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Explaining Europe's Resistance to Agricultural Biotechnology

by

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European policies blocking genetically engineered crops are conventionally attributed to the concerns of European consumers, but they can be attributed to the self-interests of European industry and farmers as well. Biotech policies maintained in the name of consumer interests are helping European chemical firms to slow their losses in the global crop protection market and are helping European farmers differentiate their conventional crops on environmental and safety grounds, maintain their agricultural subsidies and win new non-tariff trade protections.

One of the major issues dividing the United States and the European Union (EU) and potentially determining the future of world agriculture is biotechnology. In 2003, 81 percent of soybean, 73 percent of cotton, and 40 percent of the corn grown in the United States were genetically engineered with crop protection traits. In Europe, only a negligible amount of biotech crops were grown, and the *de facto* moratorium on approving biotech products continued to block imports.

Preferences of European consumers are usually cited as the primary determinant for a whole range of European policies that effectively hinder research, patenting, product development, import and sale of genetically modified agricultural products. This conventional wisdom obscures, however, the preferences of other major forces in Europe, including the powerful European agrochemical and seed industries as well as the influential farm sector. It is often assumed that European industry and farmers have lost out on a potentially beneficial production technology due to a consumer-environmental backlash.

Further examination suggests that European industry and European farmers may actually have had incentives to hinder, at least in the short term, the introduction of genetic technologies into Europe. Historically, European industry has held a dominant position in the global market for agricultural chemicals, now worth over $30 billion annually, yet it has lagged in innovation and product development in biotechnologies, which have been consistently dominated by American firms. European farmers receive large amounts of government support, with the EU's Common Agricultural Policy (CAP) now spending over $40 billion annually, but these payments are coming under increasing international pressure in the World Trade Organization (WTO) and elsewhere. Both European industry and farmers are striving to maintain their eroding advantages.

The Political Economy of Agricultural Biotechnology Policy

The political economy approach views decisions and policies made by government as rational responses to the array of pressures and inducements—such as elections, campaign contributions, lobby efforts and popular movements—arising from across the various segments of society. The main interest groups that weigh in on agricultural and food policy are input suppliers, farmers, the food

Also in this issue.....

In the next issue.....

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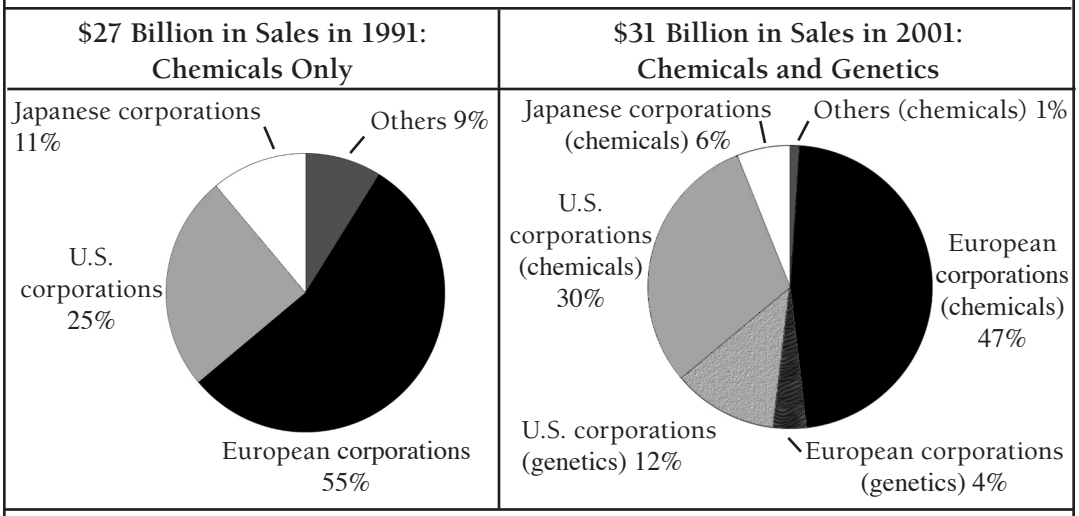
Figure 1. Changes in the Global Crop Protection Market over 10 Years



Source: Wood Mackenzie and Phillips McDougal

industry, consumers and environmentalists. On innovation and new technologies, the scientific community weighs in as well.

Policies reflect power relations between groups, who can have different political weights depending upon the current political reality, such as who is in government. Some of the main findings of the political economy literature are that concentrated interests tend to have greater political weight than diffuse interests and, similarly, domestic interests tend to have greater influence than foreign interests. One upshot is that regulations tend to reflect the preferences of producers over those of consumers, as producers are usually more concentrated, creating a situation known as regulatory 'capture.' This is particularly true in rapidly developing areas of technology, where innovating companies often have better knowledge than governments. Thomas Bernauer, in a recent book *Genes, Trade, & Regulation*, asks why the situation with agbiotech in Europe seems to contradict the standard theory, with diffuse consumer interests prevailing over concentrated producer interests. Yet, this begs the more fundamental question of what actually are the interests of European producers in the first place.

How to Explain the European Position?

The assumption commonly made is that European producers would like to introduce genetically modified crops in Europe just as in the U.S. Indeed, firms like Syngenta, Bayer CropSciences, and their various predecessors in the industry are fully engaged in biotech research and development. Also, it is assumed that—were it not for consumer and environmentalist resistance—a similar percentage of European farmers would share the economic logic of American farmers and adopt biotech. Bernauer, and most other commentators, reason that the interests of consumers and environmentalists have dominated the political process. They have coalesced around an issue of 'public outrage,' exploited low levels of public trust in the authorities (following BSE, Foot-and-Mouth, etc.), educated the public and influenced retail markets. In addition, they have taken advantage of the complex web of EU and national regulatory bodies and its multiple entry points. As a result, in an apparent exception to the standard logic of political economy, diffuse concerns over environmental and food safety, European culture, bioethics and *'ordre public'* were able to prevail over concentrated business priorities.

Yet, perhaps there is no paradox. If restrictive biotech policies actually serve the economic interests of European industry and agriculture, they may not have sufficient incentives to seek liberalization. Several pieces of evidence suggest this may indeed be the case.

Examining Industry's Incentives

European industry has long held the upper hand in the incumbent crop protection technology of agricultural chemicals and has maintained it with a strong chemical R&D infrastructure. Starting in the 1970s, in the face of increasing stringency in pesticide regulations around the world, European firms invested their R&D dollars in a next generation of chemicals with better toxicological and environmental profiles. At the time, the U.S. already had a strong life sciences infrastructure in the public sector and was home to a new biotech industry. Facing similar regulatory pressures on pesticides, American firms chose to take advantage of the U.S. position in the life sciences and shifted

significant R&D dollars into biotech programs. European industry only developed a limited capacity in the radical breakthrough technology of plant genetics and agbiotech.

Table 1. U.S. Patents Granted 1982-2002

	U.S. Patents on Agbiotechnologies and Crop Genetics	U.S. Patents on Agchemicals	Ratio of Biotech to Chemical Patents
European Inventors	774	3511	22%
N. American Inventors	3035	4449	68%

The historical *status quo* of European incumbency in agricultural chemicals is evidenced in market figures for 1991 (Figure 1). European-based corporations made 55 percent of sales in a $27 billion global crop protection market, which consisted entirely of pesticides. U.S. firms had a 25 percent share of the global market.

Since the introduction of seeds with crop-protecting genes in the mid-1990s, farmers have been shifting into this new technology, where it is available, at unprecedented rates. This is evidenced in 2001 (Figure 1) where genetics accounted for 34 percent of the $31 billion market. Comparisons between 1991 and 2001 show four crucial trends. First, sales for chemicals were basically flat over the decade. Second, chemical sales by U.S. firms grew to 30 percent (while chemical sales by European firms dropped to 47 percent), likely driven by a tie-in with genetics, especially the popular package of glyphosate with glyphosate-tolerant soybeans. Third, genetics have outstripped chemicals, providing virtually all of the growth in the global market. Finally, European firms have made a disproportionately small contribution to biotech sales, compared to U.S. firms.

Differences in Innovative Capacity

A key to these differences in sales of crop genetics is innovative capacity, and U.S. firms clearly have a significant advantage in the life sciences. One of the best ways to measure R&D strengths is to look at relative rates of patenting, and ideally we would like to compare U.S. and European inventors by looking at patents in both the U.S. and the E.U. over both biotech and chemicals for agriculture. However, under the restrictive European policies, patents are not granted in Europe over many of the inventions we wish to observe. U.S. patent registrations capture a much broader range of biotechnologies and crop genetics. Table 1 lists the number of U.S. patents granted between 1982 and 2002 on new agricultural biotechnologies and agricultural chemicals filed by European inventors versus North American inventors.

Despite the fact that European innovation is probably understated in these U.S. patent counts, there are still some telling observations. Over the 20 years, American and Canadian inventors have generated over two-thirds as many patentable inventions in biotech as they have in chemicals. In contrast, European inventors have generated only one-fifth as many patentable inventions in biotech as they have in chemicals. Analysis of citations to these patents show a large surge of highly cited early work in agbiotech in the early 1980s, virtually all by North American inventors, while citations to chemical patents were much more steady and equally distributed between European and North American inventors.

Together these results suggest that European firms are strong in the technology that is not selling, and weak in the technology that is. This goes a long way to explain foot-dragging on biotech policy; moreover, several behavioral and circumstantial indications concur.

Circumstantial Evidence

Unlike in the U.S., where firms conducted a strong campaign to counter early objections raised by environmentalists like Jeremy Rifkin, European companies were fairly passive about paving the way for the introduction of new biotech products in Europe. As a result, European firms ended up with a home market under a zero risk-tolerance regulatory regime based upon the 'precautionary principle,' while U.S. firms pushed for and got a regulatory approach based upon the 'substantive equivalence' of agricultural products, without special consideration to whether they were made using the tools of molecular biology.

The lack of European tolerance for food biotechnologies seems curious given their more liberal attitudes toward cloning and stem cell research. European regulation of chemical pesticides is at least as lenient as U.S. regulation, and European use of chemicals in agriculture is often higher. Cognitive dissonance among Europeans may allow for chemical regulations to be relatively more relaxed than biotech regulations: people tolerate risks with which they are more familiar and from which they know they derive clear benefits.

Similar trends can be seen in the lack of European champions in case law seeking to extend patents to cover DNA and genetically modified organisms. There is also a bias toward European firms in the biotech products approved before the *de facto* moratorium began.

What about Europe's Farmers?

Given the adoption rates observed in North America, Canada and Argentina, European farmers would be expected to embrace and profit from genetic technologies in much the same way. There has been some interest expressed by European farm groups, yet generally it remains muted. European farmers are perhaps just being sensitive to the sensibilities of their consumers.

While certainly some are, given the agricultural support and trade policies that govern the European farm sector, it is likely that consumer interests are not the whole story. Like industry, European farmers are not expected to push for the introduction of genetically modified crops if their deeper economic interests are being served by their restriction.

In the WTO, E.U. farmers are under immense pressure to reduce or even eliminate their direct agricultural subsidies under the CAP. Yet, support policies can be justified on the grounds of environment, food safety or 'public morality.' European growers are well aware that without current levels of support, many of them would go out of business and the value of land would plummet. The campaign to keep genetically engineered crops designated as potentially dangerous to the environment, public health and the European consumer's culinary sensibility, provides European farmers with an opportunity to differentiate their conventional crops while staying within WTO guidelines, maintaining a raft of subsidies and technical barriers to trade. This is, of course, at the heart of the debate in the WTO case filed against Europe. If Europeans win the case, it will establish a legal requirement for product differentiation on grounds of consumer preference, which should even allow them to capture a market premium at the expense of foreign farmers who use genetic crop protection.

Conclusions and Implications

The European rejection of agricultural biotechnologies cannot be explained as simply a case of consumer preferences; it also reflects the self-interests of the European agricultural inputs industry and farmers. European chemical firms have the comparative advantage in agricultural chemicals while U.S. firms have the advantage in biotech, but globally, biotech is growing much more rapidly. Had European policies allowed agbiotech products, U.S. firms were in a much better position to capture the gains. For their part, European farmers are exploiting the opportunity presented by biotech crops to bill their chemically protected crops as an alternative with desirable safety characteristics, in order to justify continued agricultural support and protections against imports, both before the WTO and before European consumers and taxpayers.

Will the current policy climate in Europe continue indefinitely? If agbiotech ends up developing products that significantly enhance consumer well-being while clearly helping the environment, then even European consumer attitudes will begin to reverse, and retailers like Carrefour and Nestle will develop that market. European seed and chemical firms will seek to acquire technologies from abroad while investing yet more of their own R&D in biotech. As European innovative capacity increases, European champions for biotech policy will emerge, and regulations will begin to adjust. European farmers will even start to grow the product. If, rather, there are no major product quality breakthroughs and agbiotech remains largely an agronomic technology, Europe can be expected to continue carving out a separate agricultural trading bloc, with higher standards and lower tolerances for biotech content. The large developing countries—China, India and Brazil—will continue to develop their own agricultural biotechnologies to feed their populations and export where they can. This would mean a continuation of the *status quo* in Europe, and it could persist for some time. Finally, if benefits of biotech continue not to be very apparent but risks become apparent through a preponderance of scientific evidence or an indisputable biosafety crisis, alternative technologies will evolve and overtake agbiotech as it is known today. In any case, the new knowledge and tools of molecular biology will continue to be decisive in the future of world agriculture.

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