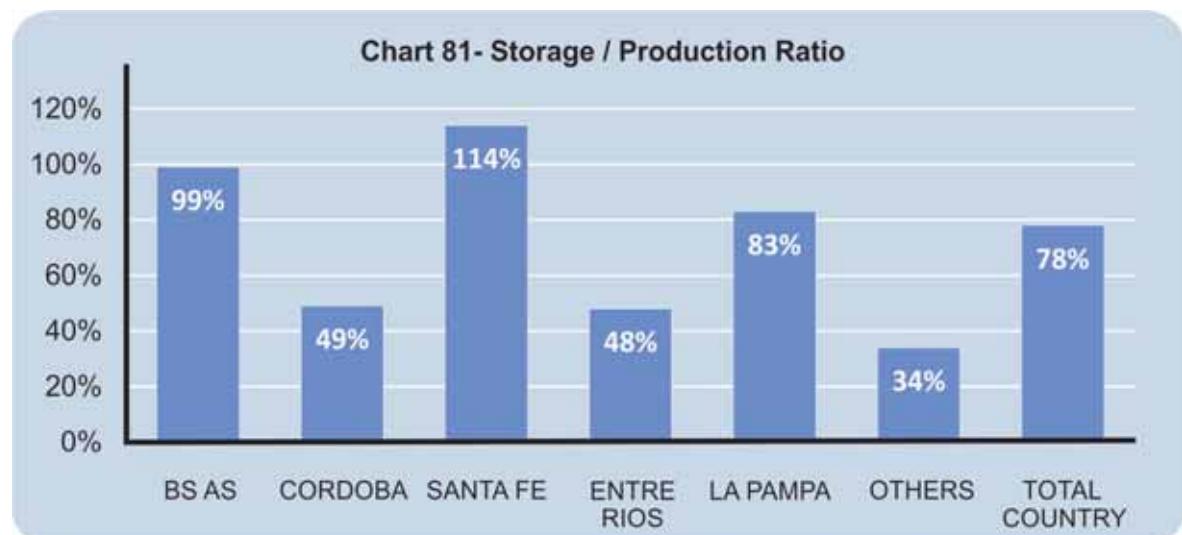
In terms of geographic distribution Buenos Aires is the province with most storage capacity followed by Santa Fe and Cordoba. Between those three provinces 87.4% of the total storage capacity is distributed.

Table 17 – storage capacity geographical distribution

Province	Primary Phase	Secondary Phase	Producer	TOTAL
BUENOS AIRES	17652	3303	8800	29755
CORDOBA	6188	2974	3550	12712
SANTA FE	9356	8499	1700	19555
ENTRE RIOS	1639	1179	650	3468
LA PAMPA	1116	103	550	1769
Others	2253	767	650	3670
TOTAL COUNTRY	38204	16825	15900	70929

Source: López & Oliveiro (2008)

The geographical approach is relevant when it generates a regional disparity between storage capacity and local production, something that generates a production surplus in some provinces and lack of storage capacity in others. .

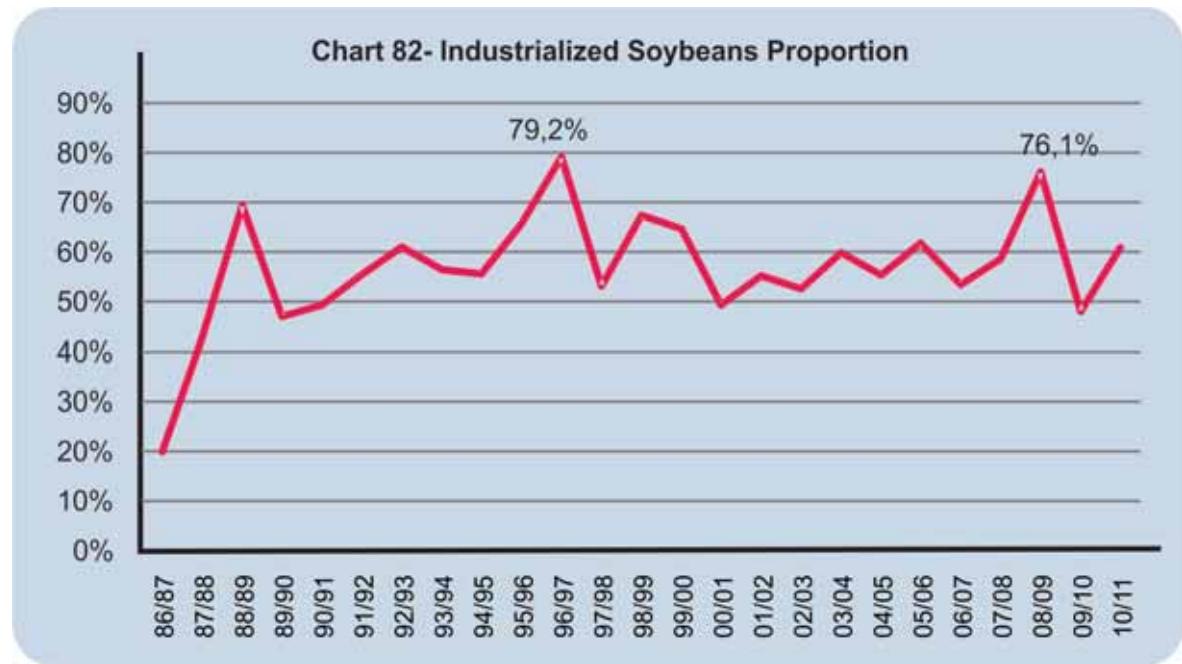


Source: López & Oliveira (2008)

The situation of “other provinces” seems worrying and linked to the expansion of the agricultural frontier, something that will be addressed further in this research. For now we can conclude that the agricultural expansion (especially soy) towards the Northwest and Northeast exceeded the expansion of storage.

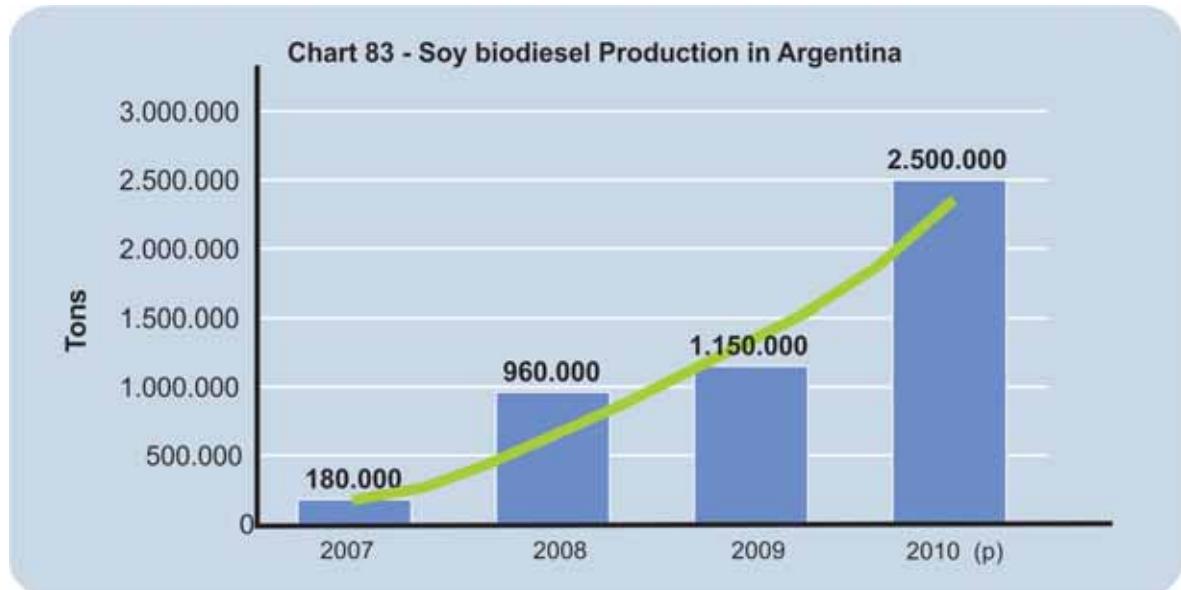
Phase 4: industrialization

As we seen before, evidence towards Argentina soy production growth is solid. In terms of composition, the growth in soybean production shows an upward tendency. In other words, the proportion of industrialized soybeans is growing at a high rate.



Source: Ministry of Agriculture y USDA

As a partial conclusion it seems clear that Argentina's soy advance has coexisted with more aggregated value by the soy sector given the quantity of soybeans transformed in flour, oil or biodiesel. In a context of soy production growth in 2007 a new product appeared in Argentina: Soy biodiesel., reaching 180.000 tons in that year. In 2009 that production elevated to 1.15 million tons, a 539% growth rate. in barely two years. Our estimations for 2010 are towards 2.5 million tons of soy biodiesel production, a 117% growth compared to 2009.



Source: CADER

Biodiesel production growth outnumbered other soy derivates growth rates and that is the reason for analyzing the impact that soy biodiesel production could have over the soy market in medium and long term.

An interest point, besides the growth in production itself, is the enormous growth of Argentina's installed capacity for soy biodiesel production. In order to observe Argentina's installed capacity we use some government publications such as Resolutions 7/10 and 554/10 published by Argentina's Secretary of Energy. In those resolutions were established the soy biodiesel quotas that producer must provide to the internal market in order to reach the 7% cut that diesel fuel must have. After reaching the quota the producers can export the margin. as shown in the next table.

It is important to have in mind that the facilities that are allowed to export and produce are all registered before the Secretary of Energy. Therefore fulfilling the requirements in terms of safety and environmental quality.

A new facility to be approved needs to fulfill very high standards requirements that include a complete environmental impact study.

Table 18 – installed capacity, domestic market quota and export margin

TN/YEAR	INSTALLED CAPACITY	PRODUCTION OFFERED FOR QUOTA	PRODUCTION ASSIGNED BY SECRETARY OF ENERGY	EXPORT MARGIN
Renova	480,000	144,000	33,750	446,250
Dreyfus	305,000	84,000	44,398	260,602
Patagonia Bioenergía	250,000	84,000	49,241	200,759
Ecofuel	220,000	72,000	45,428	174,572
Unitec	220,000	220,000	122,537	97,463
Viluco	200,000	200,000	117,082	82,918
Explora	120,000	120,000	93,875	26,125
Molinos	100,000	36,000	41,217	58,783
Diaser	96,000	96,000	83,203	12,797
Biomadero	72,000	48,000	45,277	26,723
Vicentin	64,000	24,000	48,841	15,159
Aripar	50,000	50,000	5,000	45,000
Oil Fox	50,000	50,000	50,000	0
Aomsa	48,000	48,000	48,000	0
Maikop	40,000	40,000	40,000	0
Rosario Bioenergy	36,000	36,000	36,000	0
Diferoil	30,000	30,000	30,000	0
Pitey	18,000	18,000	18,000	0
Soyenergy	18,000	18,000	18,000	0
New Fuel S.A	10,000	10,000	10,000	0
Hector A. Bolzan y Cia S.R.L	10,200	10,200	10,200	0
Era S.R.L	9,600	9,600	9,600	0
Ecopor	10,200	10,200	10,200	0
Totals	2,457,000	1,458,000	1,009,849	1,447,151

Sources: CADER and Argentina's Secretary of Energy

Table 19 – Argentina's Production Capacity 2006-2011 (p)

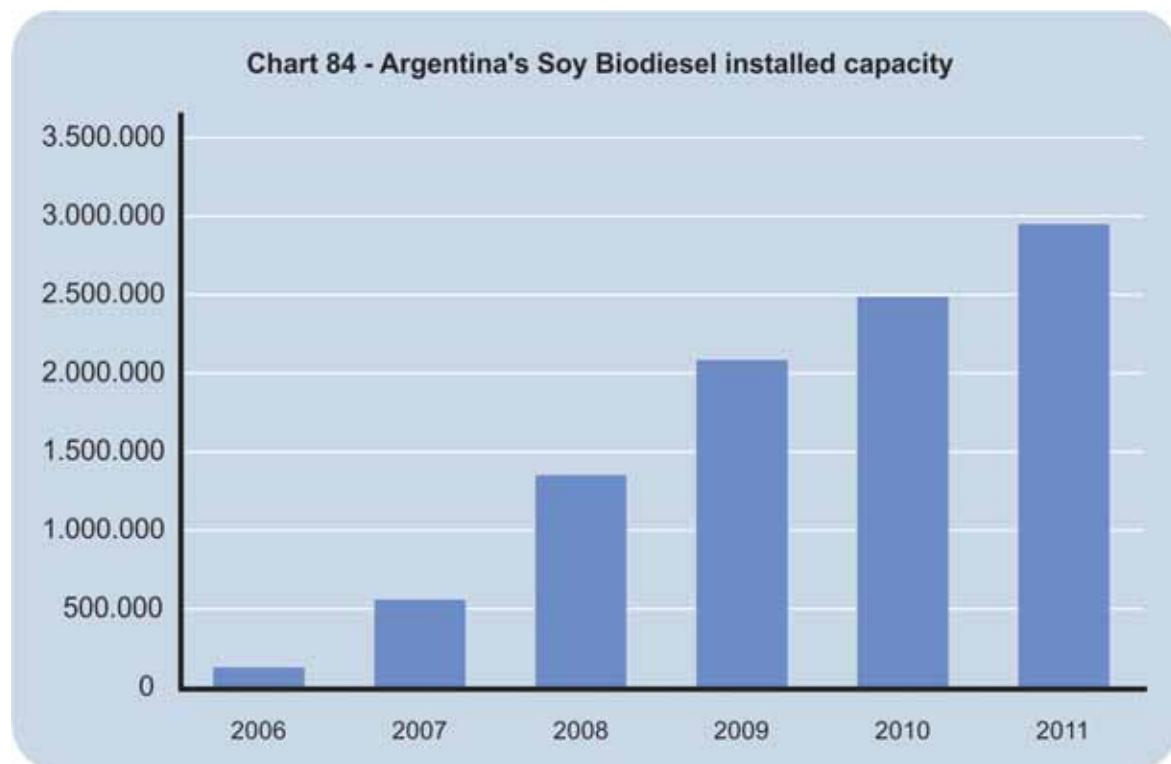
	Biodiesel Producer	2006	2007	2008	2009	2010	2011
1	Vicentin S.A		48,000	48,000	63,400	63,400	63,400
2	Biomadero S.A		30,000	30,000	72,000	72,000	72,000
3	Pitey S.A		18,000	18,000	18,000	18,000	18,000
4	Soyenergy S.A		18,000	18,000	18,000	18,000	18,000
5	Advanced Organic Material S.A		16,000	48,000	48,000	48,000	48,000
6	Renova S.A		200,000	200,000	480,000	480,000	480,000
7	Ecofuel S.A		200,000	200,000	240,000	240,000	240,000
8	Diaser S.A		30,000	30,000	96,000	96,000	96,000
9	LDC Argentina S.A			305,000	305,000	305,000	305,000
10	Unitec Bio S.A			230,000	230,000	230,000	230,000
11	Explora S.A			120,000	120,000	120,000	120,000
12	Molinos Rio de la Plata S.A			100,000	100,000	100,000	100,000
13	Energias Renovables Argentinas S.A			6,500	6,500	9,600	9,600
14	Patagonia Bioenergía S.A				250,000	250,000	250,000
15	Ecopor S.A				10,200	10,200	10,200
16	Diferoil S.A				30,000	30,000	30,000
17	Viluco S.A					200,000	200,000
18	Aripar Cereales S.A					50,000	50,000
19	Oil Fox S.A					50,000	50,000
20	Mikop s.A					40,000	40,000
21	Rosario Bio Energy S.A					36,000	36,000
22	Hector Bolzan & Cia S.A					10,800	10,800
23	New Fuel S.A					10,000	10,000
24	Cargill						240,000
25	Unitec Bio S.A						220,000
26	B.H Biocombustibles SRL						4,000
	Production Capacity	130,000	560,000	1,353,500	2,087,100	2,487,000	2,951,000

From both tables we can establish that Argentina's Soy biodiesel installed capacity is 2.5 million tons per year approximately and for 2011 that capacity is expected to be near 3 million tons per year.

Argentine industry could be divided according to CADER proposal into three classes or castes, each with different strengths and weaknesses.

- “Oil Crushers” representing the large multinational oilseed crushers with the largest plants and ample access to feedstock;
- “Large Independents” large plants but without access to their own feedstock
- “Small Independents” small and medium producers with none of the above, but count on the government’s support from a policy level.

The export margin for the whole sector is around 1.5 million tons per year but the investment projects currently under way could push the installed capacity to 3.7 million tons per year over the next couple of years, making the export margin even higher.



Source: Author's elaboration using CADER information

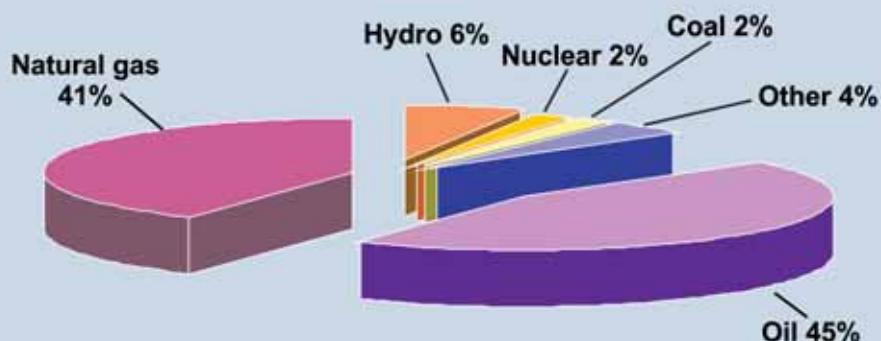
According to projections, Argentina's installed capacity at the end of 2010 is 24 times the capacity of 2006's and even higher in 2011. This could mean that the soy biodiesel sector could become a relevant one in a short term. Argentina currently posses state of the art soy biodiesel production facilities, in line with top quality standards. Same technologies as in developed countries (USA, Germany, Italy, etc) are used.

Argentina soy biodiesel industry currently posses

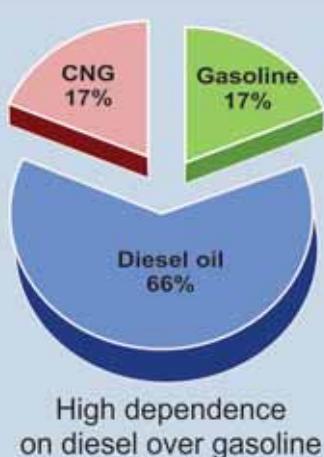
- Short distances between production areas and ports
- State of the art storage capacity in ports, environmental friendly facilities in terms of greenhouse gases emissions.

- Leading crushing industry recognized in the world by its efficiency over other similar facilities worldwide.
- High efficiency levels reaching 97.5% in the transesterification phase, meaning that from 1000 kg of soy oil 975 kilograms of soy biodiesel are made.
- Usage of private ports for loading, located inside the soy oil and soy biodiesel facilities, minimizing the need of transportation.
- High participation of hundreds of companies in all the chain of value.

A vital point to be mentioned is that Argentina's soy biodiesel market as in the rest of the world is dependant on governmental policies. The growth since 2007 has been motivated mainly from international markets and mandatory blend requirements overseas that generated a new demand for this type of fuels. The biofuel Law enacted in 2007. (Law 26.093), created an especial regime for 15 years and established a 5% cut of biodiesel in diesel fuels in order to increment the production incentives were enforced during 2010 and increased that same year to 7 %. The reasons for the Government to stimulate biodiesel production are the need of alternative fuel options in order to change the energetic dependence over fossil fuels.



Argentina energy portfolio with high dependence on oil & nat gas



There are several motives in order to promote Argentina's biodiesel production, such as:

- Carbon dioxide emission reduction
- Possibility of finding an alternative to the shortage of fossil fuels given the upward tendency of fuel demand.
- Adding value to traditional exports of the soybean complex allowing the evolution of internal economies.
- Increasing imports of diesel from other countries.
- Labor generation given that even though soy biodiesel facilities does not require too much human labor they generate demand for domestic companies services

Argentina is currently considered as one of the countries more capacitated to participate in the bioenergy international market given its comparative advantage in crop harvesting, land extension and geographic diversity, allowing to project non traditional crops production in order to feed the bioenergy industry. As mentioned before Argentina is leader in Soy and sunflower production or within the leaders worldwide. Given its export orientation Argentina is the leading country in soybean oil and sunflower oil exports. For the soybean oil industry, soy biodiesel is a clear evidence of a synergic effect.

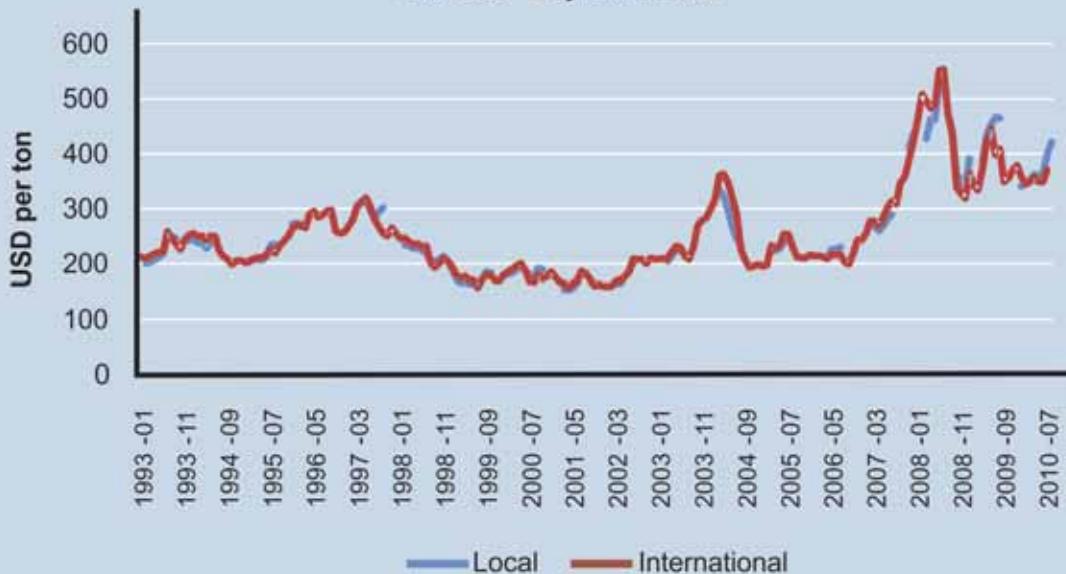
Phase 5: Commercialization

Local and international prices

The intention of this section is to evaluate if local prices affecting producer/exporters behave similarly to international prices in order to understand to which extend international prices affect internal decisions. Looking at soybeans in chart 83 we can see that local prices are almost perfectly correlated to international prices (FOB prices exporters receive).

It is worth mentioning that fiscal policy regarding soy exports will be addressed in section 3 of this research. In that section we will make a complete analysis of the history of soy export rates in Argentina studying the actual situation in order to understand its implications for the future of the crop in the country.

Chart 85 - Soybean Price



Sources: IMF and Ministry of Agriculture

Nevertheless and anticipating Fiscal Policy, FOB Price must be adjusted by export taxes and reimbursements per period in order to obtain the real price exporters receive. which is the relevant price for this analysis. After we made that adjustment the result is chart 84.

Chart 86 - Soybean Price adjusted by export taxes/reimbursement

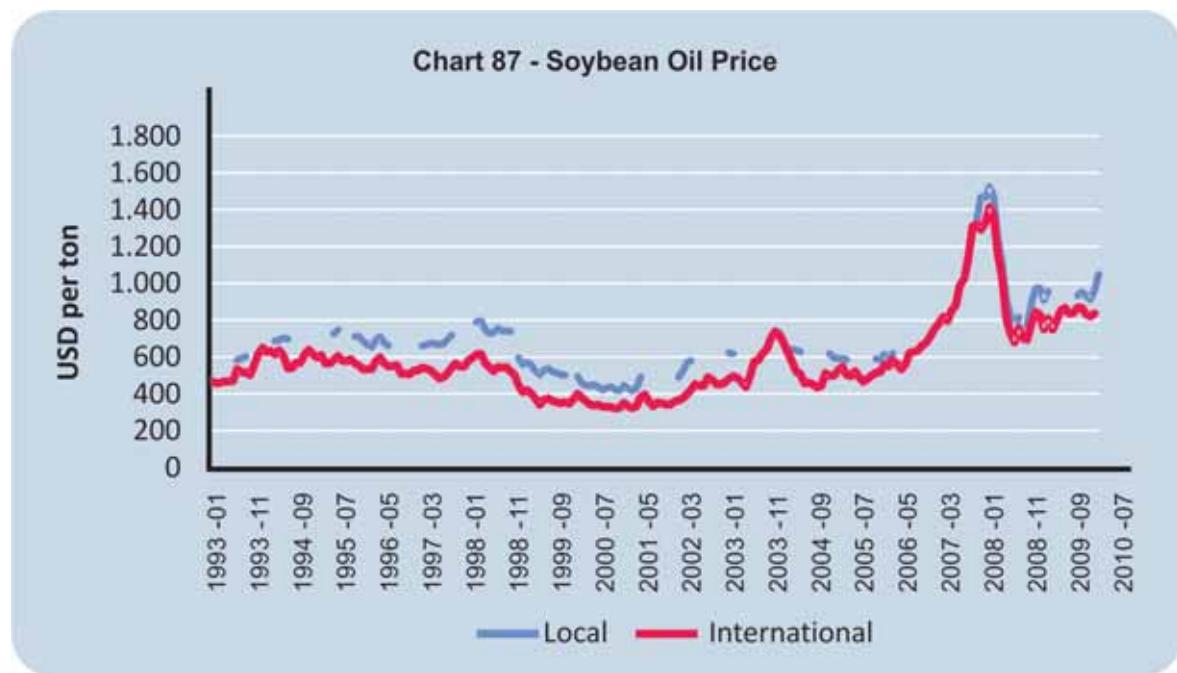


Sources: IMF, Ministry of Agriculture y CIARA

Although a gap is now in place the series are strongly correlated as well, meaning that International prices continue being relevant besides export taxes. Regarding soy the outlook is quite similar even though a larger gap is observed between the adjusted FOB price and the international price. Nevertheless a strong correlation between both prices is still evident. As presumed.

An interesting issue is that, averagely speaking, the fob price perceived by Argentinean producers is higher than the reference world price. There are at least two explanations for this phenomenon: The first one is that there should be a quality differential towards Argentinean soybean oil compared to the rest of the world; meaning that if Argentina's soybean oil is better than the one sold in the rest of the world then it's reasonable that its producers receive a higher price. This hypothesis had lost some steam given China's recent criticism towards Argentina's soybean oil quality and its consequent stop on soybean acquisitions.

The second possible explanation is that Argentina could be using its market power given that it is a world leader in soybean production (58% of soybean imports come from Argentina).



Once the adjustment to the price is made we get chart 86. In this case the outlook for Argentinean producers/exporters is not that bright given that in recent years they have perceived a lower than the world average price. It should be kept in mind that at the present Argentina's export tax rate for soybean oil is 32%.

Chart 88 - Soybean oil price adjusted by export tax/reimbursement



Sources: IMF, Ministry of Agriculture and CIARA

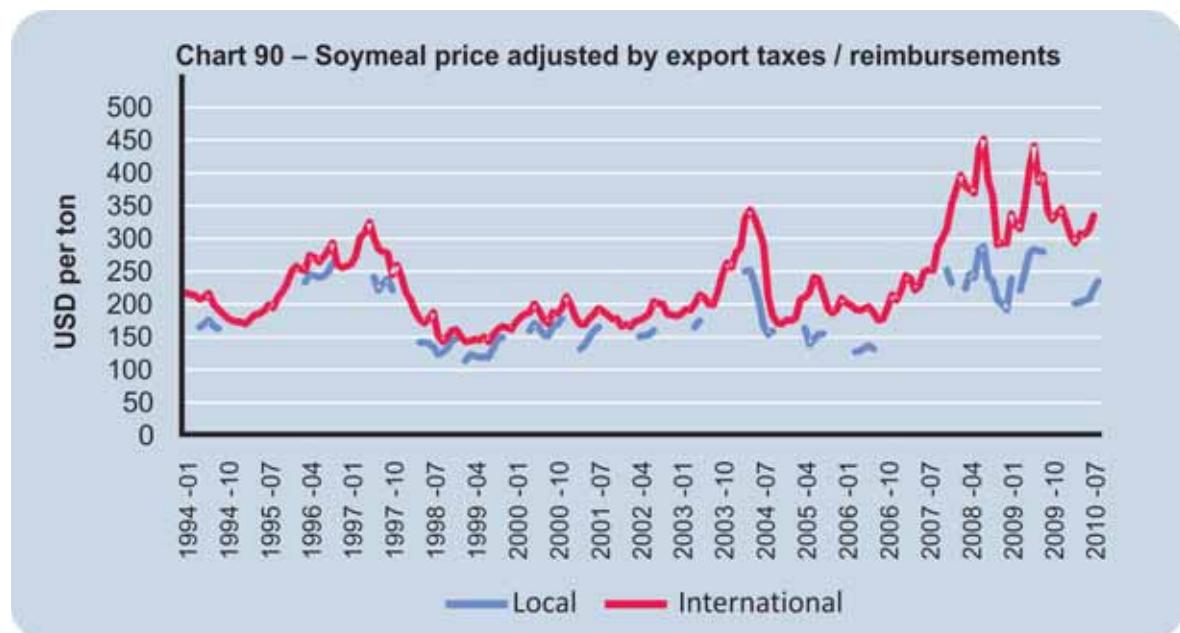
The soy meal case is similar to the soybean case. Once again a lower gap is observed between adjusted FOB prices and international prices. In this case, local price is, averagely speaking, lower than the world price but a strong correlation is still observed.

Chart 89 - Soy meal price



Sources: IMF and Ministry of Agriculture

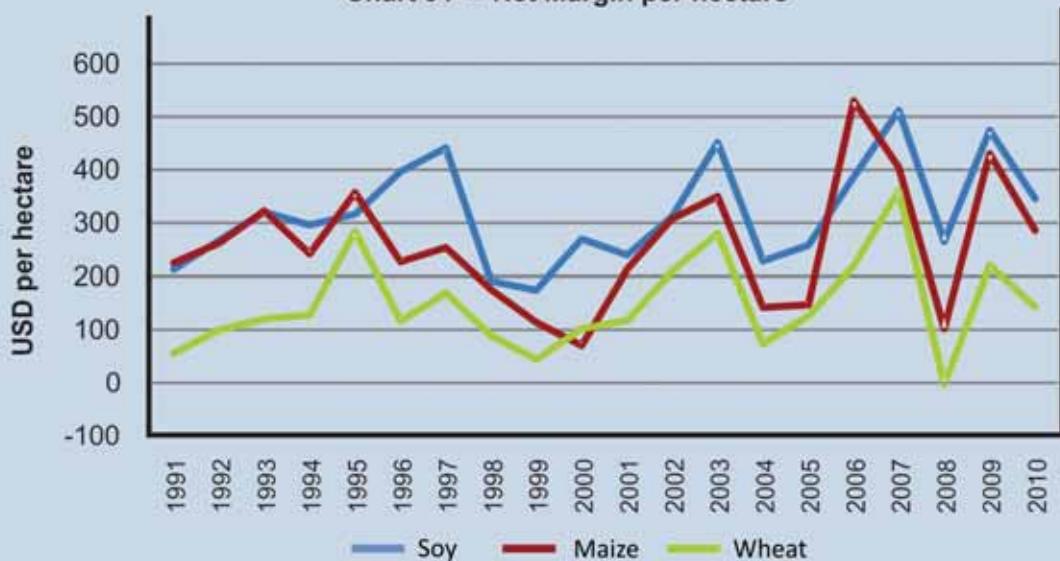
Once the adjustment is made it is revealed that the fiscal policy towards the sector has been less favorable than in the last two cases, basically because this kind of product received reimbursements during the 1990's, and that is why the adjusted series is clearly below the world average. As an example the price perceived by a producer/exporter in July 2010 was 33.2% lower than the international price.



Sources: IMF, Ministry of Agriculture y CIARA

As a conclusion, it seems clear that in the period 1991-2002 fiscal policy was in favor of the producer but since 2002 it became prejudicial given that after export taxes they have perceived less than the international price. A central issue that comes up when price evolution is studied is how those prices move around the different links in the soy chain. In other terms, is worth questioning if those prices variations move correlated with international prices thru the whole chain of soy production as we would expect. We will address this issue as a whole in the upcoming Section 3. The evolution of prices, together with costs behavior has determined the evolvement of net margins as shown in chart 89.

Chart 91 – Net Margin per hectare

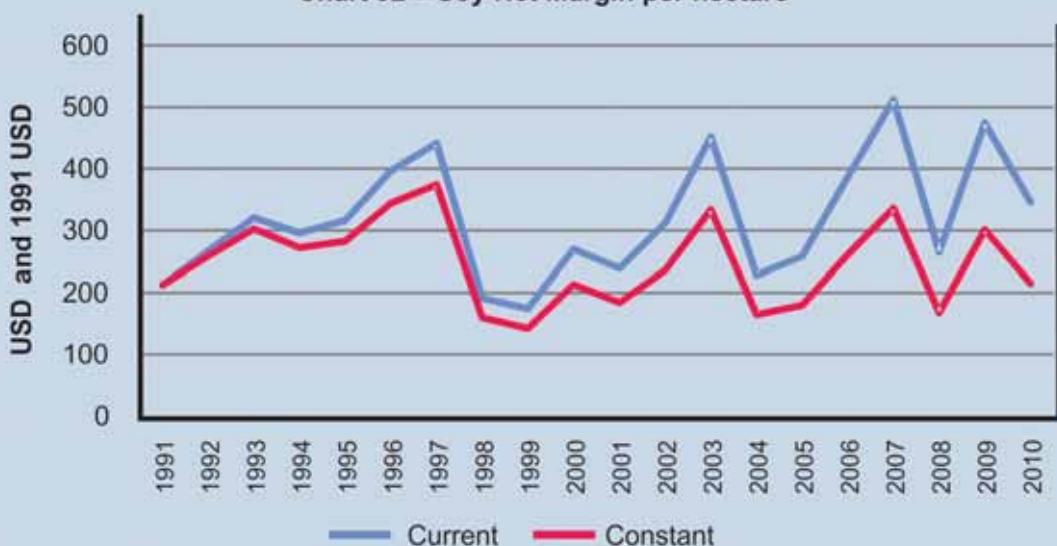


Source: Márgenes Agropecuarios

Besides the obvious volatility in margins that characterises all economic activities it seems clear than, averagelly, soy profitability has been higher than other crops. According to recent information, soy profitability is around 345 USD per hectare (southern Santa Fe), maize profitability would be around 285 USD and wheat 140 USD.

This higher profit margin of soy explains in part its enormous growth given that producers tend to produce using profitability as an input. Using constant dollars, soy performance are averagelly lower than it were in the early 1990's as shown in chart 90 even though an important volatility is in place.

Chart 92 – Soy Net Margin per hectare



Source: Márgenes Agropecuarios

According to Ambassador Dr. Jorge Remes Lenicov and Claudio Molina, the Argentine soybean complex (industry) has substantial differences compared to other oilseeds complexes worldwide. The Argentine industry pays export taxes and import taxes in several external markets.

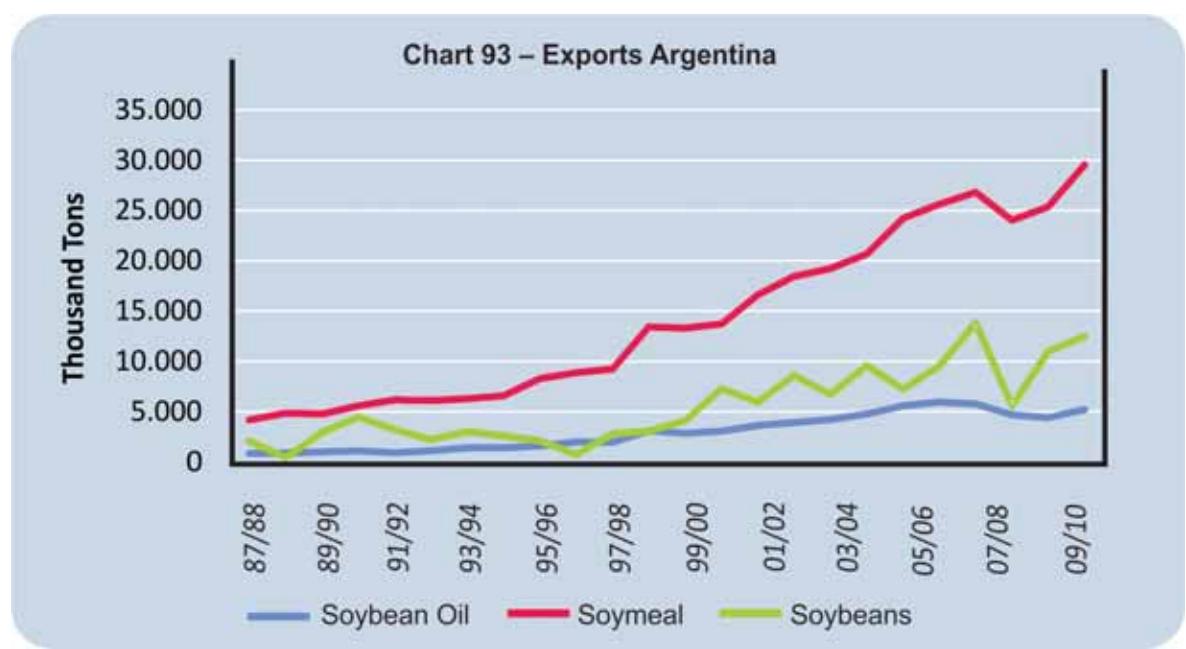
The prices in the argentine market, as was shown, follow the international prices trend which is affected by the exchange rate and by export taxes. Final numbers are formed by the forces of supply and demand, considering the international reference. The differences are transmitted upstream in the chain and assumed by the local farmers.

If an enterprise develops all the chain of production from the farm to the port, it will pay export taxes affecting its own profits. In Europe, the same type of company will receive several incentives through the green box system. Although this system was abolished in the last PAC revision, they continue receiving net incentives through rural development, sole system of payment, and environmental practices.

In conclusion, the whole soybean complex in Argentina is subject to tax payments and no incentives are given either by the federal or provincial governments.

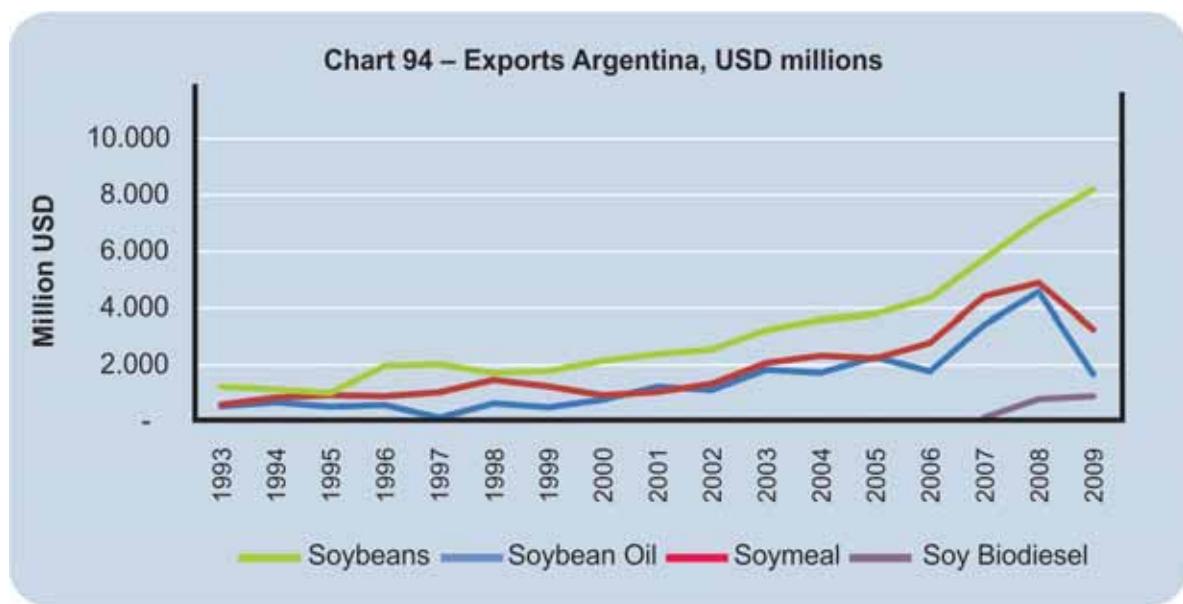
External trade

As can be concluded over this research, Argentina is characterized in the international market by its export orientation regarding soy. In fact Argentina is the world leader in soy meal, soybean oil and soy biodiesel exports and the third one in soybeans exports. As reflected in chart 91, soy exports have grown in a pronounced way over the last few years, taking aside some oscillations associated with climatic circumstances.



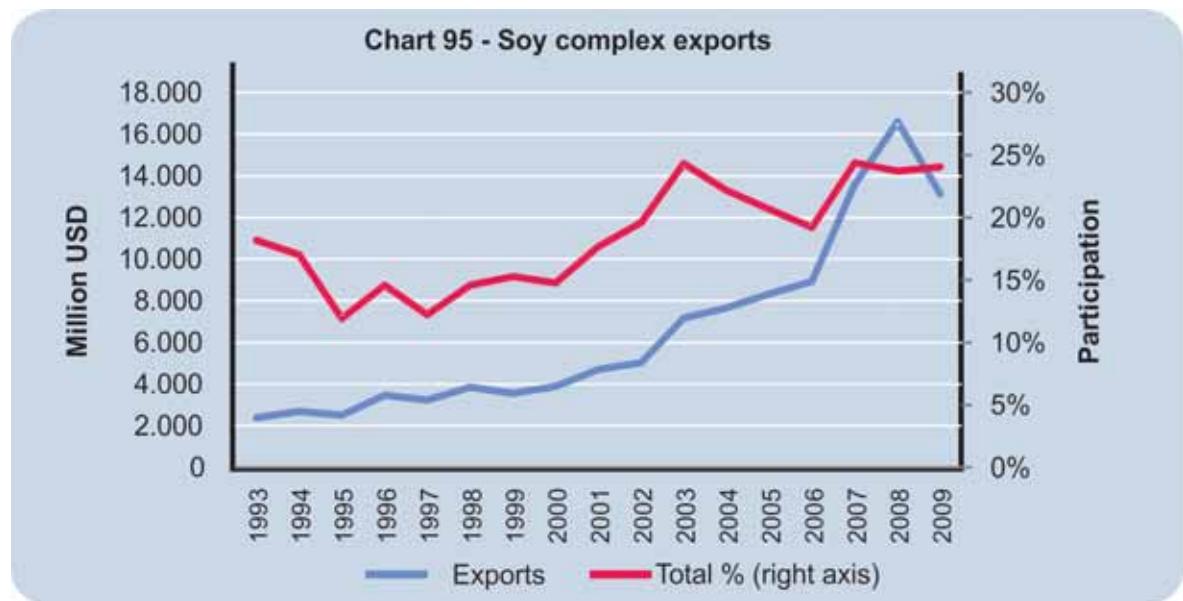
Source: Author's elaboration using USDA information

Up to this point, the 07/08 campaign was the better in terms of quantities exported even though some predictions stipulate that 10/11 campaign could be even higher. In terms of export values the growth has been remarkable given the price effect in place. As shown in chart 91. The dip in the value of exports in 2009 was clearly associated with the price fall.



Source: INDEC

As a consequence of this evolution soy exports in 2009 totaled 13.145 million USD after a record 16.607 million USD in 2008. In 2009 9 years of constant growth were broken due to the international crisis. That growth meant that the soy complex in Argentina elevated its export participation to 24% of the total.



Source: INDEC

Finally, the export destiny should be addressed and it is represented in the next three charts. Both in the soybean and soybean oil case there is an elevated concentration level with a stellar role by China. In the soy meal case a diversification is in place as is shown in the “rest” group.

Chart 96 - Soybean Exports

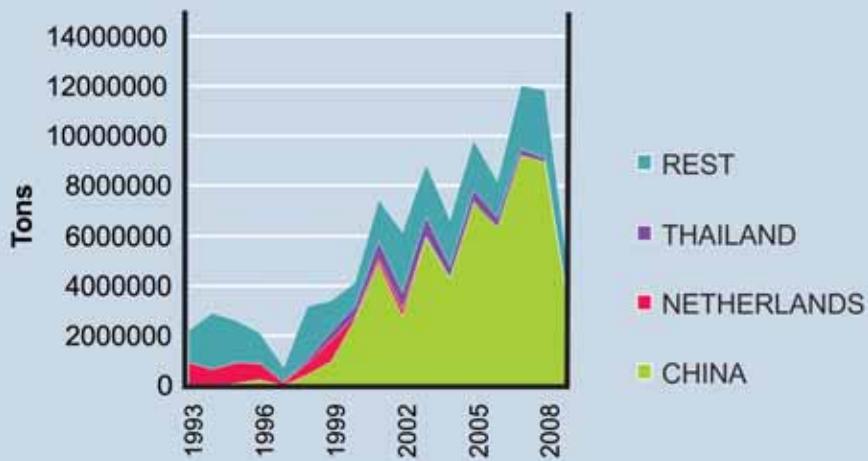
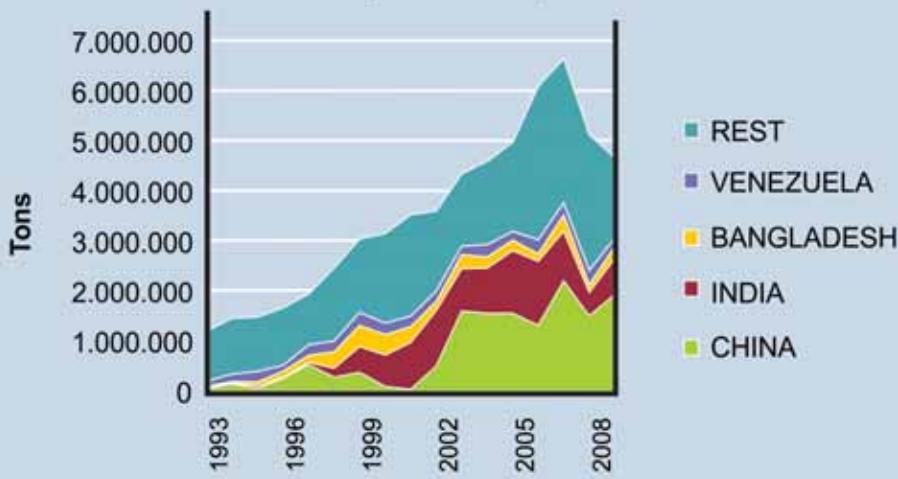


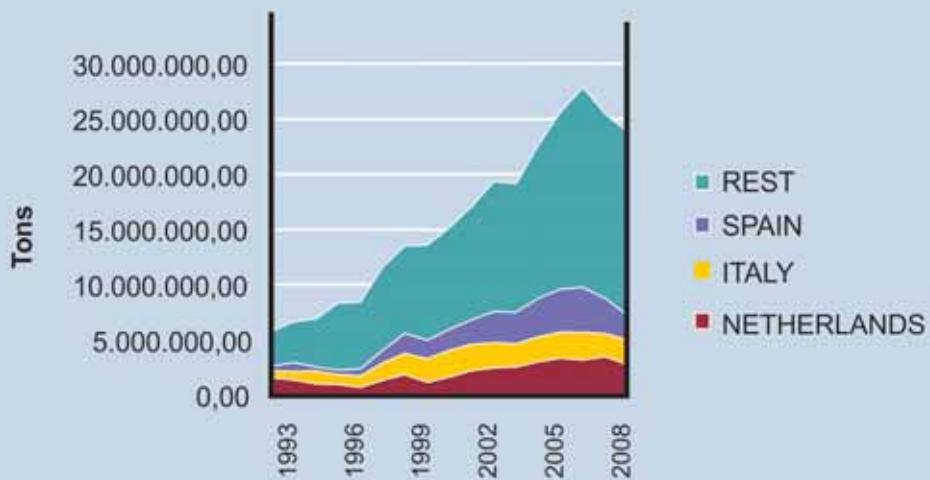
Chart 97 - Soybean Oil Exports



Source: Ministry of Agriculture

Regarding soy biodiesel the growth in export has been remarkable since 2007 when Argentina entered the market. Both in quantities and in price the growth has been important. In the first seven months of 2010 the growth compared with 2009 was 38% in price and 39% in quantities. This shows that a recovery is in place taking into account that in 2009 exports fell given the international crisis and its subsequent shortage of demand.

Chart 98 - Soy Meal Exports



Source: Ministry of Agriculture

Regarding soy biodiesel the growth in export has been remarkable since 2007 when Argentina entered the market. Both in quantities and in price the growth has been important. In the first seven months of 2010 the growth compared with 2009 was 38% in price and 39% in quantities. This shows that a recovery is in place taking into account that in 2009 exports fell given the international crisis and its subsequent shortage of demand.

Chart 99- Soy Biodiesel Exports . Argentina



Source: CARBIO and AFIP

Table 20 - soy biodiesel exports, destiny

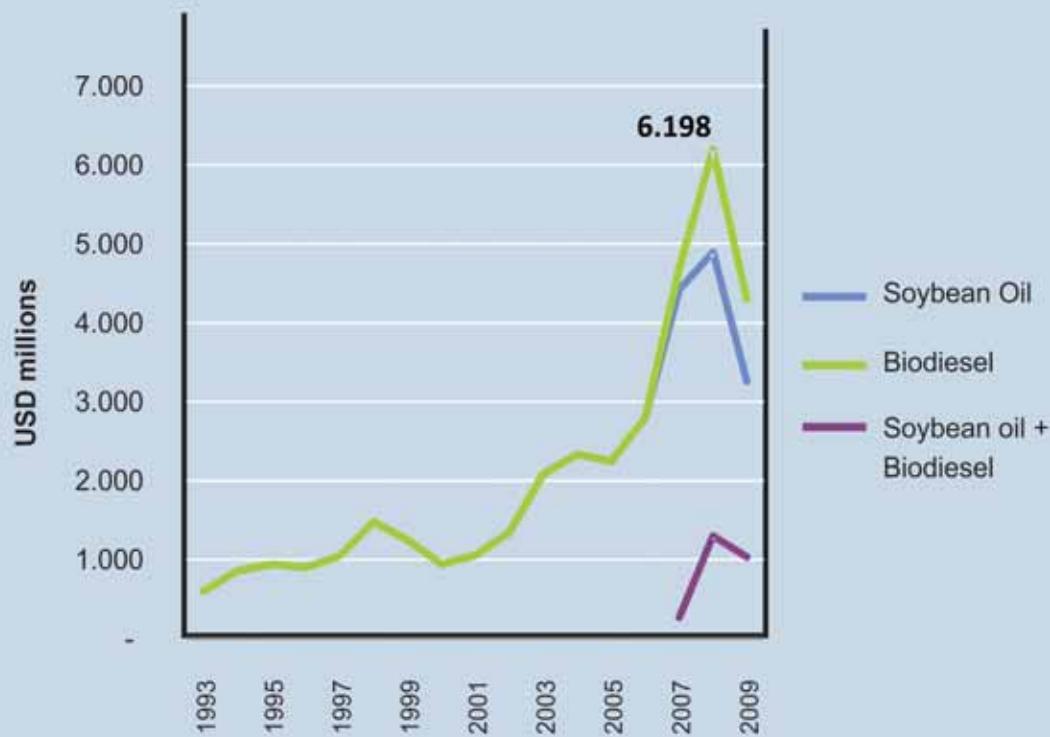
Country	USD	Participation	Cumulative
USA	1,350,894,654.17	39.5%	39.5%
Netherland	1,117,588,797.35	32.7%	72.2%
Spain	592,098,087.66	17.3%	89.5%
Italy	170,650,013.96	5.0%	94.5%
Belgium	116,104,563.79	3.4%	97.8%
Rest	73,572,878.59	2.2%	100.0%

Source: AFIP

An obvious conclusion is the relative low size of soy biodiesel market. Argentina, being the world leader in exports would surpass 1.500 million USD in 2010 and although the perspectives are bright the market size makes impossible to think that soy biodiesel could explain the recent movement in soy prices and commodities prices.

A last issue to be mentioned is the possible incidence of soy biodiesel exports over soybean oil exports. Given that soy biodiesel uses soybean oil as a feedstock it is expected that the growth of soy biodiesel exports could generate a fall in soybean oil exports. This could be observed since 2007 as shown in chart 97.

Chart 100 - Soybiodiesel Exports and Soybean oil exports. Argentina



Source: Author's elaboration

Fiscal Policy

The soy sector profit should be addressed once the tax burden is out of consideration. In this research we are particularly interested in the evolution of export tax rates, commonly known in Argentina as “retenciones”.

Argentina has introduced different policy measures in order to face one of the most serious economic crisis in the modern history during 2001. Under this framework, in 2002 by National Law 25.561 it was declared a public national emergency at social, economic, financial and exchange rates levels with the view to attempt that grave situation and to recover the payment empower for external debt.

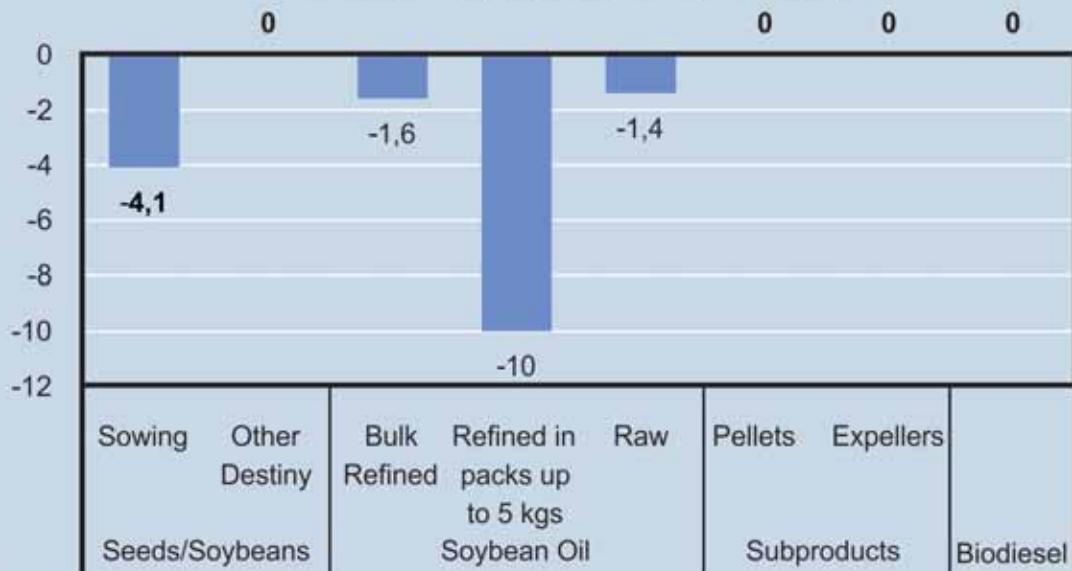
The Government decided to introduce by Resolution 11/2002, export taxes in all products, with the objective to restore public revenues and to protect most damaged social sectors in Argentina. The income taxes are used to expand and strengthen social programs for unemployment and food security and the payment of external debts in due time. Having in mind these goals, there is no date to foreseen a possible withdrawn of such measure.

Those initial levels were lately increased at a different rate for several agricultural and oil & gas products. As mentioned in previous sections this export duties are considered compatible with WTO rules since according to Article XI.1 del GATT stated: “No prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licences or other measures, shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party”. Export taxes are excepted due to the words “other than”.

Export duties are then not considered as subsidy for production or export. There are legal precedents at WTO backing this interpretation like Canada - USA in timberland (WT/DS/194/R), particularly because the WTO Subsidy Agreement foresees to consider such practice if there is only a financial contribution from the government.

Over the last twenty years the history of export taxes on soy can be divided in two periods: The first one goes from March 1991 to April 2002. More precisely March 22th 1991, when throughout a Resolution the Ministry of Economics eliminated all export taxes on soy. At that moment the export taxes on soy were declining after reaching 30% in May 1989. In 1991 only a 6% export tax rate on soybeans was in place but was gradually reduced to 0% in November 1995. At the same time that export taxes were eliminated; in 1992 a reimbursements policy was established, primarily oriented to the promotion of soy exports. Those reimbursements were in a range of 2%-10% according to the product. The situation in July 1999 can be observed in Chart 98 (negative numbers means reimbursements were active).

Chart 101 - Soy export tax rate (July 1999)

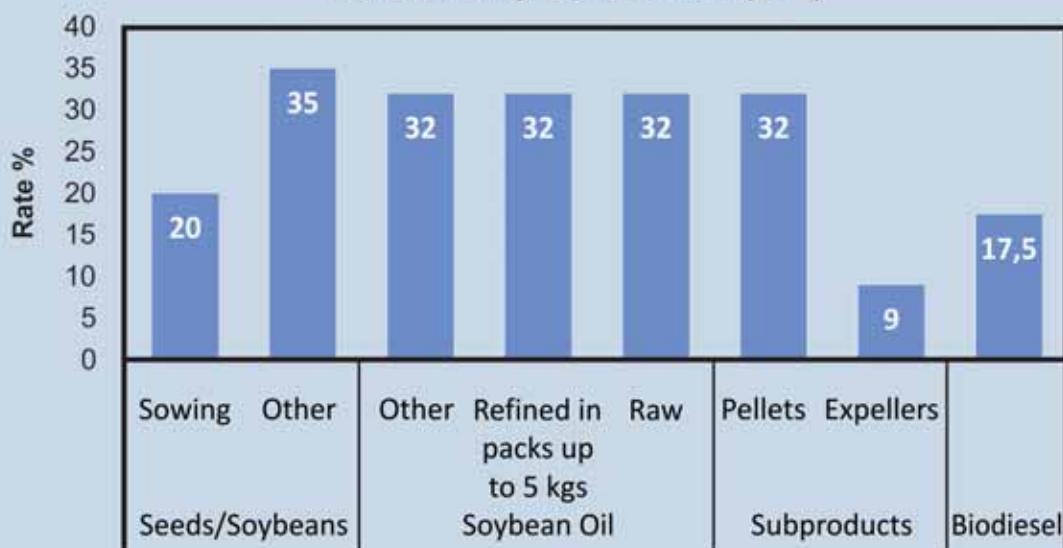


Source: CIARA

The situation changed drastically since 2002. After the economic crisis which put an end to the currency board and given the deteriorated fiscal situation the former President Eduardo Duhalde reinstated export taxes for soy and derivates.

At first the export tax rate was of 5% for all soy products and sub products with the exception of seeds and soybeans (10% for sowing and 13.5% for other destiny). Since then export tax rate were growing until its maximum reached at the present as shown in chart 99.

Chart 102 - Soy Export Tax rate (2010)



Source: CIARA

As expected, this policy changes generated controversy within the soy sector.

The hike in export tax rates was explained by the Government by:

- 1) Fiscal need
- 2) Excess profit in soy production
- 3) Soy expansion beyond sustainable/recommendable amounts.
- 4) Compensation for the Exchange policy favorable to the sector
- 5) Inflation moderation thru internal prices isolation

Nevertheless, criticism has not been quiet and was based on:

- 1) Disincentive towards agricultural investment
- 2) Lack of consideration towards higher costs within the sector
- 3) Arbitrariness over the rate management.
- 4) Incapacity controlling inflation since soy is not a major product consumed in Argentina.

Controversy aside, we can conclude that given the hike in export tax rates on soy the situation for soy producers in Argentina was not perfectly correlated with the international situation given that export rates moderate the higher international prices. This means that there is no active policy to promote a further expansion of the crop and its chain and we have first to adjust the prices using the tax rates on soy to clearly calculate the market indicator that farmers receive..

An interesting point is the coexistence of two policies that seems contradictory. On one hand soy biodiesel exports are affected by export taxes and on the other hand production is promoted via the introduction of a quota for diesel fuel.

In practice export taxes as shown depreciates the end price received by farmers and causes a decrease in the expansion of the crop to new territories away from the central ports. In other hand it promotes high efficiency methods in the primary production enabling the development of a very high efficiency agriculture.

On practice, the export tax rates on soy biodiesel did not seem to constitute an obstacle for the growth of the sector. Two causes can explain this phenomenon.

- Export tax rate differentials between soy biodiesel and other soy sub products keep incentives towards soy biodiesel in place.
- The 7% cut that diesel fuel must have generated an increasing demand towards soy biodiesel. Nevertheless it is more profitable to produce soy biodiesel and export it rather than only producing to satisfy the internal demand.

Related to differential export taxes (DET), the existence and extensión of such measure is in closed connection with tariff progressivity meaning with that a situation where a raw material has cero or reduced import levy and the end product has a higher duty, in the middle, all the intermediate products have import duties in a scale and progressive level.

From this perspective, export taxes policy on biodiesel does not work as an obstacle in the present for the growth of the sector. A last issue to address referred to Public Policy towards the chain of production and commercialization of soy and derivates is the subsidy policy

implicit and explicit applied to competitive crops and transformation chains.

The Government has been implementing compensations for grain other than soybeans and derivates producers that can be divided in three:

- i) Wheat Flour Mills: Instrumented by ONCCA resolution 2242/2009. Compensation goal is to shorten the gap between export price and internal price.
- ii) Wheat producers: The compensation goal is to harmonize the interests of the actors in the wheat chain. It is determined using domestic sales.
- iii) Maize Flour Mills: Compensates the difference between internal and domestic price.

t is destined to the mills that sell its production within the domestic market.

In order to avoid confusion it is important to mention that compensations do not produce an additional gain to the farmers but helps mitigating losses generated by export taxes policies.

Their general direction is also related to protect and enlarge internal market share of the principal food feedstocks that not include soybeans

Frontier expansion

As we have seen in the previous section, in the last couple of years an increased in soybean areas has took place. Such increase can have two different origins:

- a) use of land that wasn't previously exploited agricultural wise
- b) expansion towards land that was previously used for other agricultural activities

The objective of this section is to investigate to what extent the expansion of soybean is correlated with each of the points mentioned.

Land use change

The process of expansion of soybean depends of the soybean production area. There are two main ways of expansion, first by expanding the agricultural frontier and secondly by replacing other activities. The expansion implies direct land-use changes from natural ecosystems to soybean plantations, and indirect land-use changes to relocate the displaced productions. Traditionally, soybeans have been cultivated in the Pampean region (Central region). The marginal areas where soybean cultivation has been expanded are the Northeast and Northwest regions of Argentina as we have already seen throughout this research.

A study made by Luis Panichelli mentions that “direct land-use changes have occurred in the North region as expenses on sub-tropical dry forests, mainly the Yungas and the Chaquean Forest: 118 000 ha have been deforested between 1998 and 2002 for soybean production in Chaco, 160 000 in Salta and 223 000 in Santiago del Estero” (Panichelli L.).

A study made by Carballo Stella et al. uses satellite information's for monitoring the deforested surface since 1986 to 2007. According to this study, the expansion occurs in the Pampean region displacing cattle breeding areas and the areas near the Pampean region causing deforestation of native forest. In the last twenty years the agricultural area has gained 10 million hectares of surface from other land use, in which 2 million hectares were native forest. In the province of salta more than 500000 hectares were dismantled in the period between 1990-2004, in Santiago del Estero 1000000 hectares were also dismantled. The surface area dismantled during the same period in Tucuman was 150000 hectares, 150000 hectares in Chaco and 200000 hectares in the north of Cordoba (Carballo S. Et al.).

Indirect land-use changes consist in a shift from dairy farms and cattle breeding areas, shift from annual crops production (mainly corn, cotton, sunflower) and a decrease in rotation with pastures. The displaced activity differs by regions, mainly between the traditional

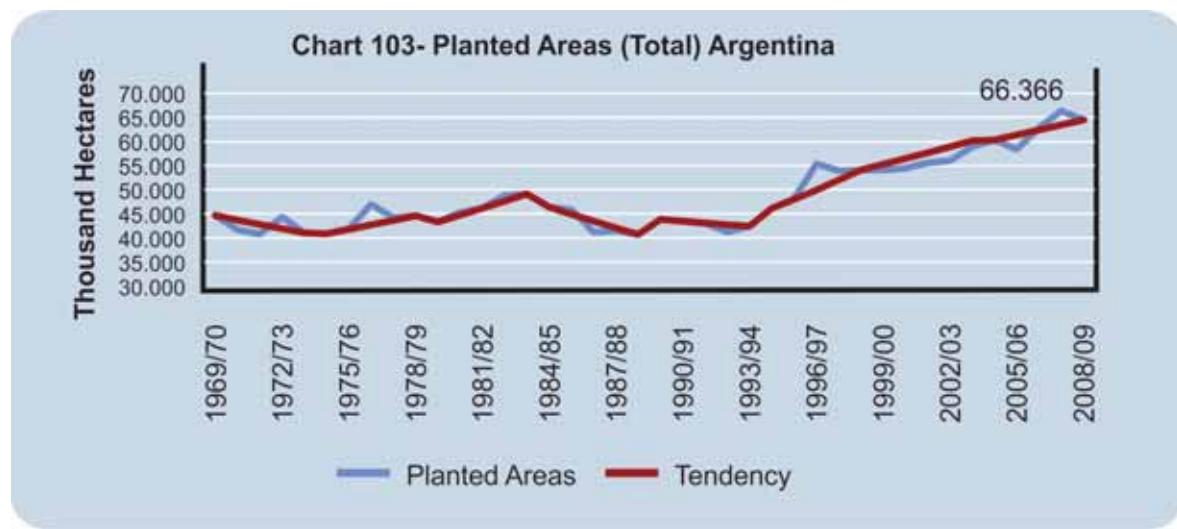
soybean cultivation area (Santa Fe, Cordoba, Buenos Aires and Entre Ríos) and the marginal area (Santiago del Estero, Salta, Chaco, and Tucumán).

The general trend in the total country showed in that period a decrease in the surface area planted of others crops than soybean, whereas the soybean surface area planted increased. However, the production of these other crops still continued to rise, as well as soybeans production increased but with a higher rate.

All this phenomena occurred previously to the appearance of soybean oil biodiesel on the country and were caused by the market price indicators although the government policy as was shown worked in the way of reducing those incentives.

Occupation of new lands

The occupation of new lands suited for agriculture has been one of the most remarkable facts in Argentina's recent history, especially since mid 1990's, technological improvements made historically regulated areas now production suited, generating and important expansion of the agricultural frontier, reaching the northeast and northwest of the country.

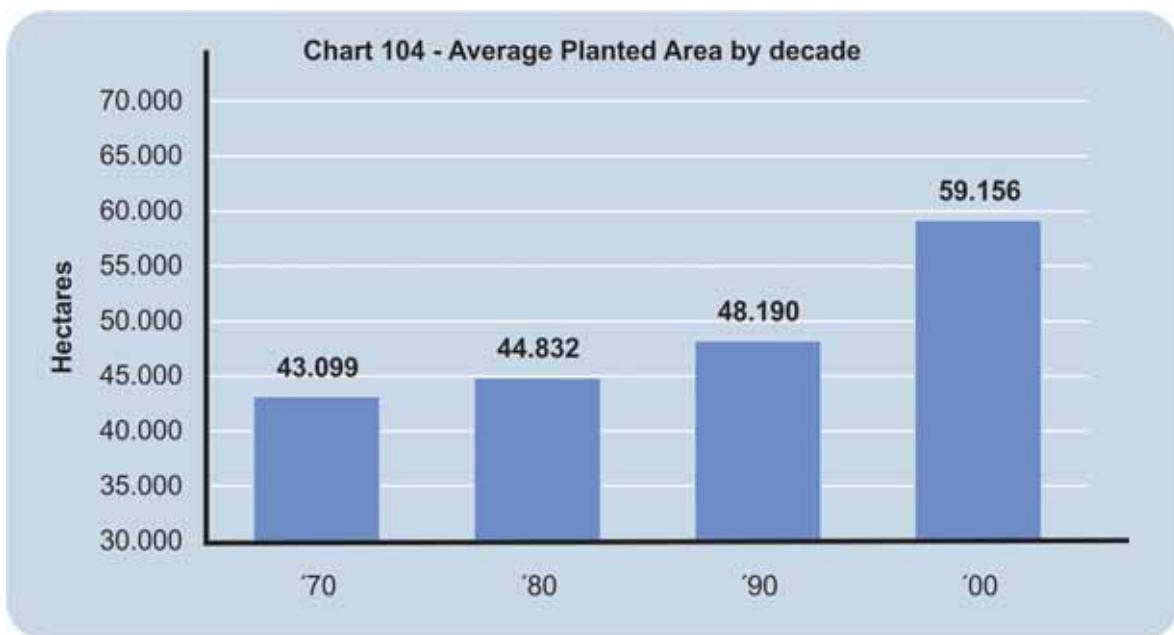


Source: Ministry of Agriculture

As we can conclude there is a tendency since 1970 towards planted area expansion.

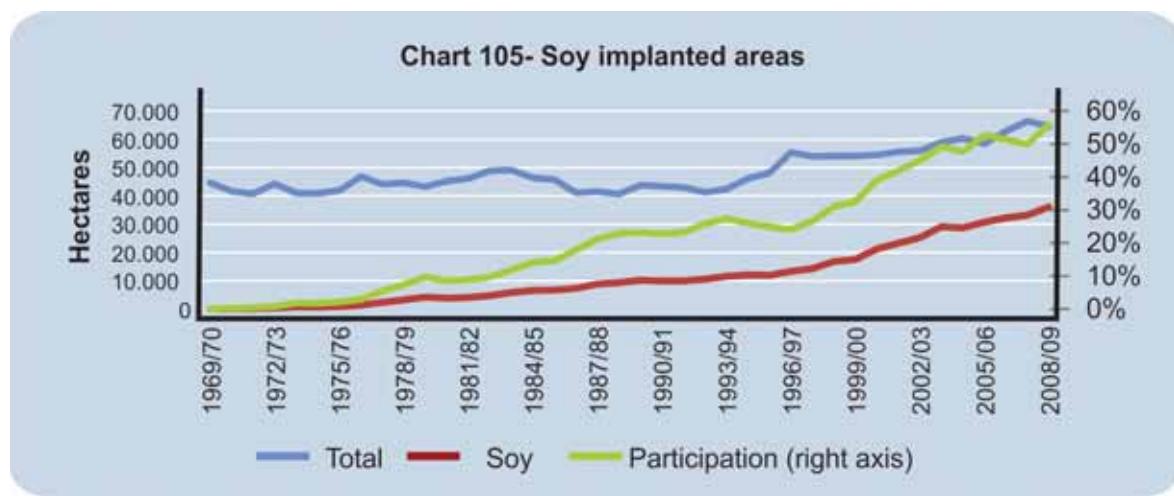
Such growth picked in the 2000's, with a 22, 8% variation comparing it with 1990's.

From this point of view it is evident that the agriculture advance is crystal clear.



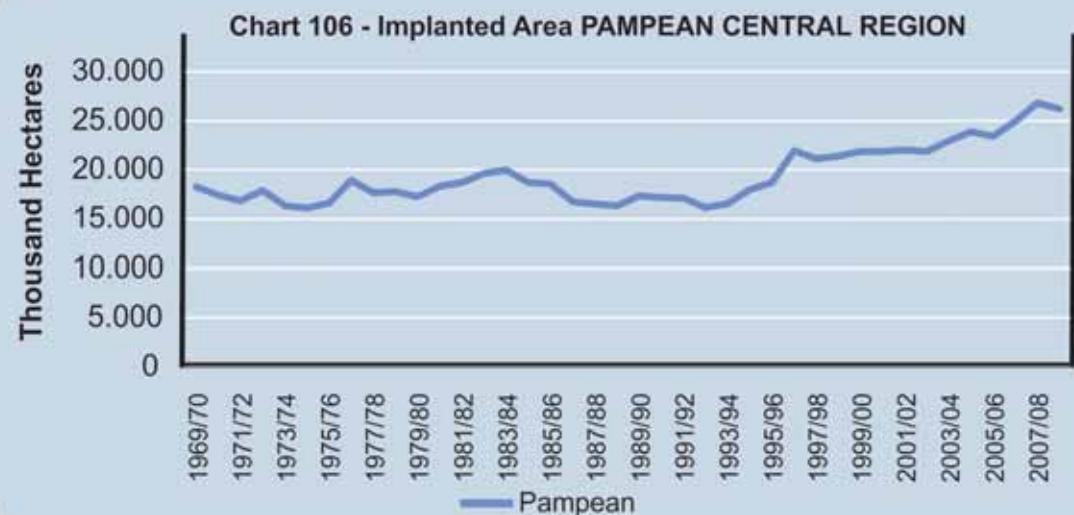
Source: Ministry of Agriculture

Soybean planted area growth in Argentina has been specially up scaled as we addressed previously, in 1969/70 campaign soybean planted areas accounted for 0,1% of the total planted areas in the country. The actual proportion now is 55, 9%, being by far the biggest crop in Argentina.



Source: Ministry of Agriculture

Another topic of analysis is the geographical distribution of planted areas. As shown in the next chart, for the last quarter century there has been a clear growing tendency of planted area in Argentina's Pampean Region (La Pampa, Santa Fe, Buenos Aires, Córdoba, San Luis y Entre Ríos), Northwestern Region (Salta, Santiago del Estero y Tucumán) and in Northeastern Region (Chaco, Corrientes, Formosa y Misiones)



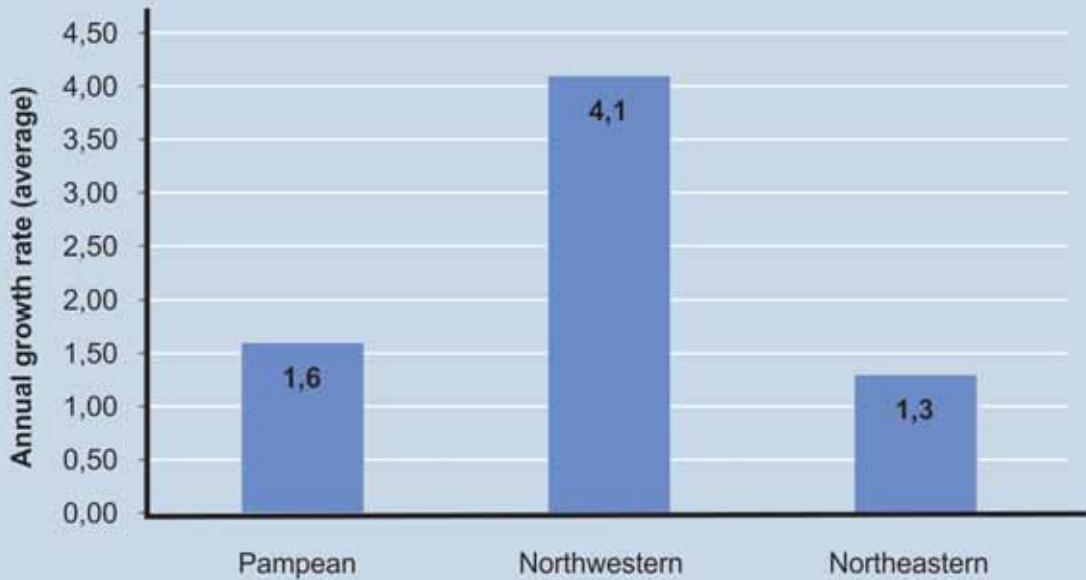
Source: Ministry of Agriculture



Source: Ministry of Agriculture

Since the 1985/86 campaign (last 25 years), the increment on implanted areas in Northwestern region has been bigger than both Pampean and Northeastern regions. A bigger Northwest Region participation has been taking place, and a frontier expansion as a result of such phenomenon

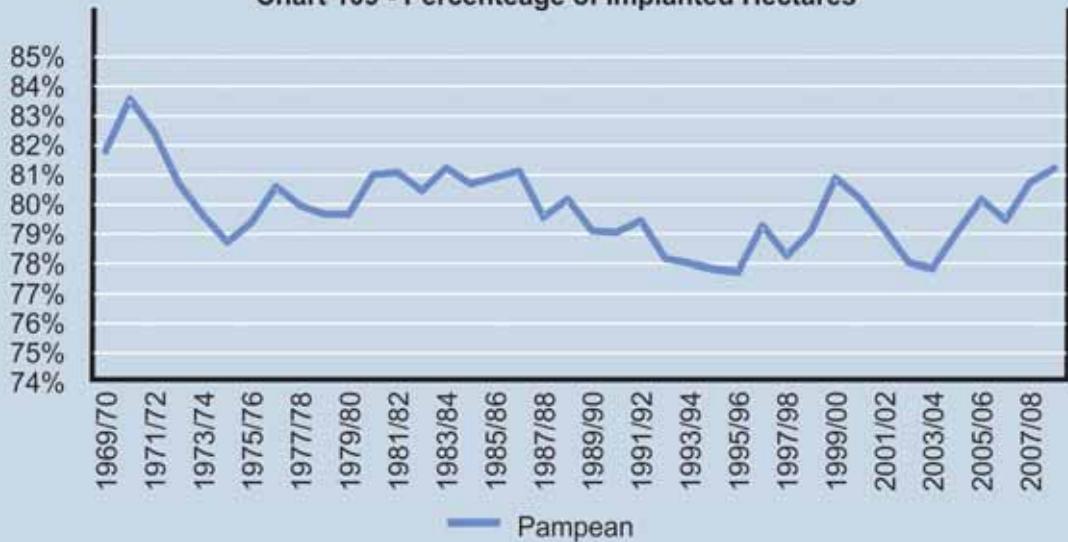
Chart 108- Implanted Areas. All crops



Source: Ministry of Agriculture

As a matter of fact, Northwest region has gained a bigger participation in the total of planted areas countrywide, which contrasts with a certain stability (with long rung fluctuations) in both Pampean and Northeastern Regions. From this perspective, the leading zone frontier expansion-wise has been the Northwestern region.

Chart 109 - Percentage of Implanted Hectares



Source: Ministry of Agriculture

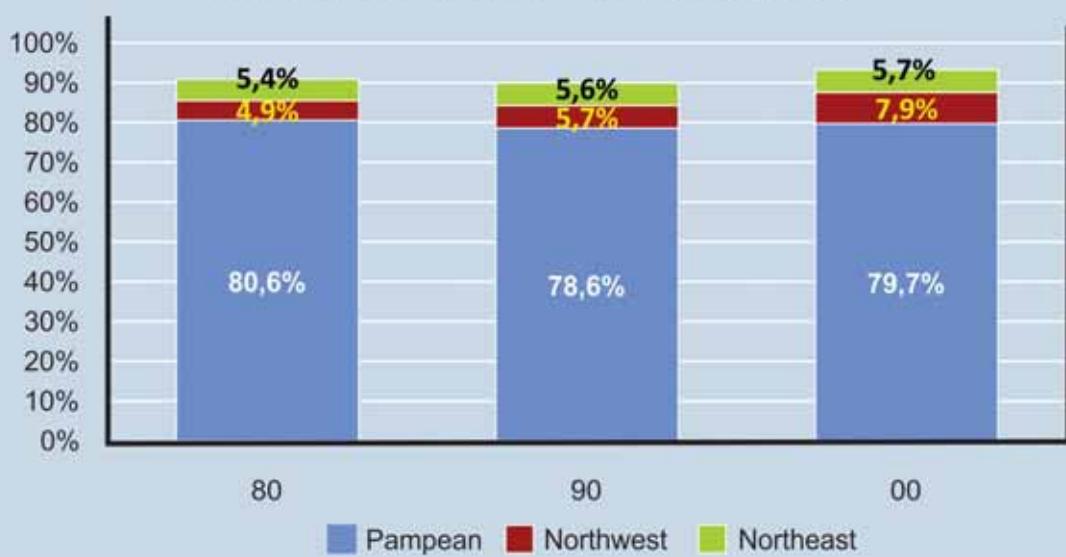
Chart 110- Percentage of Implanted Hectares



Source: Ministry of Agriculture

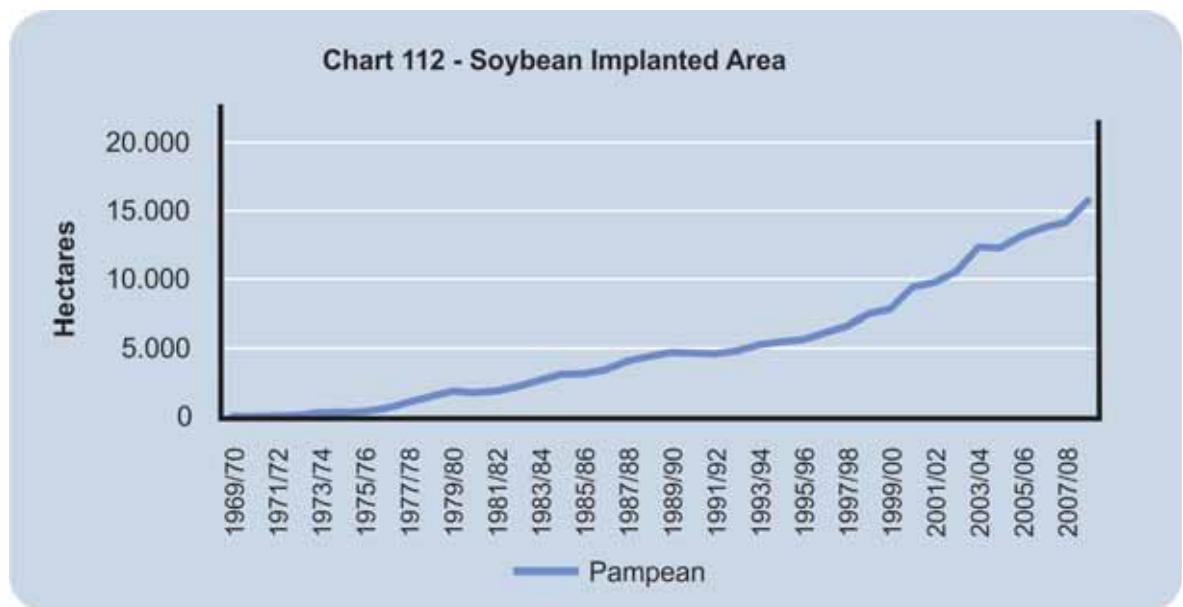
In a much clearer way we can observe the behavior in a decade basis, as shown in the next chart, the certain stability in both Pampean and Northeastern regions is offset by Northwestern region, which only accounted for 4,9% of the total in the 1980's and now is towards 7,9%.

Chart 111 - Total Hectares Implanted Percentage

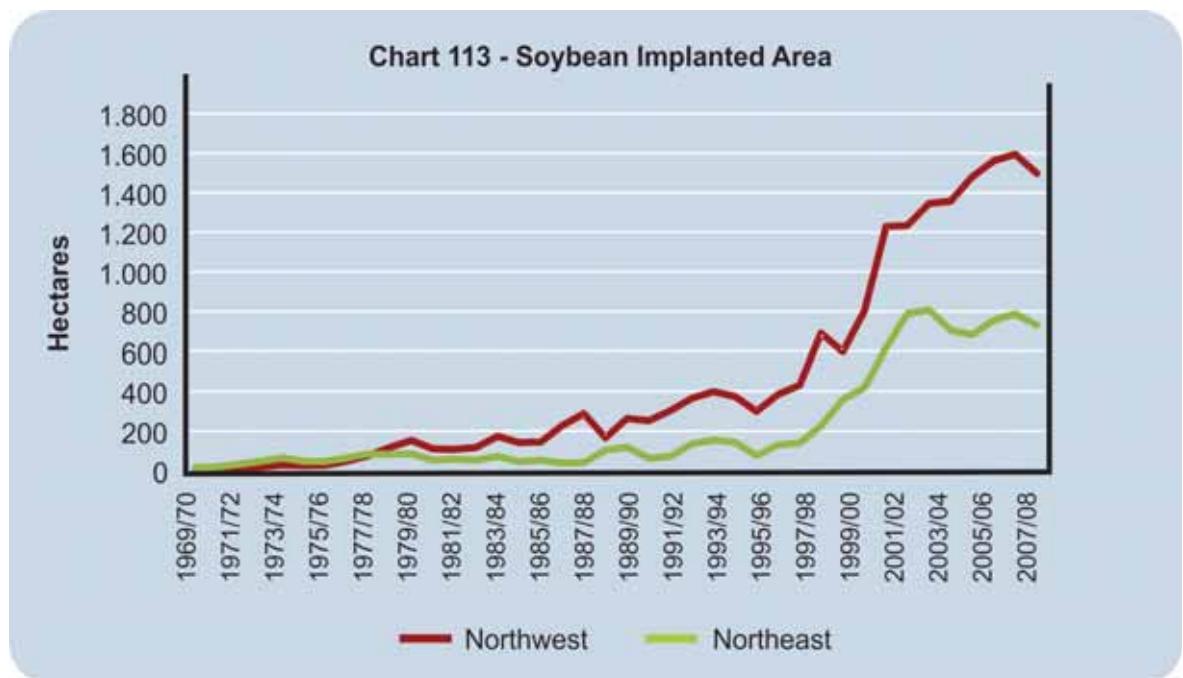


Source: Ministry of Agriculture

Evidence for the advance of agriculture towards previously unexploited areas seems to be solid, and seeing soybean ponderation we can conclude that a large part of such advance must be explained by soybean growth. Northwestern region shows a bigger growing trend than Pampean and Northeastern regions, especially bigger than the latter.



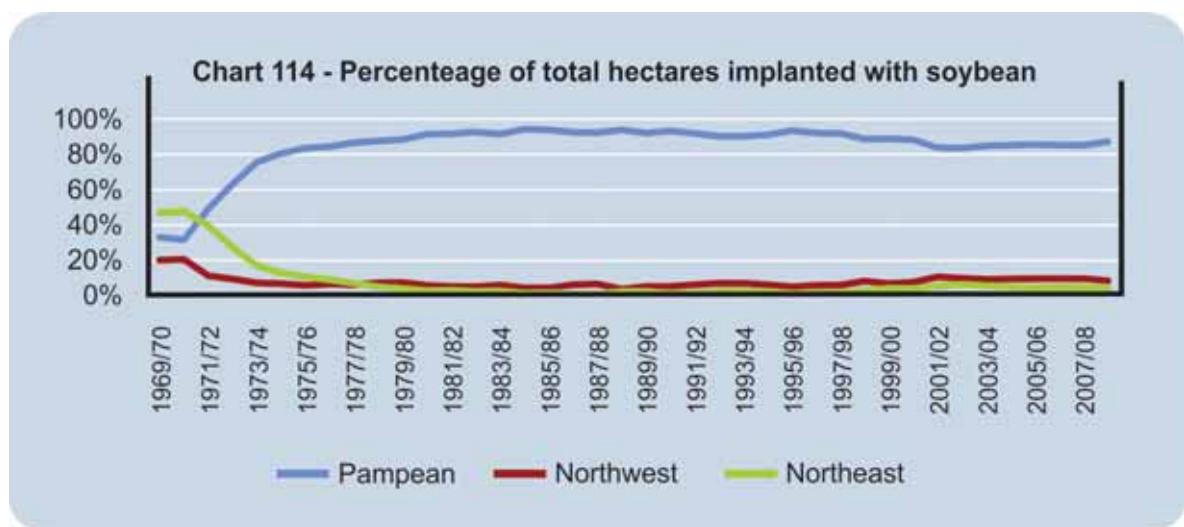
Source: Ministry of Agriculture



Same behavior is shown if we account the regions participations in soybean planted areas. Since the beginning of the 1980's Pampean Region accounted for approximately 90% of the total of hectares destined to soybean, over the last couple of years that participation slipped 6% in favor of both Northeastern and Northwestern regions.

It can be clearly seen from the graph that after the implementation of export tax and compensating policies for other crops the rate of expansion in both NW and NE regions decreased significantly due to the lower yields and higher transport costs of this new areas.

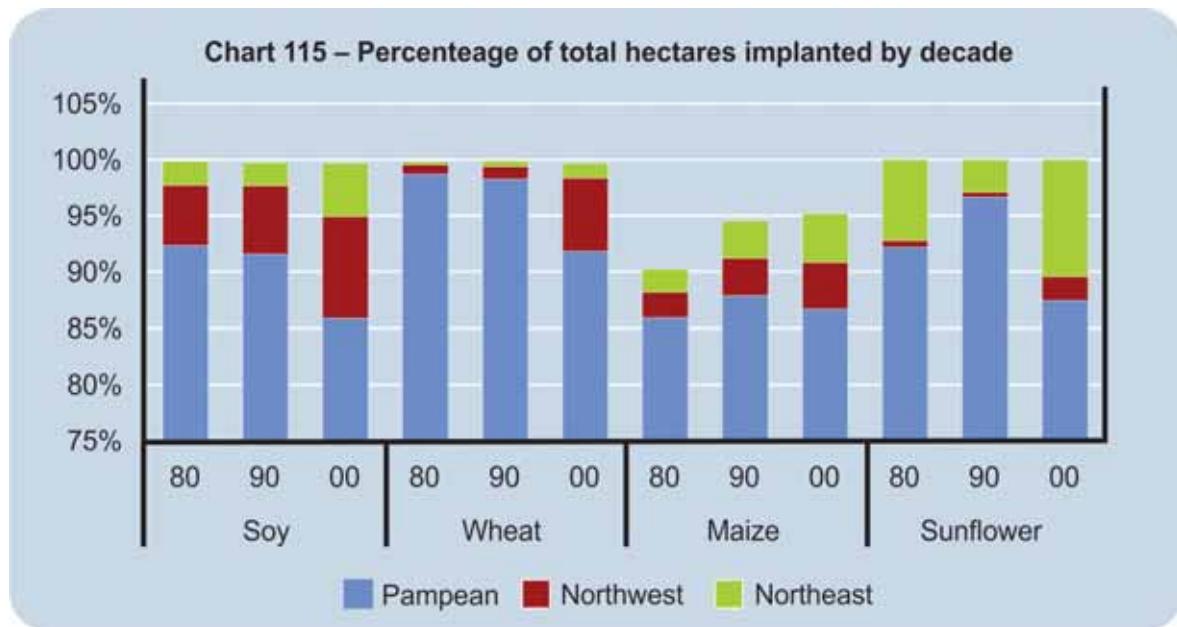
We must add to this the new restrictive legislations put in place in several provinces from 2008 onward.



Source: Ministry of Agriculture

This can be viewed as a confirmation regarding the relationship between the expansion towards unexploited areas and soybean growth.

This conclusion is in line with the arguments sustaining that improvements in production techniques makes possible to expand the frontier towards historically non profitable areas



Source: Ministry of Agriculture

As shown in the chart above, the tendency of the loss of participation by the Pampean Region has been generalized for the most part of cultives, maize being the only exception. In both soybean and wheat cases the advance of Northwestern region is evident.

From this perspective the soybean technological hypothesis seems to lose weight given that 3 of the 4 most important cultives has shown a tendency toward expansion in historically marginated areas. One last thing to consider is that the growth in soybean planted areas in relation to the planted areas total has been notably larger in the Pampean region than in the other two regions in study.

Table 21 –soybean implanted areas variation over total implanted areas

	PAMPEAN	NORTHWEST	NORTHEAST
80	415%	37%	-11%
90	320%	84%	58%
00	136%	90%	155%

Source: Ministry of Agriculture of Argentina

From this point of view seems evident that soybean has contributed to explain the agricultural frontier expansion, but it is difficult to conclude that the only factor explaining such expansion is the soybean phenomenon.

Regarding soil use in the country a very important law was enforced two years ago, it establishes the minimum requirements for defining the different uses of land by the provinces.

Each province as responsible for its territory has to define the different regions and uses according to the agroecological and social particularities. Most of the main provinces have already established the different areas within their boundaries. This will put an end to an unplanned agricultural expansion invading conservation areas.

In the next section another dimension of the frontier expansion will be addressed



■ Very High Conservation Value Forest Areas

■ Forest Conservatin Area

■ Potential Productive Area

■ Current Productive Area

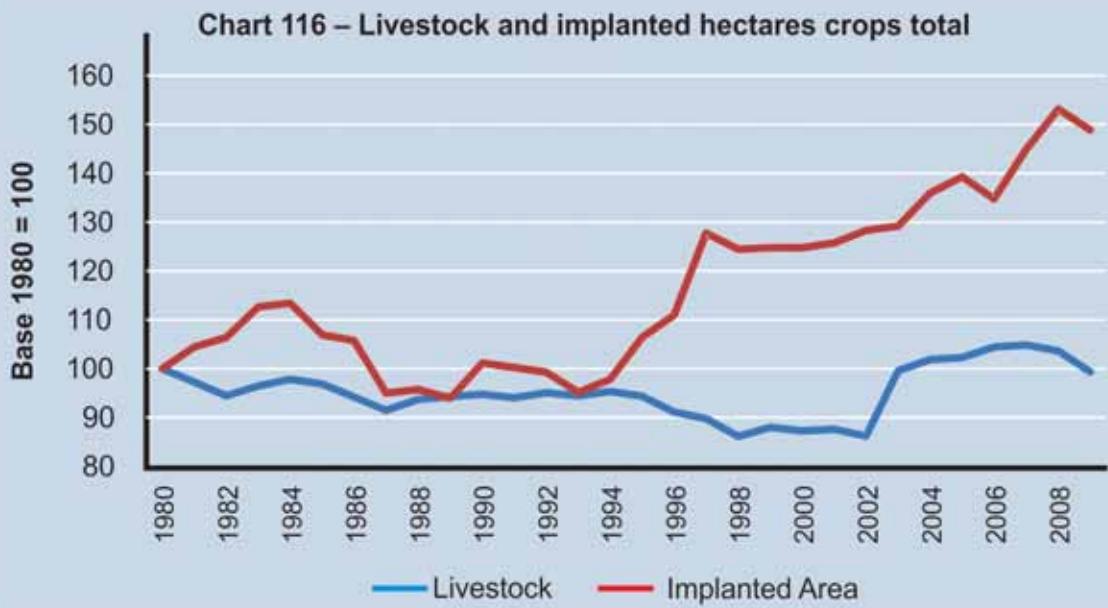
Example of territorial definition in the province of Salta NW of the country

Advance over cattle areas

As we have seen in the previous section, evidence is clear regarding unexploited areas occupation for agriculture in general and soybean in particular. Nevertheless, another thing to have in mind is the possible correlation between agricultural frontier expansion over livestock. A practical difficulty however is in place, the lack of information for Argentina is harmful, especially regarding the amount of hectares destined to livestock.

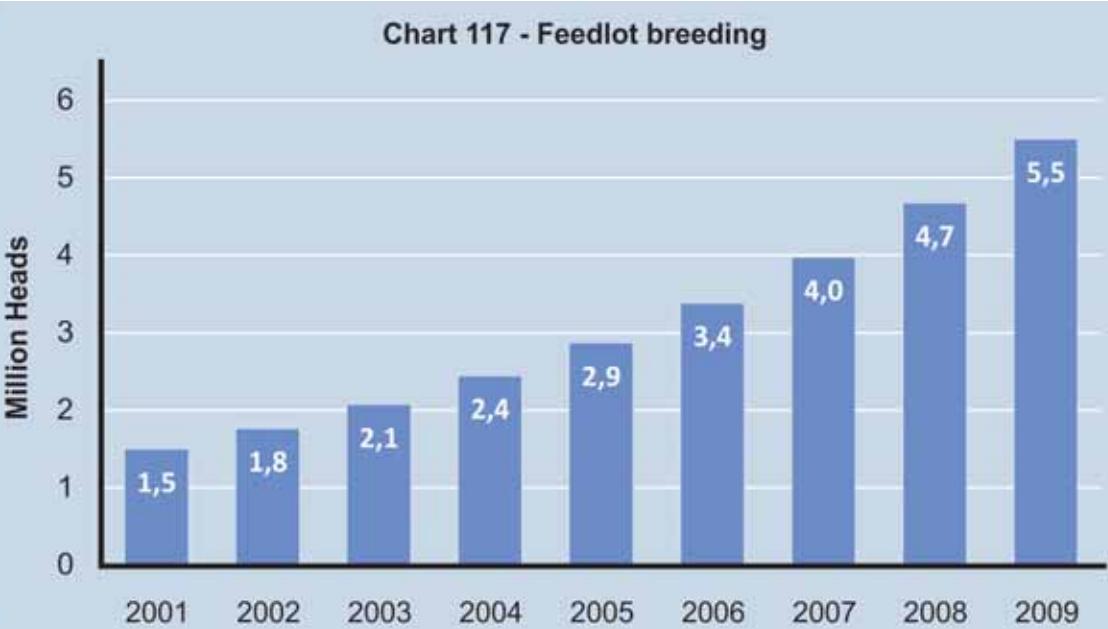
Therefore we propose another perspective comparing the evolution of livestock and planted area in Argentina.

In that comparison we draw an important conclusion: between 1980 and 2002 the correlation between livestock and planted areas was -0,71, but between 2003 and 2009 that correlation changed to 0,21. That breakthrough is an important one in order to understand the phenomenon even though its statistic signification seems to be poor.



Fuente: Author's elaboration

Eventhough several hypothesis are possible in order to explain the difference between variables the more plausible is the emergence of feed lots as an alternative for cattle breeding. This system went from 1.5 million heads in 2001 to almost 5.5 million heads in 2009 explaining the growth of both number of heads and agricultural production at the same time. Although there are little official data available the calculated growth between 2001 and 2009 represents an annual increment of 17 % with more than 0,5 million heads passing from pasture grazing to intensive and confinimated feed liberationg land for higher income agriculture production.



Fuente: Author's elaboration

The growth of this intensify and higher investment ways of cattle production is related to the increase in land prices and the need to maintain cattle ranch profit in time competing with the highest potential agricultural crop as the case of soybean in the last years.

This phenomena can be traced on the principal agricultural provinces of Argentina using instead of the total cultivated area the specific soybean area.

It's clear that since 1980 the soybean planted areas has outnumbered livestock. Livestock has maintained pretty mucho in the same level since 1980 and soybean production has roared 8.6 times.

That same relationship can be observed taking into account the growth rate of both.

Table 22 – livestock growth rate and soy implanted areas growth rate

	Livestock	Soy implanted areas
80	-0.6%	9.7%
90	-0.7%	6.2%
00	1.3%	8.1%

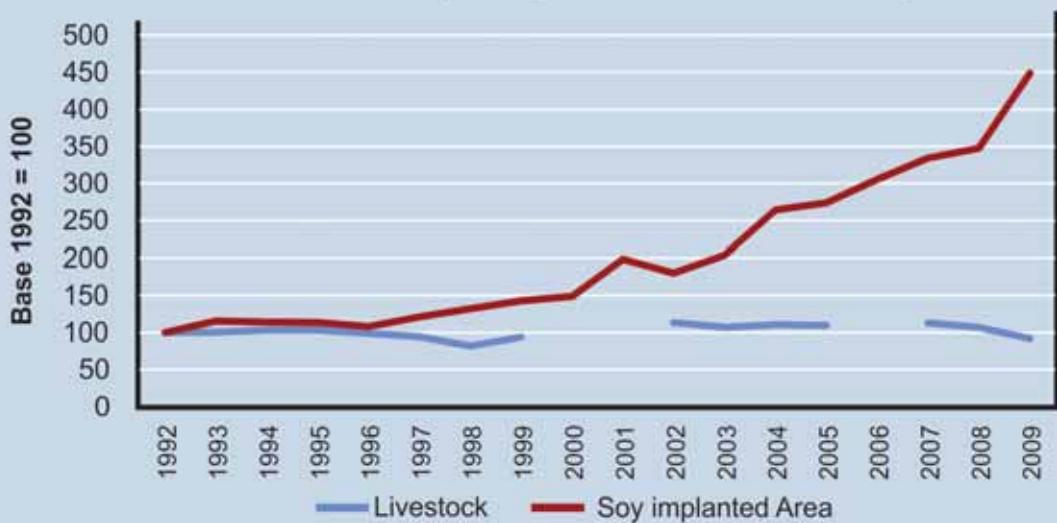
Source: Author's elaboration

Data suggest that soybean expansion shared a downward tendency in livestock, which could be started to reverse over the last decade because of the emergence of feed lots.

At this moment, there seems to be evidence to sustain that the advance of agriculture and soybean production has been correlated with a diminishing livestock thru the occupation of traditionally farming areas.

A more polished observation can be obtained if we focus in the province data, particularly in the Pampean region (Buenos Aires, Córdoba, Santa Fe, La pampa) This is known as the "core zone" regarding soybean and therefore our focus on it. Starting with Buenos Aires its clear the advance over the last two decades of soybean areas and the stagnancy of livestock

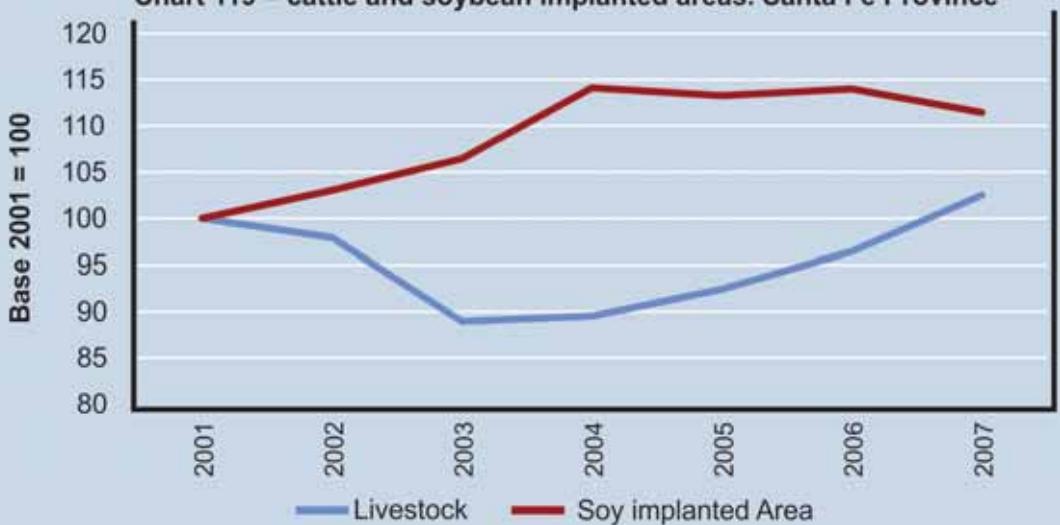
Chart 118 – cattle and soybean planted areas, Buenos Aires province



Source: Ministerio de Agricultura de la Nación y Ministerio de Asuntos Agrarios de la Provincia de Buenos Aires

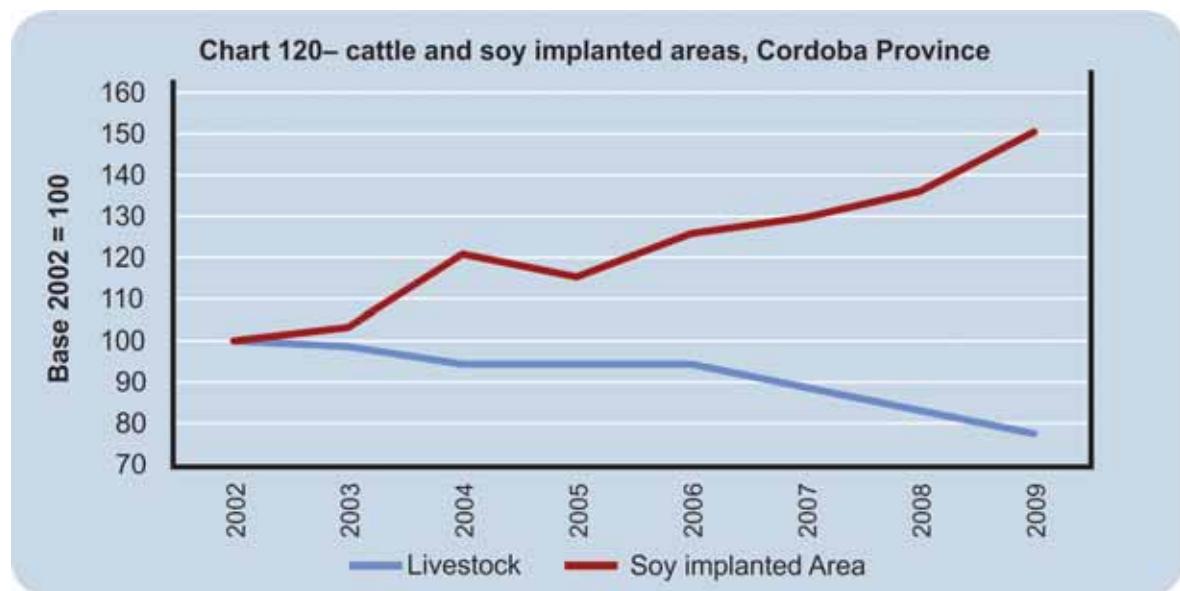
These results, in line with the national data, seem to suggest the existence of problems regarding the advance of livestock, mainly because of the diminishing amount of farming areas produced by the advance of soybean production in particular. In Santa Fe's case there is a clear negative correlation between soybeans planted areas and livestock even though the data panel is rather short. Since 2003 the livestock grows in part because of the emergence of feed lots, which tended to offset the negative correlation.

Chart 119 – cattle and soybean implanted areas. Santa Fe Province



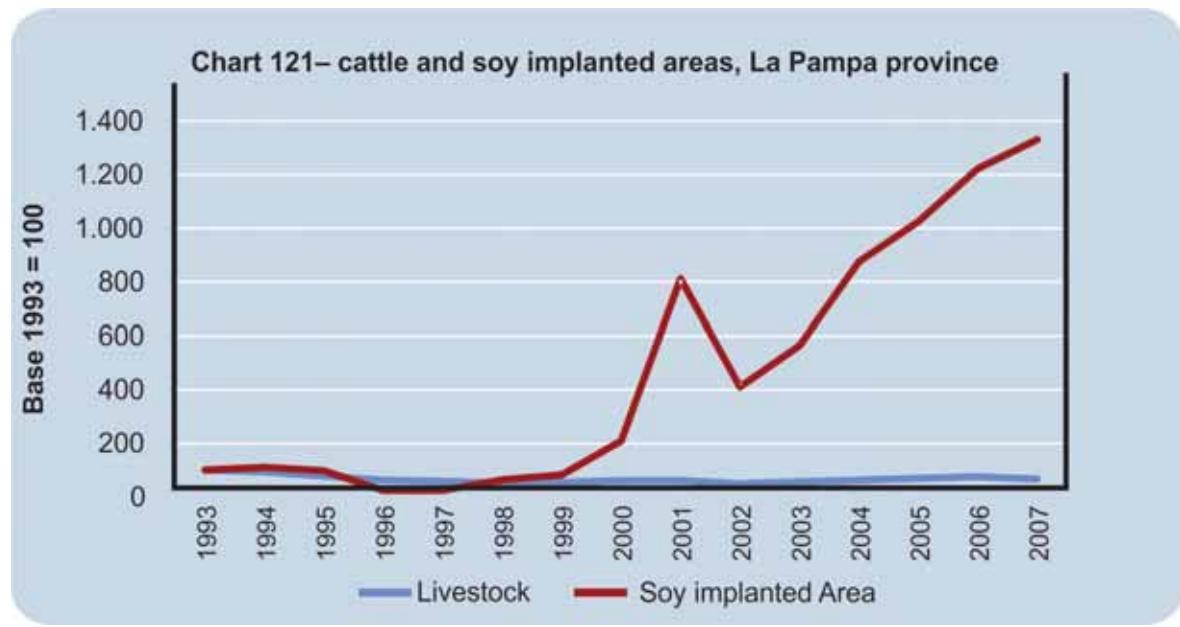
Source: Ministry of Agriculture

In Cordoba's case a similar conclusion can be drawn, but in contrast with Santa Fe's case the livestock does not show signs of recovery.



Fuente: Ministerio de Agricultura de la Nación y Gobierno de Córdoba

Finally, in La Pampa's case the relationship is more evident



Fuente: Ministerio de Agricultura y Gobierno de La Pampa

In the 2000's a recovery in livestock took place (8,5%), but the emergence of soybean production roared 537%. It seems plausible to conclude a negative correlation between the emergence of soybean production and the stagnation of livestock .In a more formal way, we try to link the evolution of soybean planted areas and livestock using an econometric model

Table 23 – cattle stock – soybean implanted areas estimation

Period	Estimation	Soybean Implanted Areas	Meat Price
1980-1999	Coef	-0.02	0.10
	DS	0.01	0.05
	p-Valor	0.00	0.05
	R2 adjusted: 0.66		
1980-2009	Coef	0.01	0.30
	DS	0.00	0.06
	p-Valor	0.02	0.00
	R2 adjusted: 0.52		

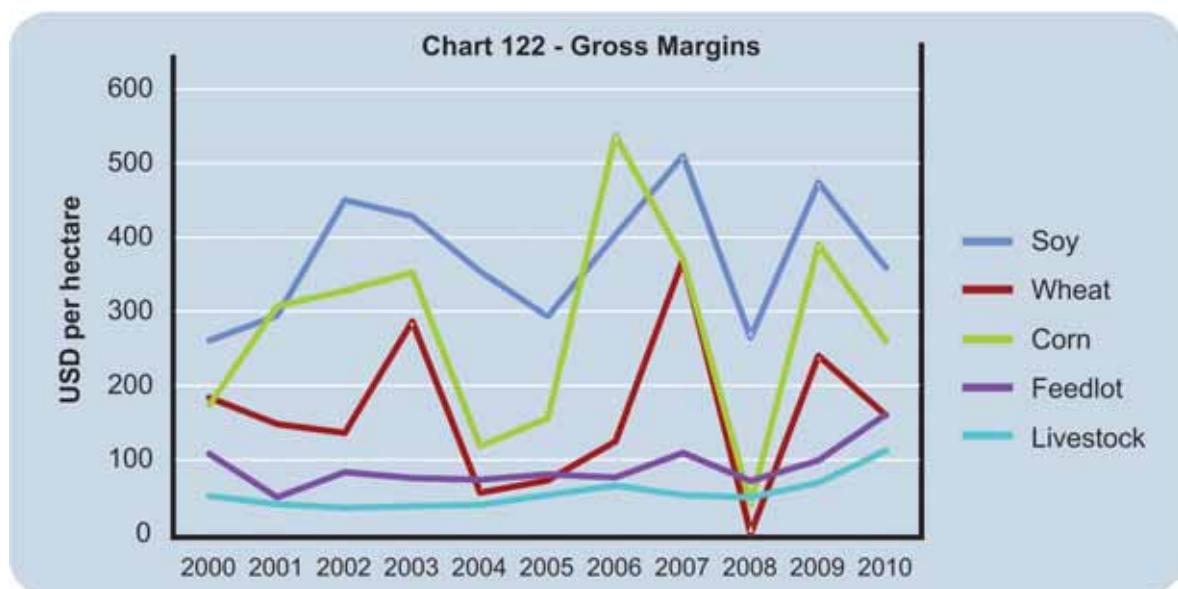
Source: Author's elaboration

There are two important conclusions: the first one is the fact that between 1980-1999 soybeans planted areas have shown a negative significant relationship with livestock, confirming that soybean advance has been in part over livestock areas.

Furthermore, there is a positive relationship between beef price and livestock as expected. The second conclusion is the notable reversion of this relationship when the data expands to the 2000's; in that span the relationship is positive. This should be explained by the emergence of feed lots in order to transform livestock production in a more efficient way using less of the crucial capital inputs as land.

Another approach: margins analysis

Another way to measure the livestock situation regarding the soy boom in Argentina is to analyze the profit margins that soy has compared to other crops and to the meat sector.



This chart is pretty illustrative in order to understand how soy margins are way better than other crops margins and meat sector margins. It can be observed how it was the soy gross margin the responsible for the producer's choice over other crops.

The profit drop in 2008 due to the international crisis affected much less the soy production than the other crops production. The meat sector even though in 2007 and 2008 had strong prices could not avoid the drop in the livestock areas as we addressed before. During the last 15 years the drop in livestock areas accounted 13.5 hectares due to the soy expansion.

The feedlot sector could not compete with soy margins as well as we can see in the chart. Soy profit margin is near 500 USD per hectare compared to the 120 USD per hectare that meat sector can gather.

Overall this is another strong point in order to explain the advance of soy production towards traditionally livestock areas.

Although there has been drastic changes in meat prices in the last six month the general tendency prevails although there are no incentives for soy in the federal or provincial policies all the contrary occurs.

From this section we can conclude:

1. Soybean planted areas growth has been linked to the advance over previously unexploited areas; nevertheless such phenomenon happened in Argentina's agriculture as a whole.
2. Pampean Region accounts for a big part of the growth of soybean planted areas over other crops, in both the Northeastern and Northwestern regions that conclusion cannot be reached
3. Linked to the last point between 1980-1990's soybean expansions has been towards livestock areas, over that span livestock stagnated. E
4. That negative relationship was offset during the 2000's in part because of the emergence of feed lots
5. It can be concluded that the growth of soybean planted areas has had a component of occupation of previously unexploited areas and a component of the advance over livestock.
6. The profit margin analysis can explain as well the advance of soy production over livestock areas.

1. Social Economic Impact

Theories

There are two important macro-economic theories based upon which many southern countries stimulate their exports as part of a strategy of economic growth and poverty reduction.

Both theories are also increasingly contested. The main aspect which we will try to address is if the soy boom contributed to economic growth and social wellbeing in Argentina.

Trade liberalization

One theory is that trade liberalization is a necessary prerequisite for economic growth and that export

based economic growth contributes to poverty reduction. This view leads governments and international financial institutions to stimulate trade liberalization and finance export expansion.

However, this theory is increasingly being contested. Firstly, Samman (2005) demonstrated that openness to trade does not automatically lead to increased trade or increased growth, in contrast to an earlier World Bank study using the same set of data (Dollar and Kraay, 2001). The effects of openness to trade appear to depend primarily on country-specific circumstances and the accompanying policies. Also, several countries that reduced their trade barriers have actually experienced growth decline.

Secondly, there is not a significant relationship between export growth and poverty reduction (UNCTAD, 2002; 2004). In many of the least developed countries (LDCs) with increasing export orientation, poverty rates actually increased in the 1990s, particularly in LDCs that had taken drastic trade liberalization measures and in countries in which export expansion or import substitution make up the most important component of economic growth. Exports of agro products have been less successful because primary commodity prices have often shown sharp declines, small farmers were often excluded, and the exports have often led to higher food prices and a decline in food security for the poor (UNCTAD, 2002). Thirdly, studies have demonstrated an unequal distribution of environmental goods and burdens among industrialized countries – concentrated in the north – as net importers of natural resources from other world regions – concentrated in the south.

Considering the limited power of southern countries on world markets and the falling prices of primary commodities, export revenues in producer countries can be maintained only through an increase in export volumes (Giljum and Eisenmenger, 2004). The extractive industries and economic activities in the primary sector associated with increasing south–north material flows, in most cases lead to a reduction of natural capital and higher environmental pressures in producing southern countries (UNEP, 1999; UNEP, 2005).

The green kuznets

A second theory is that economic growth and higher incomes resulting from free trade will eventually enable governments to finance environmental protection measures and thus restore the environmental damage that has occurred (Yandle et al., 2004). This theory is commonly known as the green Kuznets curve, showing an increase of investments in environmental restoration and protection once a certain level of GDP/capita has been reached. However, many ecological economists are critical of this claim.

Firstly, there are unequal conditions of exchange in which the production partners have little choice but to exploit and possibly exhaust their natural resources, whereas the consumption partners may maintain high environmental quality within their own borders (Giljum and Eisenmenger, 2004). This Analysis of social – economic impacts of trade of selected global commodities 8 can be demonstrated by the fact that reduced environmental pressures in some countries (according to the green Kuznets curve) took place in the context of ever-increasing global environmental pressures (Faaij et al., 2003) and reduced biodiversity (MNP, 2006). Secondly, one may wonder.

Whether southern countries characterized by ‘bad governance’ will have the capacities and leadership to undertake environmental corrective measures. Thirdly, tropical ecosystems as predominant in southern countries may be much less resilient than moderate climate ecosystems as predominant in industrialized countries.

Thus, for export commodities, two conventional theories can be summarized as follows:

- export of a commodity may lead to loss of natural capital but will have positive impacts on socio-economic development and poverty reduction;
- lost of natural capital due to commodity production will be compensated or restored once the production country has reached a certain level of economic well-being.

2. Policies for soy biodiesel stimulation and impact over Argentinean market.

As was mentioned before, something in common throughout the biodiesel markets is the State stimulation thru different policies. In other words, it seems clear that nowadays the internal market is somewhat created given that if it wasn't for the legislation requirements policies it would not exist.

Argentina's and european union cases

In the particular case of Argentina the industry is regulated thru Resolution 1283/06 enacted by the Secretary of Energy and thru the Law 26.093 that creates an internal market. Biodiesel stimulation in Argentina has two foundations: The quota that diesel fuels must accomplish using biodiesel in its composition and the tax differential that soy biodiesel has compared to other soy derivates.

But it is also important the policies adopted in other potentially important markets for Argentinean biodiesel. It is therefore important the European Union case, destiny of 60% of Argentina's exports.

There are two policies worth mentioning in the European case:

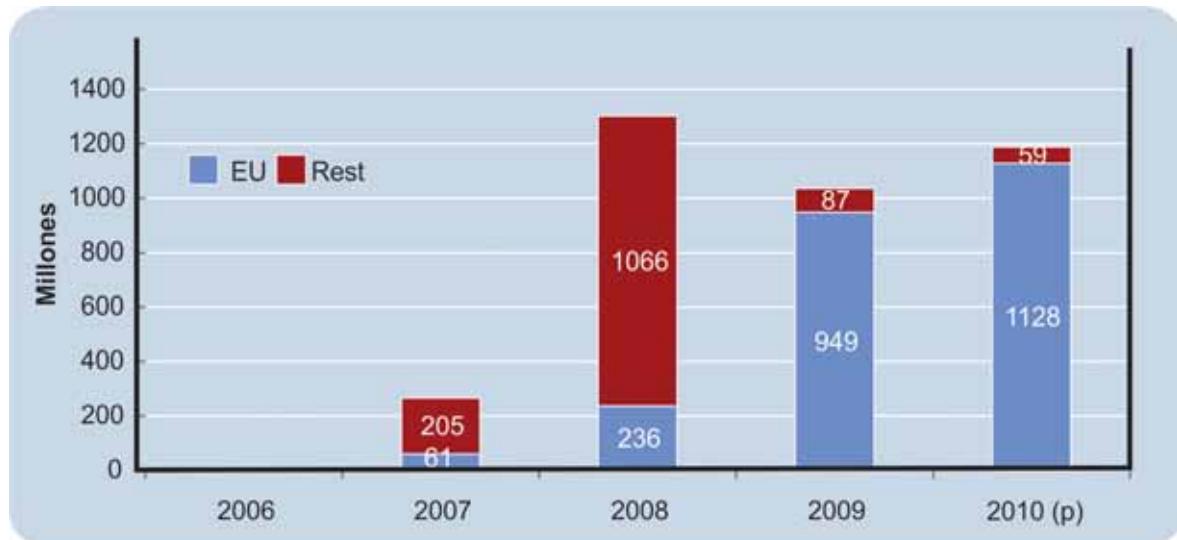
- i) Directive 2003/30/CE enacted by the European Parliament May 8th 2003, establishing that in 2010 5.75% of the fuel used in transportation must be composed of biodiesel, stimulating also demand and supply of Biofuels. and
- ii) Directive 2009/28/EC enacted by the European Parliament April 23rd 2009, fixing the goal of using 10% of renewable energies in transportation by 2020 along with consumption and production stimulation policies.

Since 2003, as seen before, the growth of production and installed capacity has been substantial (between 2003 and 2010 installed capacity expanded 921% and production 441%)

From Argentina's perspective the dynamism of the European demand appears as fundamental in order to explain the growth of the market.

Argentina's exports and europe's importance

Chart 123 – Argentina's soy biodiesel exports, USD millions



Source: Author's elaboration using AFIP database

As we can see in the chart above, Argentina began exporting biodiesel in 2006, but that year sales only were slightly above 227.000 USD. It is in 2007 that Argentina became a real biodiesel exporter and in that same moment Europe began growing as a destiny for Argentina's biodiesel going from explaining 22.8% of the exports in 2007 to 95% in 2010.

From this point of view it is clear the spillover that European demand has had over Argentina's biodiesel production. Let's keep in mind that Argentina's main advantage is to produce soy biodiesel feedstock which is Soybean oil. During 2009 Argentina's exports of soy biodiesel reached 1.15 million tons, meaning that almost 100% of the production got exported. This number might slightly change over 2010 given that the quota for the domestic market was implemented in Argentina.

Us policies

In the United States case, the leading producer of biodiesel in the world, the incentive towards production and renewable energies consumption is explained by four main State driven policies:

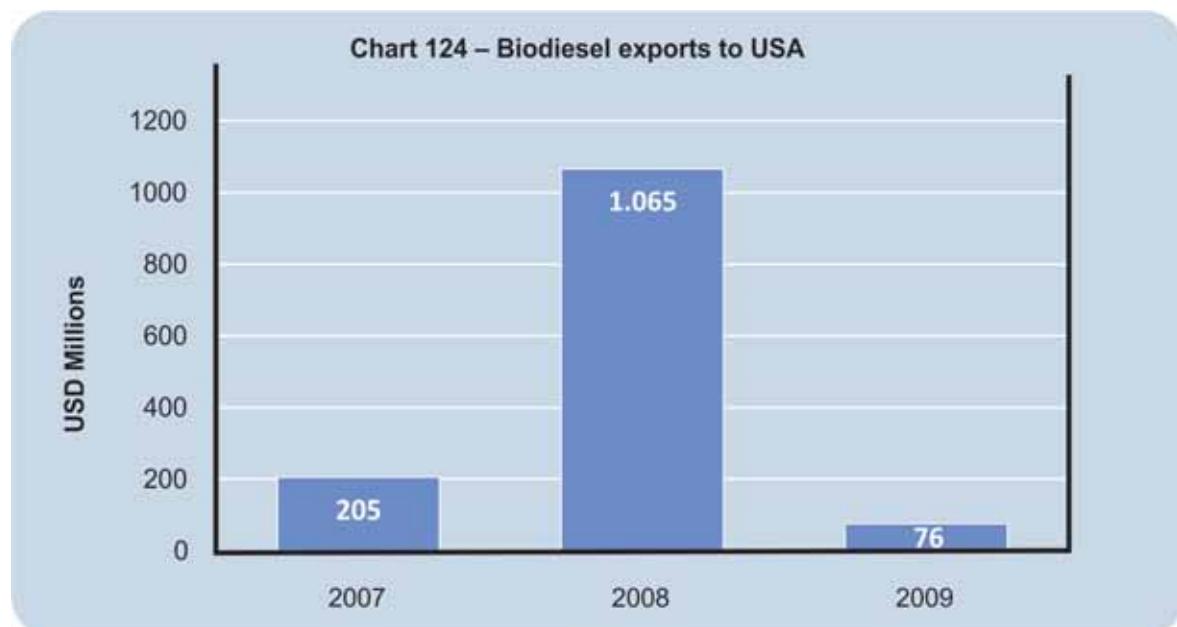
- i) Clean air law enacted in 1990, which emphasized the control of contaminant gasses emissions.
- ii) MTBE prohibition in various states
- iii) Energetic law enacted in 2005
- iv) Programs that establishes standards for renewable energies, being Biofuels one of them.

We also addressed throughout this research the case of the "splash and dash" which also helps to explain how given a state policy the market end growing. In that particular case

that growth comes with no lack of controversies as was explained.

Argentina and us biodiesel relationship

The US does not account for a large part of Argentina's biodiesel exports given that they are only 0.5% of the total (4.6 million USD) as we can see in the next chart.



Source: Author's elaboration using AFIP database

Argentina's policies regarding biodiesel

Argentina's impulse towards Biofuels is not new. In the early 1970's a plan called "Alconafita" was implemented but some difficulties such as severe droughts and low fuel prices ended the program in 1980.

In the 2004 the National Program of Biofuels was created with the following objectives:

- Find and alternative to fossil fuels which accounts for most of the energy sources in Argentina. Emphasizing the need of biodiesel development given the advantage that Argentina's has given the production of feedstock for biodiesel.
- Support rural sectors in the development of soy biodiesel plants as a local and territorial alternative for development
- Collaborate and support institutions dedicated to the elaboration and use of biofuels
- Promote private and public investments for the development of biofuels

This program came with no much success but after the Secretary of Energy took over the program the biodiesel slowly became a matter of discussion as an alternative for fossil fuels. It was in 2006 that a law for the Biofuels market was enacted by the Law nº 26.063. That law established a minimum quota of 5% that diesel fuels must cover with biodiesel.

Since July 2010 the Secretary of Energy pushed that quota to 7% and that explains in part the stimulation towards soy biodiesel in Argentina.

The increment in the quota is explained by the objective of the National Government in the advance of Biofuels production, helping the evolution of the agro industrial activities, generating more added value en la feedstock's currently produced in Argentina.

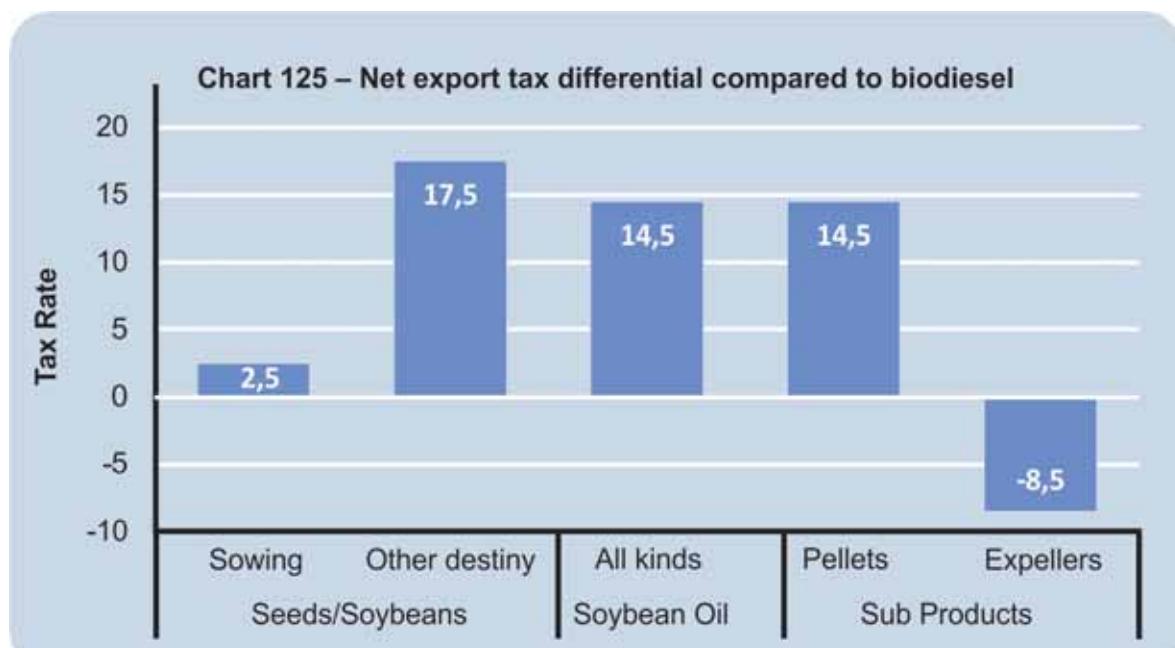
In the next table we can observe how the quota of 5% was covered and how the new quota is being taken care of.

Table 24 – Argentina's soy biodiesel quota expansion

	Corporation	Capacity	5% Quota	2%	7% Quota
1	Unitec Bio S.A	230,000	113,097	9,440	122,537
2	Viluco S.A	200,000	108,594	8,488	117,082
3	Explora S.A	120,000	89,091	4,784	93,875
4	Diaser S.A	96,000	79,459	3,744	83,203
5	Renova S.A	480,000	33,750	17,266	51,016
6	Oil Fox S.A	50,000	0	50,000	50,000
7	Aripar Cereales S.A	50,000	50,000	0	50,000
8	Patagonia Bioenergia S.A	250,000	33,130	16,111	49,241
9	Vicentin S.A	63,400	23,928	24,913	48,841
10	AOM S.A	48,000	48,000	0	48,000
11	Ecofuel S.A	240,000	29,108	16,320	45,428
12	Biomadero s.a	72,000	44,152	1,125	45,277
13	LDC Argentina S.A	305,000	27,500	16,898	44,398
14	Molinos Rio de la Plata S.A	100,000	27,810	13,407	41,217
15	Maikop S.A	40,000	40,000	0	40,000
16	Rosario Bioenergy S.A	36,000	36,000	0	36,000
17	Diferoil S.A	30,000	30,000	0	30,000
18	Soy Energy S.A	18,000	18,000	0	18,000
19	Pitey S.A	18,000	18,000	0	18,000
20	Hector Bolzan	10,800	0	10,800	10,800
21	Ecotor S.A	10,200	10,200	0	10,200
22	New Fuel S.A	10,000	0	10,000	10,000
23	Era SRL	9,600	0	9,600	9,600
	Total (tons per year)	2,487,000	859,819	212,896	1,072,715

The Secretary of Energy also establishes which companies must cover the quota and allows them to export a certain margin establishing in that way the regulations for both.

But the main policy in order to explain Argentina's soy biodiesel is the tax differential that soy biodiesel has compared with other soy derivates. This differential oscillates between 17.5% and -8.5%. The incentive for biodiesel exports compared to other soy products seems pretty clear (except in the soy meal case) as shown in the next chart.



Source: Author's elaboration

Incentive quantification

A good way of quantifying the incentive is to use the tax in absolute terms.

As shown in the next table the tax per ton produced in soy biodiesel case is lower than the correspondent to a ton of soybean oil.

Table 25 – taxes in soy biodiesel production and soybean oil as of november 2010

Product	Price per ton (USD)	Export tax rate	Tax in USD
Non sowing soybeans	390.2	20.0	78.0
Soybean oil	895.6	32.0	286.6
Soy Biodiesel	871.1	17.5	152.4

Source: Author's elaboration

According to INTA (2008) 1.04 lts of soybean oil is needed in order to produce 1 liter of soy biodiesel. One ton of soybean oil is approximately 1000 liters of the same product and from 1 ton of soybean oil 1.27 tons of soy biodiesel is obtained.

This means that one ton of soybean oil would pay a tax export rate of 286.6 USD and one ton of soybean oil 193 USD, accounting for a tax save of 32.7%. In terms of net income the incentive towards biodiesel production seems pretty solid. The main point in the analysis is the profit margin of soybean oil compared to soy biodiesel.

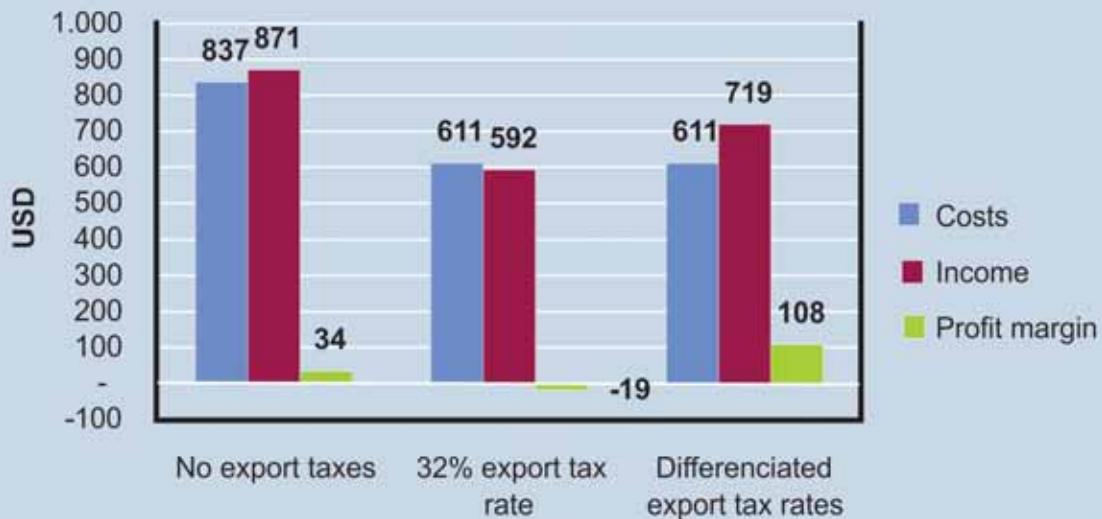
Nowadays the cost for producing one ton of soy biodiesel is approximately 611 USD, composed of 480 USD for feedstock (soybean oil) and the rest of energy, labor, methanol, etc. On the other hand, the biodiesel is exported at 719 USD per ton (September 2010).

This means that according to September 2010 values the soy biodiesel and exportation gathers a profit margin of 108 USD per ton approximately.

If the export tax rates were 32% as in soybean oil case the net price of export would be reduced to 592 USD and the profit margin would no longer exist, given that a 19 USD per ton loss would be in place.

From this point of view two situations are clear: Tax differential Works as an incentive towards soy biodiesel production and without the state's intervention the biodiesel market would not be sustainable.

Chart 126 - Costs, income and profit margin of biodiesel exports according to different export tax rate scenarios



Source: Author's elaboration

As observed in the chart above the current scenario is more convenient production and export wise than the “no export taxes” scenario and obviously more convenient than the 32% export rate scenario. In the first case, the loss in profitability is associated with the higher internal price of soybean oil and in the second case the cost is generated by the lower sale price of soy biodiesel.

An ideal scenario, would be with the current 32% export tax rate for soybean oil and 0% of soy biodiesel, In that case the profit margin of soy biodiesel exports would be 260 USD per ton.

Conclusion

It seems clear that the market for soy biodiesel has been driven by state oriented policies that accounts for most of the stimulation.

A question mark is now open towards the market sustainability without State intervention if that situation ever occurs.

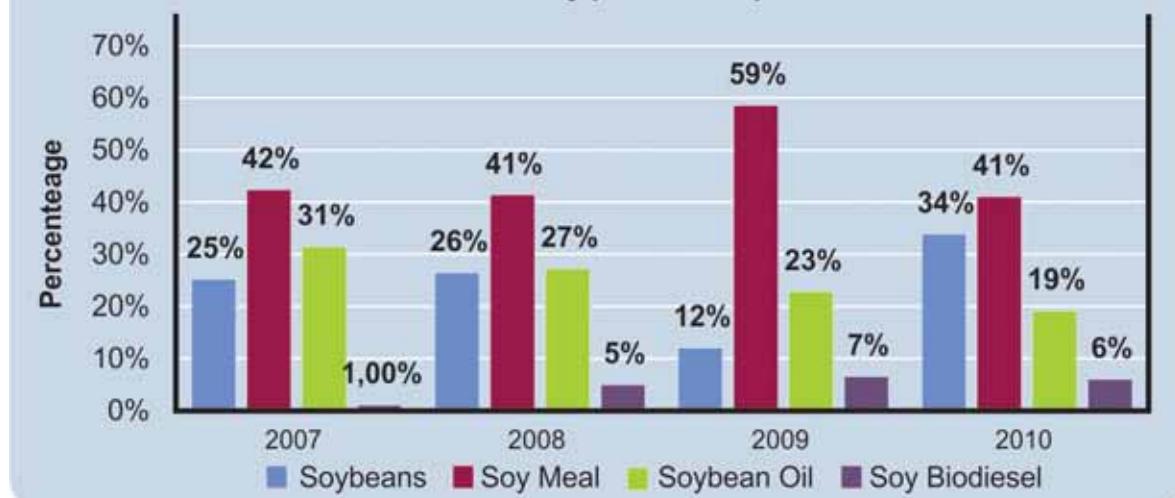
Argentina's potential production wise does not seem to diminish in the immediate future.

Biodiesel as a soy market propulsion

A central issue in this research is the biodiesel market capacity to boost or not soy production in Argentina. The common sense given the size of biodiesel market is the latter but the growth of alternative energies based on food commodities has been mentioned as one of the determinants for both food production and price growth

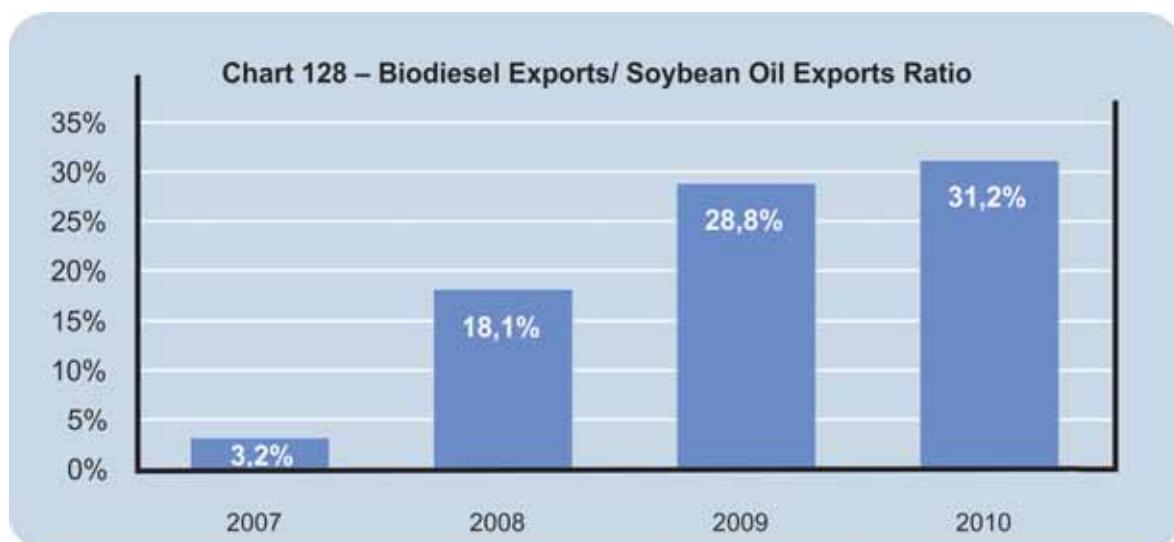
A first point against this hypothesis is the size of the market as mentioned. In Argentina's case, the world leading soy biodiesel exporters since 2009, the weight of that fuel in the soy based exports is marginal.

Chart 127 - Soy products exports



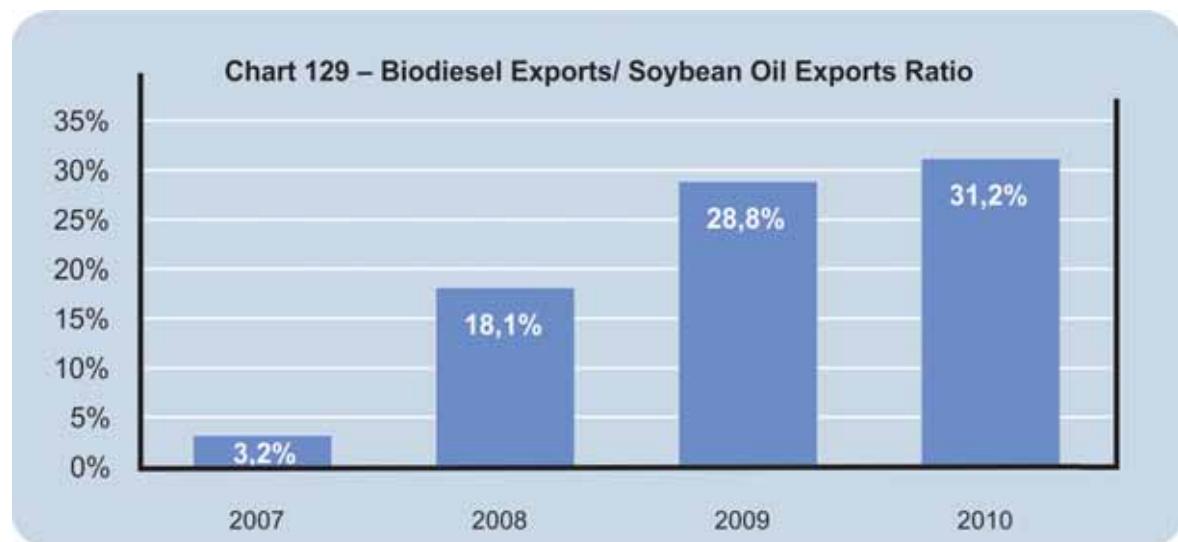
Fuente: INDEC

As observed, the soy biodiesel participation is below 10% for the whole period studied. This can be extrapolated to the world meaning that if the leading exporter has such a low weight in biodiesel exports-wise the market size in the whole world cannot be bigger than Argentina's. But a certain advance of soy biodiesel can be observed in terms of soy bean oil exports. In 2010, for every dollar exported of soy bean oil 31.2 cents of soy biodiesel has been exported which implies a small growth from 2009. This result is consistent with the trade-off between soy bean oil production and soy biodiesel production given that the former is the main feedstock for the latter.



Source: Author's elaboration using INDEC information

Regarding the production, according to 2010's data only 2.6% of the soybean oil production is transformed into soy biodiesel which also indicates the low weight of soy biodiesel in the actual soy complex. Although that ratio is diminishing it is still in levels that can not affect the decisions regarding soy production.



Source: INDEC

An idea for explaining the low participation of soy biodiesel in the soy market could be obtained if the actual growth rates of soy biodiesel and soybean oil are extrapolated. At the actual growth rate it would take 8 years for 5% of the soybean oil production to become soy biodiesel.

Table 26 – Time needed to reach certain percentage of soybean oil into soy biodiesel, extrapolating present growth rates

Percentage	Years needed
5%	8
10%	17
20%	25
30%	31
40%	34
50%	36

Source: Author's elaboration

Furthermore, as was mentioned, the growth rate of soy biodiesel is fueled by the directed policies toward the sector, both in Argentina as in the US. The question unanswered is: if this policies were to be taken away will the sector still grow?

Evidence suggests that given the newness of the market it strongly needs public policies in order to continue developing. In Argentina it is expected a strong growth in consumption given the implementation of the 7% quota that diesel fuels must have in soy biodiesel. This would mean that the exports would fall if the production does not make a catch up. Fortunately this won't be the case if the soybean oil prices keep escalating as in the present time (November 2010).

The actual production capacity of soy biodiesel in Argentina is close to 2.5 million tons a year. That means that Argentina's industry could only convert 4.9% of soybean oil production into soy biodiesel. This means that it is still a low proportion of the soybean oil production that can be converted into soy biodiesel. But this also means that nowadays the limit has not been reached and therefore if the prices keep growing soy biodiesel market can develop as never before.

Table 27 – Principal Soy biodiesel Producers, tons

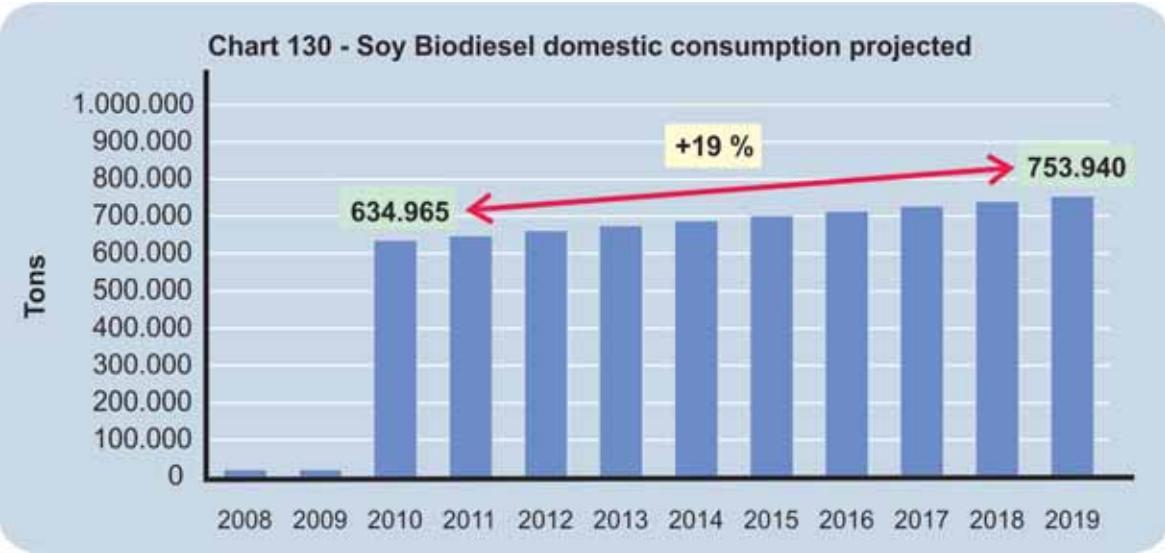
	Soybean oil exports(A)	Biodiesel installed capacity (B)	Biodiesel Production (C)	B/A	C/A
Renova	154405	480000	144000	311%	93%
Dreyfus	508600	305000	84000	60%	17%
Ecofuel	1535458	220000	72000	14%	5%
Molinos Río de la Plata	482743	100000	36000	21%	7%
Total	2681206	1105000	336000	41%	13%

Source: Elaboración propia en base a Ministerio de Agricultura y CIARA

When production planned for 2010 is observed it is even more clear the small relative size of the soy biodiesel.

The higher ratio of 2010 production / 2009 exports belong to Renova (93%). In the other cases the ratio is quite small averaging 13%.

This data suggests that even the larger soybean oil producers have soy biodiesel as a marginal product when compared with soybean oil exports.



Fuente: FAPRI

Even though the information available is from 2004 it helps as a reference in order to understand the small proportion that soy biodiesel would represent. That year 3.384 cubic meters of fuel were consumed, 3.045 of natural gas and 11.067 of gasoil.

That means that internal consumption of biodiesel would represent in 2010 13% of the total consumption of liquid fuels from 2004. Assuming a growth rate of 9.4% (in line with some research) the 2010 proportion would fall to 9.6% of the total. This means that the consumption of biodiesel is still modest. The main conclusion is that soy biodiesel does not seem to push the production of soy products.

The causality seems to be the other way around.

Final remarks:

Argentine biodiesel production is based on one of the biggest and more productive oil – feed – seed production chains. The present industry added more steps and increased industrial value to end products as raw soybean oil. Once converted into biofuel, the industry's value chain continues on through two more links: Blending and Distribution, and Final Markets. blenders and retailers in these last two stages.

Regarding the newest internal market responds to a national strategy in order to lower imports and vulnerability from foreign providers, The mandatory blend is increasing and will surely reach a level of 10 % in the near future

In the downstream oil & gas industry, four companies dominate: YPF, with a market share of 53%; Shell with 17%; Esso, 14%; and Petrobras, 12%. The remaining 4% is held by a variety of smaller players.

The biodiesel industry is highly concentrated mostly based in Santa Fe province, in the heart of the soy and oilseed crushing industry. The downstream blending terminals are located close to population centers such as the city of Buenos Aires, and Rosario, in Santa Fe province. The domestic biofuels market has commenced in Argentina with little publicity, most of citizens are unaware that the mandatory blend is in place and that they are using a mixture of fuels in their engines.

Although at the very first steps of biodiesel use some delays aroused, the fact that it has commenced is in itself an event of such significance that the delays are minimal compared to the positive implications for the country: new investment; job creation; a cleaner, domestically-sourced renewable energy matrix; and above all, one clear stride towards a path of sustainability and respect for environmental obligations.

A big part of this success is borne of Argentina's abundance of natural resources such as in soy oil, which we know will prove to be a valuable feedstock for the global industry for many years to come. Argentina currently has an excess of soy oil. There is no shortage of conflicts of interests or problems to confront in these early days of the domestic market.

Soybean implanted areas growth has been over previously pasture lands, other crops and unexploited areas in a minor proportion. This phenomenon cannot be answered only by soy production, other crops help explaining it.

Pampas region has had superior growth regarding soy production when compared against Northwestern and Northeastern regions. Between 1980-1999 the soy implanted areas shows a negative correlation with livestock, situation reverted in the 2000's due to the increase of feedlots.

When taken into account, margin analysis is pretty conclusive regarding the superiority profit wise of soy production over other activities. This superiority is driven by demand and increase in prices of several production of the soybean chain. The obvious conclusion is that soy biodiesel does not push soy production but the other way around.

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References

- Usda psd database - <http://www.Fas.Usda.Gov/psdonline/>
- M.A. Keyzer, m.D. Merbis, i.F.P.W. Pavel and c.F.A. Van wesenbeeck (2005) -
- Food, feed and fuel: when competition starts to bite - centre for world food studies (sowvu), free university amsterdam, de boelelaan 1105, 1081 hv, amsterdam, the netherlands
- Silvana giancola, maria laura salvador , melina covacevich, gabriela iturrioz (2010) "analysis de la cadena de soja en la argentina" – inta - argentina
- Fernando vilella, sebastián senesi, evangelina dulce, raúl pérez san martín , marcos daziano (2010) "el sistema de agronegocios en la argentina, su cadena y perspectivas para 2020" – acsoja , bayer – argentina.
- Daniel rearte (2010) "las retenciones y la ganadería" – instituto nacional de tecnología agropecuaria (inta) – argentina.
- Hilbert j.A., L.B. Donato, j. Muzio e i. Huerga (2009). "Análisis comparativo del consumo
- Energético y las emisiones de gases efecto invernadero de la producción de biodiesel a base de soja bajo manejos de siembra directa y labranza convencional" instituto nacional de tecnología agropecuaria (inta) – argentina
- Bioenergy business (2009). "Us biodiesel tax credits approved at last". <Http://www.Bio-energybusiness.Com/index.Cfm?Section=americas&action=view&id=11601>
- Cámara argentina de energías renovables (2009). "Estado de la industria argentina de biodiesel".<Http://www.Argentinarenovables.Org/archivos/analisisituacionbiodiesel2009.Pdf> .
- Earley, jane (2009). "Us trade policies on biofuels and sustainable development. Ictsd programme on agricultural trade and sustainable development"- issue paper nº 18. Switzerland international centre for trade and sustainable development.
- Global subsidies initiative (2008). "The united states closes controversial "splash and dash"biofuels subsidy loophole". Subsidy watch 29. International institute for sustainable development. <Http://www.Globalsubsidies.Org/en/subsidy-watch/issue-29>.
- Iea (international energy agency) (2008). World energy outlook 2008. París: international energy agency.
- Iea (international energy agency) (2009). World energy outlook 2009. París: international Energy agency.
- Molina, claudio (2009). Comunicación personal. Asociación de biocombustibles e hidrógeno de la argentina.
- National biodiesel board (2010). Nbb disappointed by delay in extending biodiesel tax Incentive. Press release. Washington d.C.
- Oecd (2008). Biofuel support policies. An economic assessment. París: oecd
- Us epa (united states environmental protection agency) (2010 b). Epa finalizes regulations for the national renewable fuel standard program for 2010 and beyond. Office of transportation and air quality, epa-420-f-10-007.
- Ministry of agriculture . <Www.Sagpya.Gov.Ar>
- Ministry of economics . <Www.Mecon.Gov.Ar>
- Ministry of planning . <Www.Minplan.Gov.Ar>
- Infoleg . <Www.Infoleg.Gov.Ar>
- Boletín oficial. <Www.Boletinoficial.Gov.Ar>
- Administracion federal de ingresos publicos (afip) database : <www.Afip.Gov.Ar>
- Instituto nacional de tecnología agropecuaria (inta) : <www.Inta.Gov.Ar>
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INTA as a national institution dedicated to agricultural and agroindustrial production decides to place bioenergy in an important state within the organization creating the national bioenergy program. The institution has a long history in bioenergy with the first biogas research projects beginning in the early eighties. We understand bioenergy as the one derived from using and transforming biomass into different energy vectors (solid liquid and gas) in order to be employed for energy requirements. INTA has been active in the area for the last 20 years focusing in the principal productive chains related with solid, gas and liquid energy vectors in accordance with sustainable development principles

The aim of the program is to secure the supply of sustainable bioenergy sources and services, taking care and supporting sustainable development, national energy security, poverty reduction, climate change attenuation & environmental equilibrium in all the national territory

Within this framework several projects are carried over, between them the Global Assessment of Biomass and Bioproduct Impacts on Socio-economics and Sustainability project that belongs to the European Union framework program 7

<http://www.globalbiopact.eu/>. The main aim of the Global-Bio-Pact project is the development and harmonization of global sustainability certification systems for biomass production, conversion systems and trade in order to prevent negative socio-economic impacts. Between the specific tasks of Argentina as a member of this project a complete study of the soybean chain related with biodiesel production from the oil of this feedstock is carried over. In this framework the present study contained in this book was developed giving answers to the following objectives.

- Identify socio-economic impacts of feedstock production
- Identify socio-economic impacts of conversion chains
- Investigate links between social and environmental impacts
- Review current and future trading schemes

Argentine soybean chain has reached an important development being leaders in the world in production and exports of different elaborated products. Within these products biodiesel became very important with a highly efficient transforming chain and modern export ports facilities mainly placed on the Paraná river sides.

We invite you to go through this book that contains an analysis of the principal drivers and interactions of the principal agroindustrial chain of Argentina.

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