Are Europe's labeling laws for genetically modified foods cost-effective, or even necessary?

Another Look at Biotech Regulation

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Discussions of appropriate regulatory norms for genetically modified foods date back to the early 1980s. Twenty years later, agreement among key trading countries on what such norms should be remains elusive. Some countries, including the United States, consider genetically modified foods substantially equivalent to conventional ones and regulate them similarly. Others, including the European Union, scrutinize and require mandatory labeling of genetically modified foods.

Mandatory labeling has added costs to the trade of agricultural commodities and food products and has restricted market access. Nevertheless, regulators in the EU have argued that mandatory labeling of genetically modified foods is necessary to safeguard consumers' right to an informed choice. But are, in fact, Europe's mandatory labeling laws necessary or cost effective? And how do the European standards compare with the standards of mandatory labeling laws implemented in other countries?

GLOBAL REGULATION

The global regulatory system for genetically modified foods is heavily fragmented — a patchwork of country-specific initiatives that continue to evolve. In 1986, the Organization of Economic Cooperation and Development recommended that risks associated with organisms derived through modern biotechnology were expected to be the same as those of conventional ones and could be assessed in similar ways. This notion of "substantial equivalence" was adopted in the United States and Canada where new food products derived through modern biotechnology are assessed for safety and nutritional fitness. Regulation in other countries, however, has zeroed in on the process of biotechnology rather than its products.

EUROPEAN UNION In the EU, a process-specific regulatory framework was adopted early on. Specifically, the EU govern-

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ment decided to regulate biotechnology by newly installed institutions, starting in 1990 with Directives 90/219 and 90/220 on the deliberate release of genetically modified organisms. Since that time, the regulatory framework in the EU has been a work in progress, frequently revised and reshaped by different legislative bodies. The 1997 revision of Directive 90/220 installed mandatory labeling for genetically modified organisms. In the same year, novel foods regulation 258/97 imposed mandatory labeling on food products derived from genetically modified organisms. It was not until a year later (regulation 1139/98), however, that the presence of novel DNA or protein resulting from genetic modification became the criterion for labeling. A standard was finally established in 1999 when the mandatory labeling threshold of the novel DNA or protein was set at one percent. Further revisions extending mandatory labeling to food additives and flavorings in processed foods went into effect in 2000 (regulations 49/2000 and 50/2000).

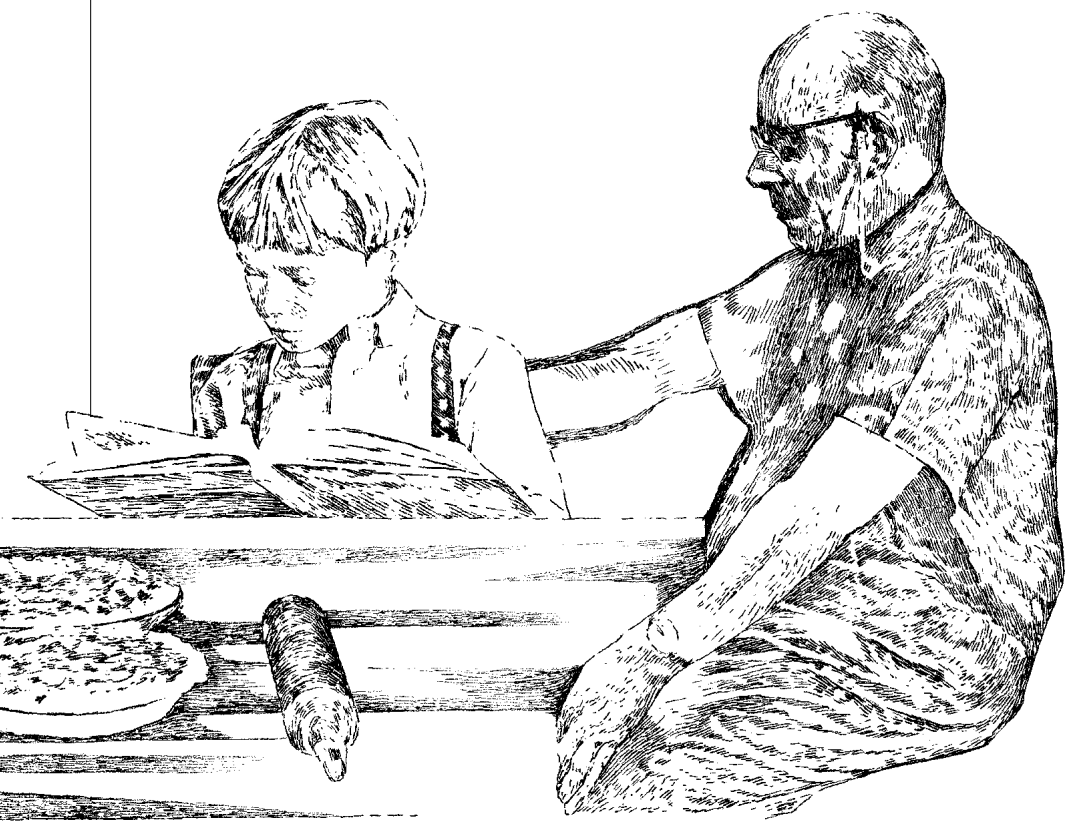
In 2001, the EU Commission adopted two new legislative proposals (2001/0180) that sought to extend mandatory labeling beyond foods and food ingredients. After almost two years of deliberations, the proposals were adopted by the EU Parliament and the Council of Ministers in July 2003 and have now gone into effect. The new regulation requires labeling of animal feeds and feed additives as well as highly refined oils, sugars, and starches. The regulation is far more onerous because a large share of genetically modified commodities is used for the production of animal feed. The new regulation also requires mandatory labeling of products that are derived from genetically modified organisms but do not contain detectable levels of novel DNA or protein (e.g., highly refined oils). Under those circumstances, enforcement of mandatory labels can no longer rely on laboratory testing. Instead, the new regulation mandates the implementation of a traceability system that requires chain of custody and accountability for all genetically modified commodities and food ingredients at each point of the $750 billion European agrifood marketing chain.

OUTSIDE THE EU Other countries also have mandated labeling of genetically modified foods, but their regulatory regimes are more liberal than that of the EU. For instance, Japan and South Korea have introduced mandatory labeling for food products that contain over five percent and two percent of genetically modified food ingredients, respectively. Mandatory labeling rules in both countries, however, have affected only a very small part of the market, as they explicitly exclude animal feeds, highly processed foods, and many oils from labeling requirements. Similarly, Australia and New Zealand require mandatory labeling for whole foods, processed foods, fruits, and vegetables that contain more than one percent of genetically modified material. Highly refined foods such as oils, sugars, and starches are again excluded from mandatory labeling.

Why did the EU arrive at a more rigid regulatory regime than other countries? Can market conditions and institutions in Europe explain the divergence?

INSTITUTIONAL FOUNDATION

To fully understand the evolution of genetically modified food regulation in the EU, one must place it against the broader context of the fundamental institutional change that has been taking place in Europe over the last decade. Starting with the 1993 Maastricht Treaty and through the 1997 Amsterdam and 2002 Nice Treaties, the EU has been slowly moving from a community of independent nations toward a centralized European state. Because of that transition, the EU's labeling policy and its institutional basis have co-evolved. Indeed, it is instructive to contrast the institutional foundation of the EU's labeling policy with that of the United States.



MORGAN BALLARD

In the United States, the genetically modified food labeling policy has been developed by the Food and Drug Administration, an agency with much experience in labeling. This approach has ensured some continuity with prior food-labeling policies. Over the years, the FDA has generally reserved the option of mandatory labeling for alerting consumers to possible safety hazards. Accordingly, the FDA's acceptance of the scientific position that genetically modified foods pose no unique safety risks beyond those of conventional foods led to its current voluntarily labeling policy. In fact, after internally reviewing its geneti-

cally modified food policy, the FDA recently determined that mandatory labeling was not even within its power. U.S. courts have agreed with that determination. In 2000, in the case *Alliance for BioIntegrity v. Shalala*, a district court reviewed the limits of the FDA's power and concluded that it has limited authority to mandate labeling when the justification is consumer interest rather than safety.

In contrast, the EU food labeling policy has been practically developed on a blank regulatory slate and has looked beyond safety considerations. As Tassos Haniotis, a member of the cabinet of EU Agricultural Commissioner Franz Fischler, recently explained, "The main idea behind labeling food products according to ingredients and processes responds to the Amsterdam Treaty idea of consumer 'right to know.' That philosophy, coupled with the use of the Precautionary Principle in food safety regulation, leads to a long-term view of potential costs and benefits for each product before it is approved."

WHY LABEL?

The Amsterdam Treaty does indeed refer to the consumers' "right to information." Of course, that is an "in principle" right; there is no prima facie case that consumers have the right to know everything through mandated labels or at any cost. Instead, the government must consider the circumstances and decide whether it is reasonable to create a positive right under which consumers are entitled to specific information. As Haniotis clarified, potential costs and benefits influence the decision; so do safety considerations.

To ensure safety, the EU government installed regulatory procedures requiring all genetically modified foods to undergo premarket risk assessment and approval. Each individual product must be subjected to a scientific review to ensure that it poses no risks to public health and the environment. A new centralized agency, the European Food Safety Authority, was created and charged with all scientific safety and communication to the public. Following scientific assessment, product approval decisions rest with the Council of Ministers.

Even with safety assurances, however, some European consumers could still be adverse to genetically modified foods. The degree of aversion might vary with consumer values and beliefs, risk preferences, level of understanding of modern biotechnology, and other factors. Some European consumers could then exhibit differential demand for genetically modified and conventional foods.

Labels could be used to inform those interested consumers about the presence or absence of genetically modified ingredients in various food products. Practical implementation of genetically modified foods labeling, however, affects the operations of the agrifood marketing chain because it requires identity preservation (separation) of genetically modified and conventional foodstuffs, from seed to the supermarket shelf. Labeling is therefore costly. In this market context, producers across the agrifood marketing chain could recognize differential consumer demand for various genetically modified and conventional food products and, after accounting for incremental costs, could decide to label their products voluntarily in order to differentiate them in the marketplace and increase their profits.

Given that the EU adopted mandatory labeling, it apparently arrived at the conclusion that if markets were left on their own, they would fail to provide consumers with appropriate information and product choice. In making that assessment, the EU government should have evaluated the merits and relevance of mandatory labeling policy against the standard criteria any regulation must confront:

- Would there be a market failure necessitating regulatory intervention?
- If so, would regulation be efficient? That is, would the social benefits secured through regulatory intervention exceed the costs?
- Would the regulation be cost-effective? In other words, would the regulatory policy of choice be the lowest-cost option for achieving the policy goals?

Seven years after the commercial introduction of genetically modified foods, is there sufficient evidence to support the judgment that mandatory labeling is cost effective or even necessary?

MARKET FAILURE

Henry Miller and Peter Van Doren effectively argued previously in *Regulation* that market failure would be evident only if food markets failed to segment despite differentiated consumer demand for genetically modified and conventional products. (See "Food Risks and Labeling Controversies," Spring 2001.) Put differently, if markets responded to differential consumer demands and thus achieved separating equilibria, then the case for market failure is undermined. Substantial voluntary labeling of non–genetically modified "non-GM" foodstuffs as well as other forms of market segmentation would then signal a diminishing prospect of market failure.

In the EU, mandatory labeling was implemented before any significant amounts of genetically modified foods were commercialized and, hence, markets were effectively preempted. One must therefore evaluate the counterfactual of whether there would have been market failure in the absence of preemptive regulation. Empirically, this is a difficult assessment.

First, it is tricky to measure *ex post* what would have been the demand for genetically modified and non-GM foods in the absence of regulation. Upfront regulatory requirements for mandatory labeling could have signaled increased product riskiness for some consumers and could have influenced their preferences.

Second, it is difficult to anticipate all the possible ways firms might have attempted to differentiate their products in the marketplace in order to accommodate the preferences of various consumer segments. For example, while some firms could have voluntarily labeled for genetically modified content, others could have used in-store information and could have leveraged their brand equity to assure consumers of product safety and quality. Charles Noussair, Stephane Robin, and Bernard Ruffieux, in their paper "Consumer Behavior with regard to Genetically Modified Organisms in the Food Supply," deter-

mined through experimental auctions that French consumers could readily substitute trust in specific food brands for explicit information on genetically modified content.

Despite those and other inherent empirical difficulties, there is evidence that firms have extensively used voluntary labels to differentiate their products in European markets. Jos Bijman and I wrote in our *Nature Biotechnology* article "Driving Biotechnology Acceptance" of significant voluntary labeling activity in key EU markets for products that have not been covered by mandatory labeling requirements. Major retail chains like Sainsbury, Tesco, and Asda in the United Kingdom, Carrefour in France, Delhaize "Le Lion" in Belgium, and Migros and Coop in Switzerland have offered labeled products from animals reared on non-GM feed. Large food service chains like Burger King have also opted for serving poultry products reared on non-GM feeds. While such chains do not offer both product lines in their stores, many of their competitors have not followed such strategies, thereby allowing market segmentation. A host of small and medium-size manufacturers and retailers in the EU have also actively participated in the "non-GM" markets, offering a wide variety of products, from cookies and meats to cotton wool rolls.

In addition to market differentiation through "non-GM" claims, further segmentation has been achieved in the EU through broad offerings of products that are considered substitutes to genetically modified commodities and foods. Those include organics that explicitly preclude use of genetically modified organisms as well as commodities where genetically modified varieties have not been marketed (e.g., wheat and sugar beets). Organics alone amount to a $9 billion market in the EU with a full range of products, from dairy, fresh and frozen meats, fruits, and vegetables to a variety of drinks, spirits, and prepared foods.

Active market segmentation can be found in many other parts of the world for genetically modified commodities, ingredients, and processed foods. For instance, in the United States the production of an estimated 1.2 million corn and soybean acres has been identity-preserved and directed to the non-GM market segment every year since the late 1990s. Similarly, there has been active market segmentation and voluntary labeling of processed foods. A few large U.S. manufacturers (e.g., Gerber, Heinz, and Frito Lay) have announced non-GM status while some specialized food manufacturers (e.g., Hain Celestial and Eden Foods) and retailers (e.g., Whole Foods and Wild Oats) offer a wide range of products voluntarily labeled as "non-GM." In most cases, such voluntary labels also claim organic status, indicating the close attribute overlap in the preferences of consumers targeted by those products. In recent years, "non-GM" claims have been increasingly subsumed into organic labels. According to Elizabeth Sloan of Sloan Trends & Solutions, many core consumers seek out organics specifically to avoid genetically modified foods. Accordingly, in the United States, the non-GM and organic segments have been converging, representing a $6 billion market with extensive offerings in virtually every food product category.

Probably the most direct case of voluntary labeling in the United States is the small but stable market of milk labeled as "free of rBST" — a bioengineered hormone that induces yield increases in dairy cattle. Milk labeled "rBST-free" has been sold alongside unlabeled milk since 1995 and it is currently estimated to represent about 1.5 percent of the total whole milk market in the United States.

There is also empirical evidence of active differentiation between genetically modified and conventional food products in Japan, Korea, Taiwan, Thailand, and elsewhere. For example, futures for non-GM soybeans have been actively traded in the Tokyo Grain Exchange since 2000. Similarly, voluntary "non-GM" labels have been placed on a variety of processed foods in the Japanese market — from soy sauce and tofu to corn snacks and potato chips.

Clearly, the empirical evidence on voluntary market response for labels is sketchy. Furthermore, the existence of market failure can be fully examined only through joint analysis of supply and demand conditions. In the case of the EU where markets have been preempted by mandatory labeling regulation, such analysis would certainly be challenging. Still, the substantial voluntary labeling activity and product differentiation that exist today through various market initiatives around the world suggest that market failure is by no means obvious or demonstrated.

EFFICIENCY

Even if economic analysis could demonstrate that EU markets would indeed fail and that efficiency gains were possible through regulatory intervention, only a necessary condition for regulation would have been established. Additional analysis would be needed to demonstrate that selected regulatory policies are both efficient and cost effective. Cost-effectiveness ensures that policy goals are achieved at minimum cost, eliminating unproductive alternatives. However, cost effectiveness does not assure that the regulation is in the best interest of society. For that, the regulation must be shown to be efficient — i.e., that it generates more benefits to society than costs.

Cost-benefit analysis is necessary to confirm that those conditions for regulation exist. Appropriate value must be assigned to the benefits the society derives from mandatory labels, and the relevant costs must be calculated. Konstantinos Giannakas and Murray Fulton considered that problem in their *Agricultural Economics* article "Consumption Effects of Genetic Modification." They derived the conditions of optimal labeling regimes for genetically modified foods in markets with differentiated consumer demand. They show that the relative optimality of mandatory labeling regimes depends chiefly on the level of consumer aversion to genetically modified foods, the costs associated with mandatory labeling, and the extent of mislabeling. Naturally, the desirability of mandatory labeling increases as a society's aversion to genetically modified foods grows, labeling costs decline, and the probability of mislabeling in the specific market is reduced.

The level of aversion to genetically modified foods exhibited by a society is determined both by the degree of aversion and the distribution of aversion among consumers. In a market with widespread and intense aversion, benefits from mandatory labeling are expected to be substantial. A society's differ-

ential willingness to pay for genetically modified and conventional foods provides a proper measure of societal benefits from mandatory labeling. Estimates of willingness to pay may be derived through consumer interviews. But as Kip Viscusi and Ted Gayer explained in their *Regulation* article "Safety at Any Price" (Fall 2002), such estimates, because of their hypothetical nature, often turn out to be misleading. Instead, economists turn to actual market behavior for insights.

BENEFITS So what do we know about European consumer preferences and their differential willingness to pay for genetically modified and conventional foods? Surprisingly, we know very little. Despite regular references by the EU government to the strong interest of the European consumers in mandatory food labels and aversion to genetically modified foods, market evidence for such preferences is almost non-existent.

Indeed, much of what is known today about consumer purchasing intentions toward genetically modified foods or interest in labels in Europe is inferred from attitude surveys such as the Eurobarometer. Such surveys have long indicated widespread public skepticism toward genetically modified foods and interest in mandatory labeling.

Attitude surveys can capture public sentiment towards genetically modified foods and biotechnologies but are constrained by their hypothetical structure, especially because they do not account for price and income effects on consumer-stated preferences. Attitude surveys may also engage their subjects as citizens rather than strictly as consumers. Importantly, as Arthur Sterngold, Rex Warland, and Robert Herrman explained in their classic *Public Opinion Quarterly* article "Do Surveys Overstate Public Concerns?" attitude surveys can be subject to significant biases. How questions are framed, the order in which information is presented, and the degree of knowledge and understanding of the respondent are just some of the potential sources of bias and error. Accordingly, attitude surveys may, or may not, provide effective proxies of consumer market behavior and differential willingness to pay for genetically modified and conventional products.

While the bulk of existing research has focused on attitudinal surveys, a handful of researchers have utilized willingness-to-pay surveys and experimental auction market techniques to capture how consumers might respond to genetically modified foods if faced with realistic food choices. For instance, Noussair, Robin, and Ruffieux studied the response of a representative sample of 97 consumers to genetically modified versus "non-GM" labeled and organic foods in an experimental laboratory setting in Grenoble, France. The authors concluded that 35 percent of consumers boycotted foods labeled as genetically modified, but the rest were willing to purchase products containing genetically modified ingredients at some prices or were indifferent and would purchase them regardless — a conclusion markedly different from those obtained from existing attitude surveys. Of course, experimental auction market analysis and survey-based willingness to pay studies are still hypothetical in nature. Accordingly, elicited consumer-stated preferences can be different from normal purchasing behavior exhibited in the market.

In the literature of European consumer behavior toward genetically modified foods, only one study has focused on revealed rather than stated preferences. As discussed in a chapter of the forthcoming book *Consumer Acceptance of Biotechnology Foods*, Leonie Marks, Steven Vickner, and I recently examined how consumers actually behaved when they could choose between labeled and unlabeled conventional food products in supermarkets across the Netherlands over a three-year period. Empirical results indicate that, in aggregate, Dutch consumers did not change their purchasing behavior toward processed foods after labels indicating the presence of genetically modified ingredients were placed on them. Hence, no consumer avoidance of genetically modified foods could be confirmed.

Divergence between stated preferences and actual purchasing behavior is not uncommon and, in the case of genetically modified foods, it has been observed in the past. In their *Agricultural Information Bulletin* article "Consumer Acceptance of Biotechnology," Lorna Aldrich and Noel Blisard summarized studies on consumer attitudes carried out as rBST was being introduced in the U.S. market in 1995. Such surveys indicated that three out of four consumers expressed interest in avoiding milk from rBST-treated cows and in relevant labels that could facilitate choice. Hindsight being 20-20, we now know that such attitudes did not translate into significant changes in purchasing behavior — or avoidance — on the part of U.S. consumers. The vast majority of U.S. consumers purchased milk from rBST-treated cattle even when "non-rBST" milk was offered side-by-side at minimal premiums.

COSTS As in the case of social benefits, comprehensive estimates of the regulatory costs associated with labeling in the EU are scarce. Regulatory preemption of the market once again limits the ways such analysis can be performed. Analytical difficulties aside, however, there have been few attempts to measure the costs of labeling regulation to the EU society or beyond.

A small number of studies, mostly from North America, have measured some of the costs associated with labeling. Most such studies have focused exclusively on the compliance costs of the regulation — the incremental costs associated with physically separating as well as preserving, testing, and assuring the identity of various genetically modified or conventional foods across the agrifood marketing chain. Compliance costs can be substantial, especially in the case of commodities used in thousands of processed foods like corn and soybeans. Nevertheless, most existing studies are limited in scope; they have focused on a small subset of products and limited portions of the agrifood marketing chain. Generalizing from such analyses is problematic, if not misleading.

The most comprehensive European study to measure compliance costs for mandatory labeling across the whole agrifood chain was commissioned by the United Kingdom's Food Standards Authority in 2001. The study concluded that such costs were equal to $140 million per year in the UK. Similar cost estimates, however, are not available for the rest of the EU.

While estimates of compliance costs are incomplete, other possible costs from the EU's genetically modified labeling regulation remain entirely unarticulated. Chief among them are

bureaucratic monitoring and enforcement costs, costs from loss in trade, and costs associated with potential structural impacts from regulation and potential inefficiencies in implied market structures.

CREDIBILITY The relevance and optimality of mandatory labeling is also influenced by the credibility of the system or the probability of mislabeling. Mislabeling refers to the case where producers (by accident or intention) falsely label food products as "non-GM" or fail to label products as "genetically modified" when required. As the incident of mislabeling increases and consumer trust falls, the social benefits from labeling are reduced and its desirability is diminished.

The possibility of mislabeling foods is not remote. Under the current EU mandatory labeling regime, presence or absence of genetically modified ingredients can be assured through analytical laboratory testing. Given that analytical testing is based on statistical methods, some testing error (e.g., sampling error, array systemic error) must be assumed and accepted. Lack of standardization has amplified the probability of testing errors whose existence has been verified by a number of laboratory ring trials around the world. A recent report published by the Australian Government Analytical Laboratories is one of several publications that have documented such errors. Similarly, mislabeling has been confirmed in the case of labeled foods offered in the marketplace. Most recently, the Irish Food Safety Authority, through its 2002 market survey, determined that 32 percent of the surveyed products carrying a "non-GM" label were mislabeled. The degree of understanding among consumers of mislabeling possibilities and relevant impacts on their purchasing decisions are unclear.

COST-EFFECTIVENESS

Even if net welfare gains from labeling could be shown to be positive, some attention to the cost effectiveness of proposed mandatory labeling would still be warranted. Effectiveness considerations require that alternative policies that might achieve the overall policy goals at lower regulatory costs be explicitly considered. Alternative policies to mandatory labeling, for instance, could include incentives for voluntary labeling and establishment of third-party certification bodies in order to reduce the costs for verification of "non-GM" claims. Direct evidence of considerations of such alternative policies in the EU is not available. Similarly, it is difficult to infer any attention to the cost-effectiveness of the instituted mandatory labeling policies from recent legislative activity in the EU.

Since the inception of the mandatory labeling policy, the EU government has incrementally stretched its labeling regulation by continuously broadening the definition of what constitutes a "genetically modified food" and, more recently, by requiring full traceability across the agrifood supply chain. The cost-benefit implications from those regulatory changes are unclear. Only a single study, commissioned by the UK's Food Standards Agency in 2001, has attempted comparative institutional analysis for the alternative labeling policies. This study estimated that compliance costs would increase eight-fold in the UK — from $140 million to over $1 billion — when the mandatory labeling regime expands from food ingredients to include feeds and oils. The result prompted the authors of the study to conclude that "the extra costs of moving towards the more stringent… labeling standards outweigh the extra benefits that can be achieved."

The credibility of the progressively rigid labeling regime in the EU was also called into question. For the bulk of the market, enforcement will no longer rely on analytical laboratory testing but on chain-of-custody certificates and traceability systems, both inside the EU and in exporting countries. Practical implementation of such systems implies increased possibility of fraud and problems with enforcement. Those issues prompted the UK Food Standards Agency to conclude that "the [pending regulation] is not practical, proportionate, or enforceable."

> It is unclear that the European Union's labeling policies can be supported by substantial welfare gains that have been presumed to exist.

While broadening the scope of mandatory labeling, the EU government has also sought to tighten the standards (tolerances) in defining genetically modified and conventional foods. Richard Maltsbarger, James Barnes, and I explained in our *Canadian Journal of Agricultural Economics* article "Global Identity Preservation Costs in Agricultural Supply Chains" that compliance costs increase non-linearly as tolerances diminish to extremely low levels, like those awaiting implementation in the EU. Thus, tightening standards will inevitably further worsen the cost-benefit balance of mandatory labeling. By how much is currently unknown because no analysis exists in the EU, or elsewhere.

CONCLUSIONS

The EU has had the difficult task of creating new regulations for genetically modified food labeling through a democratic process while simultaneously developing its governing institutions. It is unclear that the resulting policies can be supported by substantial welfare gains often presumed to exist. What is clear, instead, is that the current labeling policies could fail all three standard criteria typically used to justify regulation.

First, a case has not been made that a market failure exists or should be expected. Despite evidence that voluntary labeling and other market-driven solutions emerge to satisfy various consumer segments with differential demands, the EU government anticipated market failure years ahead of any commercial introduction of genetically modified foods in the market and thus pursued mandatory labeling.

Second, the efficiency of the current regulation has not been sufficiently appraised. Proper methods for measuring consumer behavior and social benefits from mandatory labeling have been ignored. The costs of the regulation have been underscrutinized or brushed aside. And, key uncertainties that undermine the credibility of the regulation continue to be overlooked.

Third, the cost-effectiveness of current and pending regulations has not been evaluated. The most recent revisions of the regulation promise to further cloud a murky picture of regulatory efficiency by drastically increasing the costs of regulatory restrictions while diminishing its enforceability in return for unspecified consumer benefits.

Over the years, EU policymakers seem to have operated on the belief that large social welfare gains from mandatory labeling regulation will be forthcoming. Yet, evaluating the efficiency and cost-effectiveness of genetically modified foods regulation so that consumers' economic interests are safeguarded is not simply an academic exercise. Instead, it is a constitutional burden that EU regulators must meet as dictated by article 153 of the 1997 Amsterdam Treaty — the very same article that safeguards consumer right to information:

> In order to promote the interests of consumers and to ensure a high level of consumer protection, the Community shall contribute to protecting the health, safety and economic interests of consumers, as well as promoting their right to information, education, and to organize themselves in order to safeguard their interests.

The EU government is charged with balancing and protecting the rights of many in the young European state. In the case of genetically modified foods, the EU government has emphasized consumers' right to information, which it has freely translated as "consumer right to know," and has set out to protect that right through an increasingly complex centralized bureaucratic regulation. But in the absence of serious analysis that demonstrates significant welfare gains from such regulation, the EU government could ultimately appear capricious in its decision-making. R

READINGS

- "Agrobiotechnology and Competitiveness," by Nicholas Kalaitzandonakes. *American Journal of Agricultural Economics*, Vol. 82, No. 5 (2000).
- "Consumer Acceptance of Biotechnology: Lessons from the rBST Experience," by Lorna Aldrich and Noel Blisard. *Agricultural Information Bulletin* No 7417-01, 1998.
- "Consumer Behavior with regard to Genetically Modified Organisms in the Food Supply," by Charles Noussair, Stephane Robin, and Bernard Ruffieux. Atlanta, Ga.: Emory University, 2002.
- "Consumer Purchasing Behavior towards GM Foods in the Netherlands," by Leonie Marks, Nicholas Kalaitzandonakes, and Steven Vickner. In *Consumer Acceptance of Biotechnology Foods*, edited by R. Evenson and V. Santaniello. Wallingford, UK: CABI Publishers (forthcoming).
- "Consumption Effects of Genetic Modification: What if Consumers Are Right?" by Konstantinos Giannakas and Murray Fulton. *Agricultural Economics*, Vol. 27, No.1 (2002).
- "Do Surveys Overstate Public Concerns?" by Arthur Sterngold, Rex Warland, and Robert Herrman. *Public Opinion Quarterly*, Vol. 58, No. 2 (1994).
- "Driving Biotechnology Acceptance," by Nicholas Kalaitzandonakes and Jos Bijman. *Nature Biotechnology*, Vol. 21, No. 4 (2003).
- *Economic Appraisal of Options for Extension of Legislation on GM Labeling*, by the National Economic Research Associates. London, UK: Food Standards Agency, May 2001.
- *Economic Impacts of Genetically Modified Crops on the Agri-Food Sector*, published by the Directorate General for Agriculture of the European Commission. Brussels, Belgium, 2000.
- *The Europeans and Modern Biotechnology: Eurobarometer*, Vol. 52, No. 1, published by the European Commission. Brussels, Belgium, 2003.
- "Food Risks and Labeling Controversies," by Henry Miller and Peter Van Doren. *Regulation*, Vol. 23, No. 1 (Spring 2001).
- "Global Identity Preservation Costs in Agricultural Supply Chains," by Nicholas Kalaitzandonakes, Richard Maltsbarger, and James Barnes. *Canadian Journal of Agricultural Economics*, Vol. 49, No. 2 (2001).
- "The Natural and Organic Foods Market Place," by A. E. Sloan. *Food Technology*, Vol. 56, No. 1 (2002).
- *Recombinant DNA Safety Considerations*, published by the Organization of Economic Cooperation and Development. Paris, France: OECD 1986.
- "Regulating Agri-food Production in the U.S. and the EU," by Tassos Haniotis. *AgBioForum*, Vol. 3, No. 2–3 (2000).
- *Review of Technologies for Detecting Genetically Modified Materials in Commodities and Food*, published by the Australian Government Analytical Laboratories, Department of Agriculture, Fisheries and Forestry. Australia, 2002.
- "Safety at any Price?" by W. Kip Viscusi and Ted Gayer. *Regulation*, Vol. 25, No. 3 (2002).