Department of Economics
The Chairs' Update
June 2012 N°7

INTERNATIONAL MARKET FOR SOYBEANS COEXISTENCE OF GM AND NON-GM PRODUCTS

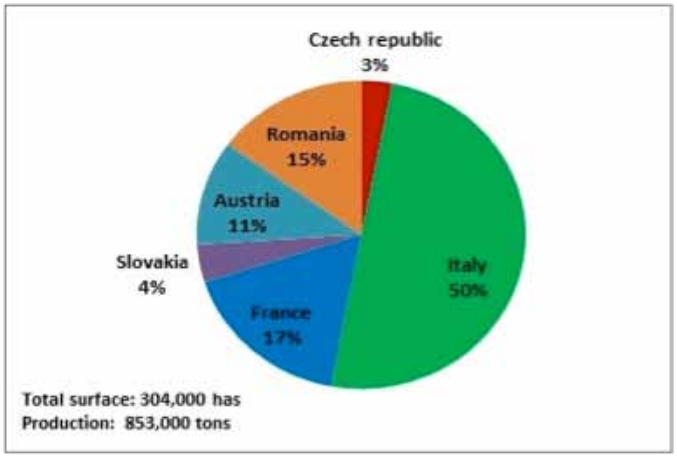
Foreword :

The École polytechnique and Institut National de la Recherche Agronomique (INRA) have developed a joint research initiative on food industries and agricultural products. On September, 25th, 2009, a first research workshop was held on « Private Standards: Substitutes or Complements to the Public Regulation? ». A second workshop was organized on November 17th, 2010, on "The Freedom of Choice Principle for Consumers and farmers and its Implication on the Value Chain". The issues raised in these workshops were used to develop and stimulate several researches in the field of Nutrition and Food Safety. The Chairs' Update n°4 focused on issues related to Genetically Modified Organisms. This Chairs' Update focuses on the challenges of international trade in raw materials, taking the soybean market as an illustration. Soybean represents a major global challenge for the supply of vegetable protein in our societies. A third workshop on the issue of innovations in food processing and public incentives will take place early 2013.

Éric Giraud-Héraud
Coordinator of the joint research initiative

The World Market for Soybeans and European Union Dependance

In just over half a century, soybean has become a major crop worldwide. Its cultivation and production has been primarily driven by the demand for soybean meal for animal breeding. With high protein content and high concentration of amino acids, soybean has become an indispensable part of the food and feed chain in the world.



Soybean is little grown in the EU relative to European demand and its cultivation has important economic and political implications. EU demand far exceeds its production (0.9 million tons/year) and imports reach around 30-35 million tons per year . France, produces about 140,000 tons per year and imports around 4 million tons of soybean meal for animal consumption including 0.5 million tons of seeds.

The deficit in soybean production in the EU and the concentration1 of global production are important risk factors for France and the EU, particularly in terms of need and reliance on imports. Member States do not have the capacity to meet domestic needs, and depend on the productive capacity of a small number of key suppliers

The issue of dependency is also a subject of controversy because of two main features in early EU legislation: i) non-authorization of GM soybean, and other GM crops in the EU, and ii) authorization of high levels import of GM soybean (over two thirds of the soybean meal imported corresponds to GM soybean).

Due to the importance of GM crops and the surrounding supply issues, the economic benefits and/or costs of GMOs needs to be thoroughly analysed. This is particularly the case for GM soybean given its importance in the global market and also for the EU where the authorization of GMO production is out of sync with the rest of the world.

Alejandro Fuentes Espinoza
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La FONDATION du RISQUE
Business Economics
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The Chairs' Update

GM Soybean Culture and Its Economic Impacts

Numerous studies analyzing the economic impacts of the main types of GM crops are available including for Bt (insect resistant) and HT (herbicide tolerant). In the economic literature, two main categories of impacts are discussed: the impact on farmers' income and the major economic impacts on international trade, on different sectors, and on production, prices, consumption and welfare changes.

Impacts on farmers' income

Current economic studies show that GM soya impacts income through changes in production costs, in yields, in time management and in recovery and changes in market prices, thus affecting the profitability of soybean crop.

In terms of production costs, HT soybeans have a positive effect by reducing herbicide and management costs, which offset the increase in seed costs. On yield, most studies indicate only a small difference between HT soybeans and conventional soybeans.

In terms of management and work time, adoption of HT soybeans is associated with an increase in « non-farm income », as a result an economy of time available for off-farm work.

In terms of valuation and price changes, GM soybean has a positive impact on producer prices (output) if there is a decrease in production costs, easier management and higher yields. On the other hand, the presence of GM and non GM would imply a limited substitution or non-existent, causing market segregation between GM and non-GM. In this situation, non-GM soybean farmers may receive a surcharge if their cultivation is certified as « non-GMO ».

The Major Economic Impacts

These impacts are analyzed mainly through modeling studies, which have the main assumption that « the increased productivity of GM soybeans ». In terms of impacts on the price, most modeling studies show that non-import restriction means in most countries (producers and non-producers of GM soybeans) lower prices for coarse grains and oilseeds (including soybeans), causing a slight decline in industry revenues.

In terms of distribution of benefits among countries, most studies show an increase in economic welfare Global GMO producing countries and for non-GMO producers. The first is based on the assumption of increased productivity (crop yields), while the second assumes lower import prices of coarse grains and oilseeds (GM and non-GM) and a more efficient use of resources in the allocation of production. These studies also conclude that the overall gain of economic welfare decreases as segregation costs rise.

The impacts on prices and production are also studied in adoption scenarios (asynchronism) of GM soybeans, and segregation. The price of soybean decreases and production increases in all regions when there is no segregation. With segregation, the price of conventional soybean is higher than the GM soy because of a preference for non-GM products.

Concerning the distribution of value between different actors (farmers, seed companies, biotechnology companies and consumers), many studies show benefits for all actors. The biotechnology firms and seed segregation costs appear.

A final aspect to note is the concentration of R&D and sale of seeds from the seed and biotechnology industries. Some studies have reported the potential for a near monopoly in seed supply which would push up GM soybean prices, destabilising the market and causing problems for farmers. However, few studies have addressed these issues, warranting further analysis.

Alejandro Fuentes Espinoza
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GM Regulatory and Economic Impacts

In general, two main aspects are addressed in studies analysing the economic impacts resulting from the regulation: i) market segmentation of GM and non-GM, with costs of coexistence and segregation, and ii) ban and/or disruption of imports of GMOs, and its impact on trade.

The Costs of Coexistence

With a generalization of GM crops, economic analysis shows that the French and wider European market splits into two segments, GM and non-GM, with different prices and costs. The coexistence entails risks of accidental presence of GMOs, and additional costs for putting measures in place to stop this. These costs are taken on by farmers of GM or non-GM (upstream) or the supply chain (farm, organic or other) and even by the consumer, downstream.

The literature reviewed indicates that the « viability of coexistence » seems to depend directly on the regulatory factor. This would mean additional costs of varying degrees depending on the level of regulation. Three main types of costs associated with coexistence are discussed in the literature (majority for the corn - for soybean costs of coexistence are limited to crop segregation and traceability -

soybean crop it's a predominantly self-pollinating plant), in particular for farmers and intermediate players: those related to changes in agricultural practices, those inherent in the establishment of a control system (traceability), and those relating to the cost of insurance or financial, from a contamination of non-GM crops.

The Scientific Council (CS) of the High Council of Biotechnologies (HCB) estimated (December 2011) that the 0.9% thresholds for authorised GMO's may be considered by the implementation of technical measures at the individual level of the farmer. In relation to the 0.1% threshold, the CS HCB said regulation for producing seeds and seedlings need to be revised. Current standards do not guarantee that the « GM free » rule will be followed, if there is a significant growth in GM crops; and the technical conditions for complying with the 0.1% threshold are a limiting factor for all operators and actors.

Impacts on Trade

The impacts on trade are determined mainly by three major issues concerning GMOs : asynchronism, asymmetry and experimentation. The asynchronism refers to the authorization of GMOs differing across countries. The asymmetry, to an unequal development of GMOs, in production, marketing and also in research experimentation between countries could also be categorised as asynchronous. These three situations present significant risks, as they could cause the interruption and/or prohibition of trade of commodities between countries.

Economic modelling is also one of the main methods of assessing impacts on trade. These studies analyse the relationship between regulation and trade argue that countries lose income when restrictive regulation stops them from producing GMOs (mainly assumption).

One of the most studied cases is the interruption of trade due to the presence of GMOs above the thresholds. The EU establishes a threshold of 0.1% of « maximum tolerance » of unauthorized GMOs for import. This threshold applies only to animal feed while human consumption has a level of « zero tolerance ». For agri-food industry, the defined thresholds of GMO imports in the agri-food industry- especially for human consumption- is a technical solution to the GMO « tolerance » problem but does not solve the economic impacts.

Other studies highlight the low EU adaptive capacity to replace -or lower- the demand on vegetable proteins. This mainly due to additional costs by increasing production and due to a protein EU industry non-competitive compared to other countries. These studies conclude that the regulatory aspect of the EU on GMOs seems to worsen the problem of supply and does not seem to agree with the needs of sectors of food and feed.
In order to reduce dependence on vegetable protein, studies must be analysed on the productivity of European producers in relation to GMO prohibition, with a closer look at the impact on market share and the possible export capacity of EU sectors compared to other regions.

Alejandro Fuentes Espinoza

What Future for the EU Needs in Proteins?

Policies and regulations that theoretically can be redirected to solve the EU's dependency on vegetable proteins, should be questioned and challenged, given the EU's high consumption of soybean. The legitimisation of EU regulatory discrimination between GM and non-GM, also has to be questioned, given the importance of biotechnology.
Studies in general, largely based on economic modelling, show that GMO crops (including soybeans) can have economic benefits among countries and on the distribution of value between the different actors of the food chain. However, the EU's current situation of low adaptability to the plant protein supply problem combined with its restrictive regulations on GMO's appears to cause economic distortions to economic actors. This has to be taken into consideration during public policy implementation.
The current EU GMO legislation highlights the need to deal with the synchronicity of the authorisation process in producing or exporting countries and consuming or importing countries. It also shows that legal recognition is needed for realistic tolerance levels that are consistent and appropriate to the economic reality of the food and animal feed supply chain

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Selected Publications:

Aramyan, L.H., C.P.A. van Wagenberg & G.B.C. Backus, 2009. EU policy on GM soy: tolerance threshold and asynchronic approval. LEI Wageningen UR, The Hague. 46 pp.

CE, 2011. Rapport de la Commission au Parlement Européen et au Conseil sur les répercussions socioéconomiques de la culture d'OGM établi sur la base des contributions des États membres, conformément à la demande formulée dans les conclusions du Conseil «Environnement» de décembre 2008 ». 13 p.

Finger R., El Benni N., Kaphengst T., Evans C., Herbert S., Lehmann B., Morse S., Stupak N., 2011. «A Meta-Analysis on Farm-Level Costs and Benefits of GM Crops. Sustainability ». 2011; 3(5):743-762.

Kaphengst T., El Benni N., Evans C., Finger R., Herbert S., Morse S., Stupak N., 2011. « Assessment of the economic performance of GM crops worldwide ». Ecologic Institute, Berlin, 149 p.

LEI-DLO, 2010. « Study on the Implications of Asynchronous GMO Approvals for EU Imports of Animal Feed Products. Executive Summary ». 12 p.

Wageningen-UR, 2011. « Sustainability of current GM crop cultivation ». Review of people, planet, profit effects of agricultural production of GM crops, based on the cases of soybean, maize, and cotton. 166 p.

The Chairs' Update

The Chair for Business Economics 2007-2011

Jean-Pierre Ponssard
Chair coordinator

The year 2011 marks the end of the partnership agreement regarding the Chair for Business Economics. This Chair will have a durable impact in structuring the research and teaching activities within the École polytechnique at large. Firstly, a new Master program will be launched in September, 2012. This program builds on an original interdisciplinary approach to environmental and energy challenges facing our society. Secondly, a new Institute is under creation at École polytechnique to foster the corresponding research activities.

I take this opportunity to express my thanks and gratitude to our partner companies: DuPont, GDF-Suez, Lafarge, and Unilever as well as to the members of our scientific advisory board: Jacques Crémer, Bernard Sinclair-Desgagné, and Yves Smeers

It has been a great honor and rewarding experience for me to lead this Chair.

Highlights of the Chair for Business Economics

The research activities were structured along the following initiatives.

i. The Impacts of Climate Change Policies on Industrial Competitiveness
ii. Climate Policy and Long Term Decisions: Investment and R&D
iii. Market Power in Vertically Related Markets
iv. Corporate Social Responsibility and Financial Performance
v. Firms and Local Communities, and more generally Bottom of the Pyramid
vi. Public Regulation and Private Standards
vii. Business Sustainability, and the Greening of the Economy

- Continuing relationships have been established with CIRED, ESSEC, HEC Paris, CIRANO Montreal Research Center, Chaire Economie du Climat (Paris, Dauphine), Institut du Développement Durable et des Relations Internationales (IDDRI) in Paris, Cambridge Electricity Policy Research Group, Climate Strategies Network, Bocconi University.
- On a yearly basis, the research team involved more than 10 professors affiliated to École polytechnique Department of Economics, and the same number of Post-Doctoral and Doctoral students.
- Two books, more than 80 articles in scientific journals have been published, and 40 working papers are under review.
- Seven courses at École polytechnique and a total of 14 PhD theses benefited from the support of the Chair.
- By bringing together worldwide experts the 22 workshops organized by the Chair provided an opportunity to disseminate the results and circulate them to a broader audience.

(Full report available on the chair website: http://chair-business-economics.polytechnique.edu)

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