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The Economics of Mandatory Biotech Food Labeling in the United States

William J. Gongol

ABSTRACT. Almost every developed nation in the world except the United States mandates the labeling of genetically modified foods. Upon examining the costs and benefits of mandatory labeling, it appears that this may not be the most efficient solution to deal with varied consumer preferences. The United States government should instead focus on increased scientific research to deal with the externalities of biotechnology.

I. Introduction

Soon her eye fell on a little glass box that was lying under the table: she opened it, and found in it a very small cake, on which the words “EAT ME” were beautifully marked in currants. “Well, I’ll eat it,” said Alice, “and if it makes me grow larger, I can reach the key; and if it makes me grow smaller, I can creep under the door; so either way I’ll get into the garden, and I don’t care which happens!”

Alice’s Adventures in Wonderland

Were Alice to return to that rabbit hole today, she would likely find a cake bearing a different message: “EAT ME (Contains Genetically Modified Organisms).” In the past twenty years, advances in biotechnology have brought genetically-engineered foods out of the laboratory and into the kitchen. To call a food “genetically modified” or “biotech” is imprecise because virtually every foodstuff in the world has been hybridized, mutated, or otherwise adapted from its original genetic form over the course of organized human agriculture. What distinguishes biotechnology from conventional breeding is that biotechnology involves direct manipulation of the genes in a clinical setting, rather than the conventional hands-on cross-breeding of our ancestors. Food crops are genetically modified for a variety of reasons, such as productivity, hardiness, and resistance to pests and pesticides.

In 2004, biotech crops comprised 45% of corn yields and 85% of soybean yields in the United States [U.S. Department of Agriculture, 2004, 24-25]. Political pressure, especially from environmental activist

groups, has led the European Union, Russia, and many other countries to mandate biotech food labeling. In the United States, labeling is voluntary, but there is considerable pressure from special interest groups to make it mandatory. When placed under scrutiny, though, the case for mandatory biotech labeling falls apart. The United States should continue to avoid mandatory biotech labeling until and unless a significantly better cause to do so can be found.

II. Why Use Biotechnology?

Even before Gregor Mendel discovered the rudiments of plant and animal genetics, humans have adapted their foods to suit the available agricultural conditions. Modern corn, even without clinical genetic modifications, is a far cry from the inedible grasses from which it evolved. That evolution took place under the guidance and with the intervention of human farmers. For the past few decades, biologists have employed biotechnology to study plant genomes and to genetically modify plant and animal life. Biotechnology has increased crop yields, improved the nutritional content of foods, and improved crop resistance to pesticides and herbicides. Simply put, biotechnology allows biologists to attempt genetic modifications without having to wait out the call and response of mutation and natural selection, and it provides powerful aids in the quest to preserve favorable characteristics from generation to generation. Opponents of biotechnology denounce it as “playing God.” That opposition, however powerfully phrased, fails a critical test of logic: It assumes that humans are better off in a state of nature than with the advantages of technology and innovation. But all the gene-splicing in the world does not end up on our plates indiscriminately; biotech foods are heavily regulated.

III. Current Information Regulations

Contrary to the myth of unregulated “Frankenfoods,” the Food and Drug Administration (FDA), the Department of Agriculture (USDA), and the Environmental Protection Agency (EPA) all monitor aspects of the safety of biotech crops in the United States. The USDA monitors the safety of meat and dairy products, the FDA monitors all other foods and their derivatives, and the EPA monitors the environmental ramifications of

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biotech crops, particularly those with built-in resistance to pesticides. The efforts of these three organizations are coordinated under the authority of the Animal and Plant Health Inspection Service's Biotechnology Regulatory Services.

Since 1992, the Food and Drug Administration has mandated the following:

- If a bioengineered food is significantly different from its traditional counterpart such that the common or usual name no longer adequately describes the new food, the name must be changed to describe the difference.
- If an issue exists for the food or a constituent of the food regarding how the food is used or consequences of its use, a statement must be made on the label to describe the issue.
- If a bioengineered food has a significantly different nutritional property, its label must reflect the difference.
- If a new food includes an allergen that consumers would not expect to be present based on the name of the food, the presence of that allergen must be disclosed on the label. [Food and Drug Administration, 2001, para. 5].

Notably, these regulations call attention only to empirical differences between food products; they do not call attention to the genetic modifications themselves. Few biotech foods on the market in the United States bear mandatory labels since most biotech foods are substantively the same as their non-biotech counterparts, at least in the eyes of US regulators [Golan, et al., 2000, 33].

According to former FDA commissioner Jane E. Henney, "We are not aware of any information that foods developed through genetic engineering differ as a class in quality, safety, or any other attribute from foods developed through conventional means" [qtd. in Thompson, 2000, para. 42]. For this reason, the USDA keeps its regulatory scope within the realm of the empirical. Government mandated labeling "[leads] to additional bureaucracy, which acts similar to a tariff in its effect on trade volumes" [Huang, et al., 2004, 47]. Additionally, government-issued labels implicitly condemn or endorse product types, causing an exogenous shift in demand. This reveals one of the most important factors in the labeling debate: The argument is as much about political power as it is about real consumer choice and safety.

While regulators have deemed the modified foods “not significantly different” from their non-GMO counterparts, critics have countered that even slight modifications to the genetic makeup of a crop can have unintended consequences. Ordinarily, it would be perfectly rational behavior to anticipate unintended consequences, but in the case of genetically-modified foods, opponents assume an unjustifiably high probability of a diverse array of catastrophic consequences. Further, they have proven themselves adept at exploiting public fears rather than educating and informing rational consumer choice. Mandatory labeling of genetically-modified foods is seen by biotech opponents not as a true conveyor of useful market information, but rather as a government-subsidized method of propagandizing their case against the companies who use biotechnology.

IV. To Label, or Not To Label Biotech Foods

To understand the economic ramifications of biotech labeling regulations, we must first understand the costs and benefits of labeling in the absence of regulations. Producers of biotech foods with clear benefits such as better nutritional value or flavor voluntarily label their products as such. This is because consumers are willing to accept biotech foods when they perceive clear, strong personal benefits from doing so [Grunert, et al., 2004, 105]. Examples of this include Flav’r Sav’r tomatoes which are engineered to have a long shelf life and Golden Rice which is infused with vitamin A to help curb blindness in the developing world.

Conversely, when the benefits of biotech products are absorbed by the producer or are mainly characteristics not easily verified by the consumer, producers tend not to label their foods as biotech. “As long as consumers perceive GM technology to carry no benefits for them, or only benefits for producers, or as long as the benefits claimed are perceived to be abstract and distant, the negative attitudes existing will probably remain stable” [Grunert, et al., 2004, 105]. The best-known example in the United States is the Roundup-Ready family of food crops, which have been genetically altered to improve crop resistance to a powerful and widely-used herbicide. While Roundup-Ready crops are touted for their high yields, they have no characteristics that make them more appealing to the consumer.

V. Labeling Non-Biotech Foods

Despite the apparently low probability of actual harm to the consumer from the consumption of genetically-modified foods, some consumers will still place value on knowing which foods have been modified through biotechnology. This presents an opportunity for producers who may choose to raise and specifically label their non-biotech foods. Those producers may derive surplus benefit from the premiums paid for non-biotech crops, as well as by selling to markets in biotech-averse regions like Japan and the European Union. They may also benefit from favorable public relations. Some companies such as Gerber have already capitalized on this opportunity by eradicating biotech ingredients from baby food – though it should be noted they did so without scientific reason [Golan, et al., 2000, 34].

In order to maintain non-biotech crop integrity, those crops must be segregated from others that contain genetic modifications. The burden naturally falls upon the non-biotech producers as long as it is legal to raise biotech crops. To slow the spread of cross-pollination, non-biotech farmers must plant all-male border rows, which is a sub-optimal use of land [Bullock and Desquilbet, 2002, 85]. It may, in fact, be impossible to completely segregate biotech crops from those not containing genetic modifications; for this reason tolerance levels are given to measure the relative “contamination” of a non-GM crop by GMO’s. The lower the official tolerance of biotech levels acceptable in non-biotech crops is, the greater the cost of segregation. Another cost of segregating crops comes from additional equipment cleaning or dedicating separate equipment for treating biotech and non-biotech crops. These are clear, measurable costs of production; however, non-GMO crops have been found to be much more costly to raise than these production costs account for. Bullock and Desquilbet found that the costs of segregation and identity preservation accounted for only a small portion of the premium paid on non-biotech crops. They concluded that the main cost unique to producing non-biotech crops was the forgone revenue from producing more efficient biotech crops [2002, 95]. Farmers raising biotech crops experience higher crop yields and lower pesticide costs, creating a distinct opportunity cost to the production of non-GMO crops.

VI. Mandatory Labeling

Government-mandated labeling of biotech and non-biotech foods can only

be effective if it has consistent, achievable standards for producers. Also, the labels must convey their messages clearly and concisely to consumers [Golan, et al., 2000, 36]. To increase social welfare, the social benefits from this process would have to exceed the social costs by at least the administration costs. The FDA and USDA are already in the business of sorting out which foods are safe and which are unsafe for consumption; mandatory labeling policies posit that society can somehow gain more from delineating safe foods further into categories whose use is speculative at best.

By the USDA's own admission, the act of labeling food characteristics fails to improve social welfare unless the socially-optimal outcome is clear. Consumers and the FDA found a clear social benefit to labels for dolphin-safe tuna and uniform nutrition fact labeling [Golan, et al., 2000, 21-24]. In the case of biotech foods, however, no socially-optimal market result is clear. Without the mandate of a socially-optimal market structure, comprehensive labeling of genetically-modified foods fails the litmus test established by the FDA and embarks on a whole new labeling policy without precedent.

VII. When to Label

USDA economists have found that mandatory food labeling can be socially beneficial if:

- Standards, testing, certification and enforcement can be established
- Information is clear and concise
- Consumer preferences differ
- Information on the product enhances consumer safety
- No political consensus exists [Golan, et al., 2000, 17-18]

When information about product use enhances the safety of the consumer, it can be socially beneficial to mandate labeling. To this end, the USDA mandates safe handling labels on meat which tell if the meat is fully cooked or if not, and to what temperature the meat needs to be heated for safe consumption. This policy is socially beneficial; all consumers benefit from understanding the safety implications of the food they eat to a degree that more than justifies the costs of administrating these labels. This concern does not apply to biotech labeling because all

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commensurable safety risks of biotech foods are already considered by the USDA, FDA, and EPA.

The government has found it socially beneficial to mandate nutrition fact labeling. This is because consumer preferences differ while the social benefit of choosing one good over another is less clear. For example, some consumers want to eat as little fat as possible; others want to eat as little sodium as possible. Through mandating nutrition fact labeling, the government provides a uniform system by which each consumer can assess the costs and benefits of consuming any particular food. This way, all consumers can benefit from better information about the content of their food without a specific endorsement of any one good over another.

Studies show that consumers often feel better about buying non-biotech foods [Grunert, et al., 2004, 103], but this does not mean that this behavior is socially beneficial. When it is beneficial as a marketing tool for producers to advertise as non-biotech, they do so already. At the same time, when biotech foods hold tangible benefits for consumers, the producers already have an incentive to label their foods as such.

Another way in which information on foods gets out is through unfolding. This is to say that some producers will voluntarily label their goods non-biotech or biotech and others will follow suit since the absence of such a label would imply their dereliction in regard to the claim. If a consumer walks through a produce aisle in a store and sees four varieties of non-biotech bananas, only three of which are labeled “non-biotech,” the consumer is wont to assume that the fourth is bio-engineered. To avoid such a charge, the fourth producer is likely to label his food as non-biotech as well [Golan, et al., 2000, 8].

The present market inefficiency, which means that not all foods are voluntarily labeled either “biotech” or “non-biotech,” is that consumers have been persuaded to perceive a risk to individual health and well-being that is neither justified by the science nor fully informed enough to engage scientifically. Consumers are notoriously apprehensive about two categories of goods: What they put in their bodies and what they put on their bodies. This intrinsic apprehension is so large and so emotional that it requires a confounding degree of scientific certainty to persuade consumers otherwise—a degree of certainty which biotechnology is unable to supply. Simultaneously, consumers are incapable of internalizing the costs of not using biotechnology, specifically, the risk of global starvation.

Effects like this temper the potential for social benefit from mandating labeling. For mandatory labeling to be a viable option, the benefits of doing so must exceed the administration costs. Furthermore, a calculation of the benefit from mandating labeling must only consider the additional benefit reaped from labeling foods which were not already labeled. Mandatory labeling by producers is severely complicated by two factors: First, most candidate crops for genetic modifications are commodity goods, making them poor candidates for market differentiation. Second, depending upon the strictness of the tolerance levels for GM presence in non-GM foods, full compliance with labeling procedures may in fact require a duplicate and parallel production chain to fully segregate GM foods from non-GM foods. This imposes an extraordinarily burdensome capital investment cost, which is disproportionately incident upon a commodity industry.

The prospect of creating standards, testing, and certification of levels of genetically modified foods by the US government is a weighty consideration. Meanwhile, many private organizations who oppose the proliferation of biotechnology already keep track of genetically modified organisms in commercially-available foods. Mandating biotech labeling without banning the use of biotechnology would impose an undue cost on producers of non-biotech foods who want to retain their non-biotech labels. This is because the burden of segregating non-biotech crops would rest entirely on them so as to retain genetically modified organism levels under the official tolerance.

The USDA's guidelines say that information on labels must be clear and concise, or consumers will not read them. Unclear labels fail to defray information and search costs of consumers. As should be clear by this point, the issue of genetic modifications is anything but clear or concise. The lack of scientific consensus on the implications of genetic modifications and the lack of consumer consensus about what constitutes a "safe" genetically-modified food combine to render such a labeling effort impossible.

Mandatory labeling can also be a cop-out when there is no political or scientific consensus as to the costs and benefits of the consumption of a food. Dolphin-safe tuna labels emerged from one such episode. While many lobbied to protect the dolphin population, the government could not ban the tuna due to tariffs and other laws. The reason this worked was because no compelling case was made by opponents that protecting dolphins was not socially beneficial. In the case of biotechnology, many

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argue that though there is no scientific consensus on the safety of biotech foods, we should label them to appease importers from other countries. However, importers of our foods already tend to have private negotiations regarding biotech content of foods and independent organization such as Greenpeace already monitor the content, so it is unlikely that mandating labels domestically will have a great effect on American exports.

In 2000, 60% of all processed foods in the United States contained some bioengineered component. Despite the enormous market involved and the nearly-universal adoption of those biotech foods, there has been no evidence found of widespread consumer harm. Meanwhile, scientists have developed such biotech foods as Golden Rice, which has been engineered to deliver high levels of beta-carotene to curb childhood blindness in the developing world. It would be difficult to overstate the potential social benefit from infusing our foods with vitamins and minerals in which we are deficient. Biotech research is far from over, and as with all new technologies, we can rationally expect it to become more advanced and precise with time.

While the social benefits from biotechnology, both to consumers and producers, are evident, we have yet to identify and measure massive unforeseen costs. Opponents can point to no evidence of widespread birth defects, crop failures, or other forms of measurable harm attributable to biotechnology. Opposition to biotechnology remains a “could be” argument, while the technology itself has already delivered significant social benefits. Even the most prominent failure of the biotech era has proven to be nothing more than a hypothetical case of risk. StarLink was a biotech corn that was constructed with an internal pesticide. It was accepted for use in animal feeds, but not for human consumption. On September 18, 2000, the *Washington Post* published an exposé alleging that StarLink was found in Kraft’s Taco Bell brand taco shells. The next day, the FDA received around fifty complaints from consumers claiming illness derived from consuming the taco shells. While most claims turned out to be treatable allergic reactions not necessarily related to the corn, StarLink was taken off the market. Despite the absence of any measurable harm, the FDA stopped accepting as animal feeds biotech foods not accepted for human consumption [Centers for Disease Control, 2001, 3-5].

VIII. Externalities

Finally, let us address the remaining argument against the proliferation of

biotechnology: externalities. We cannot say with 100% certainty that biotech foods are categorically safe. However, biotech food can be (and presently are) held to the same safety standards to which we hold all other foods for consumption.

Some suggest that biotech foods are likely to cause birth defects, the evolution of superdiseases, and any other number of cataclysms. Superdiseases, or diseases with extraordinary resistance to existing treatments, could mutate within or due to genetically-modified foods, particularly those modified for resistance to pesticides. This risk, however, is not peculiar to biotech foods; hospitals already encounter this hazard completely outside the realm of bio-engineered foods. Those foods at risk for superdiseases are already monitored with the same regard as the pesticides themselves, rendering it redundant to condemn biotech foods on these grounds.

Since it is impossible to prove a negative, it cannot be proven with complete certainty that biotechnology will not cause birth defects, plague, or other unforeseen catastrophes. Since biotech foods have the potential to cause problems like this, they most certainly present a market externality. The evidence so far, though, is that the risks of these cataclysms are very low, while the measurable social benefits are in fact quite great. Furthermore, many of the benefits of biotechnology can be used to offset the harm created when natural catastrophes occur quite without the aid of biotechnology itself. We cannot be certain that the global crop of genetically-modified rice might not someday fail in one terrible event; however, we can be certain that higher yields of some hybrids of rice can be used to offset the damage and hunger caused by natural disasters like typhoons and droughts.

Overall, though, mandatory labels fail to redress externalities. Assuming that the externality was well-defined and negative, mandatory labeling would fail to attain the socially-optimal outcome because of free-riders. Most genetic modifications are not made in laboratories, but rather in the wild by cross-pollination and evolution. Cross-pollination makes it practically impossible to perfectly segregate non-biotech crops. Hypothetically, mandatory labeling will reduce the demand for biotech foods, thus increasing the demand for non-biotech foods and causing biotech producers to internalize some of the non-biotech producers' segregation costs. Another possible solution would be to establish "[b]iotech cultivation regulations (for example, boundaries and refuges) and well-defined property rights ...to [control] the potential

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environmental externalities...” [Golan, et al., 2000, 36]. However, the nature of biotech externalities is purely speculative, and if there is nothing categorically wrong with biotech crops, this places an undue burden on biotech producers who are otherwise increasing the quality and efficiency of the food industry as a whole.

IX. A different answer

If we demand additional government intervention in the case of biotechnology, the only egalitarian manner in which to do so would be through the promotion of scientific research and education as to the costs and benefits of biotechnology. If biotech foods pose a dire threat to humanity, we have two ways of finding out: through maintaining the status quo and waiting for a horrible disaster to happen or through increased scientific research into the effects of biotechnology. If biotech foods do not categorically threaten life as we know it, increased scientific research will help us to continue to make safer, more efficient, more nutritious foods.

X. Country of origin labels

The U.S. government has already shot down the prospect of country of origin labeling on foods. [Golan, et al., 2000, 30] Imported foods which meet the same health and safety standards as domestic foods can not be singled out based on their country of origin. Country of origin labeling was promoted by trade protectionists who sought to inflate the demand for domestic goods in this manner. Commercially available biotech foods currently meet the same health and safety standards as all other foods. Hence, singling biotech foods out in this same manner is merely chauvinism of a different shade, and would be inconsistent with previous decisions like the rejection of country of origin labeling.

XI. Conclusion

If government action is only justified when it produces a net social benefit, an adequate case has not been put forth for mandatory labeling of genetically-modified foods. The arguments for mandatory labeling rest on tenuous arguments and speculation. The apocalyptic projections of

biotechnology opponents are mythological in scope and nearly as fictional. While the net social benefit appears to clearly rest on the side of aggressive application of biotechnology and voluntary labeling, a clear and compelling case can be made for further research into biotechnology to better define the costs and benefits of further genetic engineering. The implicit and explicit costs of mandatory labeling appear to be a less efficient use of public resources than an investment in better understanding the consequences and benefits of biotechnology. We do not know yet what we may find further down the rabbit hole of bio-engineering, but the present evidence suggests the government should leave the labels in Wonderland.

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