Coexistence regulations of GMOs and non-GMOs

Sylvaine Poret

Department of Economics
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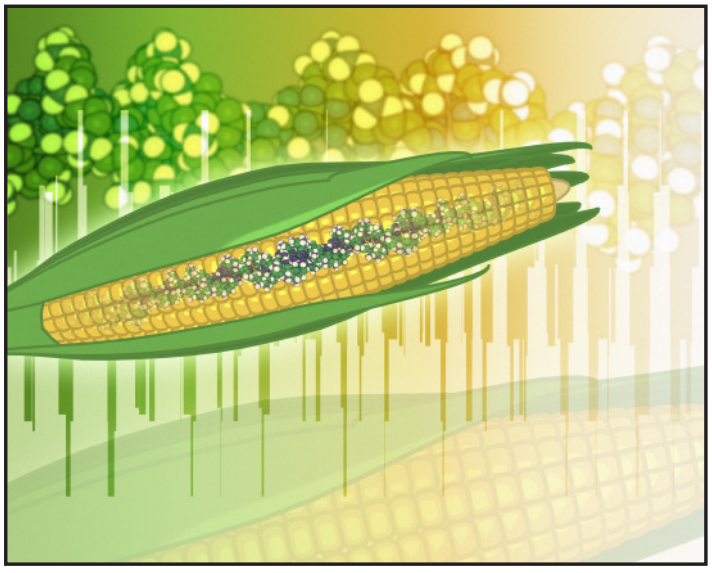
Conference on "The Freedom of Choice Principle for Consumers and Farmers and Its Implications on the Value Chain" (November, 2010)

On November 17th, 2010, INRA (National Institute for Agronomic Research) and École Polytechnique - Department of Economics – have organized the second joint workshop with DuPont de Nemours and the support of the Chair for Business Economics, on the Genetically Modified Organisms (GMOs): ***"The Freedom of Choice Principle for Consumers and Farmers and Its Implications on the Value Chain"***. By bringing together academics and professionals the workshop has provided an outstanding opportunity to share experiences about this topic and stimulate future research activities. The workshop was opened by Antoine Messéan (INRA Agronomist Researcher) who has presented the context of the coexistence between GM and non-GM plants and some new problems related to this question. The first part of the workshop, chaired by Michel Trommetter (INRA Economist), was devoted to the regulation of the coexistence at the production level with four presentations. Marie-Angèle Hermitte's (CNRS Lawyer) presentation of "Technological Pluralism: Confidence and Responsibility" referred to successive modalities enforced by authorities to manage the introduction of this new technology. Sylvaine Poret (INRA Economist) presented her work on the coexistence regulation in fields and its effects on markets. The Portuguese coexistence legislation and its enforcement were explained by Ana Paula Carvalho (Head of Seeds, Varieties and Genetic Resources Unit, Portuguese Ministry of Agriculture, Rural Development, and Fisheries). Maddy Cambolive (Advisor Regulatory Affairs DuPont-Pioneer) presented the DuPont company and its researches in the field of varietal innovation.

To close the morning, a round-table, chaired by Louis-Georges Soler (INRA Economist), assembled Rémi Haquin (Comité Céréales de France AgriMer Président & Commission Environnement d'ORAMA Président), Elisa Vergine (SRI Amundi Analyst, IDEAM) and Christine Noiville (Comité Economique, Ethique & Social du Haut Conseil des Biotechnologies President). The afternoon was dedicated to the topic of consumption and the enforcement of the freedom of choice principle for consumers. Louis Lévy-Garboua (Paris 1 University, Professor of Economics) provided a reflection on consumers' confidence in the product quality in relation with his researches in behavioral economics. Bernard Ruffieux (Grenoble University, Professor of Economics) presented results of his experimental research works on the consumers' aversion to GM food. Yves de la Fouchardière (Loué Fermiers CEO) presented the cooperative "Fermiers de Loué" and outlined his concerns about soybean supply, final products labeling and the debate on regulatory thresholds. The second round table has brought together Pierre Combris (INRA Economist), Charles Pernin (Consumer Organization Representative CLCV) and Yves Goemans (Legal Counsel Europe, Solae Europe S.A. DuPont).

The Organizing Committee



Do Consumers and Citizens Really Have an Aversion for GMOs?

A very large number of researches in recent years have been devoted to estimating consumer demand for genetically modified food. In a first approach, the authors have attempted to show how consumers perceive the innovation rather negatively. It, nevertheless, shows a significant divergence behavior from one country to another (namely, opposition to GM foods is stronger in the EU than in the US) and even among individuals within the same country (there is also consumers with much GM aversion in US (Desquilbet and Poret, Forthcoming). This heterogeneity in behavior can be explained by a series of arguments, ranging from the perceived effects on health, environment and biodiversity. The explanations also consider the arguments for a 'demand for naturalness', for ethical and social responsibility. Most studies (See Lusk et al., 2005) are based on surveys attempting to assess the willingness to pay (WTP) of consumers for a product labeled as GM food, versus a product labeled 'GMO

free'. The obtained results are declarative, unless it is difficult to discern whether or not these intentions, a priori rather negative, would result in a boycott made by actual consumers. Recent techniques of experimental auctions (outlined in this workshop by Bernard Ruffieux and developed in the publications of Noussair et al., 2002, 2004, Kassardjian et al., 2009) allow to adopt a more realistic investigation, and to balance the presence of GM ingredients with other intrinsic characteristics of products. First, consumers enrolled in a laboratory are subjected to a process of revelation of actual WTP for a given product. Moreover, it is possible to use this technique to explore the WTP of consumers for products that are not marketed, providing that their marketing is still credible. Noussair et al. study the purchasing behavior of French consumers, who are demographically representative of the population, to elicit and compare the WTP for products that are traditional in content and labeling, that are explicitly guaranteed to be GMO-free and that contain GMOs. They also consider the buyer's behavior with respect to different thresholds of maximum GMO content. Their results suggest that (i) most people are not greatly concerned with the GMO issue and (ii) a large part of them are not aware of whether they buy products containing GMs. However, most measures of consumers' and citizens' opposition to GM food have been made with the first generation of GMOs, the only products currently available on the markets. These first generations GMOs are designed to improve production efficiency, for instance, by developing plant resistant to pest, rather than bringing new and attractive characteristics for consumers. Thus, for the consumer, the opportunity cost of rejecting such first-generation GMOs is very low or null if the improvements made in upstream production do not result in lower prices on the retail market, given the market power of some intermediates and / or resellers. Nevertheless, some of these improvements may have benefits for the consumer's utility. They can meet certain expectations of consumers concerned regarding the environment and sustainable development. For example, some first generation GMOs reduce pesticide use. But in this case the consumer is placed in a position of trade-off between certain and immediate collective nuisance (pollution by pesticides) and an uncertain individual or collective future nuisance (possible environmental and sanitary risks associated with GMOs).

What about the consumer hostility to GM technology if the benefits of this technology were immediate and tangible, that is to say embedded in immediate features, news and desirable for food products?

This issue of the Chairs' Update focuses on some of the topics developed during the workshop "*The freedom of Choice Principle for Consumers and Farmers and Its Implications on the Value Chain*" (November, 2010):

- Bernard Ruffieux (INRA-GAEL and Grenoble University) "Consumer's Aversion for GMO Food: Is it Real and Does it Survive a Yummy Apple?"
- Sylvaine Poret (INRA-ALISS & Ecole Polytechnique) "How do GM/non GM Coexistence Regulations in Fields Affect Markets and Welfare?"
- Ana Paula Carvalho (Head of Seeds, Varieties and Genetic Resources Unit, Portuguese Ministry of Agriculture, Rural Development, and Fisheries) "La coexistence entre cultures OGM et non OGM au Portugal : retour d'expérience ".

The presentations can be downloaded from
http://chair-business-economics.polytechnique.edu/home/workshops/

For example, one can think about the flavor of the product, its appearance, its nutritional qualities, or its ease of use. In these cases, would the consumer remain hostile? Or, would she/he be willing to arbitrate the contrary, when purchased between her/his hostility to GM technology and the direct benefits that this technology can bring to it? Using a study conducted in 2005 in New Zealand, Kassardjian et al. show that the decline in WTP due to the suspicion about GMOs is quickly offset by an attractive feature, even little objectively necessary for the consumer, as, for example, the addition of vitamin C. Thus, using the same experimental technologies, these authors show that the attractiveness of certain desirable characteristics obtained from a GMO may offset the rejection occasioned by the use of such technology.

Éric Giraud-Héraud

[1] *WTP is defined as the maximum price at which the participant is willing to buy the product.*

[2] *The simplest and most often procedure used is to ask participants to report their WTP by committing to buy the product if the market price (provided by a random draw following an unknown distribution of prices for participants) is less than the maximum purchase price. It is easy to verify that this procedure leads to an incentive for a participant to declare his true WTP.*

Coexistence Regulations of GMOs and Non-GMOs

The introduction of GM crops in the European agri-food system raises some interesting economic questions. On the one hand, GMOs currently available result in efficiency gains for farmers or manufacturers. On the other hand, although a part of these benefits can be transferred to consumers through price reductions of final products, the risk perceived by some consumers overcomes these gains. Indeed, in many countries, one can notice the rejection of GM food by some consumers (Desquilbet and Poret, Forthcoming). This leads to an infrequent economic phenomenon of markets splitting in two. From an economic perspective, the introduction of GM crops makes production of non-GM crops more costly if farmers are to sell their crop as non-GM, that is, Identity Preserved (IP), in order to meet the demand from consumers who view non-GM products as superior to GM products. In other words, the cultivation of GM crops creates a negative externality on non-GMO farmers who intend to prevent GMO commingling in their harvest and to respect the labeling threshold in crop production. Reducing adventitious presence of GMOs in non-GM harvest may be achieved by costly technical measures put in place either by GMO or by non-GMO producers. These measures could include isolation distances or pollen barriers. In juridical terms, both the producer of non-GM grain and the producer of GM grain may influence the probability or the magnitude of accident losses through their choices of care and activity levels, which makes gene flow a case of bilateral accident. In addition, in a situation where consumers have a higher valuation for non-GM products, only gene flows from GM crops to non-GM crops can generate an economic loss. This makes the risk unilateral (and not reciprocal), in the sense that GM producers have no incentive to take due care to reduce

the risk of gene flows. This could change with second-generation GMOs.
As an activity that creates risks of harm to others, cultivation of GMOs presents a specific difficulty: it is technically impossible to attribute the damage due to gene flows to a precise producer. The admixture related to gene flows is thus a case of non-point source pollution, since it cannot be traced back to a single or definite source. As a result, there is a chance that parties could not face the threat of suit for harm done. Therefore, tort liability alone is not an adequate regulation to solve the risk of GM gene flow towards non-GM crops and ex ante safety regulation is warranted. In addition, ex post tort liability is expected to be useful, since technical ex ante coexistence measures in fields do not entirely eliminate the risk of gene flow. These arguments call for coupling ex ante safety regulation with ex post liability regulation at the farm level (Desquilbet and Poret, Forthcoming; Desquilbet and Poret, 2010).
In practice, the European authorities have instituted a regulatory framework to ensure consumers' freedom of choice. Since the coexistence of several agricultural production systems is a prerequisite for providing a real freedom of choice, a coexistence regulation was adopted in the European Union. The European Commission (EC) recommendation 2003/556 on coexistence allows Member States to impose mandatory regulations on farmers growing GM crops in order to limit gene flows from their fields to neighboring non-GM fields, giving as a justification 'the newcomer principle', which assigns property rights to non-GM farmers.
The EC recommendation focuses on coexistence in fields, that is, the problem of gene flows between neighboring crops in the case of maize cultivation. Questions related to the mixture risk at later stages of the food or feed supply chain are not addressed. This can be explained by the fact that specific requirements concerning GMO presence may be specified in contracts between the various intermediaries of the chain - handlers, elevators, manufacturers, and retailers. On the contrary, there is no contractual relationship between neighboring farmers. This is the reason why a coexistence regulation in fields has to be implemented by the authorities. As the theory recommends, the institutional environment for the coexistence of GM, conventional and organic crops in the European Union combines ex ante regulation measures and ex post liability rules. Legal coexistence rules should thus ensure that crop value losses are prevented and/or compensated. However, it can be expected that the Member States will enforce them in various ways and in various degrees, what will induce a strong heterogeneity in adoption rates of GM crops across countries, all the more so the new commission recommendation of July 13, 2010 grants more flexibility to Member States in the coexistence organization. This raises further questions of harmonization and international trade.

Sylvaine Poret

The Portuguese Coexistence Regulation

The Portugal appears as a pioneer in the enforcement of the coexistence between GM and non-GM cultivations in the European Union. The Portuguese coexistence legislation was implemented in 2005 by the Decree-Law no. 160/2005, of September 21. The regulatory framework includes ex ante regulations with a first step including registration, information and training duties and mandatory technical measures in fields, and ex post liability rules. The regulation system is based on two major players, farmers and seed companies. Farmers have to fulfill many requirements; penalties can be applied if they do not comply. In the farmers' obligations, information is very important. First, before the initial start of the cultivation of GM maize and preferably before the acquisition of seed, farmers have to attend specific training courses (one day per farmer) in order to be informed about coexistence, traceability and labeling. The seed companies or farmers organizations are responsible for the organization of the training courses, and they also have to provide information on each pack of seeds about the national coexistence measures and the traceability and labeling rules, listing of all their buyers and technical assistance during the cultivation. Second, farmers have to notify the Ministry of Agriculture regarding the fields planned to be cultivated with such GM varieties, not later than 20 days before the scheduled date of sowing. Futhermore, they have to inform by letter their neighboring farmers, not later than 20 days before the scheduled date of sowing, of their intention to sow GM varieties. At the sowing and harvest time, farmers have to meet technical measures to avoid mixing in nearby fields, such that isolation distances, buffer zones or pollen barriers, and segregation in handling and transport. Isolation distances are not a problem for large farms, but it is for small ones. To solve this problem, farmers can voluntarily associate to create production areas exclusively dedicated to the cultivation of GM varieties, or it is confirmed that the agricultural products produced in a particular region, both from genetically modified varieties and from conventional varieties, are intended to be mixed in lots to be labelled as containing genetically modified organisms. This way, each farmer does not have to meet technical measures around his GM culture; it is more effective in terms of coexistence and segregation costs. Then, farmers have nothing to justify as they all cultivate GM crops; this implies the creation zone and only farmers at the borders of the production zone have to accomplish isolation rules. It is historic, farmers do not work together but for GMO, they do. GM crop free regions can be also built. The Portuguese decree also establishes ex post liability rules. A compensation fund, funded by a tax fee on the GM seed bags, will be used to compensate any damage due to accidental cross-pollination.
As a first result, while the total area of maize cultivation in Portugal has declined continuously since 2005, the area of GM maize has increased since this date. Half of GM maize production comes from GMO dedicated zones, and in 2010, there are more than 300 famers forming a part of dedicated zones. In 2009, 105 controls have been performed by official inspectors on isolation measures during cultivation and at the end of the harvest. Official inspectors also control the GMO rate in standard cultures when they are next to GM culture. They make controls in worse cases and the lab results show that most of the time the GMO ratio is lower than the regulatory threshold, 0.9%. These results, as an experience feedback, seem to prove that a coexistence regulation can be efficiently implemented respecting the freedom of production choice principle for farmers. A further step of the analysis could be to study if these coexistence rules can be implemented in other countries with different farm structures, crop patterns, and legal environments.

From the presentation of Ana Paula Carvalho

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Selected Related Publications

Desquilbet, M., and Bullock, D. S., 2009. Who Pays the Costs of Non-GMO Segregation and Identity Preservation? American Journal of Agricultural Economics, 91(3), 656-672.

Desquilbet, M., and Poret, S., Forthcoming. Labelling and coexistence regulation of GMOs and non-GMOs: an economic perspective. In GM and non-GM Food Supply Chains: Co-Existence and Traceability, Yves Bertheau (eds). Wiley Blackwell.

Desquilbet, M., and Poret, S., 2010. How do GM/non GM coexistence regulations affect markets and welfare? Work in progress.

Devos, Y., Demont, M., Dillen, K., Reheul, D., Kaiser, M., and Sanvido, O., 2009. Coexistence of Genetically Modified (Gm) and Non-Gm Crops in the European Union. A Review. Agronomy for Sustainable Development, 29(1), 11-30.

Kassardjian, E., Robin, S., Ruffieux, B., 2009. L'hostilité aux OGM survit-elle à des produits attractifs? Revue Française d'Economie, Forthcoming.

Lusk, J.L., Jamal, M., Kurlander, L., Roucan, M., and Taulman, L., 2005. A meta-analysis of genetically modified food valuation studies. Journal of Agricultural and Resource Economics, 30(1), 28-44.

Noussair, C., Robin, S., and Ruffieux, B., 2002. Do consumers not care about biotech foods or do they just not read the labels? Economics Letters, 75: 47-53.

Noussair, C., Robin, S., and Ruffieux, B., 2004. Do consumers really refuse to buy genetically modified food? Economic Journal, 114: 102-120.

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Economie du Climat-Pistes pour l'après-Kyoto sous la Direction d'Olivier Godard & Jean-Pierre Ponssard
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Forthcoming Events

Workshops

May 31, 2011: "Lectures on Risk and Insurance Economics" organized by The Chair for Large Risks Insurance-AXA (Location: Institut Louis Bachelier, Palais Brogniart, 2 Place de la Bourse, Paris 02 M°: Bourse). Speakers and talks: Pierre-André Chiappori (Columbia University): "Asymmetric Information in Insurance Markets: Recent Advances on the Empirical Front". Keith Crocker (Penn State University): "The Economics of State Falsification, with Applications to Accounting Fraud and Insurance Fraud". Guillaume Plantin (Toulouse School of Economics):" Political Economy of Prudential Regulation".
To register: http://www.economie.Polytechnique.edu/accueil/actualites/evenements

June 29, 2011: "Les labels ISR" Internal Workshop to the Chair for Sustainable Finance and Responsible Investment- GT2: Stratégie des entreprises, relations avec les parties prenantes et finance durable (Location: 9:30 am to12:30 pm; AFG, 31 rue de Miromesnil, Paris 08). Speakers and talks: Samer Hobeika (Polytechnique) : " Le développement de l'ISR en France : une analyse économique du rôle des labels ". Diane-Laure Arjalies (HEC): "When product categories are rooted in a compromise: the case of socially responsible investment funds". Sylvaine Poret (INRA & Polytechnique) : "Normes responsables dans l'agro-alimentaire ".

October, 2011: "The Global Impact of China's Energy Demand" (Location: Paris, TBA).

October 17-18, 2011: "Low Carbon Economy and Technology Innovation Mechanism". First Joint Franco-Chinese Workshop École Polytechnique – HIT (Location: Harbin Institute of Technology, Harbin, China).

Seminars

May 6, 2011: Seminar Environment and CSR: " Impact of the Uncertainty Surrounding Global Economic Recovery on Energy Transition and CO2 prices: Insights from MERGE" - Axel Pierru (IFP)- co written with Yves Smeers (CORE) and Olivier Durand-Lasserve (Location: 10:30 am to 12:00 pm; Library-Department of Economics-Polytechnique-Palaiseau).

May 6, 2011: Coriolis Seminar –Philippe Bougeault, X74, Directeur de la Recherche, Météo-France "De la mécanique des fluides de l'environnement à la prévision du Système Terre "- Conference given for the Science Week (Location : 9:45 am ; Amphi Poincaré- Polytechnique-Palaiseau).

May 12, 2011: PEEES (Paris Environmental and Energy Economics Seminar)- Till Requate University of Kiel - (Location : 4 :00 pm to 5 :30 pm ; Université Paris-Descartes, Salle des Thèses 5ème étage, Bâtiment Jacob, 45 rue des Saints-Pères- Paris 06).

May 13, 2011: Seminar Environment and CSR- Juan Pablo Montero-Department of Economics, PUC Chile (Location: 10:30 am to 12:00 pm; Library-Department of Economics-Polytechnique-Palaiseau).

May 17, 2011: IDDRI Seminar – "Psychology and Sustainable Development: Beyond Behavior Change"- David Uzzell-University of Surrey (Location: 5:00 pm to 7:00 pm; Amphitheater Erignac, Sciences Po, 13 rue de l'Université, Paris 07)

May 18, 2011: Seminar Environment and CSR - Larry Beeferman-Harvard Law School-Special seminar that will take place from 2:30 pm to 4:30 pm at the Association Française de Gestion (31 rue Miromesnil, Paris 08).

May 20, 2011: Seminar Environment and CSR - Craig Smith (INSEAD)-Chaired Professor of Ethics and Social Responsibility (Location: 10:30 am to 12:00 pm; Library-Department of Economics-Polytechnique-Palaiseau).

May 26, 2011: PEEES (Paris Environmental and Energy Economics Seminar) "Strategic Incentives for Car Fuel Taxes and R&D Fuel Efficiency Subsidies "- Stef Proost -K.U. Leuven (Location : 4 :00 pm to 5 :30 pm ; Université Paris-Descartes, Salle des Thèses 5ème étage, Bâtiment Jacob, 45 rue des Saints-Pères- Paris 06).

June 17, 2011: IDDRI Seminar- "Les accords sectoriels : Une piste pour l'après-Kyoto "- Jean-Pierre Ponssard-Polytechnique (Location: 5:00 pm to 7:00 pm; Amphitheater Erignac, Sciences Po, 13 rue de l'Université, Paris 07)

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