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International Trade and the Labelling of Genetically Modified Organisms ❖

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The availability of genetically modified organisms (GMOs) has transformed the way a large number of products – previously unmodified – have influenced spending habits of consumers across North America and Europe. This paper explores several of these issues and focuses, in particular, on the question of labelling of these products. Ethical and scientific issues affecting both food and non-food GMOs produced through innovations in biotechnology is also explored. **JEL: F14; L66; Q17.**

One of the greatest technological developments of recent times has been the ability to genetically modify living organisms. In agriculture, biotechnology has brought great advances, with the possibility of developing crops that are hardier, more resistant to pests, and that generate greater yields. Biotechnology is a broad term that encompasses many technologies, but in general is defined as the commercial application of living organisms and their products, which involves the deliberate manipulation of their DNA molecules.[1]

As might have been expected with all forms of technological development there has followed a backlash from a combination of public opinion, official and semi-official interests. These tend to embrace the following areas: ethical

[1]The Convention on Biological Diversity (CBD) defines biotechnology as: "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use".

resistance to interfering with living creatures, the fear of loss of biodiversity and concern regarding the risk that genetic modification can pass to other organisms. Genetically modified food products have been generally available for quite some time now (although many consumers have not been aware of this). But two cases in Europe, the scare involving the mad cow disease and the dioxide poisoning of many different types of food products in 1999, have put the issue of genetically modified organisms (or GMOs) on all the front pages and greatly increased the level of awareness and information of the average consumer. This has created a strong opposition to the presence of GMOs in food products - and with this - the demand for greater information by consumers. This has translated into the demand for labelling of all genetically modified food products, allowing consumers to make more informed purchasing decisions.

Of particular note is the difference in attitude between American consumers and their European counterparts in transforming the GMO debate from a public health issue to an international trade controversy. American producers and advocacy groups maintain that biotechnologically re-engineered crops are "substantially equivalent" to their traditional counterparts, and that gene-splicing is just a more precise way of doing what farmers have been doing for centuries through cross breeding and hybridisation. While European lawmakers see mandatory labelling as a way of giving consumers the possibility of making more informed decisions, American producers fear that labelling laws and regulations on GMOs can prove discriminatory and, in any case, signal that there is something different, and possibly dangerous, in GMO products.

Of course, there have been public health issues related to GMOs in the United States as well, but interestingly these have not resulted in the same type of public outcry as in Europe. For example, the fall of 2000 saw a massive recall of millions of taco shells sold under the Taco Bell brand, found to contain unapproved genetically modified corn. The variety of corn involved, *StarLink*, is approved for animal feed but not for human consumption because of concerns that a protein in the corn could cause some allergies. This recall and the subsequent uproar by environmental groups may have raised awareness among U.S. consumers, but apparently not to European levels. Recent surveys show that more than 50% of U.S. consumers have heard or read "little or nothing" about biotechnology.[2] Only 43% of those surveyed believe that genetically modified food is offered in U.S. supermarkets. A large majority said they would be very likely to buy a product that had been genetically engineered to taste better or reduce the need of pesticides. Furthermore, according to the same survey 3 out of 5 consumers felt that they would benefit from biotechnology within the next 5 years.

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[2] According to the latest International Food Information Council (IFIC) survey of U.S. consumers, conducted May 5-9, 2000, by Wirthlin Worldwide.

So are the risks of GMOs real or are we witnessing a case of general hysteria and misinformation on the part of those vocal entities? Opinion is divided on this. Genetic engineering is capable of introducing allergens into recipient plants, but the overall risks of introducing an allergen into the food supply are believed to be similar to, or less than, that associated with conventional breeding methods. The risk of horizontal gene transfer from plants to environmental bacteria or from plant products consumed as food to micro-organisms or human cells is generally acknowledged to be negligible, but one that cannot be completely discounted. Pest-resistance due to exposure to genetically modified plants has not occurred to date, and harmful effects on non-target organisms, which have been detected in the laboratory, have not been observed in the field. Nevertheless, these and other possible environmental effects remain areas of concern.

As recently as December 2000, the American Medical Association declared that there was no scientific justification for special labelling of genetically modified foods, and that voluntary labelling would be without value unless it was accompanied by focused consumer education. This is in line with the view of much of the biotech industry that feels that labelling the presence of GMOs in food products would incorrectly signal to consumers that the government believes there is something to worry about. Furthermore, there is the issue of what to label: what percentage constitutes GMO presence? In relation to this are we to conclude that '100% GMO free products' is a feasible objective? What about livestock that have been fed genetically modified feed? What labelling classification would be appropriate for them? Clearly the issues are more complex than might at first appear.

American producers fear that GMO labelling legislation can be used to discriminate arbitrarily between local and foreign products. For example, in Norway the government may ban the import of GMO products based on a number of different criteria. These may include rejecting products on grounds of health and environmental risks, or products deemed not "socially justifiable", or not contributing to "sustainable development" in some way. Furthermore, it applies a "precautionary policy" in which GMO products are generally banned if non-GMO alternatives are available. The Norwegian policy has resulted in the banning of GMO imports, while instead granting exemptions for some locally produced GMO goods. While the impact of this policy on U.S. exports is limited for now to niche markets, this could change as GMO presence becomes more widespread.

Further issues …

Scientists and farmers have been selectively breeding plants for centuries. But traditional methods are time-consuming and somewhat 'hit-or-miss', resulting in both good and bad characteristics. It has generally taken plant breeders 10 to 12 years of crossing and back-crossing hybrids of plants with the original plants to obtain the desired traits and breed out tens of

thousands of unwanted genes. Today, plants can be bred by changing their genetic makeup - often with the insertion of just a single gene. These genes introduce one or more desired elements, for example, the ability to resist the attack of insects, withstand herbicide treatments or produce foods with higher levels of essential nutrients. The power of this technique is not only in the precision, but in the ability to transfer genes between organisms that normally would never interbreed.

Use of bioengineered crops has increased dramatically since their introduction in the mid-1990s. The estimated global area of transgenic crops for 2000 was 44.2 million hectares or 109.2 million acres, equivalent to almost twice the area of the United Kingdom. This figure is the result of a 26-fold increase - from 1.7 million hectares in 1996 to 44.2 million hectares in 2000. This high rate of adoption reflects the growing acceptance of transgenic crops by farmers in both industrial and developing countries. During the five-year period 1996 – 2000 the number of countries growing transgenic crops more than doubled, increasing from 6 in 1996 to 9 in 1998, to 12 countries in 1999 and 13 in 2000.[3]

GMOs are not present only in food products. Genetically engineered pharmaceuticals are already widely used, with more than 150 products on the market. Some 2,200 biotech drugs are in development and almost 250 are awaiting government approval in the U.S. Genetically engineered medicines are now available for treating cancer, heart disease, diabetes, cystic fibrosis, and immune system deficiencies. Others are used to promote the healing of wounds and fight infections.[4] For example, since 1978 genetically modified bacteria have been producing human insulin, which is used by millions of people with diabetes. Recent years have seen the development of *Pharming* - the use of genetically altered livestock, such as cows, goats, and pigs, to produce medically useful products.

In the U.S., the administration of genetically modified foods is shared by the Food and Drug Administration (F.D.A.), the Environment Protection Agency (E.P.A.) and the U.S. Department of Agriculture (U.S.D.A.). In Europe, oversight over GMOs is handled by the Directorate General on Health and Consumer Protection. At the international level, the UN Bio-safety protocol, also known as the Cartagena Protocol, sets detailed procedures for the import of GMOs. The Cartagena Protocol, adopted in 2000, is based on the following precautionary principle: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".[5] Over 80 countries, including the European Union, but significantly not the U.S., have so far signed the protocol.

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[3] International Service for the Acquisition of Agri-Biotech Applications, 2000 Annual review.

[4] PhRMA Annual Report 2000-2001.

[5] Principle 15, Rio Declaration on Environment and Development.

To label or not to label: just another case of product differentiation?

GMOs versus organic foods, what's the difference?

The issue of GMOs in food products may seem similar to that of organic produce, i.e., a case of quality differentiation that segments the market. There are however important differences. Organic produce is sold at a much higher price than their equivalent traditionally produced goods, and targets a niche market of consumers willing to pay a premium for so-called "healthier" foods. Genetic modification instead tends to reduce the costs of production of many foodstuffs. Production in these products however tends to be extremely concentrated, and reduced costs are not passed on to consumers. Furthermore, the characteristics of organic produce are highly advertised, while the presence of GMOs is usually neglected on food labels, contributing to the atmosphere of consumer distrust.

Concerns regarding pesticide residue and environmental preservation have created a legion of loyal organic food fans, willing to make special trips to find their favourites and often paying 20% or more for organic than for conventional foods. While natural food was once the sole domain of small speciality markets, today retail sales of natural foods represent the fastest-growing segment of the grocery industry. Organic agriculture bars the use of synthetic pesticides and artificial fertilisers, and instead relies on ecological interactions to raise yields, reduce pests and build soil fertility. Diverse planting patterns, frequent rotations and attraction of beneficial insects, for instance, would all be organic means of pest control. Organic meat and dairy farming is the raising of animals without hormones, antibiotics or other artificial chemicals; it also includes using organic feed and allowing animals sufficient range of movement and sunlight.

Organic produce, since it is grown without synthetic pesticides or chemicals, is more far more labour-intensive. Organic crop yields are often not as high as those grown under non-organic conditions, and fewer farmers use organic methods and sustainable agriculture practices; therefore the price of organically grown produce reflects the greater demands placed on the grower.

A legitimate question, therefore, would be one trying to establish exactly what it is that consumers get for the higher prices. Organic *aficionados* are confident that the food they consume is both safer and healthier. Whether organic foods are healthier, more nutritious or safer than conventional foods is still a subject of debate in the scientific arena. The differentiation with respect to conventional products is therefore not necessarily vertical, but may be purely horizontal. Producers and retailers of GMO foods or processed foods containing GMO maintain instead that their products are "substantially equivalent" to conventional foods. Given the cost structure of the industry, prices tend to be largely similar to that of their conventional counterparts. To such an extent that most consumers are not aware that

much of the goods consumed nowadays has in some way been genetically manipulated.

Labelling: where do we stand?

The European Union currently has a labelling law (the "Novel Food" Directive, May 1997) that requires food products containing biotech derived ingredients to be labelled "contains genetically modified organisms". In 2000 the threshold was set at 1% in each ingredient and in the product as a whole, i.e., products containing less than 1% of GM material do not have to be labelled.

In the U.S., the FDA currently requires special labelling only when a food is produced under certain conditions. This arises, for example, when biotechnology's use introduces an allergen or when it substantially changes the food's nutritional content, like vitamins or fat, or its composition. Otherwise special labelling is not required. Consumer surveys in the U.S. appear to show support for the FDA's stance.[6] According to the most recent International Food Information Council (IFIC) survey, 69% of consumers support the FDA's labelling policy. Further, confidence in the FDA position has remained relatively stable over the past 3 years, despite the increasing controversy over food biotechnology. While it is general consensus that the role of labelling is to inform and protect consumers, the feeling in the U.S. is that consumers are already overwhelmed by the level of detail on food labels, and that there is no need to add information without proven scientific justification.[7]

What could be the economic effects of introducing labelling on GMO products? Suppose consumers' preferences differ over different types of goods, with higher utility ascribed to goods without GMO presence. However, consumers are often not able to discern GMO presence in goods, because at the marketing stage all varieties of the goods are combined. If labelling laws are enacted (as has been discussed in the European Union), the economies of scale from joint marketing are likely to be lost. However, consumer utility may increase, as consumers are able to choose the variety that they most prefer. How is this problem different from a standard product differentiation scenario, with firms choosing a separating equilibrium to show their different type if they think that it will benefit them and that these benefits would outweigh the costs of signalling their type? The difference is that the economies of scale associated with marketing are *external*, so the increased cost of revealing type falls not only on the firm in question but on all other firms.

In a closed economy context this would be the end of the story. However within an integrated world economy issues are bound to be more complicated. To illustrate consider a simple 2-country scenario. In a two country world, use of GMO technology may be concentrated in one country, or at least unevenly divided. In this case labelling laws would affect the two

[6] International Food Information Council.

[7] Hoban, Thomas. "Consumer attitudes towards biotechnology in North America."

countries differently, with a possible positive effect for the country with a comparative disadvantage in GMO technology and instead a negative effect for the country exporting GMO goods. Labelling would therefore be seen by the latter country as a form of arbitrary trade barrier, in the same league as misused product and health standards. If labelling laws were decided unilaterally, we would expect the two countries to have different labelling criteria (less stringent in the GMO technology abundant country), with the possibility of a trade war deriving from disagreement over differing criteria.

Another point to keep in mind is this. Even if it might be in the individual producer's interest to market his particular variety individually, given market conditions and consumer attitudes, he may very well not be in a position to control the marketing process. In the case of soybeans, for example, producers sell their crop to local buyers, elevators and grain handlers. How local buyers then decide to market the product to processors is not controlled by producers. On the contrary, it is local buyers' marketing decisions that heavily influence producers' decision on the type of crop to plant.

Furthermore, there is a certain degree of uncertainty intrinsic in growing any crop that has been genetically modified. Even if the producers' decide to plant pure non biotech crops, their bags of seed may have been contaminated with some biotech material. Cross pollination can also occur due to insects - estimated to be up to 0.5% in the case of soybeans. If biotech crops had been produced previously, one might be unable to completely clean machinery to remove unwanted seed. This is particularly an issue in the case in which one plans to produce "identity preserved" (IP) crops. This uncertainty adds to the producers cost of producing non-biotech goods, and should be taken into account in any production decision.

Labelling in the world economy

Whilst until recently the issue of the labelling of GMO food products seems to have been limited to internal markets and to the habitually contentious trade between the U.S. and the European Union, the debate is destined to take on world proportions. Other countries, specifically in South America, are becoming increasingly active in GM agricultural production. Brazil and Argentina, for example, already account for a third of world soybean production. Regulation in South America tends to lag the U.S. and Europe in general, with the effect that any type of labelling laws would be difficult to implement. Furthermore, GMO presence would be harder to track given more lax Intellectual Property Rights protection. In the U.S., farmers are tied to explicit and restrictive contracts: they can use the seed only for planting, they can not resell it, and they cannot use harvested beans as seeds for the following year's crop. No such contracts apply in many of the other major producing regions, such as Argentina, Brazil and China.

Concluding Remarks

Modern biotechnology holds the promise of great advances for mankind, however ethical and scientific concerns should not be overlooked. The controversy over the issue of labelling of GMOs in food products is just one aspect of what will be a continuing debate over the next decades. As consumer awareness rises, the dissemination of information regarding new or modified products becomes increasingly important. In a fast changing world, governments can no longer make decisions on matters involving public health safety completely independently of what occurs around them. Quite clearly discussion of biotechnology development, in all its diverse aspects, is an issue that will have to be dealt with on a global level.

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Book Review:

Allen J. Scott (2001) – Global City-Regions: Trends, Theory, Policy. Oxford University Press: New York. PP 484. ISBN 0-19-829799-8.

In view of the onslaught of Globalization in recent years, there has been a renewed interest in the growing significance of the emerging system of global city regions. Allen J. Scott has succeeded in bringing together between the cover of this book expert analysis and forethought from different perspectives. The author of each of the chapters has succeeded in not only evaluating some or all of the ramifications of the growing metropolises but also succeeded in presenting both the theoretical analysis and also of the practical problems surrounding the rapid expansion of cities and their role in the contemporary world system.

The book, Global City-Regions: Trends, Theory, Policy addresses in a nut-shell problems associated with the World's urban populations, their affiliations with host countries, and how they have (and will continue to) shape their surrounding regions. The book provides an overview of the effects of Globalization on regional developments and offers different viewpoints from an impressive line-up of academics, business managers, and public policy experts. The book is divided into nine sections, each one specifically exploring issues ranging from the development of global-city regions, their competitive advantages and disadvantages, and their on-going problems including such issues as prevailing social inequities.

In the very first chapter of the book the authors (A.J. Scott, J. Agnew, E. W. Soja and J. Storper) have tried to crystallise the issues facing the global city-regions in five main questions dealing with the many ramifications. These pointed questions raise issues ranging from the timing of the rapid growth of city-regions; the viability of existing economic and social institutions to deal with and respond to Globalization; the position of the developing countries to reap the advantages from the development of city-regions; to the very fundamental public interest within the framework of traditional nations of democracy and citizenship.

In subsequent chapters the authors have tried to provide answers to these questions. In the process of addressing these issues they have posed a myriad of questions of their own. This very fact suggests the need for a concerted and co-operative effort both on the regional and on the international level to find answers. Failure to do so may prove costly in the long-run, for the mere fact that at the present all signs rightly point to the city-regions as the motors of the global economy led by the on-going phenomenon of Globalization. In a way, it is correct to

assume that the processes of Globalization are conceived as only capable of being world-wide in scale. In fact, the activities of no group, be it governmental (national or local) in nature, or society as a whole, or corporations, have ever been more global in magnitude. As such the authors have rightly pointed out that a 'continuum of sequences' are actually shaping the entire world at the present time. It is this phenomenon that has the potential of an unlimited spread that can readily transgress national jurisdictions, and therefore, any interaction sequence is considered to reflect the operation of Globalization.

It is in this context that Allen J. Scott - the editor of the volume rightly points out that:

> "Globalization combined with population growth and urbanisation brings unparalleled challenges and opportunities for developing global city-regions in terms of both wealth creation and environmental sustainability."

The success of the opportunities presented to achieve the objectives of both wealth creation and environmental sustainability in the ultimate analysis depends on the role of governments and no less on the private sector to work hand in hand to create a new policy modus-operandi, or a paradigm, to not only unleash the economic incentives but also to emphasise responsibility, and accountability.

Overall, this book not only provides a multidimensional attempt to bring forth the many ramifications surrounding the growth of global city-regions, but also attempts to offer a number of policy options in solving both economic and social problems. It is in this context that this book is a must in every library and on the desk of every policy maker.

Ismail Shariff

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