

PRODUCTION DEVELOPMENT

The public debate about agrobiotechnology in Latin American countries: a comparative study of Argentina, Brazil and Mexico

Renata Campos Motta



UNITED NATIONS

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This document has been prepared by Renata Campos Motta, Research Associate with the Agricultural Development Unit, Division of Production, Productivity and Management of ECLAC.

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Abstract

This study is about the public discourse on the introduction of biotechnology in agriculture in three Latin American countries, Argentina, Brazil and Mexico. It aims at identifying the discursive disputes to influence public opinion and thus to legitimize policy options regarding agrobiotechnology. Based on the assumption of the fundamental role of mass media in the public sphere of contemporary societies, the research draws on media analysis and the frame analysis of news articles to describe the political claims made by various actors attempting to frame shared meanings of GMOs. It addresses the questions: (1) How is agrobiotechnology depicted on the national media of these countries? (2) What are the main issues regarding GM crops that are being currently debated in these three different cases? (3) How are GMOs interpreted? (4) Which actors defend each type of argument? It is a descriptive work aimed at mapping and comparing the debates in the three countries, especially in what concern the participation of each frame and its main carriers. In addition to looking at similarities and differences among countries, the study identifies actors and frames that cross national borders in the interpretative disputes about a global issue: the adoption of biotechnology in agriculture.

I. Introduction

This study¹ is about the public discourse on the introduction of biotechnology in agriculture in three Latin American countries, Argentina, Brazil and Mexico. It aims at identifying the discursive disputes to influence public opinion and thus to legitimize policy options regarding agrobiotechnology. It does not evaluate if GMOs are beneficial to producers or bring risks to health or to the environment. Rather than yielding general conclusions about the new technology, this study describes the political claims made by various actors in the public discourse on GM food that takes place on the media, based on the assumption of the fundamental role of mass media in the public sphere of contemporary societies. It addresses the questions: (1) How is agrobiotechnology depicted in the national media of these countries? (2) What are the main issues regarding GM crops that are being currently debated in these three different cases? (3) How are GMOs interpreted? (4) Which actors defend each argument?

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Therefore, it depicts how specific actors interpret and dispute shared meanings about different impacts of the new technological paradigm (Katz and Bárcena 2004: 31); their attempts to shape institutional frameworks (intellectual property rights, risk management rules, including debates about the criteria for approval GMOs and demands for public participation); their claims about impacts in the economy (from direct agronomic impacts to macro impacts on employment, trade balance, exports); their claims about effects on health and environment and also their identification of which types of actors are the main beneficiaries and which are the negatively affected by the new paradigm

Transgenic food² is a subject that has been intensely discussed in the last two decades in different parts of the world. In some places, official decisions to liberalize such products have been targets of protest by social movements and organizations from civil society and by appeals from political bodies not directly responsible for the decisions, emphasizing the risks of the new technologies. At the same time, decisions to prohibit GMOs have also been contested by scientist associations, economic actors and by other governmental bodies, stressing that the benefits and opportunities brought by the new technology cannot be missed. In either case, there is seldom agreement: be it to liberalize or to prohibit genetically modified food, the political decisions in this area have been constantly contested. In addition, national and international actors take part in such disputes, since the international agricultural market is highly interdependent and a decision taken in one country may affect actors situated beyond those geographical borders. This study aims at bringing this complexity into analysis by identifying the geographical scope of actors who engage in the national public debates.

Argentina, Brazil and Mexico are considered world "mega-producers" of transgenic crops, but have different positions in the ranking: in 2011, the first two were on top of the list whereas the latter was at the end of the list (30.3; 23.7 y 0.2 million hectares, respectively, according to the table below).

TABLE 1
GLOBAL AREAS OF BIOTECH CROPS IN 2009: BY COUNTRY
(Million Hectares)

	Country	Area (million hectares)	Biotech Crops
1	United States	69.0	Soybean, maize, cotton, canola, squash, papaya, alfafa, sugarbeet
2	Brazil	30.3	Soybean, maize, cotton
3	Argentina	23.7	Soybean, maize, cotton
4	India	10.6	Cotton
5	Canada	10.4	Canola, maize, soybean, sugarbeet
7	Paraguay	2.8	Soybean
10	Uruguay	1.3	Soybean, Maize
11	Bolivia (Plurinational State of)	0.9	Soybean
16	Mexico	0.2	Cotton, soybean

Source: Adapted from Clive James, 2011.

From a chronological perspective, the adoption of GMOs in these countries is part of a transnationalization of an experience from the USA. Argentina closely followed the pioneers and approved GM soy in 1996. After 15 years, some of the results are now under debate. While some analysts see the consolidation of power from external agents in the country (Bárcena et. al., 2004: 31), it is disputable if transnational firms have been the actors who most benefited from the adoption of

² The terms referring to biotechnology applied to agricultural crops, namely, agrobiotechnology, genetically engineered crops, transgenic food, GM food/crops and GMOs are used interchangeably.

biotechnology in the country, since it lacks a strong legal framework for intellectual property rights. Also, the new technological paradigm has implied a reorganization of the production in Argentina that opened opportunities for some local actors in detriment of others (Gras and Hernández, 2009). Some Argentinean firms have pursued transnationalization strategies and now are active in neighbouring countries. Another characteristic of the Argentinean experience is the relative absence of voices against genetically modified crops in comparison to Brazil and Mexico. Nevertheless, if the adoption of GM soy did not raise much public attention and debate back in 1996, the recent years have witnessed a flourishing debate about what has been identified as its negative impacts on society, economy, health and environment. Land concentration, land expulsion of small farmers, environmental contamination and health intoxications from pesticides associated with GMOs are issues on the agenda, as well as the development model of the country (Gras and Hernández, 2009; Gruttadauria, 2008).

From Argentina, GM soy was illegally taken to Brazil, where its status remained long in dispute, between legality and illegality. There was major opposition from civil society and conflict between and within the legislative, executive and judiciary powers. The proponents of GMOs won many battles, approving GM soy, cotton and corn. International biotechnology firms associated with national partners to invest in new products—process in which Embrapa, the Brazilian Agriculture Research Corporation, an institution related to the Ministry of Agriculture, played a crucial role—; also, national firms started to compete with multinationals, criticizing their monopolistic practices. At the moment, after the first years of GM corn planting seasons, other controversies appeared: is coexistence possible? If so, who pays the price? Is monitoring needed? Who is threatened by the negative impacts and who are the beneficiaries?

Recently, Mexico has attracted much attention in the GMOs issue, as the government modified the legal framework to authorize the experimental and commercial cultivation of GM corn. Although the country has approved many other genetically modified seeds, the case of corn is of special interest because the country is its center of origin and biodiversity. Thus, while some alert against its risks to biodiversity, health and food security, others defend the new technology as the solution to food security and the dependence on imports from the USA. Argentina and Brazil are either referred to as experiments of success or as a proof of the (transnational) threat of GM seeds to (national) agriculture and environment.

The configuration of a public discourse and the definition of a policy for GM food in Argentina, Brazil and Mexico will be studied as part of an entangled and transnational process of political disputes regarding genetically modified crops. This means that each country cannot be studied as an endogenous unit, since actors and arguments cross the political-administrative borders and incorporate past experiences into new conflicts. Moreover, multilateral rules negotiated under trade, health and environmental international regimes discipline national legal frameworks about biotechnology.³ Nevertheless, the state has the competence to decide on the agricultural production and the commercialization of transgenic crops. Therefore, the transnational trade flows of such products depend on state policies that promote or prohibit these products. Thus, the recognition of the transnational character of the GMOs issue does not imply that legitimacy can be ascribed a priori; it must emerge through democratic processes in order to result in public policies (Costa, 2006).

³ Among these, the most important are the Cartagena Protocol and the Codex rules. “The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health. It was adopted on 29 January 2000 and entered into force on 11 September 2003”. (Available at: <http://bch.cbd.int/protocol/>, accessed on 13/12/2011). The Codex Alimentarius is a joint program from the Food and Agriculture Organization and the World Health Organization, all part of the United Nations System. Codex is dedicated to food standard setting with two objectives: protecting the health of consumers and ensuring fair practices in the food trade. The organization is considered as an international standard setting body serving as a reference in the Sanitary and Phytosanitary Agreement from the World Trade Organization (SPS/WTO, Annex I 3.a).

This study maps the contemporary public debates about agrobiotechnology in these three countries as it is depicted in the news media in the years 2009 and 2010. Instead of comparing three similar events in each country—for example, the approval of a same product, probably leading to different periods of analysis in each one—the choice was to identify national debates on GMOs not as closed units of analysis, but as part of a transnational phenomena, as above mentioned. This choice of a synchronous comparative analysis of these three countries, each dealing with very different policy issues—Mexico on the verge to decide about GM corn, Brazil debating about risk management rules for GMOs, Argentina with a strong conflict about the long-term effects of the soy-model based on genetic engineered seeds—, brought together three distinct time perspectives. So, if in Mexico the claims are marked by a future orientation of what would happen if GM corn is adopted or prohibited, in Argentina the interpretative disputes regard what are the effects of a past decision of adopting GMOs on a large scale and, in Brazil, the claims differ about how to regulate the (possible? desirable?) coexistence of GM and non-GM crops, i.e. how to keep the decision always present and open for actors to adopt GMOs or not. In sum, the use of countries as units of comparison is not made in detriment of conceiving the debate on agrobiotechnology as an object of study with a transnational scale (Costa 2011).

This working paper is divided in two parts, besides this introduction and the conclusion. The first (Section II) presents the research design, explaining the choice of the sources, the categories developed and the methodology for data analysis. It describes the sample of media articles and the results of the media analysis, oriented by the research questions 1 and 2, namely, the media coverage of agrobiotechnology and the main issues under attention in each country. The second part (Section III) describes the political claims found in the content of the media articles according to the emphasis given by the actors. The debate is thus depicted in three steps corresponding to the three main dimensions of meaning ascribed to GMOs: economy; health and environment; ethics and politics. This part aims at answering the research questions 3 and 4, which concern the actors and their arguments

II. Methodology

A. Choice of the sources: news media

This study has identified the ongoing public debates using newspapers articles as the main source of data. Three news media per country were chosen according to a combination of criteria in order to find the most adequate sources according to the phenomena under study but also obeying to pragmatic considerations. Given the research aim to identify political claims about agrobiotechnology, at least two types of actors are implied. On the one hand, there is the political elite as a target of such communications (although also political authorities make public demands covered by the media), since it is held responsible to take collectively binding decisions regarding GMOs. On the other hand, there are actors who make political demands about the issue. These include: demands for the adoption of biotechnology, usually, by biotechnological firms, farmers and their associations, and scientists; demands for the prohibition of GM crops, whose claim-makers are mostly social movements and their organizations, but also scientists and farmers. Accordingly, in order to depict most types of political claims about agrobiotechnology, the sources must include newspapers read by the political elite, by the economic elite and newspapers which usually cover protest events and demands from social movements, i.e., newspapers considered more dissident in relation to the newspapers of widest circulation, offering an alternative coverage to those.

Besides these theoretical considerations, there were four pragmatic criteria: first was availability of full content and ease of retrieval.⁴ Due to the need to obtain as much content as possible, the second criterion was to select newspapers that presented the highest number of articles on the key-word search. The third criterion was geographical scope: all papers were to be targeted at a nationwide audience and local sections were neglected in the sampling of articles. Last but not least, the selection of sources aimed at achieving a reasonable degree of comparability. Thus, three standard and elite newspapers of large national circulation were selected, namely, *Folha de São Paulo*, *El Universal* and *La Nación*.⁵ The next set of papers focused on the business elite: *Valor Econômico*, *El Economista* and *El Cronista Comercial*. The third group of papers was chosen to offer an alternative coverage to the first and second sets. These were *Carta Maior*, *La Jornada* and *Página/12*. These three news media are partners, what confirms their comparability. Nevertheless, it is important to highlight that *Carta Maior* is not a newspaper as the others, but a news blog. The choice to include it in the sample is rather a negative choice, since there was not a daily newspaper in Brazil comparable to *Página/12* and *La Jornada*. There is a weekly printed newspaper, *Brasil de Fato*, but its search offered a very low number of results and failed the criteria of the need to obtain content. Other sources tried were the weekly magazines *Caros Amigos*—leading to still fewer numbers of articles—and *Carta Capital*—which offered problems of access to content. Thus, *Carta Maior* was included because it matched the criteria of access to content, higher number of results, scope and comparability.

The search was restricted to newspapers with full text available and included the period from January 1st 2009 to December 31st 2010. Types of articles included news, editorials and opinion articles. The search was conducted online using the key words: *biotecnologia*, *transgenico*, *transgenicos*, *transgenica*.⁶ In order to be included in the sample, articles had to comply with two criteria: topic and geographical scope. They should refer to the countries under study (cover national issues)⁷ and to one of the main topics:

⁴ The data were collected during a research stay at Agricultural Development Unit from ECLAC/UN, Santiago de Chile from 14/03/2011 to 30/04/2011. Cepal had subscriptions to a few newspapers and to Proquest, an electronic resource to search and accede to full content from many databases of scholarly journals and news material, including the “Latin America Newsstand”.

⁵ Although *Folha de São Paulo* and *El Universal* are the leaders of circulation in their categories (not uncontested), this has not been the criteria for their selection. In addition to being available at the databank from Proquest, they presented the higher number of search results. If the criteria were circulation numbers, *El Clarín* should be chosen (288.519 daily copies) instead of *La Nación* (160.368 daily copies, the second in circulation, IVC, 2011). This choice was not due to the fact that *El Clarín* was absent from Proquest databank – since its content is available online. Two other criteria were decisive in the choice for *La Nación*. The first was easiness of retrieve, since it was possible to make a single search in Proquest combining key-words applicable to all countries. The second, and more important, is the overall comparability of the sample taking into account the political bias of *El Clarín*. *La Nación* presents a historically consistent coverage of the interests from agribusiness which has not changed in face of short-term conflicts between the rural sector and the government or the latter and the media. This has not been the case with *El Clarín*, which started to oppose systematically the government in the conflict with the rural sector in 2008 because of its own disputes with the present government. Given that the Argentinean debate about agrobiotechnology cannot be desimbedded from such a context, *La Nación*’s systematic political bias in the coverage of the interests from agribusiness in Argentina ratifies its choice to represent the first set of newspapers in the sample.

⁶ The papers that were available in Proquest were searched and collected from a single search combining the words “biotecnologia” OR “transgenic*”, which enabled a search for content in both Portuguese and Spanish languages. *El Cronista Comercial*, to which ECLAC had a subscription, was searched directly in two turns, with the words “biotecnologia” and “transgenico”, which also yielded results for the feminine and plural versions. *La Pagina/12* required to register, which was free, and offered a good search engine for combined searches. *La Jornada* was searched per google advanced engine as well as *Carta Maior*, but for the latter, due to the little number of results, its own search engine was also used with each of the key-words.

⁷ Exceptions to the scope criteria were made when in articles referring to a survey from USA production, for example, the survey is used to make a claim about the country’s GM food policy such as “if Mexico had adopted GM corn, it would have saved money”.

- GM food/crops policy: articles that refer any agricultural commodities for food and feed purposes (corn, soy, rice, beans, etc.), to debates or decision regarding GM crops, be their commercialization, the approval for research or of new rules relevant to it.
- GM crops production: articles with information on any agricultural commodities, such as season revenues, costs, expansion of crops, exports.
- GM crops research and development: articles about biotech firms' investment in the countries selected related to a food crop.

Besides these topics, three others were added because in their coverage it was common to find references to the debate about GM food policy. These were country-specific: for Mexico, articles about biodiversity and climate conditions were also included; for both Brazil and Argentina, articles about glyphosate and its use.^{8,9} The final sample of articles can be seen on Table 2 below and in the Annex.

TABLE 2
NEWS MEDIA SOURCES SELECTED PER COUNTRY, FORM,
AUDIENCE AND NUMBER OF RESULTS

Source	Country	Form	Audience	Number of results	Final sample	Content analysis
La Nación	Argentina	Print	Elite	48	12	8
El Cronista Comercial	Argentina	Print	Business	174	31	28
Página/12	Argentina	Print	Alternative	212	62	27
Folha de Sao Paulo	Brazil	Print	Elite	216	45	35
Valor Econômico	Brazil	Print	Business	109	40	38
Carta Maior	Brazil	Online	Alternative	58	6	3
El Universal	México	Print	Elite	75	24	23
El Economista	México	Print	Business	43	13	13
La Jornada	México	Print	Alternative	394	93	58

Source: Own elaboration.

B. Levels of analysis and categories

The information from the sample of articles was coded in two levels:

- The media level: the article as the unit of analysis.
- The article level: political claims as the units of analysis.

⁸ Articles on these issues were only included if reference was made to the main topics. The relevance of the article to the topics was assessed using the 150-words rule: by headline, sub/headlines lead and first 150 words (starts counting after the sub-headlines, with the first word of the first sentence until the end of the sentence in which the 150th word is located). These should mention the topics of interest. This rule is justified not only in pragmatic grounds but also due to journalistic practices that instruct reporters to summarize the main information of the article at its very beginning (the so-called inverted pyramid). Exception to this rule was made when the main topics are referred to as titles to subdivisions in the course of the article. Thus the article is considered only in its subdivision when coded for "topic". The topic criterion was applied in a wide way, based on the assumption that the researcher can judge if an article is implicitly about GM but not phrased in that manner, e.g. an article on technology that refers to a well-known biotech company.

⁹ Given the need to be the most efficient and precise as possible, articles with the following topics were discarded: biotechnology in general (research policy or results) when not directly quoting application in agriculture —or, when it does, it is only in an enumeration—, when applied to other fields such as medicine, when referred to transgenic animals (even when for food uses as fish, but because of the need to refer to agriculture), when just part of an enumeration (such as listing areas of bilateral cooperation); references to financial results of biotechnology seed industries.

Each level has different analytical purposes. The first one offers quantitative data about the articles and is suitable for media analysis: what has been published, in which sections the conflict was most reported, in which months, who wrote more on the issue, etc. The second aims at extracting the content of the articles for a qualitative analysis, including quantitative methods as well. Note that in both levels of analysis, the article is the data from where information is extracted, but into different units of coding: the first requires the "external information" about the article, i.e. looking at it in a holistic way in its relation to the media as its context. The second requires reading the "internal information" of the article and breaking it up into categories such as actors and arguments (frames). Below, the categories and results of the first level of analysis are presented. Then, the method and categories of the second level of analysis are presented, while the results on political claims will be depicted only in Section III.

1. Media analysis

Articles were classified according to topic, section, authorship and type. The topics vary across countries and indicate how GMOs relate to broader issues in that society, such as development models, environment, land use, among others. The importance of classifying where the article appeared (section) and by whom it was written (authorship) is to see to what audience it is targeted and if it is a wider issue or a concentrated topic dominated by specialized journalists.¹⁰ As for the type, only news articles were subjected to frame analysis in order to get information on which actors appear and which type of arguments they use (see Section III). The results of the media analysis will be briefly presented.

a) Topic

The media material revealed that the GMOs issue in Argentina is usually depicted as part of a big "technological package" adopted in the agriculture that includes genetically modified seeds, glyphosate and the system of "siembra directa" ("no tillage agriculture" or "cero labranza"). GMOs are thus highly associated in the Argentinean debate with the other components of the package. Since about 95% of soy in Argentina is genetically modified,¹¹ most debate about "the soy model" contains references to the use of biotechnology as one of its components. What's more, the soy in Argentina is genetically modified to resist to the herbicide glyphosate from Monsanto named Roundup - thus called soy RR or Roundup Ready -, so all debate about the benefits or effects derived from the use of this herbicide are interrelated with GM soy. Thus, the combination GM seeds-glyphosate-siembra directa in soy plantations represent the "development model". Also, usually actors refer to GM soy, although there are other components in an enumeration of elements. Thus, it is difficult to classify an article as pertaining only to agrobiotechnology. As can be seen in Table 3 below, while the majority of articles were about agrobiotechnology (40%), there were about just as many articles specifically about glyphosate (35%). The third most commented issue was the "development model" based on soy production (16%).

The Brazilian sample was mostly concentrated on agrobiotechnology as a topic per se (88%), including articles on GM crops policy (debates or decision regarding GM crops, be their commercialization, the approval for research or of new rules relevant to it); articles informing about GM crops production (such as season revenues, costs, expansion of crops, exports), and articles about GM crops research and development. As mentioned, many articles were about the first yields of GM corn and the efficacy and feasibility of coexistence rules. Also, the debate on the approval of GM corn was covered. GM soy only was mentioned when there were announcements about crops production or about

¹⁰ The journalist from Le Monde and responsible of the dossier about GMOs, Catherine Vincent, makes a parallel from what happens in a redaction and society: at the beginning, scientists conduct research, convinced of the good fundamentals of their research; and the economic actors are conscious of what is at issue in a new technology. The same happens in the paper: two types of journalists are interested by biotechnologies, the ones from the scientific and the economic sections. Their parallel ways cross and become a big venue where concerns from all society converge: farmers and consumers, journalists from agriculture but also other areas, until the chief redactor notes that it is not a purely scientific or economic issue anymore (Ricroch, 1998).

¹¹ According to declarations from Monsanto (quoted in Colombres, 2010).

research, patents and development of new varieties. Glyphosate was a topic in 4% of Brazilian articles, all published by Valor Econômico, to cover the debate about anti-dumping taxes to Chinese imports of the product, and the importance of its costs due to the large-scale adoption of GM seeds resistant to it. Other 3% of the articles related to the use of pesticides related to GMOs, including glyphosate.

TABLE 3
NEWSPAPER ARTICLES ACCORDING TO TOPIC PER COUNTRY
Number of claims and percentages (in parenthesis)

	Argentina	Brazil	Mexico
Agrobiotechnology	42 (40)	81 (88)	116 (89)
Glyphosate or pesticides	37 (35)	6 (7)	0 (0)
Development model	17 (16)	0 (0)	0 (0)
Biodiversity	1 (1)	0 (0)	8 (6)
Other	5 (5)	5 (5)	7 (5)
Total	105 (100)	92 (100)	130 (100)

Source: Own elaboration.

Regarding the topic, the media material revealed that the GMOs issue was highly debated in Mexico (89%), as the vast majority of articles sampled with the key-word search had agrobiotechnology as the main issue. The sampling also included articles on biodiversity (6%), climate conditions and climate change (3%), food crisis (1%) and indigenous knowledge (1%), since in the context of those issues actors made claims for or against the adoption of GMOs in the Mexican agriculture. Among these, it is necessary to highlight the relationship between claims against GMOs in Mexico and the defense of biodiversity in the country.

While in Argentina GMOs are associated with soybeans, in México, the debate covered regards corn ("maíz"). The Mexican Biosafety Law foresees the creation of a special protection regime for the native corn, since the country is the center of origin and biodiversity of the grain. This is a point of (stated) consensus and even actors favoring GMOs publicity argue for the protection of native corn from the flux of genes of GM corn i.e. from contamination (Enciso, 2009a). During 2009, a series of legislative modifications were made in order to create the framework to approve the experimental cultivation of GM corn in Mexico. Actors against GMOs perceived these modifications as a menace to native corn and framed their opposition to the possible adoption of GM technology as a defense of the native corn.¹² GMOs mostly refer to GM corn and claim to preserve biodiversity (the native corn) are usually claims against GMOs in Mexico. Thus, the issue of agrobiotechnology in Mexico is deeply associated with the defense of biodiversity and especially, the native corn. Articles covering the legislative changes were classified under the topic "agrobiotechnology", while articles expressly concerned with the fact that Mexico is center of origin of corn were classified as about "biodiversity".

In sum, the debate about genetically engineering in agriculture refers, in each country, to different issues and products: in Argentina, GMOs is a synonym of GM soy and, above all, the "soy model"; in Mexico, GMOs come to the spotlight of media attention when referring to corn; in Brazil, it is less a product-oriented debate (which ensued before the approval of GM soy and GM corn), and

¹² For instance, when the experimental probes were approved in October 2009, the coordinator from the campaign on sustainable agriculture and transgenics from Greenpeace Mexico, Aleira Lara, called the people for action: "All Mexicans must join in the defense of maize, the basis of food; reason is on our side" (quoted in Perez, 2009a). This framing was already available in the discourse from activists and it is not fortuitous that the campaign against transgenic crops in Mexico was named "Sin Maíz No Hay País" (something as "No Corn, No Country") and the network formed by social movements and non-governmental organisations to coordinate actions against GMOs is called "Red en Defensa del Maíz" ("Network in Defense of the Corn").

more a debate on coexistence and on the overall legal framework for agrobiotechnology – but this debate was triggered with the yields of corn because of its specific polinization characteristics in comparison to soy. This results shows that there are advantages of not choosing a product as the object of comparison, because they indicate that there is variation in how agrobiotehcnology becomes a topic of public debates depeding on the product.

b) Section and authorship

The great majority of the total sample was published in the Economy section (Table 4),¹³ and strikingly so in the Brazilian case. In Argentina, however, there are variations in the coverage. While GMOs appear mainly as an economic topic in La Nación, Página/12 depicts it as pertaining more to politics and society in general than to economy. The Mexican sample is very different: most articles on agrobiotechnology are published in the section of national politics (67% from the sample of El Universal) or in the section “Sociedad y Justicia” (49% of articles from La Jornada). In all countries and in most papers, the news articles are mostly concentrated in a few hands i.e. the GMOs issues are usually reported by the same journalists.

TABLE 4
NEWSPAPER ARTICLES ACCORDING TO SECTION PER COUNTRY
Number of claims and percentages (in parenthesis)

Section	Country			Total
	Argentina	Brazil	Mexico	
Economy	48 (46)	72 (78)	22 (17)	142 (43)
Society	15 (14)	0 (0)	46 (35)	61 (19)
Politics	15 (14)	2 (2)	25 (19)	48 (15)
Opinion	6 (6)	1 (1)	18 (14)	33 (10)
Agriculture	0 (0)	2 (2)	9 (7)	11 (3)
Science	0 (0)	3 (3)	7 (5)	10 (3)
Other	27 (26)	12 (13)	23 (18)	62 (19)
Total	105 (100)	92 (100)	130 (100)	327 (100)

Source: Own elaboration.

c) Final considerations about the sample

The three samples are very different and, most of all, the Brazilian one stands out because of the low number of results from the media chosen for its coverage of protest events and social movements activities (6 articles from Carta Maior, 62 from Página/12 and 93 from La Jornada). Moreover, only 3 articles from Carta Maior were submitted to frame analysis, since the other were opinion articles. It is not clear the reason for such low number of results and, as mentioned above, many other news media were tried, without yielding more articles. This small sample is even more puzzling given the contrast to the big sample collected from Folha de São Paulo and Valor Econômico. As a result, the corpus from media material for content analysis taken from Brazil is unevenly distributed between more conventional media reporting and dissident voices (83 versus 3).

Some problems were also identified in the data collected from Argentina. The majority of the sample is composed of articles from Página/12, a newspaper that favors the government in the conflict against rural producers and also in the disputes with other media enterprises. Nevertheless, as already

¹³ Note that all articles from the business newspapers El Cronista Comercial, Valor Econômico and El Economista were automatically classified in the Economy section for comparability purposes, since they already target a business audience. This division makes sense only for wide range papers in order to show how the media actors classify the information over GMOs and target their readers.

mentioned, *La Nación* covers the other side of the conflict from the point of view of rural actors. How is the low number of articles about agrobiotechnology in *La Nación* to be explained? It could be a result of an editorial decision not making an issue out of it; but it could also be due to technical problems in the key-word search or in the index of the databank, in which case, one would conclude that the use of electronic searching engines could generate errors that might jeopardize research findings. Be as it may, for the present study the few number of articles from *La Nación* was compensated by the high number of articles from *Página/12* that were left out of the frame analysis, since only news articles were codified. The final Argentinean sample for content analysis was composed of 36 articles from *La Nación* and *El Cronista Comercial* versus 27 from *Página/12*. Thus, there was no major bias in the sample.

The Mexican sample also shows some imbalance between the sources, what is explained by the high activism of *La Jornada* in GMOs, having published, amongst its 93 articles, 30 opinion articles, 4 interviews and 1 editorial. Moreover, the paper covers this subject mostly in the section “*Sociedad y Justicia*” (46 articles), followed by “*Opinión*”. This contributed for ameliorating the imbalance between sources for the content analysis: news articles from the more elite media summed 36 versus 58 from the more dissident *La Jornada*. Even so, there is a certain left-oriented bias in the Mexican sample.

It is important to state that media selectivity is not a methodological deficiency but a finding in itself, given that there was a conscious choice for the data sources according to the research question, namely, the analysis of public debates. Assuming that the presence of frames about GMOs in the media has passed through processes of selection from media actors of what is relevant and who are the legitimate speakers about an issue, the findings show actors and frame that achieve a wider visibility and reach a wider audience than the political claims about agrobiotechnology ordinarily do. They are communicated not only to the directly affected and mobilized parties such as biotechnological firms and scientists conducting research and development activities, social movements concerned about the issue or political authorities who are targeted of demands on how the GMOs policy should be. The greater the visibility of an issue, the more pressing it becomes for the political elite to deal with it. This is not to imply that, although being a, the media determines the framing of an issue as given by individuals (Gamson, 1992) nor its relevance for other agendas, including the political and electoral (McCarthy, Smith e Zald, 1996).

The next section explains the second level of analysis, in which only the news articles are analysed in their content (Table 2). The total sample from Argentinean newspapers in 2009 and 2010 comprised 105 articles so distributed: *La Nación* (8), *El Cronista Comercial* (28) and *Página/12* (27). The Brazilian sample totalized 92 articles, being *Folha de São Paulo* (35), *Valor Econômico* (38) and *Carta Maior* (3). The total sample of Mexican articles comprises 130 articles so distributed: *El Universal* (23), *El Economista* (13) and *La Jornada* (58).

2. Frame analysis

In order to identify and measure how agrobiotechnology is interpreted and given meaning by actors trying to influence public debate, the method chosen to read the media articles was frame analysis (Goffman, 1974). Aiming at creating both qualitative and quantitative results, I draw on Mayring's proposal of a qualitative content analysis. The process of building categories to code the material included a mix of inductive and deductive steps (Glaser and Strauss, 1967; Mayring, 2010). After a pre-analysis, codes were created directly from the empirical material and drawing on the researchers' knowledge about the topic. The result was a long list of codes that had to be reduced and given some categorization. This was done inspired by the codebooks developed for other studies that used the political claim-making method (Ferree et al. 2002; Koopmans, 2002; Koopmans and Stratham, 2010) or that used typologies for the topic under study (Rucht et al., 2008). The categories about agrobiotechnology were discussed with the experts from the Agricultural Development Unit from ECLAC/UN. Two main categories were chosen: actors and frames.

Actors were classified in two variables: type (Table 5) and scope (Table 6). The geographical situation of actors is relevant due to the global dimension of the debate on GM food and the fact that

interests of global actors are at stake. As for the type, five broad codes were created: political actors, market actors, social movements and their organizations, scientists and media actors. As mentioned before, such codes make sense in the issue area of agrobiotechnology, in which the government is usually the main target of policy demands, and the main claim makers are either developers of biotechnology (market actors and scientists), farmers who use it (market actors), social movements and organizations who contest it and, since I am using media articles as a source, journalists and editorialists are also considered as actors who construct media framings about GMOs.

TABLE 5
ACTORS VARIABLE: TYPE

Actors types	Definition
Political actors	State and party actors from: - Executive - Legislative - Judiciary - Local, regional, national and international levels
Market actors	Socio-economic interest groups: - Farmers and their associations - Food industry and their associations - Seeds and chemical industry (agro-inputs) - Consultant firms in agribusiness - Other market actors
Social movements and their organizations (SMOs)	Non-profit actors from civil society: - Environmental movements and organizations - Human rights organizations - Peasants and landless farmers associations - Individuals
Scientists	- Scientists - Associations of scientists - Actors from State agencies speaking as scientists
Media actors	Editorials and journalists

Source: Own elaboration.

Although it would be ideal to have a more extensive list —differentiating, for instance, between a Congressman and a Minister of Agriculture—, for pragmatic reasons it was necessary to aggregate all codes into five broad categories for the content analysis. This was done without prejudice of being able to retrieve the quotations to analyse qualitatively the results. It is important to make the distinction between the advantages of each type of data. The numbers reflect the standing and framing given by media to these actors. Thus, the quantitative results treat all claim-makers equally, based on the media selection of the actors deemed relevant to speak about GMOs. However, such strength is also a limitation of the quantitative results, because it neglects the hierarchies present in society. In order to illustrate, what equally counts as one quotation can have very different impacts in the issue: if the President of the country speaks about the benefits of GM crops or its environmental risks it has a stronger weight in the political disputes than the quotation from a small farmer demanding GM seeds or any scientist speaking of possible risks.

The actors participate in the debate over GM food policy making claims on issues and giving justifications for their positions. They try to influence shared meanings by strategically emphasizing some aspects of agrobiotechnology and silencing about others. The claims about GMOs were classified according to the main meaning assigned by actors to agrobiotechnology i.e. by their

preferred way to frame it. The frames were categorized in three dimensions of the debate: (i) economy; (ii) health and environment; (iii) ethics and politics.

TABLE 6
ACTORS VARIABLE: SCOPE

Actors scope	Definition
National	Actors from the country under study. Include subnational actors: - State/province/regional actors. - Local actors
International	Actors that are not from the country from which the data is being analysed, including: - Intergovernmental or supranational, formed by state actors - Transnational: non-state actors - Foreign country actors

Source: Own elaboration.

The **economic dimension** is constituted by market-based arguments pro- and contra GMOs. This type of claims appeals to economic considerations as the basis to decide about adopting agrobiotechnology. While market actors take the ultimate decisions— farmers purportedly weighing economic costs and benefits and consumers following their preferences—, these depend on a regulatory framework that enables their freedom to decide. Thus, arguments classified under the economic dimension refer not only to economic considerations but also include demands for a specific role of the State—in an utilitarian sense—in what regards the approval or prohibition of GMOs and the adoption of monitoring and inspection rules, i.e. a State that guarantees that market actors can choose to adopt or reject GMOs. Notwithstanding the importance assigned to State regulation, claims shedding light on the economic dimension of the debate about GMOS imply that it is the (transnational) market that decides in the end—as an aggregation of the individual choices of farmers and consumers— if GMOs will be adopted, even if they are authorized by any given State policy.

The **dimension of health and environment** comprises claims regarding the effects of GMOs to human, animal and plant health and to the environment. In lieu of economic benefits and costs, here what is under dispute is to frame the **biosafety** or the **(bio) risk** of GMOs. Since the State is the ultimate responsible for protection of nature and bodies, claims under this dimension also imply demands for specific (de) regulations. A crucial base to inform decision-making about the effects of GMOs on health and environment is knowledge and, therefore, scientists are placed in an authority role together with state authorities. Nevertheless, the (transnational) scientific authority is also disputed by social movements and individuals who resort to other types of knowledge about negative effects of GMOs on their bodies and environments, in particularly, direct evidence of local damage and suffering. The role of the State is to know and to manage risks and how this is achieved is also object of differential interpretations, according to the preferred frames for GMOs. If safe, there is no need for much State intervention; if risky, collective binding decisions are demanded as duty and responsibility of the State.

The **ethical-political dimension** of the debate about GMOs is overarching in relation to the other dimensions, because it handles with the question of “what should be the criteria to decide about GMOs?” i.e. the economic and biological considerations are but one type of benefits and damages associated with biotechnology that can be taken into consideration. The criteria thus bring to the fore the political and normative question of what should be the aims of the technology. A major dispute concerns the framing of GMOs as part of a trajectory of **progress** in the solution of the challenges posed to humankind—in particular, food security and climate change—or a **critique** against such conception, framing biotechnology rather as a threat to broader societal aims. Moreover, it includes claims about distributive questions such as “who benefits and who is affected by the adoption of the new technology?” and implicit or explicit demands for, on the one side, more participatory politics or,

on the other side, more insulation from politics in the decision-making. There are consequently disputes regarding what should be the basis for decision-making regarding GMOs. Thus, there is also contrasting views of State and democracy.

The resulting system of categories for frames about agrobiotechnology include six pairs, organized in three dimensions and two positions (pro and contra) as shown in Table 7 below. Note these may be complementary ways of interpreting agrobiotechnology, since one actor may adopt more than one argument; the choice of one frame indicates rather what is most emphasized.

TABLE 7
FRAMES ABOUT GMOS

Dimensions	Positions	
	Pro	Contra
Economy	“benefits”: economic, in particular, agronomic benefits	“costs”: economic “externalities”
Health and Environment	“biosafety”: inexistence of health and environmental risks; demands for deregulation	“(bio)risk”: negative effects to health and environment ; references to uncertainty and lack of studies
Ethics and Politics	“progress”: technology as solution to pressing global issues such as food security (hunger) and climate change	“critique”: biotechnology as a threat to food security, to culture diversity; claims about winners and losers of its adoption.

Source: Own elaboration.

Some explanations regarding coding procedures are necessary. The data were interpreted using computer software for qualitative analysis, Atlas.ti. The unit of analysis is a political claim. Thus, not all actors who appear in the media article are coded, but only those who are given opportunity to frame GMOs, be it by a speech act or some other action, for instance, the coverage of an authorization of a GM seed by a political authority stating it poses no risk to health. Also, if someone is quoted using many frames simultaneously, by affirming, for instance, that agrobiotechnology bring higher yields (frame: benefits) as well as promises to reduce environmental impact (frame: biosafety), each claim is coded separately. But if the same frame is repeated along a political claim, it is not coded twice for the same speaker, since the framing is considered the justificative given for a claim.

Again, the “triangulation” of methods, by mixing qualitative and quantitative data, aims at using each type to control interpretations about the other. The numbers serve as a basis to make a big picture of the whole debates and compare countries, enabling an overview of what meanings achieve the public sphere as reported by news media. Nevertheless, the public debates are not defined by frequency of arguments, but much more for their quality, their circumstances and, not less important, by the speaker. The percentage and totals treat each political claim as equal, but the researcher cannot neglect the fact that the public sphere is hierarchized and some speakers and frames have more power than others. Therefore, in the description of the results, in order to avoid the horizontalizing effect of the percentages, the qualitative data will be retrieved to identify who the speakers are and the context of their claims. The results of this analysis will be presented in the Section III below.

III. Public debates on Agrobiotechnology

The debate on GMOs in Argentina refers to the results of 15 years since the introduction of biotechnology in agriculture, in 1996. As the genetically modified seeds were adopted together with glyphosate and the wider use of “siembra directa” (no-till farming), a technological package quickly adopted at a large scale, the debate on GMOs in the country cannot be isolated from the combination of factors—including new managerial modes of organizing the production chain—that came to be called “the soy model” or “sojización”, as it became clear in the sampled period. Thus, the main nodes of debate were the effects on the economy, the social impacts and the effects on health and environment of the soy model. The coverage on those issues varies significantly according to the source: while *La Nación* and *El Cronista Comercial* focus on the economic benefits of agrobiotechnology and its spillover effects on the other areas, *Página/12* offers a view in striking contrast, emphasizing negative effects on health and the environment, and the social costs of “the soy model”, and discussing the distribution and consequences of the economic benefits. Thus, the media discourse sampled offered a varied picture of actors and frames in the debate related to agrobiotechnology in Argentina.

The Brazilian sample of articles is very different from those of Argentina and Mexico: both *Folha de São Paulo* and *Valor Econômico* offer a much more intense coverage of the GMOs issue than all tested news media with an alternative editorial line. Differing from media in the other countries, the Brazilian business paper offered a much more detailed coverage of agrobiotechnology, particularly because it closely

followed the meetings of the commission responsible for approving products, CTNBio. Some events covered by *Valor Econômico* did not appear in the sample from *Folha de São Paulo*. However, in general, both media actors overlapped in their coverage and preferred to frame GMOs as an economic issue, which becomes clear when 71% of the articles of *Folha de São Paulo* are in the Economy section.

Among many nodes of controversy in the mediated public debate in Brazil, there were: the public hearing about GM rice, the first yields of GM corn challenging the efficacy of coexistence rules, the feasibility and costs of post-market monitoring of the released GMOs and the flexibilisation of approval procedures for new GMOs. In contrast to Argentina, where the debate is about effects after many years of adoption from the new technology, the Brazilian debate occurs in an adaptation phase, when the first yields of GM corn pose many questions, but above all: Is coexistence with other modes of agriculture possible? The issue of coexistence poses a serious challenge for farmers who prefer not to plant GM crops for a variety of reasons, such as cost-benefit considerations (due to high price of the seeds and royalties or reduce agronomic performance), the exploration of a market niche, the preference for creole seeds or a political position in defense of the rights of farmers over seeds. There is thus a shift from future promises of the technology to its present results, which brings to the fore the debate on legality and reality and pose distributive questions at the fore regarding the locus of responsibility. Note that, while in Brazil the debate on regulation of GMOs is an issue on the agenda, it does not seem to be the case in Argentina, where coexistence between GM and non-GM crops and post-market surveillance of GMOs do not appear in the sample. It is as if in Argentina the decision to adopt agrobiotechnology had been done once and for all and belongs to the past.

The sample of articles from Mexican newspapers in 2009 and 2010 covers an important phase of the debate on GMOs in the country: the one preceding and following the first approvals for the experimental cultivation of GM corn, which occurred in October 2009. The debate is, in contrast to the Argentinean, future oriented: many actors claim advantages and disadvantages of the adoption of new technology, but they are evoked as a potentiality, of what would happen. At the same time, they recur to the past experience of other countries in order to justify their claims, be those for or against GMOs. So, the adoption by some is transformed in an argument to prove the benefits, the biosafety and the desirability of the new technology. By the same token, the rejection of those products in other countries is used as an argument to prove its costs, its risks to health and environment and its ethical implications. Actors that oppose GMOs also draw on the experience of other countries that adopted the technology to illustrate their claims.

It shows a moment in which "the risky decision" of the Mexican authorities to adopt or prohibit GMOs is being observed as such by all interested parties. The potential effects on economy, health and environment, ethics and politics are discussed, but the coverage of those issues varies significantly according to the source: the main narrative of *El Universal* favours the adoption of new technology, highlights economic arguments about the benefits of the new technology, but is also attentive to risk claims, which appear in some headlines, in particular the risk of contamination of native corn by GM corn. The coverage on GMOs in *El Economista* is clearly pro the adoption of the technology in Mexican agriculture, emphasizing arguments of competitiveness and food security. No room is given for claims about potential damages caused by the adoption of GMOs in Mexico. On the other hand, *La Jornada* clearly states in some editorials its position regarding GMOs: they imply economic costs, damage to health and to biodiversity and threat food security and cultural diversity.

An overview of the results of the content analysis from news articles is shown below in Table 8. There are major differences among the countries: whereas in Brazil the economic dimension is by far the most debated, in Argentina and Mexico it is the health and environment issues that are object of most interpretative disputes. Such dimension comes in second in the Brazilian sample, whereas the economic considerations are the second most emphasized meaning in claims found in the Argentinean sample. The Mexican material offers a particularity in that the ethical and political dimension of agrobiotechnology is fiercely debated, accounting for 36% of all claims, following closely the health and environmental dimension.

TABLE 8
POLITICAL CLAIMS ABOUT AGROBIOTECHNOLOGY IN NEWS MEDIA
ARTICLES 2009-2010 CLASSIFIED PER FRAME AND COUNTRY
Number of claims and percentages (in parenthesis)

Dimension	Frame	Argentina	Brazil	Mexico
Economy	Benefits	31 (24%)	30 (15%)	46 (17%)
	Costs	4 (3%)	80 (40%)	10 (4%)
	subtotal	35 (28%)	110 (55%)	56 (20%)
Health and Environment	Biosafety	21 (17%)	35 (18%)	36 (13%)
	(Bio)risk	58 (46%)	32 (16%)	83 (30%)
	subtotal	79 (62%)	67 (34%)	119 (43%)
Ethics and Politics	Progress	4 (3%)	11 (6%)	29 (11%)
	Critique	9 (7%)	11 (6%)	71 (26%)
	subtotal	13 (10%)	22 (11%)	100 (36%)
Total		127 (100%)	199 (100%)	275 (100%)

Source: Own elaboration.

In what relates to the balancing of frames in each dimension, there are also variations among countries. Whereas biotechnology is framed almost only as an economic benefit in Argentina and Mexico— with no room for "cost" frames; in Brazil, its economic costs come to the spotlight, accounting for the top way to frame biotechnology in that country (40%) outweighing by far benefit frames (15%). On the other hand, actors frame three times more the negative effects to health and environment in Argentina and in Mexico - the leading frame in each country, responding to 46% and 30% of the claims— than in Brazil, where biosafety claims outweigh (bio)risk ones. In the ethical and political dimension, critique frames more than double progress ones in Mexico and in Argentina, whereas in Brazil there is a balance between those. In Mexico, "critique" is the second top frame.

TABLE 9
CLUSTERS OF TYPES OF CLAIMS ACCORDING TO FRAMES

Benefits	Costs	Biosafety	(Bio)risk	Progress	Critique
1. Agronomic advantages	1. Reduction of agronomic advantages	1. Denying risks and assuring safety:	1. Knowledge about risks	1. Technological revolution	1. Victims of the technological revolution
2. Competitiveness in the global agriculture market	2. Economic externalities:	(i) contamination or flux of genetic material;	2. What are the risks? :	2. The solution to food security and climate change	2. Blaming the winners
3. Intellectual Property Rights (IPRs): the Argentinean exception	(i) market rejection;	(ii) pesticide use	(i) contamination or flux of genetic material;	3. Science-based decision making: no room for politics	3. Threat to food sovereignty
	(ii) demands for non-GM seeds;	2. Risks under control	(ii) risks to consumer health;		4. Not less, but more politics!
	(iii) costs of coexistence and segregation;	3. Risk and trust: if GMOs are safe, why regulate?	(iii) pesticide use		
	(iv) burden of regulation	4. Converting damage into benefits	3. Risks out of control!		
	3. Consumer rights		4. Risks and responsibility		
	4. IPRs: the Monsanto enforcement practices in Brazil				

Source: Own elaboration.

This section looks at what is to be found behind such numbers and compares the public debates of the three countries in 3 dimensions: economy (A); health and environment (B); and ethics and politics (C). The description answers the questions: How are GMOs framed?; Which actors are given

media coverage to defend their framing? The description of the qualitative results of the frame analysis clustered by the types of frames are shown in Table 9 below. They will be illustrated for each frame following the order of clustering.

A. The economic dimension

In the debate about agrobiotechnology, there are both pro and contra-arguments based on economic considerations. These have been classified under “benefits” and “costs” as ways of framing GMOs.

Economic-driven claims defending GM crops have been categorized as “benefits”. The most common type refers to claim about the agronomic advantages of biotechnology, such as: more productivity, less costs, less losses with pests, less use of pesticides, resistance to weather and soil conditions (such as draught), labor-saving farming; and more quality of GM seeds (for instance, longer shelf-life). Another type of claim emphasizing the economic benefits of GMOs is to argue that it is a crucial factor to assure competitiveness in the global agricultural market. A third type of arguments emphasizing the economic benefits of agrobiotechnology are claims about the importance of a regime of intellectual property rights (IPRs) and innovation as an legal institution that fosters innovation and guarantee the continuity of the benefits of GMOs.

Political claims that focus on the economic disadvantages of agrobiotechnology have been labeled under the frame "costs". A first cluster of such claims adopts a counter-theme to those about the agronomic advantages of GMOs. They denounce the reduction of the agronomic advantages of GM crops vis-à-vis their conventional counterparts such as: the increasing costs with pest resistance to the GM technological package and the higher prices of inputs for the GM technological package (such as the pesticides associated with GM seeds). A second cluster of claims regards the economic externalities of adopting GM crops. These include arguments about market access disadvantages of GMOs (and the exploration of market niches for non GM seeds); concerns about contamination and loss of market niches; fear of litigations from biotech companies; complains about non availability of conventional seeds and criticisms about monopolistic practices and concentration of the seeds market; concerns about costs of coexistence between GM and non-GM production, including costs of segregation in the whole chain; complains about the burden of regulations, including labeling. A third type of claim regards the debate on consumer rights to be informed and to take decisions. A fourth cluster of claims sheds light on the costs of IPRs and criticizes the system of royalties payment, offering a counter-theme to the frame of IPRs as an institution to foster the economy.

Overall results

The debate about agrobiotechnology in Brazil was in its majority concerned with economic considerations (55% of the all claims coded), notably with costs (40%). In the other two countries, economic arguments are also present, especially regarding benefits, but few actors in Argentina or Mexico framed GMOs as costs (Table 8).

In what regards the types of actors that participated in this dimension of the debate, it is not surprising to find that the majority of carriers of economic frames are “market actors” i.e. farmers and their associations, biotechnological firms and the food industry. Political authorities in Mexico are the second most active type of actors in this dimension and they always frame the economic benefits of biotechnology, whereas in Brazil and Argentina, when politicians do make claims with economic considerations, they alerted to the costs of GMOs. In those countries, media framing is the second most active in this dimension of the debate, highlighting both benefits and costs. Scientists and social movements almost do not refer to economic aspects of the issue.

1. Benefits

Benefits arguments accounted for 24, 15 and 17% of all claims in the Argentinean, Brazilian and Mexican debates, respectively (Table 8). In all three countries, market actors are by far the first to defend such arguments, accounting for the majority of benefit claims, whereas no social movement

recognizes benefits from GMOs. Media actors are especially active as proponents of the benefits of the technology in Argentina (32%), but also play some role in the other countries (13% in Brazil and 9% in Mexico). Scientists have also a saying in claiming the benefits in all three countries (3, 10 and 11%, respectively in Argentina, Brazil and Mexico). In Mexico political authorities defend more openly the economic advantages of adopting agrobiotechnology (13%), while in Brazil they have a minor (7%) participation and in Argentina, no saying about it (Table 10).

TABLE 10
POLITICAL CLAIMS ABOUT THE ECONOMIC DIMENSION OF AGROBIOTECHNOLOGY
PER TYPE OF ACTORS PER COUNTRY

Number of claims and percentages (in parenthesis)

	Argentina		Brazil		Mexico	
	Benefits	Costs	Benefits	Costs	Benefits	Costs
Political actors	0 (0)	2 (50)	2 (7)	14 (17)	6 (13)	0 (0)
Market actors	20 (65)	1 (25)	21 (70)	35 (44)	28 (61)	3 (30)
Social movt.	0 (0)	0 (0)	0 (0)	8 (10)	0 (0)	5 (50)
Scientists	1 (3)	0 (0)	3 (10)	5 (6)	5 (11)	1 (10)
Media actors	10 (32)	1 (25)	4 (13)	18 (23)	7 (15)	1 (10)
Total	31 (100)	4 (100)	30 (100)	80 (100)	46 (100)	10 (100)

Source: Own elaboration.

Arguments coded as adopting “benefits” frame will be described bellow in the following order of clusters: a) agronomic advantages; b) competitiveness in the global agricultural market and c) IPRs: the Argentinean exception.

a) Agronomic advantages

Arguments about the advantages of GMOs take specific forms in each country when narrating the aggregate effects of its adoption to the economy. In Argentina, the “technological package” that includes GM seeds is held responsible for the high increase in the agricultural production. Media framing from *El Cronista* and *La Nación* is active in defending the new technology. Below, an excerpt from the journalist Julieta Camandone, who mostly writes on agrobiotechnology in *El Cronista*, holding GM soy responsible for higher yields:

The spread of transgenic soy resistant to the herbicide glyphosate (RR) started in the early nineties, enabling a strong increase in yields. This technology, together with the technique of no-till farming, which avoids plowing the soil and improves it for cultivation, explains much of the growth in production¹⁴ (Camandone, 2009).

In the Brazilian sample, no such a narrative of a “technical revolution” in agriculture is found. Contrasting with Argentina, where the benefits of agrobiotechnology are taken for granted by its proponents and are not specified, but only mentioned in the context of the big package, actors in the Brazilian case clearly need to emphasize and compare the economic advantages of the new technology vis-à-vis the conventional seeds. The use of benefit claims is aimed at influencing the discourse about GMOs, because market decisions as well as policy regulations are evolving. This is because the first yields of GM corn were due in 2009. After the political decision to approve the product, the market decisions were the focus of attention: would farmers adopt the new technology? What were the perceived economic benefits? The debate thus is more focused on the specific agronomic benefits of

¹⁴ In the original: "A principios de los años noventa comenzó la propagación de la soja transgénica resistente al herbicida glifosato (RR), que permitió aumentar con fuerza los rendimientos, y esta tecnología, de la mano de la técnica de siembra directa, que evita el arado del suelo y mejora el piso para el cultivo, explican gran parte del crecimiento de la producción".

agrobiotechnology such as productivity, cost reduction, quality, among others. Among actors that defend their benefits are producers and their associations, consultant firms, scientists and media actors. Below, a producer and a scientist (agronomist) who approve the advantages of GM corn in comparison to conventional seeds are quoted:

Stimulated by the operational easiness of the cultivation, by the gains in productivity and by the cost reduction, the producer João Domingos, owner of Tarumã [name of his farm property], already plans to sow transgenic varieties in 90% of the 540 hectares area reserved for corn in the season 2009/2010. In his view, freed from the damage provoked by the caterpillars, the new hybrids might present from 6% to 9% higher yields than the conventional seeds, whereas the production costs were 4% lower, basically because of the reduction in pesticide use. "I will yield up to a ton more per hectare with Bt corn, which means R\$300 more per hectare", said the producer. (...) Cláudio Doro, agronomist engineer from Emater-RS [technical rural assistance entity from the federal state Rio Grande do Sul] calculates that 6,7% of the area intended for corn in the country (14.3 million hectares according to Conab [National Supply Agency]) were sown with transgenic seeds in this season (...). According to him, in the experiments conducted in Passo Fundo, the productivity of Bt corn was up to 14% higher than in the conventional varieties.¹⁵ (Valor Econômico, 2009b).

Also in Mexico, agronomic benefits specifically associated with GMOs are quoted by actors trying to influence the debate and the policy, since the political decision to approve or reject GM corn has not been taken. Contrasting to the data from Argentina and Brazil, arguments in Mexico are always future-oriented (prognostics of higher yields, less losses with pest control and draught) or deduced from experiences of other countries, in particular Argentina, Brazil and USA, in the defence of the need for Mexico to catch up in competitiveness with other countries. Many market actors, such as associations of producers, biotechnological firms and their associations (especially Agrobio Mexico) argue for the increased yields to be expected. Actors argue that Mexico has a special need to increase productivity, and GMOs would be the solution that would decrease the country's reliance on imports,¹⁶ as can be seen in the quote from the director of Agrobio:

"The difference in the average productivity that can be achieved between a biotechnological and a conventional corn will vary between 10 and 20%, and, if we say it will spread in the most productive states, then in three years we could reduce imports, because we would have 5 million tons more grains and we would reach 29 million tons of annual production", explained Sallamanca¹⁷ (Martínez, 2010).

Among the multinational biotech firms, Monsanto is the most quoted in all countries as an advocate of the economic benefits of the GMOs. Below a quote from the Monsanto representative for Latin America summarizes the argument about the many agronomic advantages of the technology:

The company adopted as its own moto the commitment to double yields in the production of corn, soy and cotton by 2030, maximizing efficiency in the use of resources by means of genetic

¹⁵ In the original: "Estimulado pelas facilidades operacionais do cultivo, pelo ganho de produtividade e pela redução de custos, o produtor João Domingos, dono da Tarumã, já pretende plantar 90% da área de 540 hectares que será destinada ao milho na safra 2009/10 com variedades transgênicas. De acordo com ele, livres dos danos provocados pelas lagartas os novos híbridos devem apresentar rendimento de 6% a 9% maior do que os convencionais, enquanto os custos de produção foram 4% menores, graças basicamente à redução na aplicação de inseticidas. "Vou colher até uma tonelada a mais por hectare com o milho Bt, o que significa R\$ 300 a mais por hectare", disse o produtor. (...) Cláudio Doro, engenheiro agrônomo da Emater-RS, calcula que 6,7% da área de milho no país (de 14,3 milhões de hectares, segundo a Conab) foram plantadas com sementes transgênicas nesta safra. (...) De acordo com ele, em experimentos feitos em Passo Fundo a produtividade do milho Bt ficou até 14% mais alta do que a das variedades convencionais."

¹⁶ Some actors imply that the country imports corn from USA due to the higher productivity of the GM corn adopted there, but do not take into account other factors that might account for the competitiveness of corn from USA (for instance, subsidies, infra-structure, etc).

¹⁷ In the original: "La productividad promedio que se puede dar entre un maíz biotecnológico y un convencional variará entre 10 y 20%, y hablamos que se generalice en los estados más productivos, entonces en tres años podríamos reducir las importaciones porque se tendrían 5 millones de toneladas más de grano y llegaríamos a 29 millones de toneladas de producción anuales", detalló Salamanca.

improvement, biotechnology and agronomic practices suited to each environment. Thus, for instance, the first soybean technology developed for South America, Bt-RR2Y in soy, composed by two joined transgenic traits, has demonstrated higher yields in the order of 7.1 to 11% in comparison to the first generation. In addition, it developed Genuity VT Triple Pro, a new technology in corn that maximizes yields through a bigger protection against insects that attack that plant in the air and subsoil, and conferring tolerance to the herbicide Roundup. At the same time, it is researching and developing new biotechnological traits such as tolerance to drought, to cold, efficient use of nitrogene and higher yields.¹⁸ (El Cronista Comercial, 2010).

b) Competitiveness in the international agriculture market

The media tends to cover the launching of new products, occasions in which the purported advantages of biotechnology are advertised. When national firms are involved, such events are portrayed as bringing the country to join the club of exports of biotechnological inventions, not only of crops. In Argentina, a gen resistant to draught developed by Bioceres, together with national universities and research institutes, was announced as the national biotech export product:

The biotechnological firm Bioceres discovered, together with the Universidad del Litoral and Conicet [National Council of Scientific and Technical Research], a gene resistant to drought that was converted into the first biotechnological product for agriculture exported from Argentina.¹⁹ (El Cronista Comercial, 2009).

In Brazil, when the development of the first GM sugar cane was announced, it was explained that the national firms provide their genetic material, while bioengineering is made by multinationals. Nevertheless, the country is the one that brings the new product to the world market:

Brazil shall launch in the market, in five years, the first transgenic sugarcane in the world. (...) After years of research, the recent partnership foirmed between the center funded by the main sugar factories [CTC Center for Sugarcane Technology] and three multinationals from crop protection industry - Basf, Bayer and Dow Chemicals - will bring the transgenic sugar cane into market. According to Andrade [Director from CTC], CTC will provide a large database of genetic material, whereas the firms will bring in their accumulated research in transgenics to the development of the products. They will also conduct the toxicological studies²⁰ (Freitas, T. 2010).

Mexican politicians watch such developments and claim that Mexico is “delayed” to enter the club of successful players in the international agrarian market. The Secretary of Agriculture Alberto Cárdenas Jiménez is especially active in trying to influence the adoption of the new technology, for instance, mentioning that “We entered into a cutting-edge issue and Mexico can not be left behind”²¹ (Martinez, 2009b).

¹⁸ In the original: “La empresa asumió por motus propio el compromiso de duplicar los rendimientos en los cultivos de maíz, soja y algodón para el 2030, maximizando la eficiencia en la utilización de recursos de la mano del mejoramiento genético, la biotecnología y las prácticas agronómicas adecuadas a cada ambiente. Así, por ejemplo, la primera tecnología en soja que desarrolló para Sudamérica, la Bt-RR2Y en soja, compuesta por dos eventos transgénicos acumulados, ha demostrado aumentos de rendimiento en el orden del 7,1 al 11% en comparación a la primera generación. Además desarrolló la Genuity VT Triple Pro, una nueva tecnología en maíz que maximiza los rendimientos a través de una mayor protección contra insectos que atacan la planta en la parte aérea, subterránea y confiriendo tolerancia al herbicida Roundup. En paralelo, está investigando y desarrollando nuevos eventos biotecnológicos como tolerancia a la sequía, al frío, uso eficiente del nitrógeno y mejoramiento del rinde.”

¹⁹ In the original: “La empresa de biotecnología Bioceres descubrió, junto con la Universidad del Litoral y el Conicet, un gen resistente a la sequía que se convirtió en el primer producto biotecnológico para el campo exportado desde la Argentina”.

²⁰ In the original: “O Brasil deve levar a mercado, em cinco anos, a primeira cana-de-açúcar transgênica do mundo. (...) Após anos de pesquisa, a recente parceria firmada entre o centro financiado pelas principais usinas do país [CTC (Centro de Tecnologia Canavieira)] e três multinacionais da indústria de defensivos agrícolas -BASF, Bayer e Dow Chemicals- levará a cana transgênica ao mercado. Segundo Andrade, o CTC vai disponibilizar um amplo banco de material genético, enquanto as empresas trarão seu histórico de pesquisas em transgênicos para o desenvolvimento das variedades. Elas também farão os estudos toxicológicos”.

²¹ In the original: “Entramos de lleno a un tema de vanguardia y México no puede quedarse”.

The Chief of Sagarpa [Secretary of Agriculture] said that there was no turning back from starting with cultivating these crops, therefore they will concentrate on making up for the lost time, as Mexico is ranked 13th in the production of transgenic crops, after more than a decade since the introduction of the technology²² (Martinez, 2009c).

As in the cases of Argentina and Brazil, media framing in Mexico shows a clear preference for framing GMOs as beneficial to the economy and argue that Mexico is lagging behind other countries that adopted GMOs. This is true for both *El Economista* and *El Universal*. But the narrative of “delay” in innovation is not restricted to Mexico. Multinational firms always portray their activities in each country as crucial for its competitiveness, often in comparison to the other countries leaders in the use of agrobiotechnology, which are used as benchmarks. For instance, in Brazil, Monsanto promises to invest in local research and development to accelerate innovation and catch up with the USA:

The goal, according to André Dias, president of the company in the country, is to expand investments to "skip generations" and make Brazil match the USA in the development of the technology within three years. Only this year the firm received authorization to launch a product in the country that has existed for 12 years in the USA. "We are catching up"²³ (Freitas, 2009).

In Mexico, Monsanto states its plans to invest and be a big player, again referring to the narrative of “catching up” with other countries:

"Mexico is a step behind in this process, since in El Salvador they already had the first harvest of GM corn and the first results delivered a increase by 15% in productivity and a reduction by 10% in the production costs, i.e. there is an economy of 546 dollars por hectare". Mentioning that each experimental cultivation area can cost up to \$20,000, he insisted that Mexico will experiment with the latest technologies; "our goal is that this process will not be further delayed", and, if it goes on as foreseen by the steps provided for by the law, the first commercial cultivation may start in the end of 2011²⁴ (Perez, 2009d).

c) Intellectual Property Rights (IPRs): the Argentinean exception

The same enthusiasm from Monsanto is not found in the relationship of the company with Argentina. While the overall argumentation of Monsanto – and other market actors - for the benefits of GMOs is very similar in all three countries, the firm has a special claim in Argentina: its demand on the government for a strong regime of intellectual property rights. Monsanto warns that Argentinean producers will be deprived of new products and lose the opportunities seized by countries where IPRs are respected, for instance, Brazil and Paraguay:

In Brazil and Paraguay, in turn, Monsanto do sell soybean seeds because the charge of royalties for the biotechnology (what the firm receives) is applied to the grains, i.e. at the end of the process, and not at the moment of purchasing seeds. This allows a much higher return to the firm. For this reason, in these countries there is a variety of soybean under regulatory evaluation that advances two steps forward in comparison to the technology used in Argentina. It is the soybean BT RR2. At the same time, the firm assures that they look forward to a regulatory framework that enables them to

²² In the original: " El titular de la Sagarpa dijo que no hay marcha atrás para iniciar con la siembra de estos cultivos, por lo que se enfocarán a recuperar el tiempo perdido, en donde México está en el lugar 13 en la producción de transgénicos después de que esta tecnología lleva más de una década".

²³ In the original: "A meta, segundo André Dias, presidente da empresa no país, é ampliar os investimentos para "pular gerações" e fazer com que dentro de três anos o Brasil se equipare aos EUA no desenvolvimento da biotecnologia. Só neste ano a empresa conseguiu aprovação para lançar no país um produto que já existe há 12 anos nos EUA. "Estamos recuperando o atraso."".

²⁴ In the original: ""México va un paso atrás en ese proceso, pues en El Salvador ya se obtuvieron las primeras cosechas de maíz OGM y los primeros resultados arrojan un increment de 15% en la productividad y una reducción de 10% en los costos de producción, es decir hay un ahorro de 546 dólares por hectárea". Al mencionar que cada área de experimentación puede llegar a costar hasta 20 mil dólares, insistió en que en México se experimentará con tecnologías de vanguardia; "lo que pretendemos es que no se retrase más dicho proceso", pues de continuar bajo el esquema previsto por la ley, a finales de 2011 podrían iniciarse las primeras siembras comerciales".

*bring the new soybean technology to the Argentinean market, the third biggest world producer of the grain*²⁵ (Camandone, 2010a).

In the words of the spokesperson of the company:

*Notwithstanding the inexistence of a legal framework at the local level that allows for the charge of royalties, Monsanto stated that it will keep striving to find a solution that permits it to bring the launchings to the country. "We will continue working together with the seed industry to develop a plataform that enables us to launch new soybean technologies in the country so that the Argentinean farmers can experience the same benefits as other farmers around the world", said a source from the company*²⁶ (Colombres, 2010).

Monsanto is not alone in this demand. National agrobiotechnological and seed firms such as Satus Ager (Camandone, 2010b) and agro-chambers and associations (La Nación, 2009a) also defend that the benefits from agrobiotechnology are dependent upon the payment and enforcement of royalties. They subscribe to the view that innovation needs a IPRs regime. Also media framing promptly amplify such demands for a strong enforcement of IPRs, as becomes clear in the headlines and subheadlines from El Cronista, or in the news from La Nación bellow:

*Due to the informality of the soybean market in the country, the North-American multinational now leads the corn seeds market and, in Brazil and in Paraguay, the soybean seeds market*²⁷. (Camandone, 2010a).

*The issue of intellectual property acquired urgency for another reason. In 2012, Brazil will launch a new soybean resistant to glyphosate and to insects, which is not yet present in the country. Unlike Argentina, Brazil already has a mechanism for recognizing intellectual property. The fear is that this soy gets smuggled into Argentina. In 1996, when transgenic soy was approved here, it soon was smuggled into Brazil and was sown in many regions in the South. There it was called "soy Maradona", because of its small size and its robustness. Not few fear that it will now arrive, with the soybean to be launched in Brazil, the "Ronaldinho or Ronaldo soy"*²⁸ (La Nación, 2010).

Therefore, in Argentina, the importance of a IPRs regime applied to seeds are especially praised and the debate about negotiations to establish such a regime is a context in which the benefits of GMOs are constantly evoked by actors to justify their demand. Using the same narrative as in Mexico, actors in the Argentinean debate compare the country with others fearing that it is lagging behind. But the context is different: while in Mexico GMOs have not been given the green light and this is the object of demand, in Argentina, the issue is the absence of enforcement for IPRs. Fearing that it will

²⁵ In the original: "En Brasil y Paraguay, en cambio, Monsanto sí vende semillas de soja porque el cobro de la regalía por biotecnología (lo que aporta la firma) se hace sobre el grano, es decir, al final del proceso, y no en el momento de comprar la semilla. Esto permite un retorno mucho mayor para la empresa. Por eso en estos dos países está en proceso de aprobación una semilla de soja que avanza dos pasos respecto de la tecnología con que se siembra en la Argentina. Se trata de la soja BT RR2. Desde la empresa, al mismo tiempo, aseguran que esperan un marco regulatorio que les permita traer la nueva tecnología para la soja al mercado argentino, tercer productor mundial del grano".

²⁶ In the original: "Pese a que a nivel local aún no hay un marco legal claro que habilite el cobro de las regalías, Monsanto aclaró que seguirá trabajando para encontrar una solución que le permita hacer nuevos lanzamientos en el país. "Continuaremos trabajando en conjunto con la industria de semillas para desarrollar una plataforma que permita lanzar nuevas tecnologías en soja en el país para que los productores argentinos puedan experimentar los mismos beneficios que otros agricultores alrededor del mundo", dijo una fuente de la empresa".

²⁷ In the original: "Por la informalidad del mercado de la soja en el país, la multinacional norteamericana lidera ahora las ventas de semillas de maíz y apunta a la oleaginosa en Brasil y Paraguay".

²⁸ In the original: "El tema de la propiedad intelectual adquirió cierta urgencia por otro motivo. En 2012, en Brasil, se lanzará una nueva soja resistente al glifosato y a insectos, que todavía no está en el país. A diferencia de la Argentina, en Brasil ya se resolvió un mecanismo de reconocimiento de la propiedad intelectual. El temor es que sin acuerdo en la Argentina esa soja ingrese de contrabando. En 1996, cuando se aprobó la soja transgénica aquí, luego fue de contrabando a Brasil y se sembró en varias regiones del Sur. Allí la bautizaron "soja Maradona", por su porte petisa y robusta. No pocos temen que ahora ingrese, con la soja que va a salir en Brasil, la "soja Ronaldinho o Ronaldo".

jeopardize the ability of biotechnological firms to profit from its wide adoption and from farmers to have the latest launchings at their disposal, the demand is for regulation. Thus, another type of argument about the benefits of GMOs appears in this debate: their dependence on a legal regime that protects intellectual property rights. In this case, the IPRs are seen as a legal institution beneficial to the economy.

2. Costs

Claims about costs of GMOs basically only appeared in the Brazilian debate, where they were the leading frame of the public debate on agrobiotechnology. Both in Argentina and Mexico they comprised only 3% of all claims (Table 8). Therefore, this section only briefly describes the costs arguments in these two countries, but concentrates on the Brazilian sample. There, all types of actors participate in the debate emphasizing the costs that GMOs would imply in many regards. Market actors were the most concerned with the economic disadvantages of the new technology (44%), followed by media actors (22%) and by political authorities (17%). Social movements and scientists have a relative minor participation, but are also present (Table 10). These claims will be described in the following clusters: (a) reduction of agronomic advantages; (b) economic externalities; (c) consumer rights and (d) costs of IPRs.

a) Reduction of agronomic advantages

Claims about the reduction of the relative agronomic advantages of GMOs in relation to non GM shed light on a number of issues: decrease in productivity, including costs of pest resistance, costs of use of pesticide. In the Mexican material, scientists from del Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), social movements grouped in the campaign against GMOs, peasants associations such as Unión Nacional de Organizaciones Regionales Campesinas Autónomas (Unorca) and other activists such as a Canadian farmer victim of a litigation from Monsanto, argued against almost all purported²⁹ economic benefits of GMOs. They adverted for the higher costs of production due to seed prices and costs with pesticides and pest resistance to GMOs; risks of contamination and of legal action from biotech firms; the problem of unavailability of non-GM seeds in the market. Greenpeace Mexico is especially active in the campaign against GMOs and published a study about its costs, as reported by El Universal:

Zero increase in productivity, null profit, additional costs, higher use of agrochemicals, crop failures and difficulty for commercializing its production, these are some of the heavy costs caused by the sowing of transgenic seeds in countries that bet on those crops, affirmed the organization Greenpeace Mexico. In their report "Transgenic crops: zero profits" presented this Monday, the organization explained that it documented, "for first time", specific cases in which transgenic crops have had high costs for the different sectors involved in the food chain (El Universal, 2010a).

Although such arguments could be read as speaking against biotechnology, they have also been employed by market actors who defend the use of GMOs and want to continue with its use. In Brazil, farmers start to question the relative economic advantages of GM seeds, among other reasons, because of the costs of royalties:

At the beginning, the great argument in favor of transgenic soy was the reduction of total costs, which in 2003/2004 were 9.8% lower than those of non-GM crops, says the advisor from the State Federation of Agricultural Cooperatives (Fecoagro), Tarcísio Minetto. Today, this difference dropped

²⁹ In the original: "Cero incremento de la productividad, ganancias nulas, costos adicionales, mayor uso de agroquímicos, cosechas perdidas y dificultad para comercializar su producción, son algunos de los gravosos costos ocasionados por la siembra de semillas transgénicas en países que le apostaron a dicho cultivo, aseguró la organización Greenpeace México. En su informe "Cultivos transgénicos: cero ganancias" presentado este lunes, el colectivo explicó que documentó, "por primera ocasión", casos específicos en los que los cultivos transgénicos han tenido elevados costos para los diferentes sectores involucrados en la cadena alimentaria".

to 2% to 3%, and, moreover, producers even fight in court not to pay Monsanto the royalties of 2% over the yields resulting from multiplying their own seeds³⁰ (Valor Econômico, 2009a).

Also, both biotech firms³¹ and Embrapa have recognized that there were costs of pest resistance.³² But most claims of this type were from producers complaining about the prices of pesticides associated with the use of GM seeds. While glyphosate was the object of a controversy in Argentina regarding its toxicity, in Brazil, the main node of controversy was the prices of the product. The impact of higher prices becomes acute because of its wide use, leading to its “commoditification”, which, according to Nortox, a national firm that supplies glyphosate in Brazil, is due to the widespread adoption of GM seeds:

Nortox S.A., a firm from the State of Paraná, filled on Friday a petition at the Ministry of Development for the revocation of the 2.1% surcharge applied to glyphosate imported from China. (...) Nortox pleads that prices returned to the historical average of \$3.70 recorded in the last decade, as glyphosate became a "commodity" due to the diffusion of transgenic seeds³³ (Zanatta, 2010c).

The targets of the claims were both Monsanto and the government. The latter was demanded to end with anti-dumping measures attending the interests of Monsanto against the imports of cheaper glyphosate imported from China. But there was differentiation inside the government: the Ministry of Development, Industry and Foreign Trade (as Secretariat for Camex) was the demanded party, whereas other political actors, such as the Ministry of Agriculture and legislative actors were supporters of producers:

Last week, Congressmen representing the rural sector entered into the fight to defend their political base, the largest consumer of pesticides. The Agriculture Commission of the Representatives House approved an invitation of the Ministers from Camex to explain the antidumping. According to representative Luis Carlos Heinze (PP-RS), Monsanto holds 70% of domestic production because it imports from its industries in Argentina and the USA the same Chinese glyphosate that it tries to impede entering Brazil. The internal market consumes 280 million liters glyphosate annually and Monsanto produces less than 100 million, he said³⁴ (Zanatta, 2010c).

The battle over the raw material used in the manufacture of pesticides has generated disputes in the backstage opposing producers, rural Congressmen and the national industry against the North-American multinational Monsanto³⁵ (Zanatta, 2010b).

³⁰ In the original: "No início, o grande argumento em favor da soja transgênica era a redução dos custos totais, que em 2003/04 eram 9,8% inferiores aos das lavouras não-transgênicas, afirma o assessor da Federação das Cooperativas Agropecuárias do Estado (Fecoagro), Tarcísio Minetto. Hoje essa diferença caiu para 2% a 3% e os produtores ainda brigam na Justiça para não pagar para a Monsanto royalties de 2% sobre a safra obtida a partir da multiplicação própria de sementes".

³¹ These started requiring from producers to expand "refuge areas" to avoid pest resistance (Zafalon, 2009a).

³² At a public hearing about GM rice on March 2009 (Zanatta, 2009d).

³³ In the original: "A paranaense Nortox S.A protocolou no Ministério do Desenvolvimento, na sexta-feira, um pedido de extinção da sobretaxa de 2,1% aplicada nas importações de glifosato originário da China. (...) A Nortox alega que os preços voltaram à média histórica de US\$ 3,70 registrada na última década, já que o glifosato tornou-se uma "commodity" em razão da disseminação das sementes transgênicas".

³⁴ In the original "Semana passada, a bancada ruralista entrou na briga para defender sua base política, a maior consumidora de agrotóxicos. A Comissão de Agricultura da Câmara aprovou convite aos ministros da Camex para explicar o antidumping. A Monsanto, segundo o deputado Luis Carlos Heinze (PP-RS), detém 70% da produção doméstica porque importa de suas fábricas na Argentina e EUA o mesmo glifosato chinês que tenta impedir de entrar no Brasil. O mercado interno consome 280 milhões de litros anuais de glifosato e a Monsanto produz menos de 100 milhões, diz".

³⁵ In the original: "A trava sobre a matéria-prima usada na fabricação de agrotóxicos tem gerado disputas de bastidores que opõe produtores, parlamentares ruralistas e indústrias nacionais contra a multinacional americana Monsanto".

b) Economic externalities

Economic externalities are the framing of costs that are not taken into account by those who are emphasizing the economic benefits of GM crops. They will be described in four categories: market rejection; demands for non-GM seeds; costs of segregation and coexistence; burden of regulation. The first type of claim makes visible the other side of the food chain, establishing a connection between the producer and the consumer. Such claims frame the decision to adopt agrobiotechnology in agriculture as depended upon the consumer's approval. Thus, concerns about the market rejection of GMOs, the option for non-GMOs as a market niche and the fear of risk of contamination and loss of this market niche have been coded as adopting a "cost" frame.

Market rejection

All claims coded as costs in the Argentina debate are related to the same events and to the costs of market rejection of GMOs: the Russian rejection to import GM soy from Argentina because it was not approved in the country. In Brazil, rice producers feared market rejection of GM rice, due to the precedent of the contamination of GM rice in the US which led to major losses from producers. While such fears were dissipated when GM rice was not approved, corn and soy producers - specially Abrange, an association of non-GM producers³⁶ - remain afraid of losing their market niche due to contamination with GM products.

Gebana Brazil, a Swiss trading that buys and negotiates contracts in Europe, has refused the production of many farmers from the region due to contamination by genetically modified grains. The contamination occurs for various reasons, ranging from the use of a machine that has not been cleaned properly to the dust produced in the harvest of a neighbour using transgenic crops. For the small farmers from Parana, this type of contract is very important. Without scales of production, these contracts for supplying organic soy and corn guarantee them a higher remuneration per ton. "The price paid for a ton of organic grains can be between 15% and 20% higher than the price negotiated in offers for conventional corn and soy", says Eduardo Mattioli Rizzi, manager from the Agriculture Department from Gebana Brasil³⁷ (Brito, 2009c).

Demands for non-GM seeds

Another type of claim that refers to externalities of the adoption of agrobiotechnology includes demands for conventional seeds as well as criticisms on non-availability of such seeds. They deal with the option to decide what to plant and let market actors compare their relative benefits.

The quick spread of transgenic soy in Mato Grosso made the producers look for new alternatives not to lose the supply of this variety. The transgenic soy, due to the increasing activity of multinationals, already responds for 60% of the total seeds offered in the State. Three years ago it was only 20%. Aprosoja (association of producers), Embrapa Soja, Abrange (which assembles producers and processors from non-transgenic grains) and Aprosmat (comprising seed producers) will meet today in Cuiabá to settle details of a program that will promote conventional seeds in the State. (...) The aim of this program is to "strengthen and maintain the cultivation of conventional soy", says Luiz Nery Ribas, technical manager from Aprosoja, entity that gathers producers from the State. He makes it clear, however, that Aprosoja is not against transgenic soy, but the producers have the right to opt for the variety they want to plant³⁸ (Zafalon, 2010).

³⁶ There were also counter-arguments for those claims from the President of CTNBio (Zanatta, 2010f).

³⁷ In the original: "A Gebana Brasil, trading suíça que compra e negocia contratos na Europa, tem recusado a produção de muitos produtores da região devido à contaminação por grãos geneticamente modificados. A contaminação ocorre por vários motivos, desde o uso de uma máquina que não tenha sido completamente limpa até a poeira produzida na colheita de um vizinho com lavoura transgênica. Para os pequenos produtores do Paraná, esse tipo de contrato é muito importante. Sem escala de produção, esses contratos para fornecimento de soja e milho orgânicos lhes garantem remuneração maior por tonelada. "O preço pago por uma tonelada de grãos orgânicos chega a ser entre 15% e 20% maior que o negociado em ofertas de milho ou soja convencionais", afirma Eduardo Mattioli Rizzi, gerente do Departamento Agrícola da Gebana Brasil".

³⁸ In the original: "O avanço rápido da soja transgênica em Mato Grosso fez os produtores buscarem novas alternativas para não perderem o fornecimento dessa variedade. A soja transgênica, devido à atuação cada vez

Again, Monsanto is a target of claim, being accused of monopolistic practices in selling seeds:

The firm has been the target of accusations and lawsuits from producers, who claim there is illegal charge of royalties and restrictions for the production of conventional seeds in the contracts between Monsanto and the "sementeiros" - responsible for multiplying their own grains for planting. "We are not against the technology RR. What we are worried about is monopoly, which restricts the right of the producer to make his choices", says Gláuber Silveira da Silva, president from Aprosoja (Association of Soy Producers) from MT [State of Mato Grosso]. He affirms that, in the contracts to multiply seeds, Monsanto requires that the "sementeiro" occupies 85% from his production with transgenic soy and leaves only 15% for conventional varieties. Monsanto denies making such requirements. In order to avoid restrictions on non-transgenic seeds, Aprosoja signed an agreement with Embrapa (Brazilian Agricultural Research Corporation) to develop conventional varieties in 18 cities in the west of Mato Grosso, according to Silva. He, who farms 3.000 hectares with conventional seeds, states: "There is a world market for conventional soy and we cannot be left out"³⁹ (Maschio, 2009).

Costs of coexistence and segregation

Another cluster about the economic externalities of agrobiotechnology relates to costs of coexistence and segregation. It was the occasion of the first yields of GM corn in 2009 that posed the issue of coexistence on the agenda and triggered the whole exchange of arguments regarding who was going to pay the costs of it. Folha de São Paulo clearly used its power to set the agenda about the rules for coexistence. On May 10th 2009, it published an investigative journalistic work resulting in a series of articles published together with the following headlines:

- The country loses control over GMOs
- Control is a unnecessary luxury, says government
- For Ministry, rule does not avoid contamination
- Producers discard segregation
- Test does not guarantee that food is 100% free from GMOs
- Veto: transgenic corn authorized in Brazil was prohibited in Germany
- Analysis: Pressure from farmers liberalized GMOs
- Producer loses two contracts because of contamination

The articles indicate that the issue of coexistence is related to other ones (such as market rejection of GMOs and consumer rights) and affect a varied spectrum from actors in all food chain.

maior das multinacionais, já atinge 60% do total de sementes ofertadas no Estado. Há três anos era de apenas 20%. Aprosoja (associação de produtores), Embrapa Soja, Abrange (que reúne produtores e processadores de grãos não transgênicos) e Aprosmat (que reúne produtores de sementes) se reúnem hoje em Cuiabá para acertar detalhes de um programa que dará força à semente convencional no Estado. (...) O objetivo desse programa é o de "fortalecer e manter o plantio da soja convencional", diz Luiz Nery Ribas, gerente técnico da Aprosoja, entidade que reúne produtores do Estado. Ele deixa claro, no entanto, que a Aprosoja não é contra a soja transgênica, mas os produtores têm o direito de optar pela variedade que desejam plantar".

³⁹ In the original: "A empresa tem sido alvo de acusações e ações judiciais de produtores, que dizem haver cobrança ilegal de royalties e restrições para a produção de sementes convencionais nos contratos entre a Monsanto e os sementeiros -responsáveis por multiplicar os grãos próprios para o plantio. "Não somos contra a tecnologia RR. Estamos preocupados é com o monopólio, que restringe o direito de o produtor fazer sua escolha", diz Gláuber Silveira da Silva, presidente da Aprosoja (Associação dos Produtores de Soja) de MT. Ele afirma que, nos contratos de multiplicação de sementes, a Monsanto exige que o sementeiro ocupe 85% de suas lavouras para produzir sementes de soja transgênica e somente 15% para variedades convencionais. A Monsanto nega que faça essa exigência. Para evitar a restrição de sementes não transgênicas, a Aprosoja firmou convênio com a Embrapa (Empresa Brasileira de Pesquisa Agropecuária) para desenvolver variedades convencionais em 18 municípios do oeste de Mato Grosso, de acordo com Silva. "Existe um mercado mundial para a soja convencional e não podemos ficar fora", afirma ele, que cultiva 3.000 hectares de soja convencional".

While political actors are demanded to play a role in enforcement (and ensure it does happen), producers concede they are not segregating production nor have the material conditions to do it; the food industry complains for being forced to assume responsibilities that are not theirs and consumers have their right to knowledge jeopardized.

Burden of regulation

The series of articles published by Folha de São Paulo on May 10th 2009 may frame the issue in terms of costs for producers may lose contracts, and as a threat to the right of coexistence and the right of information to consumers. However, it appears that the aim of the media actor is rather to criticize the government for lack of control and then to advance an agenda for more flexible rules, freeing private actors from the costs of complying with their duties.⁴⁰ The food industry joins the battle against regulation, concerned with the cost of segregation, and also positioning themselves against the national rules for labeling and post-market surveillance.

In a letter to the commission responsible for the analysis and approval of genetically modified organisms, Abia (Brazilian Association of Food Industry) argued that such monitoring would be "unfeasible"⁴¹ (Salomon, 2009).

The claims from the industry to CTNBio do not fall on deaf ears, on the contrary: they find in the President of that commission wide amplification: he stands out in the sample as the fiercest defender of deregulation of GMOs in Brazil. Bellow, a quotation where he states economic reasons for cutting off post market surveillance.⁴²

In defense of the modification, Walter Colli reaffirms the autonomy of CTNBio. "I understand the suspicion, but it is silliness. This harms the whole industry. I have support and a legal opinion from the Ministry of Science and Technology. I am not doing it because Canada complained. Abia [Brazilian Association of Food Industry] has already sent a letter to the Minister about it", he says. Colli affirms that "this resolution has always bothered me" and he admits that the current rule has only been created because the process of commercial liberalization started requiring "monitoring" of the approvals, due to an initiative from the Public Attorney. "Otherwise we could not liberate". Colli states that the regulation "is wrong" and that it "gives responsibility to who has no duty and it interferes in the chain where we have no right to do so". "It does not stand judicial review"⁴³ (Zanatta, 2009a).

⁴⁰ This becomes clear in an Editorial published two days later (Folha de São Paulo, 2009d). After criticizing the government for GMOs being "out of control" in the country, the media actor concludes that control is not possible and, as illegality is abominable, the regulatory framework should be modified. GMOs are framed as safe and bringing many benefits.

⁴¹ In the original: "Em carta dirigida à comissão responsável pela análise e pela liberação de organismos geneticamente modificados, a Abia (Associação Brasileira das Indústrias da Alimentação) argumentou que tal monitoramento seria "inexequível"".

⁴² But he also defends simplifying overall approval rules, based on the argument that the risk assessment that has been made to approve the product is enough and no further control is needed (such claims will be analysed in the dimension of health and environment). However, in December 2009, when the President of CTNBio states that the post-market surveillance rules are rubbish, Folha de São Paulo reacted in a disapproving way: "In Brazil, the law is in force but is not enforced. This has been the regulatory pattern on GMOs in Brazil. Under pressure from adversaries of the technology and from part of the public opinion, the CTNBio creates innocuous rules that are later revoked. The end of monitoring, as demanded by the food industry, is justifiable. By speak of "rubbish", however, the president of CTNBio disqualifies the previous work from that body and awake unnecessary suspicion about the independency of the commission in face of the industry's interests" (Folha de São Paulo, 2009b).

⁴³ In the original: "Em defesa da alteração, Walter Colli reafirma a autonomia da CTNBio. "Entendo a desconfiança, mas é bobagem. Isso prejudica toda a indústria. Tenho suporte e um parecer jurídico do Ministério da Ciência e Tecnologia. Não estou fazendo porque o Canadá reclamou. A Abia [associação da indústria de alimentos] já mandou carta para o ministro sobre isso", afirma. Colli diz que "essa resolução sempre me incomodou" e admite que a atual regra só foi criada porque o processo de liberações comerciais de transgênicos passou a exigir, por iniciativa do Ministério Público, "monitoramento" das aprovações. "Senão não poderia liberar". Colli afirma que a resolução "está errada" e que "dá responsabilidade a quem não tem obrigação, interfere na cadeia onde não temos direito". "Isso cai em qualquer instância da Justiça"".

c) Consumer rights

After the lost battle in which GMOs were approved in Brazil, social movement organizations for the defense of consumer rights keep fighting for the right of information as a basis for consumer to decide what to eat.

IDEC (Brazilian Institute for Consumer Defense) and the FNECDC (National Forum of Organizations for Consumer Rights) sent a letter, on May 7th, to the Ministry of Agriculture, in which they demand immediate measures regarding the lack of inspection in the cultivation of GMOs in all stages of the production chain, including the sector of poultry and bovine meat. (...) Depending on the answer received, it may serve as basis for the institution entering a new representation to the Public Attorney, which is already ahead of four lawsuits requiring compliance with labeling rules⁴⁴ (Brito, 2009b).

Also in Mexico opponents of GMOs framed their resistance in an economic fashion, for instance, Greenpeace Mexico when it entered with a denounce at the Interamerican Commission of Human Rights arguing that producers and consumer rights were disrespected by the Mexican government in their right to know (El Universal, 2010c).

d) IPRs: the Monsanto enforcement practices in Brazil

While in Argentina farmers and biotechnological firms demand the government a legal framework for the enforcement of IPRs, Monsanto in Brazil has developed a system to ensure the payment of royalties, explained below in the article from Folha de São Paulo:

In order to guarantee the payment of royalties by the Brazilian farmers, Monsanto had to diversify the collection system for the technology of transgenic soy. The Brazilian legislation that allows the producer to 'save' grains harvested to use as seeds in the following season made the multinational create a mix system. If the producer does not buy the certified seed produced by authorized sementeiros [seed multipliers] —who issue notes for charging royalties— he has to pay for the non-authorized use of the technology at the moment of marketing the product. Those who buy authorized seeds pay from R\$0,42 to R\$0,45 per kilo and receives a virtual credit to commercialize from 61 to 74 kg —varying from State to State— of soybeans after harvest. The farmers who opted to "save" grains to use as seeds have to declare to the buyers that the product is transgenic. When he delivers it, he pays 2% of the value to Monsanto. If he does not declare that the soy is RR [Roundup Ready, patented product from Monsanto], the buyers, who have contracts with Monsanto, make a test⁴⁵ (Folha de São Paulo, 2009a).

However, far from satisfying all, some Brazilian farmers are denouncing it as illegal and unfair, without putting into question their choice for GMOs and their agreement that royalties must be paid for the purchase of seeds. What they contest is Monsanto's system to control the commercialization

⁴⁴ In the original: "O Idec (Instituto de Defesa do Consumidor) e o FNECDC (Fórum Nacional das Entidades Cíveis de Defesa do Consumidor) encaminharam no último dia 7 carta ao ministro da Agricultura, Reinhold Stephanes, na qual cobram medidas imediatas em relação à falta de fiscalização da produção transgênica em todas as etapas da cadeia produtiva, incluindo o setor de carnes de frango e suína. (...) A depender das respostas, o conteúdo pode embasar nova representação da instituição ao Ministério Público Federal, que já está à frente de quatro ações que pedem cumprimento das regras de rotulagem".

⁴⁵ In the original: "Para garantir o pagamento de royalties por parte dos produtores brasileiros, a Monsanto teve de diversificar o sistema de cobrança pela tecnologia da soja transgênica. A legislação do Brasil, que permite que o produtor "salve" grãos colhidos para usar como sementes na safra seguinte, fez com que a multinacional criasse um sistema misto. Caso o produtor não compre a semente certificada produzida por sementeiros autorizados -que emitem boletos de cobrança de royalties-, ele tem de pagar pelo uso não autorizado da tecnologia no momento de comercializar o produto. Quem compra semente certificada paga de R\$ 0,42 a R\$ 0,45 por quilo de semente e tem um crédito virtual que permite a comercialização de 61 kg a 74 kg -varia conforme o Estado- de soja após a colheita. Já o agricultor que optou por "salvar" grãos para usar como sementes tem de declarar aos compradores que o produto é transgênico. Ao entregar, ele paga 2% do valor à Monsanto. Se ele não declarar que a soja é RR, as compradoras, que mantêm acordo com a Monsanto, fazem um teste. Caso seja constatado que a soja é transgênica, o produtor paga então 3% do valor comercializado".

buy charging royalties over the harvest. Moreover, some farmers claim the right to multiply seeds, which is being jeopardized by the inspection practices from Monsanto.

Coordinated by the newly constituted Association of Soybean Producers from Rio Grande do Sul (Aprosoja-RS), organizations representing farmers from that State will take judicial action against the charge of royalties by Monsanto on the marketing of transgenic soy. The lawsuits will be initiated in many counties of the State this month, demanding the suspension of payment or holding funds in escrow until merit is judged, said the president from Aprosoja-RS, Pedro Nardes. According to him, the issue is not charging royalties when selling certified seeds. The battle is rather against the 2% paid by farmers when they deliver to tradings or to cooperatives the harvest they obtained from seeds multiplied by themselves in their properties - R\$0,86 per bag based on the average value of soybean in the State⁴⁶ (Bueno, 2009b).

Thus, it is not only for its practices on the concentration of seeds market and for the costs of its glyphosate-based product (Roundup) that Monsanto is targeted. Producers and their associations also complain that the system adopted by the multinational to charge royalties has become expensive and can lead to decreasing advantages of GMOs.

In sum, the economic considerations are an important dimension of the debate about agrobiotechnology. Not only biotechnology firms and farmers want to influence discourse and policy on GMOs by resorting to frames such as benefits and costs. Also politicians, scientists, social movements and media actors participate in such exchange of ideas. The issues that enter the public debate may vary from country to country in their specific expression but tend to include agronomic considerations; competitiveness issues as well as interdependence with import markets; a regime of IPRs that is considered appropriate for all parties; the feasibility and costs of coexistence between GM and non-GM production in the whole chain, from seeds supply to consumer rights; the legal framework for pre-market approval as well as post-market monitoring. As for national specificities, they can be summarized as follows: whereas actors in Argentina emphasize the benefits associated with GMOs and thus appear to have succeed in treating its adoption in agriculture as an irrevocable and unquestioned decision, Mexican actors are striving to shape discourse and policy in a fashion that also silence costs and highlights the advantages that the technology will bring to the national economy. Brazil stands almost alone in the debate of a country that has adopted agrobiotechnology and is experiencing many disputes regarding the mix of benefits and costs that affect different actors in very distinct ways.

B. The health and environmental dimension

Arguments about the effects of agrobiotechnology on human, animal and plant health as well as on the environment are used both to frame GMOs as safe and as risky. They have been classified as "biosafety" and "(bio) risk", respectively.

"Biosafety" is the name given to the assessment of adverse effects that modern biotechnology can have on biodiversity and health. Many national laws and international legal instruments applied to GMOs adopt the concept.⁴⁷ "Biosafety" frames mean that GM crops are safe i.e. that they pose no risk

⁴⁶ In the original: "Coordenadas pela recém-constituída Associação dos Produtores de Soja do Rio Grande do Sul (Aprosoja-RS), entidades representativas de agricultores gaúchos recorrerão à Justiça contra a cobrança de royalties, pela Monsanto, sobre a comercialização de soja transgênica. As ações devem ingressar em diversas comarcas do Estado neste mês pedindo a suspensão do pagamento ou depósito dos valores em juízo até o julgamento do mérito, diz o presidente da Aprosoja-RS, Pedro Nardes. Segundo ele, a questão não é a cobrança de royalties na venda de sementes transgênicas certificadas. A briga é contra os 2% que os agricultores pagam quando entregam às tradings ou cooperativas a safra obtida com sementes multiplicadas por eles em suas propriedades - R\$ 0,86 por saca com base na cotação média da soja no Estado".

⁴⁷ In the multilateral level, the most important instrument specifically created with this purpose is the Cartagena Protocol on Biosafety to the Convention on Biological Diversity. It was adopted on 29 January 2000 and entered into force on 11 September 2003. Both the Brazilian and Mexican Laws for GMOS are called Biosafety Bills: the

to health nor to the environment. Among the claims coded as “biosafety” are **denials of risks and assurances of safety** of GMOs in general, the argument that risk analysis has been done (implying “there is no risk”) and assertions on the equivalence of GMOs and non-GMOs. “Biosafety frames” also refer to claims that **risks are under control**, i.e. that the existing regulations are sufficient to manage any acknowledged risks, thus, they include the overall argument that there is no grounds for fearing any negative effects of the new technology. Since such assurances of the safety of GMOs are the assumptions used as a basis for **demands for de-regulation**, these demands and criticisms that there are too many requirements for GMOs have been coded as “biosafety claims”. The argument that GMOs have been approved in other countries, when used to refer to its safety regarding health and environmental issues, have also been considered as adopting a “biosafety frame”.

Another type of claim also coded under this category arguments that biotechnology can be **beneficial to the environment and to health**. Examples of the former are claims that genetic engineered crops not only lead to a reduction in the use of pesticides, but are also associated with the substitution from more toxic to less toxic pesticides. Examples of claims about the health benefits of GMOs are announcements of seeds with more nutritional value.

Claims coded as “biorisk frames” refer to the most common usage of “risk” as the probability of damage to health and environment. This conceptualization leaves room for two ways of emphasizing risks when talking about GMOs: highlighting the knowledge about probabilities of damage or making visible what are the damage associated with agrobiotechnology. Thus, “biorisk frames” were ascribed to arguments that set the emphasis on the **knowledge about the adverse effects** of GMOs. These include, at one extreme, the affirmation that there is “uncertainty” about the future negative effects of and, at the other, the statement that there is enough compiled knowledge not to doubt the existence of risks from GMOs.

Then, arguments referring to **specific damages to health and environment** were coded as “biorisk”, including negative effects on consumer health (food safety), negative effects on workers’ health and on the health of communities who live close to GM crops plantations —usually related to the use of pesticides—, negative effects on the environment – because of the use of pesticides or as a threat to biodiversity. Claims about the transfer of genetic flux, also referred by some actors as “contamination” have been coded either as a “cost” or as a “risk” depending on what has been considered to be the damage: when it regards the economic losses involved, such claims have been coded as “costs”, when it concerns the negative environmental effects of the transfer of genetic material from the GMOs to the environment, the claims were coded as “risk”.

As a counter-theme to “biosafety”, “biorisk” was considered the dominant framing of demands for more regulation and stricter requirements of GMOs —or criticisms that **risks are out of control**—, since these are based on the assumption that there are negative effects from biotechnology to health and environment. This unfolds in the debate about the adequacy of existing regulations and the desirability of not less —as demanded by proponents of agrobiotechnology— but more (and stricter) regulations. Thus, also as a counter-theme to “biosafety” frames, opponents of GMOs react to any proposals by highlightening the connection between **risk and responsibility**. On the other extreme of the possibilities of how to decide about GMOs, (bio) risk claims include demands for moratoria on GMOs, instead of unregulated liberation.

Overall results

References to health and environmental issues constituted the major dimension of the debates about agrobiotechnology in the samples from Argentina and Mexico (62% and 43%, respectively). In both countries, risk claims have by far outweighed biosafety claims, whereas in Brazil, where the

former, Law 11.105/2005 or "Lei de Biosseguranca"; the latter, Law DOF 18-03-2005 or "Ley de Bioseguridad de Organismos Genéticamente Modificados".

biological dimension was the second most debated (34%), biosafety claims slightly surpassed risk ones (Table 8).

Concerning the types of actors that participated in this dimension of the debate, some findings can be described by reading Table 11 horizontally. A distinct characteristic of the Brazilian debate is that environmental and health issues were mostly brought to debate by political actors both in terms of biosafety and biorisk. In Argentina, political actors are the most active to frame GMO as risk. In all countries, there is an absolute contrasting participation of market actors and social movements in this dimension of the debate: just as market actors only frame GMOs as safe and in all countries (with a minor exception in Mexico), social movements only frame it as risky. It was in this dimension that scientists engaged the most in the debate about agrobiotechnology in Argentina (91% of all claims from scientists) and Mexico (51%), and almost so in Brazil (45% of their claims pertained to the economic dimension and 44% to the health and environmental one). Media actors had a high participation in the Argentinean debate (32% of all claims in this dimension), but also in the other countries they expressed their views regarding the effects of GMOs to health and environment (23% and 16% of the debate in Brazil and Mexico, respectively).

TABLE 11
POLITICAL CLAIMS ABOUT THE HEALTH AND ENVIRONMENTAL DIMENSION OF
AGROBIOTECHNOLOGY PER TYPE OF ACTORS PER COUNTRY
Number of claims and percentages (in parenthesis)

	Argentina		Brazil		Mexico	
	Biosafety	(Bio)risk	Biosafety	(Bio)risk	Biosafety	(Bio)risk
Political actors	1 (5)	21 (36)	21 (60)	15 (47)	18 (50)	8 (10)
Market actors	14 (67)	0 (0)	10 (28)	0 (0)	13 (36)	4 (5)
Social movt.	0 (0)	14 (24)	0 (0)	5 (15)	0 (0)	39 (47)
Scientists	2 (9)	15 (26)	2 (6)	6 (19)	4 (11)	21 (25)
Media actors	4 (19)	8 (14)	2 (6)	6 (19)	1 (3)	11 (13)
Total	21 (100)	58 (100)	35 (100)	32 (100)	36 (100)	83 (100)

Source: Own elaboration.

1. Biosafety

Biosafety arguments have a similar participation in all countries, accounting for 17, 18 and 15% of all claims in the Argentinean, Brazilian and Mexican debates, respectively (Table 8). In Brazil and Mexico, political actors were the main actors to assure the safety of GMOs (60% and 50%) and market actors followed. In Argentina, market actors were the first to defend such arguments (67%). In no country did social movement frame GMOs as safe. Scientists have also a saying in all three countries about the biosafety of GMOs (10, 6 and 11%), but decided rather to enter the debate by framing GMOs as a risk issue. Just as they did with benefit frames, media actors are especially active in assuring the safety of the technology in Argentina (19% or the second most active type of actor doing so), whereas in the other countries, they preferred to frame GMOs as risks (only 6% in Brazil and 3% of in Mexico of biosafety claims were supported by media actors).

The spectrum from biosafety claims starts from contesting claims that GMOs pose risks be by denying their validity or by giving assurances of safety, including the claim that existing rules are sufficient to control the recognized risks and unfolds into proposals for de-regulation. At the other extreme of the spectrum is the transformation from (bio)risks to (bio) benefits, that is, instead of talking about negative effects of GMOs to health and environment, proponents speak of their beneficial impacts. Accordingly, examples of claims coded as adopting a “critique frame” are described below along four clusters: a) “denying risks and assuring safety”; b) “risks under control”; c) “if they are safe, why regulate?” and d) “converting damage into benefits”.

a) Denying risks and assuring safety

There are generic assurances of safety from GMOs as well as arguments contesting claims about specific risks. Examples of generic include approvals of products in each country and also claims that GMOs have been approved in other countries. In all countries the authorities responsible for approving GMOs usually manifest themselves publicly for the safety of the products under their scrutiny. Bellow, an example from Brazil:

The National Technical Commission on Biosafety (CTNBio) approved yesterday by 15 votes to 5, a favourable opinion to the commercial release of the fourth variety of genetically modified cotton in the country. (...) The CTNBio members resolved that the transgenic cotton does not present potential risks to human beings or to environment⁴⁸ (Valor Econômico, 2009c).

Besides those generic claims, arguments about the safety of GMOs vary in each country according to what is claimed to be the risks involved. While the issue of pesticide is more urgent in Argentina and Brazil, which have long time exposure to the technological package, in Mexico it is the threat to biodiversity due to the transfer of genetic material that is primarily addressed in the claims assuring the safety of GMOs. But also in Brazil the flux of genetic material from GM seeds to conventional varieties is object of disputes between advocates of safety and risk claims.

Contamination or flux of genetic material

In Mexico, proponents of biotechnology assure that the cultivation of GM crops will not take place where native corn is to be found and that this will not be threatened. These can be seen in the quotation from Monsanto bellow:

GM corn will never occupy the place of native corn nor its food richness. Monsanto's commitment is not to sow genetically modified varieties in the regions of origin of the grain⁴⁹ (Perez, 2010).

Biotechnological firms, usually represented by Agrobio Mexico, avoid the word “contamination” and frame the relationship between GM and non-GM crops in a positive way as “coexistence”. While they quote Brazil as an experience that attests that coexistence is possible, the same is disputed in that country. Thus, actors in the Brazilian debate, in particular, the political authorities responsible for GMOs authorizations (such as the presidents of CTNBio, Walter Colli first and then Edilson Paiva, and its executive-secretary) contested the scientific basis of claims that existent rules for coexistence were inefficient.⁵⁰ The main elements of such argumentation were: the denial of the risk of contamination—using the language of probabilities—, the denial of the scientific basis or evidences of claims that contamination did take place, and assurances that existent rules are sufficient to manage the (negligible) risk.

The president of CTNBio, Walter Colli, said yesterday that there is no evidence yet of the contamination of conventional maize by pollen from transgenic plants. In an interview to Folha, he maintained that the minimum distance of 100 meters between GM and non-GM crops is sufficient to ensure the coexistence among crops. "The risk of contamination is lower than 0.9%", affirmed Colli⁵¹ (Folha de São Paulo, 2009c).

⁴⁸ In the original: "A Comissão Técnica Nacional de Biossegurança (CTNBio) aprovou ontem, por 15 votos contra cinco, um parecer favorável à liberação comercial da quarta variedade de algodão geneticamente modificado no país. (...) Os membros da CTNBio entenderam que o algodão transgênico não apresenta potenciais riscos para os seres humanos ou o meio ambiente".

⁴⁹ In the original: "Los maíces transgénicos nunca ocuparán el lugar de los criollos ni su riqueza alimenticia. El compromiso de Monsanto es no sembrar las variedades genéticamente modificadas en zonas de origen del grano".

⁵⁰ Only one market actor make claims assuring that the existent rules are sufficient, the biotech firm Monsanto (Folha de São Paulo, 2009c). Other types of market actors, in particular producers and the food industry, put into question such affirmations, as will be seen bellow in the description of risk claims. They have more to lose if the rules prove to be inefficient.

⁵¹ In the original: "O presidente da CTNBio, Walter Colli, disse ontem que não existem ainda evidências sobre a contaminação de milho convencional por pólen de plantas transgênicas. Em entrevista à Folha, ele sustentou que o

Pesticide use

In Argentina, the main claims about biosafety related to glyphosate used in association with genetically modified seeds. They were a reaction to the events in April 2009, when social movements, and some local authorities started expressing concerns about negative effects of the GM-technological package into health and environment. Producers interest-groups such as the Chamber of Fertilizers and Agrichemicals Industry (Ciafa - Cámara de la Industria de Fertilizantes y Agroquímicos), Chamber of Agricultural Health and Fertilizers (Casafe - Cámara de Sanidad Agropecuaria y Fertilizantes) and Soybean Chain Chamber (Acsoja - Asociación de la Cadena de la Soja), where the most active in defending the safety of glyphosate:

On April 16th this Chamber (Ciafa) and the Chamber of Agricultural Health and Fertilizers (Casafe) stated in a joint declaration that according to Senasa [National Animal Health and Agrifood Quality Service], the active ingredient glyphosate in its normal use is classified in the group of actives with lower toxicological risk and it is successfully used in the whole world. Approved by the bodies of environmental protection in the United States and Europe, it is marked in more than 140 countries. They add that it has no negative effects on fauna, micro-fauna and human health, nor does it have unacceptable effects to environment⁵² (Verbitsky, 2009).

In this conflictual debate about the toxicity of glyphosate, by risk claims by challenging or denying their scientific basis was a common strategy used by proponents of GMOs such as the media framing adopted by La Nación and the quotation from Acsoja below:

An study of alleged scientific validity that alerted of the damage to health that the herbicide glyphosate would cause and which was attributed to the The National Scientific and Technical Research Council (Conicet) is not registered in this center of investigation. (...) By its turn, the Association of Soybean Chain (Acsoja) expressed its concern about the recent decision from the Ministry of Defense to prohibit the cultivation of transgenic soy in the lands owned by the military services that are situated in the proximities of urban areas. The organization, which unites institutions, producers and firms constituting the soybean chain, expressed its especial uneasiness about "the declarations that, without support, state that the cultivation of transgenic soy and the technological package that accompanies it produce negative effects to environment and human health."⁵³ (La Nación, 2009b, emphasis added).

In Brazil, the toxicity of glyphosate came under debate when GM corn resistant to it was adopted. When Valor Econômico covered the increase in the MLR of glyphosate for corn, it was framed rather as an undesired action, as involving higher ingestion of pesticides. Nevertheless, Valor Econômico resorted to the science-based authority of international organizations as national governmental bodies in order to assure that such an increase does not pose damage to health. The scientific dimension of a biosafety claim becomes clear: in a reference to a damage (consumers' health) that would intuitively raise concerns (the increased ingestion of pesticides), media framing

espaçamento mínimo de cem metros entre lavouras de milho OGM e não OGM é suficiente para assegurar a coexistência das lavouras. "O risco de contaminação é menor do que 0,9%", afirmou Colli".

⁵² In the original: "El 16 de abril esa cámara (Ciafa) y la de Sanidad Agropecuaria y Fertilizantes (Casafe) dijeron en una declaración conjunta que para el Senasa el principio activo glifosato en su uso normal está dentro del grupo de activos de menor riesgo toxicológico y se lo utiliza con éxito en todo el mundo. Aprobado por los organismos de protección ambiental de Estados Unidos y Europa, se comercializa en más de 140 países. Agregan que no presenta efectos nocivos sobre la fauna, la microfauna ni la salud humana, ni tiene efectos inaceptables para el ambiente".

⁵³ In the original: "Un estudio de supuesta validez científica que alertaba sobre los perjuicios a la salud que causaría el herbicida glifosato y que se atribuía al Consejo de Investigaciones Científicas y Técnicas (Conicet) no está registrado en ese centro de investigación. (...) Por su parte, la Asociación de la Cadena de la Soja (Acsoja) expresó su preocupación por la reciente decisión del Ministerio de Defensa de prohibir la siembra de soja transgénica en las tierras pertenecientes a los cuarteles militares que estuvieran próximas a las zonas urbanas. La entidad, que reúne a instituciones, productores y empresas que componen la cadena de la soja, señaló su especial inquietud por "las declaraciones que, sin sustento, manifiestan que el cultivo de soja transgénica y el paquete tecnológico que la acompaña produce efectos nocivos para el ambiente y la salud humana".

resorts to scientific knowledge (toxicological studies) and scientific-base political authorities, national (Anvisa) and international (from Codex Alimentarius, UN).

The alteration in the maximum residue level [MRL] for corn affected the Accepted Daily Intake (ADI), a reference to the maximum that a person can consume. This global limit is set today in 0.042 mg/kg in Brazil. With the change in corn, the total ADI came close to 35% allowed by law. Thus, there would still be the margin of 65 percentual points to raise the MRLs. The Codex Alimentarius, linked to the United Nations, established the MRL for corn in 0.3 mg/kg, for instance⁵⁴ (Zanatta, 2010a).

b) Risks under control

In some cases, approving a GM product is not a once and for all decision. Rather, there are risk management measures to be applied. Biosafety claims are found in such a context where, in face of denounces of risk, there is a recognition of a probability of damage, but assurances that the rules in force are sufficient to guarantee safety, control and responsibility. This applied particularly to the issue of coexistence between GM and non-GM corn (risk of contamination), and also to the issue of MRL of glyphosate (risk to consumer's and workers' health) in Brazil, as show in the quotes in the section above. Also in Argentina, some actors recognize that glyphosate is toxic, but assure that it can be used safely if the risk management measures are applied:

Daniel Dechanzi, agronomist from the agriculture cooperative La Ganadera, a firm which uses agrochemicals and also has experience in the application of such products, acknowledged that they are "lightly toxic" and clarified that "if the corresponded precaution is taken, they are not dangerous for human beings"⁵⁵ (Waigandt, 2010).

In Mexico, the established consensus on the importance of protecting native corn puts special pressure on assurances of control in the enforcement of risk management measures to experiment with GM corn. A scientist guarantees that these are sufficient to avoid any risk:

Regarding the situation in Mexico, Francisco Zavala García, subdirector of Research and Graduate School of Agronomy of the Universidad Autónoma de Nuevo León, commented that the institution was assigned to evaluate the projects for experimental cultivation of corn taking place in the country. He said that the crops fulfil a series of requirements and monitoring mechanisms to ensure safety and avoid any risk⁵⁶ (Martinez, A. 2010).

The political authorities in Mexico are the most keen to reaffirm the belief in the efficiency of regulatory framework to control any risks:

Interviewed in the context of the presentation of the Mexican Network of Genetically Modified Organisms, the chief of Sagarpa assured that in this way it is under legal conditions to start the experimental cultivation, since we can identify both benefits and risks of the authorization of GMOs in what regards its release in field and environment. He explained that monitoring will fall under the responsibility of the Secretary of Agriculture, whereas the issue of biological diversity will be for Senamart and sanitary and epidemiological surveillance will be treated by the Secretary of Health. (...)

⁵⁴ In the original: "A alteração no limite de resíduo do milho impactou o índice de Ingestão Diária Aceitável (IDA), uma referência para o máximo que uma pessoa pode consumir. Esse limite global está fixado hoje em 0,042 mg/kg no Brasil. Com a mudança no milho, o IDA total chegou próximo de 35% do permitido pela legislação. Assim, ainda haveria esse espaço de 65 pontos percentuais para elevar os LMRs. O Codex Alimentarius, ligado às Nações Unidas, fixa o LMR do milho em 0,3 mg/kg, por exemplo".

⁵⁵ In the original: "El ingeniero agrónomo Daniel Dechanzi, de la cooperativa agrícola La Ganadera, una empresa expendedora de agroquímicos y también con experiencia en la aplicación de estos productos, reconoció que son "levemente tóxicos" y aclaró que "si se toman las precauciones correspondientes no son peligrosos para el ser humano".

⁵⁶ In the original: "En cuanto a la situación en México, Francisco Zavala García, subdirector de Investigación y Posgrado de la Facultad de Agronomía de la Universidad Autónoma de Nuevo León, comentó que a esta institución le tocó evaluar los proyectos de investigación que se realizan en el país para obtener maíz transgénico. Expuso que los cultivos cumplen con una serie de requisitos y mecanismos de vigilancia que garantizan su seguridad y evitan cualquier riesgo".

We will have more institutions to help us to evaluate how the crops are going and, if any symptom appears to affect us, we will immediately react, explained the federal official⁵⁷ (Martinez, 2009b).

c) Risk and trust: if GMOs are safe, why regulate?

Some actors defend that there is a logical implication of acknowledging that GM crops are safe (or that their risks are under control): that there is no need to regulate them. Many claims about biosafety include demands for de-regulation. The credibility of such demands rests on the authority of bodies responsible for the risk assessment and a fundamental plea is for trust in the conduction of their duties. Claims clustering around risk and trust are more frequent in the Brazilian sample. The high participation of political actors in the Brazilian debate is mostly explained by the active role played by the President of CTNBio. He makes constant assurances of the safety of GMOs, guaranteed by the scientific authority of the CTNBio, especially in the context of polemics about pre-marketing approval and post-market monitoring procedures and labeling. He recurrently asks for trust in the institutions responsible for approving GMOs.

According to Colli, when the commission authorizes the marketing of a certain genetically modified organism, it has already ruled out its risks for consumption as well as to the environment. That is why he considers monitoring unnecessary, except in few cases where monitoring would be restrict to environmental impacts. "What is the reason for demanding such a thing if we know that it does no harm? Is it to know if a soy product causes stomach pain? If [GMOs] did harm, the Americans would already have died", he argued⁵⁸ (Salomon, 2009).

So confident are some Members of CTNBio in their claim to be trusted in their biosafety assessment of GMOs,⁵⁹ that they advance proposals of deregulation, lifting the need to monitoring the effects of the adoption of agrobiotechnology (Zanatta, 2009a). The main benefited sectors are biotech firms and the food industry; they are disobliged of many responsibilities. The proponents of such deregulation advance different groundings for their proposals. One reason is the assurance of safety based in the confidence of the risk assessment. A connected reason is that risk assessment would have proven the “substantial equivalence” of GMOs and non-GM seeds, a well known argument used by proponents of the technology. The logic of argumentation is: if proven to be safe (by a trustworthy and competent scientific authority) or proven to be equal, then, there is no need to question such evaluation. Monitoring would be unnecessary since the evaluation of risk will not be proven wrong.

The president of CTNBio, the biochemical doctor Walter Colli, confirms the proposal to alter the rule. "This things do no harm. And, if they do, nobody will know because there is no way to monitor everybody. The juridical argument that imposes itself is that monitoring is only justified if there were doubts about the risk assessment. If the product is identic to the conventional, there is no reason to monitor", he says. "We are suggesting leaving it as non-compulsory. The commission will tell in which cases it will be necessary. (...). It is absurd to monitor effects on humnas because 15

⁵⁷ In the original: "Entrevistado en el marco de la presentación de la Red Mexicana de los Organismos Genéticamente Modificados, el titular de la Sagarpa aseguró que de esta manera están en condiciones legales para iniciar las siembras experimentales, ya que podremos determinar tanto beneficios como riesgos en la liberación de los transgénicos en el contexto de su repercusión en el campo y medio ambiente. Explicó que el monitoreo que se realizará recaerá en la responsabilidad de la Secretaría de Agricultura, mientras que el tema de la diversidad biológica será para la Semarnat y la vigilancia epidemiológica y sanitaria en la Secretaría de Salud. (...) tendremos más instituciones que nos ayudarán a revisar cómo van los cultivos y si alguno de ellos presenta síntomas que afecten, actuaremos de manera inmediata, detalló el funcionario federal".

⁵⁸ In the original: "Segundo Colli, quando a comissão libera a comercialização de determinado organismo geneticamente modificado, já afastou riscos ao seu consumo, assim como ao ambiente. Por isso, considera o monitoramento desnecessário, com exceção de poucos casos em que o monitoramento esteja restrito a impactos ao ambiente. "Qual é a razão de pedir uma coisa dessas se a gente sabe que não faz mal? Para saber se um produto que usa soja está causando dor de barriga? Se [os transgênicos] fizessem mal, os americanos já tinham morrido", argumentou".

⁵⁹ When CTNBio approved monitoring rules for alerting about adverse effects in animals fed with GM corn, Walter Colli, President of CTNBio, assured: "I am sure that nothing will happen" (quoted in Zanatta, 2009b).

thousand products have soy derivatives in their composition. How can we know if the problem lies in the product or in the water that the person drank?", he questions (Zanatta, 2009a).⁶⁰

The question that follows is, if it is not feasible, why was this risk management rule proposed and adopted in the first place? Again, it is the President of CTNBio who, in the same article, advances an explanation. He implies that there was a conflict, in which they had to make a compromise and establish post-marketing monitoring rules. The reason for the rules was political, but he considers the rules to be an error. Thus, this error should be repaired, according to him. The issue of responsibility is brought to the core of the debate. The juridical dimension of the debate is already pinpointed in the quote above: “monitoring is only justified if there is doubt in the risk analyses”. Based on that “juridical argument”, CTNBio Members not only propose to discharge industry from accountability for post-marketing monitoring, but also to free CTNBio from the responsibility of revising its decisions if adverse effects of GMOs do appear (Zanatta, 2009c).

At the last meeting under his command, the former president Walter Colli launched the idea of suppressing the obligation of post-marketing monitoring. He also preached removing the requirements about the objective of the monitoring plan, what would relieve the commission to reevaluate its decisions in the event of adverse effects to environment or to human and animal health. Colli suggested to alter the terms "risk" and "risk evaluation", eliminating them from the text. "This would make the norm vague and imprecise", he affirmed, in a note to the vice-State Attorney, Sandra Cureau. Colli's proposal would also exonerate CTNBio from the obligation to manifest itself about biosafety aspects and eventual questions received after the public hearings promoted by the body⁶¹ (Zanatta, 2010d).

The proposal from the President of CTNBio of taking out the wording “risk” and “risk analysis” from the regulation of GMOs is exemplary of a crucial framing strategy of the proponents of biotechnology: to dissociate GMOs from the word risk. In the next section, this is made by shifting from the risk/safety dichotomy in what regards effects to health and environment and, instead, to frame such effects as “benefits”.

d) Converting damage into benefits

Claims that GMOs are beneficial to health and environment include the arguments that biotechnology minimizes damage caused by pesticide use and that they bring nutritional advantages. In Argentina, besides assuring its overall safety, actors argue that glyphosate replaced other much more toxic pesticides, representing a benefit to the environment, as in the quotation below from La Nación:

An eventual ban on the use of glyphosate would have serious consequences to the system of agricultural production in Argentina, compromising the process of soil conservation that has initiated with the adoption of no-till farming, increasing deeply the costs and forcing, in some cases, to revive some pesticides with high toxic levels that had been long abandoned. (...) Gustavo Duarte, consultant,

⁶⁰ In the original: "O presidente da CTNBio, o médico bioquímico Walter Colli, confirma a proposta de alteração na regra. "Essas coisas não fazem mal. E, se fizerem, ninguém vai saber porque não tem como monitorar todo mundo. O argumento jurídico que se coloca é que monitorar só se justificaria se houvesse dúvida na análise de risco. Se o produto é idêntico ao convencional, não há razão para monitorar", diz. "Estamos propondo deixar isso como não obrigatória. A comissão dirá em quais casos seria necessário. (...) É um absurdo fazer monitoramento de efeitos em humanos porque 15 mil produtos têm derivados de soja na sua composição. Como saber se o problema é do produto ou da água que uma pessoa bebeu?", questiona".

⁶¹ In the original: "Na última reunião sob seu comando, o ex-presidente Walter Colli lançou a ideia de suprimir a obrigatoriedade do monitoramento pós-liberação comercial. Também pregou retirar exigências sobre o objetivo do plano de monitoramento, o que desobrigaria o colegiado de reavaliar suas decisões em caso de efeitos adversos sobre o ambiente ou sobre as saúdes humana e animal. Colli propôs alterar os conceitos de "risco" e de "avaliação de risco", eliminando-a do texto. "Isso deixaria a norma vaga e imprecisa", afirmou, em nota, a subprocuradora-geral da República, Sandra Cureau. A proposta de Colli também retiraria da CTNBio a obrigatoriedade de manifestar-se sobre aspectos de biossegurança e eventuais questionamentos recebidos depois de audiências públicas promovidas pelo colegiado".

added another point of view. To this expert, agriculture without glyphosate would impact a higher load of agrochemicals less environmental-friendly⁶² (Bertello, 2010).

There are similar claims in the Brazilian debate about the benefits of GMOs to health and to environment. Bayer claims the benefits to the environment of its product Liberty Link rice, as reducing residues and being degradable and Céleres, an agribusiness consultant firm affirm that GM seeds with insecticide properties are safer to the environment and to workers' health as it replaces pesticides (Bueno, 2009a). Monsanto goes a step further, promising the reduction in the use of natural resources and to bring benefits to human health launching new products such as soy with omega 3 or with better quality oil:

Dalmazo says that the new biotechnological wave is about to arrive, with launchings of soybean with omega 3, which decreases cardiovascular problems, and the soybean with higher quality oil, which reduces the level of trans fat⁶³ (Zafalon, 2009b).

In sum, more than shifting the wording from “risk assessment” to “biosafety assessment” in order to emphasize assurances of safety and disconnect GMOs from the word “risk” and its negative connotation, the framing strategy of proponents of biotechnology include advancing claims that it is beneficial to health and environment.

2. (Bio) risk

Framing GMOs as a risk to health and environment was the preferred discursive strategy from actors in the Argentinean sampled material, accounting for almost 50% of the claims coded. In Mexico, such frame was chosen in about a third of all claims and in Brazil the percentage of biorisk frames is less significative, 16% of all claims (Table 8).

(Bio) risk is the preferred framing for political actors making claims about GMOs in the Argentinean and Brazilian materials (36 and 47%, respectively). In México only one tenth of these claims are made by political actors. Market actors practically do not frame GMOs as (bio) risk. On the other hand, this framing represent the majority of the claims from social movements in Argentina (24%), almost half of their claims in México (47%) and about a sixth in the Brazilian debate (16%). In what regards the framing from scientists, (bio) risk is an important meaning given to GMOs in all countries, but more so in Argentina (26%), followed by México (25%), and Brazil (19%). Media actors also adopt (bio) risk frames when covering GMOs, especially in Brasil (19%), followed by Argentina (14%) and Mexico (13%).

Examples of claims emphasizing (bio) risk when referring to GMOs will be described bellow in the following order: (a) knowledge about risks; (b) what are the risks?; (c) risks out of control!; (d) risk and responsibility.

a) Knowledge about risks

Political claims focusing on the knowledge about risks are presented bellow as part of a continuum⁶⁴ that starts with the affirmation that there is no knowledge to assure the absence of risks and ends with claims that there is enough knowledge confirming the existence of risks associated with GMOs. In between these poles from unknown and known risks, there are arguments that emphasize the importance of the willingness to know risks and/or blaming others for the lack of it. There is the claim that the inexistence

⁶² In the original: "Una posible prohibición del uso del glifosato podría generar consecuencias graves para el sistema de producción agrícola de la Argentina, comprometer el proceso de conservación de los suelos que se inició con el uso de la siembra directa, aumentar fuertemente los costos y obligar a resucitar en algunos casos herbicidas de un elevado nivel de toxicidad que ya fueron dejados de lado hace tiempo. (...) Gustavo Duarte, consultor, agregó otra mirada. Para este especialista, la agricultura sin glifosato implicaría "una mayor carga de agroquímicos menos amigables con el ambiente".

⁶³ In the original: "Dalmazzo diz que está chegando também a segunda onda de biotecnologia, com os lançamentos da soja com ômega 3, que diminui problemas cardiovasculares, e a soja com óleo de melhor qualidade, que vai diminuir o teor de gordura trans".

⁶⁴ This continuum is inspired in the typology of the not-knowledge from Ulrich Beck (2007).

of risks is yet to be proven – in contrasting disagreement to carriers of frames of “biosafety”. Regarding the adoption of GMOs in Mexico, the president from the social movement organization Red Fronteriza de Salud y Ambiente, Francisca Duarte Ahumada, affirms that:

(...) the cultivation of transgenic maize presents risks and there is no sufficient information about the effects from such products (...). Duarte Almada said "at the global level, there are not enough studies yet to assure us that genetically modified organisms do not have negative impacts on human and animal health. "We oppose ourselves to this type of decisions, because it is not sufficiently demonstrated that any organism that has been modified in its genetic composition does not pose risk to human health", insisted the spokesperson (El Universal, 2009).⁶⁵

Another type of claim is based on the dissatisfaction of such statements that there is not sufficient knowledge about adverse effects of GMOs. It includes criticisms that the lack of knowledge is explained by the fact that there is no will to know and the right questions have not been posed or demanded. For example, in a press conference to announce the results of a study about the contamination of native corn by GM corn, one of the authors, Antonio Serratos, stated that the petitions for experimental cultivation of GM corn under governmental evaluation in Mexico were nothing more than a bureaucratic procedure, since the necessary investigations were not made (Enciso, 2009b). Similar claims are also found in the Brazilian debate. Not only are transnationals blamed for not wanting to know or hiding their knowledge about adverse effects of GMOs on health and environment; actors also blame, directly and indirectly, the authorities for not requiring such data before reaching decisions. In the following quotation, members from CTNBio - dissident voices - denounce that two varieties of GM soy were approved without its petitioners having submitted the legally established data.

(...) three members of the commission pointed to the absence of basic tests for the market release of transgenic products. "They were released without the studies established by law. We are the edge of legality, affirmed one of the rapporteurs from the petition from Bayer, the agronomist Leonardo Melgarejo. "I have the impression that the State Attorney should manifest himself". According to Melgarejo, the obligatory studies that were not submitted included scientific tests with pregnant animals considered susceptible to the product, in addition to long-term data on up to two generations, sufficient to rule out hypotheses about chronic intoxication caused by the new seed. "Bayer did not present such data", affirmed Melgarejo, representative from the Ministry for Agricultural Development in the CTNBio⁶⁶ (Zanatta, 2010e).

Assuming that knowledge is conditioned on the will to know, some actors advance the claim that risks will be found if they are look for. In a statement related to the confirmation of contamination of native corn species with GM corn, a scientist resorts to the principle that negative results should not be taken at face value. In other words, he implies that there is a scientific obligation to search knowledge and not be satisfied with provisional results. In a similar fashion to the quotation above, in the Argentina sample there are examples of claims about not only the will to know about the adverse effects of pesticide use in combination of GMOs, but the duty to do so. Some claims adopt an adversarial

⁶⁵ In the original: "el cultivo de maíz transgénico implica riesgos y no se cuenta con información suficiente sobre los efectos de esos productos. (...) Duarte Ahumada dijo que "a nivel mundial no hay los suficientes estudios todavía que nos digan que los organismos genéticamente modificados (OGM) no provocan un impacto nocivo en la salud de los seres humanos y de los animales. "Nos oponemos a ese tipo de decisiones, pues no está lo suficientemente demostrado que cualquier organismo que ha sido modificado en su composición genética no provoca un riesgo a la salud de las personas", insistió la dirigente".

⁶⁶ In the original: "três membros da comissão apontaram a ausência de testes básicos para a liberação comercial dos produtos transgênicos. "Eles foram liberados sem os estudos previstos nas normas. Estamos no limite da legalidade", afirmou um dos relatores do processo da Bayer, o agrônomo Leonardo Melgarejo. "Tenho impressão de que o Ministério Público deve se manifestar". Os estudos obrigatórios não apresentados, segundo Melgarejo, foram testes científicos com animais prenhes, considerados mais suscetíveis ao produto, além de dados de longo prazo, de até duas gerações, capazes de descartar hipóteses de intoxicações crônicas pela nova semente. "A Bayer não apresentou esses dados", afirmou Melgarejo, representante do Ministério do Desenvolvimento Agrário na CTNBio".

character and refers to the existence of a controversy. Besides showing willingness to know risks, the claim-maker is concerned with contesting those who state that there are no proofs of adverse effects of pesticides in Argentina. The chief of the Laboratorio de Embriología Molecular from Universidad Nacional del Nordeste (UNNE), Raúl Horacio Lucero, does not justify his knowledge about risks associated with pesticide use using probabilistic calculations made from extrapolations of laboratory studies. Rather, he collects evidence from people directly affected over the years. He:

(...) detailed clinical histories of malformed children who began arriving at his office in 1993. He exhibited x-rays from babies without toes, girls with arms without articulations, data on stillbirths, spontaneous abortions. "All came from areas with massive use of agrochemicals. All. I have their names, and I know their suffering. How can anyone tell me that 'there are no proofs'? Let them bring their pregnant wives and daughters and they will see the irrefutable proofs", he challenged. Lucero's statistical data show a direct relationship between the increase in use of agrochemicals in Chaco and cases of malformations, always in areas with massive use of herbicides and pesticides. In all cases he analysed the parents' genetics and confirmed that chromosomes represented no problems. "We knew that agrochemicals affected genes, but we had no means of conducting studies. This is what Andrés Carrasco (UBA-Conicet) has just confirmed. Unfortunately time has proved us right, time bomb exploded, there are thousands of affected and to deny it is a crime", he said⁶⁷ (Aranda, 2009a).

Similarly, some claim-makers in Mexico emphasize that time has been enough, if not to collect evidence of concrete damage like in Argentina, at least to compile scientific information that confirms the risks of GMOs. Here, in the other end of the spectrum, the claims contrast those that refer to uncertainty and lack of knowledge to point out this opposite: that there is enough knowledge that demonstrates the existence of risks and no new studies are needed. So is the statement made by Elena Álvarez-Buylla, researcher at the Instituto de Ecología from the Universidad Nacional Autónoma de México (UNAM):

"(...) there is sufficient scientific evidence to demonstrate that GMOs pose risks to biodiversity of the planet and to human health". Regarding the experimental cultivation of transgenic corn in the fields in the North of the country, she emphasized that not only was it an "obsolete research, because results of similar experiments are already known, which motivated the application of a moratoria on the cultivation; but also there aren't any scientific questions that can generate new knowledge. On the contrary, it favours the lack of transparency, and there are no control over scientists with conflict of interests"⁶⁸ (Solano, 2010).

While these examples of risk frames emphasize the knowledge base of claim-making regarding damage to health and environment attributed to GMOs, the next cluster of claims gravitates around the damage itself. They are intimately related, this classification is rather a matter of difference in emphasis: the first cluster regards the possibility of answering to the question “are there risks?” and

⁶⁷ In the original: "detalló historias clínicas de niños malformados que comenzaron a llegar a su consultorio en 1993. Exhibió radiografías de bebés sin dedos, chicas con brazos sin articulación, datos de fetos muertos, abortos espontáneos. "Todos provenían de parajes con uso masivo de agroquímicos. Todos. Tengo sus nombres, conozco su sufrimiento. ¿Cómo me pueden decir que 'no hay pruebas'? Que traigan a sus esposas o hijas embarazadas y verán las pruebas irrefutables", desafió. Las estadísticas de Lucero muestran una directa relación entre el aumento de uso de agroquímicos en Chaco y casos de malformaciones, siempre en zonas con uso masivo de herbicidas y plaguicidas. En todos analizó la genética de los padres y confirmó que los cromosomas no presentaban problemas. "Sabíamos que los agroquímicos afectaban los genes, pero no teníamos la forma de realizar los estudios. Eso es lo que acaba de confirmar Andrés Carrasco (UBA-Conicet). Lamentablemente el tiempo nos dio la razón, la bomba de tiempo estalló, los afectados son miles y negarlo es criminal", afirmó".

⁶⁸ In the original: "(...) existen suficientes pruebas científicas para demostrar que los transgénicos son un riesgo para la biodiversidad del planeta y para la salud humana". En cuanto a la siembra experimental de maíz transgénico en campos de cultivo en el norte del país, enfatizó que no sólo se trata de una investigación "obsoleta, porque ya se conocen los resultados de experimentos similares, lo que generó la aplicación de una moratoria en su cultivo. Tampoco ahora hay preguntas científicas que puedan arrojar nuevo conocimiento; por el contrario, se favorece la falta de transparencia, y no existe monitoreo de científicos que no tengan conflicto de intereses".

the second answers the question “what are the risks?”. It is not possible to fully separate one from another; however, this analytical exercise is justified in order to shed light to the strong scientific anchorage of the debate about agrobiotechnology.

b) What are the risks?

The three main types of risks identified by the actors in the sampled material are the risk of transfer of genetic material from the GMOs to non-GM seeds (mostly quoted as "contamination"), the risks to human health of consuming GMOs and the risk of the technological package leading not to less – as argued by proponents of biotechnology using “biosafety frames”-, but to more use of pesticides. Considering the expression “farm-to-fork” or “farm-to-table”, used in the field of food safety, usually the risks identified by the actors in the debate refer to the beginning of the food chain, namely, the farming of GMOs.

Contamination or flux of genetic material

In the sampled material, actors associate the risk of transfer of genetic material from GM crops to non-GM species with two related concerns: a threat to native species (to biodiversity) and a threat to coexistence with non-GM crops. The former is more found in the Mexican sample, whereas the latter is typical of the Brazilian sample. But it is in Mexico where warnings about the threat that GMOs constitute to biodiversity abound. In contrast to Brazilian claims, actors in the Mexican debate adopt a nationalist tune and wording that highlight its particularity as the center of origin of biodiversity from corn. When the social movement campaign “Sin maíz no hay país” handed a petition to the director from Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (Senasica) against the adoption of biotechnology, they framed it as handing over a valuable national resource:

They recalled that scientists, researchers and academics who participated in the campaign send their comments supported with technical and scientific information, with which they demanded the rejection of experimental cultivation with transgenic maize in face of the high risk of genetic flux from transgenic to creolled corn. (...) "If you allow the cultivation of transgenic corn in Mexico, you will give step with no turning back, and you will be responsible for giving away the key natural resource of the nation, and for putting in risk the biodiversity of Mexican maize"⁶⁹ (Perez, 2009c).

Thus, GMOs are framed as an external and foreign threat to the “original” and “criollo” grains. When newspapers report studies confirming that contamination occurred, the fears are intensified and the confirmation of damage is used as evidence on which to base risk claims. In other words, the fact that genetic material has contaminated non-GM seeds reinforces the claim that GMOs pose a risk to biodiversity and, as a consequence, that coexistence between GM-crops and non-GM crops is not feasible, at least in Mexico. For instance, during the forum “Las voces campesinas frente a los transgénicos”, the Director of Greenpeace Mexico, Patricia Arendar stated that, for being center of origin, “in this country there cannot be coexistence”. But not only in the center of origin does the coexistence with GMOs pose a problem. Many actors in the Brazilian debate claim that the risk of contamination threatens the coexistence between GM corn and non-GM corn. In a long series of news articles, the paper Folha de São Paulo denounces the “real” risk of contamination.

The problem starts already in the field, with the risk of real contamination of conventional or organic crops by transgenic plants. The possibility of a plant pollinizing the other (...) sets doubts about the real assurances that conventional crops will not receive transgenic pollen⁷⁰ (Brito, 2009d).

⁶⁹ In the original: "Recordaron que científicos, investigadores y académicos que participan en la campaña enviaron sus comentarios sustentados en información técnica y científica, con los cuales reivindican su rechazo a la siembra experimental de maíz transgénico ante el alto riesgo de flujo genético de los granos transgénicos a los criollos. (...) “Si usted otorga permisos para la siembra de maíz transgénico en México, dará un paso que no tiene retorno y será responsable de regalar el recurso natural clave de la nación y poner en riesgo la biodiversidad de los maíces mexicanos.”

⁷⁰ In the original: "O problema começa já na lavoura, com o risco real de contaminação de plantações convencionais ou orgânicas por plantas transgênicas. A possibilidade de uma planta polinizar outra (...) cria dúvidas sobre as garantias reais de que a lavoura convencional não receberá pólen transgênico".

As big corn producer, the adoption of GM corn in Brazil gave rise to concerns about the feasibility and efficacy of norms for the coexistence between GM and non-GM crops. The doubts regarding the possibility to control risks unfold in a debate regarding the sufficiency of risk management measures, which will be ahead.

Risks to consumer health

Only in the Mexican sampled material do claims about the risks of consuming GMOs appear. This argument is usually associated with the information that corn constitutes the basis of Mexican food; therefore, the fear is that GM corn will be part of the daily meal of Mexicans. Making reference to studies conducted in other countries confirming damage to health resulting from the consumption of GMOs, Antonio Turrent Fernández, scientist from the Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP) and also the president from the “Unión de Científicos Comprometidos con la Sociedad” states that, independent from the authorization of GM corn, Mexico already imports 10 million tons of corn. Since there is no guarantee or control to determinate if the imported grains are genetically modified or not, he assumes that GM corn is already “on the table from Mexicans”. During the alternative meeting to the FAO Conference on Biotechnology that took place in Mexico, organized by the Red en Defensa del Maíz, Vía Campesina Región América del Norte, la Asamblea Nacional de Afectados Ambientales y el Colectivo Coa, Turrent states that:

(...) the quantity of corn that an Austrian or a French eat are not to worry, but we, who have corn for breakfast, lunch and dinner, especially the poorer groups, the risk is very different. Turrent pointed out that countries where crops for mass consumption among the population, as wheat for English-speaking peoples and rice to orientals, do not allow the cultivation of transgenic crops for human consumption in their territories. "In the United States there is no transgenic wheat, neither in Canada, and Japan does not accept the consumption of genetically modified rice. That is how they do in practice, but they see no problem if Mexico consumes altered maize; this indeed is a crime against humanity", he added⁷¹ (Partida, 2010).

In the quotation there is a common theme found in the sample material, namely, that Mexico displays an acute situation without precedents in other countries, since in no other place there are GM crops which are the basis of food. Thus, examples from other countries are used to support the “biorisk” argument.

Pesticide use

In the sampled material from Argentina there was a heated debate about the effects of glyphosate on human health and on the environment, in which Página/12 was particularly active. The journalists explicitly stated - and reiterated in most news articles on the issue - that the use of glyphosate is to be attributed to the decision, taken by state authorities in 1996, to liberalize genetically modified soy resistant to it. They linked the issue of contamination from pesticides to the GM soy, as can be seen in the quotation below:

Argentina has today 19 million hectares of transgenic soy, representing 56% of the country's arable land, and 190 millions of glyphosate, from which the most famous trade name is Roundup, from the firm Monsanto, which markets the soybean seed resistant to the agrochemical. The firms Syngenta, Atanor, Dupont, Bayear and others also produce glyphosate. The chemical is used in the production of rice, where denounces about its sanitary effects also abound. The agrochemical has the property of remaining long periods in environment and travel long distances carried by wind or water. It is sprayed (by air or by land) on the fields. The only thing that grows in the land sprayed is

⁷¹ In the original: "las cantidades maíz que comen un austriaco o un francés no son para preocupar, pero nosotros, que desayunamos, comemos y cenamos maíz, sobre todo en los grupos más pobres, el riesgo es muy diferente. Turrent señaló que en naciones donde también tienen alimentos de consumo masivo entre la población, como trigo en las angloparlantes o arroz en los orientales, no se permite la producción en sus territorios de alimentos transgénicos para consumo humano. "En Estados Unidos no hay trigo transgénico, tampoco en Canadá, y Japón no acepta que se consuma arroz genéticamente modificado. En la práctica ellos están haciéndolo así, pero para afuera no hay problema en que en México sí se consuma maíz alterado; eso sí es un crimen de lesa humanidad", agregó".

*transgenic soy, the rest of vegetables absorbs the poison and dies within days. The publicity of the firms classifies glyphosate as harmless for human beings*⁷² (Aranda, 2009b).

However, examples of claims from actors about direct effects of pesticides on their health and environment who do not refer to biotechnology also abound in the Argentinean sample. Many quotations from the newspaper *Página/12* are from peasants' families and NGOs. Their claims also inspire social movements organizations trying to influence the GMOs policy in Mexico.⁷³ In Brazil, the use of pesticides associated with GM seeds was one of the arguments employed by actors to oppose the approval of the GM rice. Again, the environmentalist social movement refers to the prohibition of the pesticides in other countries due to health effects, framing it as a threat to human health (Thuswohl, 2009). Another event which actors attribute to GM technology, the use of pesticide, was the increase in the allowed maximum residue limits (MRL) of glyphosate in the corn crop. The representative from the Brazilian Health Surveillance Agency, responsible for toxicological studies of human health effects from glyphosate, states that the farming practices associated with GMOs have as a consequence the increase of pesticides residues which reach the "table" of consumers, in the end of the food chain:

"Of course that people's exposure is increased. But the practice changes, the residue increases", justifies the director of Toxicology from the Brazilian Health Surveillance Agency (Anvisa), Luiz Cláudio Meirelles. Even with the increase in the maximum level of residue, he affirms, "the residue is within the daily intake". Maize crop "endured", according to the tests of Anvisa, this inclusion. "In the light of knowledge, there is no way not to go along this lines", he said. He admits that increasing levels is not ideal. "Maybe we should discuss this before.

*We will eat more residues, but this decision derives from the technology of GMOs (which demands pos-emergency application), and it is not under our competence". Glyphosate responds today, according to Anvisa, for 42% of the total consumption of agrotóxicos in the country*⁷⁴ (Zanatta, 2010a).

This quotation shows the contrast between two types of knowledge regarding the health and environment risks of the pesticide used with GM seeds: on the one hand the toxicological tests conducted in the laboratory in which the crop "endures" many applications of pesticide; on the other

⁷² In the original: "Argentina cuenta en la actualidad con 19 millones de hectáreas de soja transgénica, el 56 por ciento de la superficie cultivada del país, y 190 millones de litros de glifosato, donde la marca comercial más famosa es el Roundup, de la compañía Monsanto, que comercializa la semilla de soja resistente al agroquímico. También producen glifosato las empresas Syngenta, Atanor, Dupont y Bayer, entre otras. El químico se utiliza en la producción de arroz, donde también acumula denuncias por sus efectos sanitarios. El agroquímico tiene la propiedad de permanecer extensos períodos en el ambiente y viajar largas distancias arrastrado por el viento y el agua. Se rocía (vía aérea o terrestre) sobre los campos. Lo único que crece en la tierra rociada es soja transgénica, el resto de los vegetales absorbe el veneno y muere en pocos días. La publicidad de las empresas clasifica al glifosato como inofensivo para al hombre".

⁷³ The NGO Semillas de la Vida takes part in the open consultations for the authorization of GM corn and send their comments, asserting that the product under consideration by Mexican authorities: "far from avoiding a higher use of agrochemicals, increases their importance to agriculture" (Perez, 2009e). In the original: "Claro que aumenta a exposição das pessoas. Mas muda a prática, aumenta o resíduo", justifica o gerente-geral de Toxicologia da Agência Nacional de Vigilância Sanitária (Anvisa), Luiz Cláudio Meirelles. Mesmo com a elevação do limite, segundo ele, "o resíduo está dentro da ingestão diária". A cultura do milho "suportou", de acordo com testes da Anvisa, essa inclusão. "À luz do conhecimento, não tem como não seguir dessa maneira", disse. Ele admite que aumentar limites não é ideal. "Talvez devêssemos discutir isso antes. Vamos consumir mais resíduos, mas essa decisão deriva da tecnologia de transgênicos [que exige aplicação na pós-emergência], e não passa por aqui". O glifosato responde hoje, segundo a Anvisa, por 42% do consumo total de agrotóxicos no país"

⁷⁴ In the original: ""Claro que aumenta a exposição das pessoas. Mas muda a prática, aumenta o resíduo", justifica o gerente-geral de Toxicologia da Agência Nacional de Vigilância Sanitária (Anvisa), Luiz Cláudio Meirelles. Mesmo com a elevação do limite, segundo ele, "o resíduo está dentro da ingestão diária". A cultura do milho "suportou", de acordo com testes da Anvisa, essa inclusão. "À luz do conhecimento, não tem como não seguir dessa maneira", disse. Ele admite que aumentar limites não é ideal. "Talvez devêssemos discutir isso antes. Vamos consumir mais resíduos, mas essa decisão deriva da tecnologia de transgênicos [que exige aplicação na pós-emergência], e não passa por aqui". O glifosato responde hoje, segundo a Anvisa, por 42% do consumo total de agrotóxicos no país".

hand, the direct evidence collected from families, doctors and social movements' organizations about those who have not “endured” the actual practices of farming with glyphosate.

c) Risks out of control!

A third type of claims is clustered together for denouncing that risks of GMOs are out of control. Some claims embed a tension between legality and reality in what concerns the control of risks. Either it is the law that has not been applied or the legal framework is considered inadequate to control risks. In the first case, the claim is that the rules for risk management are only “a piece of paper” because they are not actually enforced, implying a claim for bringing the rule of law. In the second case, the tension resides in the fact that the “reality of risks” challenges the existent legal measures designed to control them, what implies a demand to review the rules of risk management.

The claims about contamination of corn varieties with GM corn in Mexico denounce its illegality and the need to assign responsibilities and enforce the law. The quotation below refers to a claim made by Mexican social movements' organizations before the Consultative Committee on Agriculture (CCA), an annual meeting between the United States and Mexico foreseen by the North American Free Trade Agreement (NAFTA).

The organizations explained that they resorted to CCA because they had exhausted all national instances to exposure and denounce this case of transgenic contamination. They affirmed that the authorities have violated the laws from General Ecological Balance, from Environmental Protection and from Biosafety of Genetically Modified Organisms, as well as the Federal Penal Code and the Cartagena Protocol on the Safety of Biotechnology. Quintana [from Frente Democrático Campesino] considered that the omission in monitoring and the violation of the law by the Federal Prosecutor for Environmental Protection, Semarnat, the National Service of Agro Alimentary Health, Safety and Quality, and by the General State Attorney also demonstrate that "there is lack of coordination between the responsible bodies for biosafety in Mexico and inability to make adequate samplings. To date, they have not yet satisfactorily integrated the previous analyses nor the citizens' complaint presented about the contamination of maize in Chihuahua". They demanded CCA to issue a statement of facts in face of the lack of effective implementation of the Mexican legislation and "given the existence of a systematic pattern of illegal sowing of transgenic maize in Chihuahua, without being detained or sanctioned by federal authorities"⁷⁵ (Enciso, 2009d).

In Brazil not only social movements, but also political bodies such as the Ministry of Agrarian Development (not the Ministry of Agriculture) claim that the existing rules are inefficient to avoid the flux of genetic material from GM crops to conventional ones. Thus, although legal, the actual practices are not sufficient in face of the risks. The most active claim maker in this regard is a subnational political authority, namely, the Secretary of Agriculture from the State of Paraná. They demand the revision of the existing rules and new federal regulation in face of the experience of the first GM corn crops:

A study by the Secretary of Agriculture from Paraná completed this month showed contamination of common corn crops by transgenic varieties from nearby fields, despite the fact that

⁷⁵ In the original: "Las organizaciones explicaron que acudieron ante la CCA debido a que han agotado todas las instancias nacionales para exponer y denunciar este caso de contaminación transgénica. Expusieron que las autoridades han violado las leyes General del Equilibrio Ecológico, de Protección Ambiental y de Bioseguridad de Organismos Genéticamente Modificados, así como el Código Penal Federal y el Protocolo de Cartagena sobre la Seguridad de la Biotecnología. Quintana consideró que la omisión en la vigilancia y el incumplimiento de las leyes por la Procuraduría Federal de Protección al Ambiente, la Semarnat, el Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria y la PGR también constatan que hay “descoordinación entre los responsables de la bioseguridad en México e incapacidad para hacer muestreos adecuados. A la fecha no han integrado satisfactoriamente las averiguaciones previas ni la denuncia popular presentada por la contaminación del maíz en Chihuahua”. Pidieron a la CCA integrar un expediente de hechos ante la falta de aplicación efectiva de la legislación mexicana y “dada la existencia de un patrón sistemático de siembras ilegales de maíz transgénico en Chihuahua, sin que las autoridades federales las detengan o sancionen”.

both areas respect the segregation distance prescribed by CTNBio (the National Technical Commission for Biosafety, the highest biosafety authority in the country). The contamination, according to the survey, was caused by wind pollination. The coordinator of the study, the agronomist Marcelo Silva, affirmed that the distance of minimum and maximum segregation, between 20 and a hundred meters, in conformity with the Normative Resolution number 4 from CNTBio, should be revised. "The coexistence between common and transgenic crops is under risk", said Silva. "We have a very robust assurance that the CTNBio norm is insufficient"⁷⁶ (do Vale, 2010).

In Argentina it is the issue of pesticide use that lead to claims that, although practices are in compliance with the legal rules, the "actuality" of the risks urges the elaboration of new rules that will be able to control the risks. Bellow, Página/12 reports about an action taken by the Office of the People's Advocate/Ombudsman Office (Defensoría del Pueblo) in response of a demand from the network of social movements' organizations Red Nacional de Acción Ecologista (Renace). They asked for a new methodology that would not allow for the classification of glyphosate as "not dangerous".

*The National Ombudsman Office has just taken a step in that direction: he required the Ministry of Agriculture to modify the form of classifying agrochemicals, demanded toxicological studies to be conducted by independent institutions (not by firms nor by scientists linked to the companies), and, until the new methodology is not implemented, he required that the agrochemicals should be relocated to the highest category of toxicity, what will imply that fumigations should be kept away from rural schools, peasants's houses and suburban neighborhoods*⁷⁷ (Aranda, 2010a).

d) Risks and responsibility

The last clusters of (bio) risk claims have in common their emphasis on the relationship between risk and responsibility. They shed light on the political nature of adopting GMOs i.e. they depict it as a "decision", a choice among courses of action that have consequences and that someone will be hold accountable for that. This attribution of responsibility sometimes is directed to governments, but also firms are hold accountable for damage to health and environment from GMOs.

In the Brazilian case, (bio) risk frames show an attributional function when proposals about deregulation of GMOs come to the agenda. There are at least two occasions in which actors call for responsibility when making claims about GMOs. One was the reaction from the Public Attorney (MPF) against the proposal to exclude firms from the obligation to monitor and report adverse effects in the post-marketing of GM products. It highlights health and environment as "juridical goods" that must be protected by the State and identifies risk analysis as the instrument to do so (Zanatta, 2010d).. Another occasion for such claims was the proposal of deregulation that involved the dismissal of the requirement for risk analysis in case of products resulting from the combination of two previously approved biotech products, the so-called "pyramidals". The quotation bellow makes an explicit linkage between the role of CTNBio members in risk management and their responsibility for damage.

⁷⁶ In the original: "Estudo da Secretaria da Agricultura do Paraná concluído neste mês apontou contaminação de lavouras de milho comum por espécies transgênicas de plantações vizinhas, apesar de as duas áreas respeitarem a distância de separação estipulada pela CTNBio (Comissão Técnica Nacional de Biossegurança, maior autoridade em biossegurança do país). A contaminação, segundo a pesquisa, ocorreu por meio da polinização empurrada pelo vento. O coordenador do trabalho, engenheiro agrônomo Marcelo Silva, afirmou que a distância de separação mínima e máxima, entre 20 e cem metros, conforme determina a Resolução Normativa número 4 da CTNBio, deve ser revista. "A coexistência entre lavouras comuns e transgênicas está posta em risco", disse Silva. "Temos uma certeza bastante robusta de que a norma da CTNBio é insuficiente."".

⁷⁷ In the original: "La Defensoría del Pueblo de la Nación acaba de dar un paso en ese camino: solicitó al Ministerio de Agricultura que modifique la forma de clasificación de los agroquímicos, instó a que los estudios de toxicidad estén a cargo de instituciones independientes (no de empresas ni de científicos ligados a las compañías) y, hasta que no se implemente la nueva metodología, reclamó que los agroquímicos sean reubicados en la más alta categoría de toxicidad, lo que implicará alejar las fumigaciones de escuelas rurales, viviendas campesinas y barrios periurbanos".

In his opinion, the expert Leonardo Melgarejo stated that members from CTNBio could respond in solidarity for damage caused by the new stacked transgenes⁷⁸ (Zanatta, 2009c).

In Mexico the main issue evoking the connection between risk and responsibility is the contamination of native species of corn with genetic material from GM corn. Some actors not only blame firms for the contamination, they also accuse them of pursuing it intentionally as part of a strategy which was previously adopted in Brazil:

Ana de Ita, from Centro de Estudios para el Cambio en el Campo Mexicano, warned that the authorities have accepted that since 2001 there is contamination in the farming of the grain and it has been stated in Chihuahua, where it has already been demonstrated that the presence of GMOs was not by genes flow, but because there were intentionally planted. She recalled that such mechanism for contamination is a strategy adopted by some firms. This, she recalled, has already happened previously in Brazil with soybean⁷⁹ (Enciso, 2009c).

Once again, Mexican claim makers highlight the particularity of their case: there, it is not enough assing responsibility or intentionality for damage, because it is beyond compensation. Greenpeace Mexico asks authorities to apply the precautionary principle (Sosa, 2010); for many actors the only solution left for Mexico is the moratorium on GM corn, including for experimental cultivation. This is part of the recommendations made by the scientists responsible for the study "Origen y diversificación del maíz, una revisión analítica", edited by the Comisión Nacional para el Uso y Conocimiento de la Biodiversidad (Conabio), a body from Semarnat. The recommendations were published in La Jornada:

To reestablish the moratorium on the cultivation of transgenic maize in Mexico - which was lifted in March - and to modify the Law on Biosafety and Genetically Modified Organisms (LBOGM), with the aim of establishing measures for the protection of the native grain and determining the extent of its contamination, these are the recommendations made by scientists in a study financed by the Ministry of Environment and Natural Resources (Semarnat) and Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (Sagarpa)⁸⁰ (Enciso, 2009a).

In extreme contrast to proposals of deregulation, the suggestion of a moratorium is based on an opposite conception of how politics should deal with (bio)risk. Also in Argentina, when framing GMOs as a risk to health and environment, some actors defend the ultimate risk management measure. For instance, the court from Cordoba prohibited the use of glyphosate - indirectly rendering impossible the use of GM seeds resistant to the pesticide -, and the Minister of Defense prohibits the cultivation of GM soy, as reported below by La Nación:

The Minister of Defense, Nilda Garré, prohibited the Armed Forces to farm transgenic soy in its own fields situated in urban and suburban areas, as well as in the nearby areas of militar housing, as, for example, Campo de Mayo. The resolution points to "the protection of environment and human health", according to the official statement. The Armed Forces produce soybean and other crops that

⁷⁸ In the original: "Em parecer, o especialista Leonardo Melgarejo afirmou que os membros da CTNBio poderiam responder de forma solidária por eventuais danos causados pelos novos transgênicos cruzados".

⁷⁹ In the original: "Ana de Ita, del Centro de Estudios para el Cambio en el Campo Mexicano, advirtió que las autoridades han aceptado que desde 2001 existe contaminación de cultivos del grano y se ha alentado en Chihuahua, donde ya se demostró que la presencia de transgénicos no fue por flujo de los genes, sino porque hubo siembras de manera intencional. Recordó que dicho mecanismo de contaminación es una estrategia que utilizan algunas empresas. Ello, recordó, ya sucedió de manera previa en Brasil con la soya".

⁸⁰ In the original: "Establecer nuevamente la moratoria en el cultivo de maíz transgénico en México –que se levantó en marzo– y modificar la Ley de Bioseguridad y Organismos Genéticamente Modificados (LBOGM), con el fin de establecer medidas de protección del grano nativo y determinar su grado de contaminación, son las recomendaciones que hicieron científicos en un estudio financiado por las secretarías de Medio Ambiente y Recursos Naturales (Semarnat) y Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (Sagarpa)".

*they sell in the market to obtain resources destined to operational expenditures, as food for the troops and for the herds of cattle and horses from the Comando*⁸¹ (Bertello, 2009).

To sum up, in all countries actors similarly dispute in the health and environmental dimension of agrobiotechnology what are its (positive or negative) effects, the knowledge basis of their claims and the adequacy and desirability of regulation. Nevertheless, the concrete issues that come to media attention are very different and, not less important, the time orientations. In Argentina, the debate concerns present damages of past decisions to adopt the technological package of GM seeds resistant to glyphosate. In Brazil, the debate is about present decisions on how to deal with the also present issues of risk management such as coexistence and market monitoring. In Mexico, the main issue to receive media coverage is the threat to biodiversity, framed mostly in a future-oriented fashion, although it also includes claims about the actual incidence of contamination. The Mexican debate is at the same time nationalistic in tune and open to transnational influences, what is not much the case in the other countries.

C. The dimension of ethics and politics

The third dimension of the debate about GMOs refers to the broader societal implications of the adoption of biotechnology in agriculture. It includes claims that frame the context of the manipulation of genetic material applied to agriculture, making connections to other issues, with a strong ethical and political connotation. Among the main topics brought to debate are general beliefs and values regarding technology, either valuing its adoption as a sign of progress or fearing it by linking it to exploitation and expropriation; thus, beliefs about who are the winners and losers of technology adoption; beliefs about how biotechnology relates to certain pressing issues facing humanity such as food security and climate change; and beliefs about how the political decision-making about adopting technologies should be.

“Progress frames” were clustered among three main types of claims. First, there is the view that adopting a new technology is part of a linear progress path. A stronger version of this type of claim is the perception that biotechnology signals a “technological revolution” with many positive spill-over effects in economy and society which benefits all. Some actors contest the claim that agrobiotechnology may only serve the interests of agribusiness and defend that it is not only accessible to small farmers, but that these are its main beneficiaries.

Second, there is the claim that biotechnology is a solution to the challenges posed to humankind by climate change and food security. In some cases, particularly in Mexico, this argument assumes a nationalist connotation, for instance in the claim that it is the solution for the country to increase food production, achieve self-sufficiency and reduce dependence on imports. In other cases, mostly found in the Brazilian and in Argentinean debates, this argument is more global in its appeal: actors depict those countries as food providers to the world. A third type of claim coded as adopting a “progress frame” refers to the belief that political decision making regarding the adoption of technology should not be guided by political nor ideological considerations; instead, it should be based on technical-scientific grounds and conducted in a rational way.

The category “critique frames” compiles the types of claims that counter such “progress frames”. First, the claims that emphasize the victims of the “technological revolution” and the negative social effects of adopting agrobiotechnology, such as land concentration, reduction in employment and the threat to the coexistence of different models of agriculture. A demand for

⁸¹ In the original: "La ministra de Defensa, Nilda Garré, prohibió a las Fuerzas Armadas cultivar soja transgénica en campos propios ubicados en zonas urbanas y suburbanas, así como en adyacencias de barrios e instalaciones residenciales militares, como, por ejemplo, Campo de Mayo. La resolución apunta a "la protección del medio ambiente y a la salud de las personas", según el comunicado oficial. Las Fuerzas Armadas producen soja y otros cultivos que venden en el mercado para obtener recursos que destinan a gastos operativos, como son los alimentos para la tropa y rodeos vacunos y equinos del Comando de Remonta y Veterinaria".

corrective action i.e. for policies that protect agro-ecological, peasant, indigenous and familiar agriculture can be implied in such claims. A variation of this type of claim is the emphasis on collective identities and the cultural dimension - in particular, the transmission of traditional knowledge - associated with peasant and indigenous agriculture. The second type of “critique frame” is correlated to the first and includes arguments that opt for blaming the winners of adopting agrobiotechnology, identifying agribusiness and transnational corporations as the main beneficiaries of it and criticizing their expansive and monopolistic practices.

A third type of claim refers to the challenges posed to humankind by climate change and food security, but in a very contrasting way to those purported by carriers of “progress frames”. Here, actors not only contest the claim that food security and climate change can be solved by technology, they also inverting it by affirming that GMOs are actually a (foreign) threat to food security; and, consequently, they transform food security into food “sovereignty”, not without emphasizing the millenary (local, national) traditions of seed selection. Last but not least, “critique frames” also include beliefs about political decision making regarding the adoption of technology, however, in a very different way to those advocated by GMOs’ proponents. Basically, the main argument is that such decisions must involve not less, but more politics. There are two variations in this type of claim: (i) the demand for public accountability, including blaming public officials for corruption and the associated demand for the separation between private and public interests with precedence of the latter over the former; (ii) the demand for public participation in decision making.

Overall results

Claims about the broader societal implications of agrobiotechnology were more often found in the Mexican media sample than in the two other countries. While in the former country this dimension represented 36% of the debate, in Argentina and in Brazil it only accounted for, respectively, 10 and 11% of all claims coded (Table 8).

Table 12 shows the participation of actors and their frames. Similarly to the dimension of health and environment, in all countries market actors and social movements have contrasting framing strategies in the ethical-political dimension.

TABLE 12
POLITICAL CLAIMS ABOUT THE ETHICAL-POLITICAL DIMENSION OF
BIOTECHNOLOGY PER TYPE OF ACTORS PER COUNTRY
Number of claims

	Argentina (N=127)		Brazil (N=199)		Mexico (N=275)	
	Progress	Critique	Progress	Critique	Progress	Critique
Political actors	1	0	4	3	10	1
Market actors	2	0	5	0	12	9
Social movt.	0	4	0	3	0	36
Scientists	0	0	2	0	3	16
Media actors	1	5	0	5	4	9
Total	4	9	11	11	29	71

Source: own elaboration.

Market actors are the main carriers of progress frames in all countries. However, in Mexico, farmers and their associations also frame GMOs as “critique”. Social movements are by far the leader carrier of critique frames in Mexico, while in Argentina and in Brazil, although they also frame agrobiotechnology that way, this is first of all a media framing. In all countries, media framing is overwhelmingly against GMOs in this dimension, but in Mexico media actors also frame “progress”. Another difference from the Mexican material is the strong participation of scientists in this dimension—what not happen in the other countries—, adopting almost always “critique” frames. Political

authorities are the second more active as carriers of "progress" frames in all countries, but in the Brazilian material these only slightly surpass claims coded as "critique".

1. Progress

"Progress" arguments accounted for 3,6 and 11% of all claims in the Argentinean, Brazilian and Mexican debates, respectively (Table 8). In all cases, it is a frame mostly adopted by market actors and political actors. To a lesser extent, media and scientific actors also are carriers of this frame. No social movement in the sampled material defends this framing of the GMOs. The claims categorized as adopting a "progress frame" are clustered below around the main variations found in the material, namely: (a) "technological revolution"; (b) "the solution to food security and climate change" and (c) "science-based decision making: no room for politics".

a) "Technological revolution"

Biotechnology is the latest technological development in the path of progress and this is the necessary product of a linear evolution. The President of CTNBio in Brazil emphasizes that there is no coming back:

The agronomist Edison Paiva, who was yesterday elected the president of CTNBio (National Technical Biosafety Commission), defended the commercial liberation of genetically modified plants and criticised the opposition to these organisms. "We work within the boundaries of knowledge, and the groups against it are very efficient in causing fear", he told Folha. (...) To Paiva, transgenic varieties "are a necessity, a reality from which there is no return". Researcher at Embrapa for 35 years, with a PhD in genetic engineering, he points out that genetically modified cultures already occupy more than 140 million hectares in the world⁸² (Folha de São Paulo, 2010).

In Argentina, the journalist of La Nación refers to the possibility of prohibiting glyphosate—and, with it of GM crops—as a return to the backward past. There is no point in stopping progress or going back to the "pre-GMOs era".

With Argentina transformed in a key player in the production, no one in the sector seems to want to return to such stages⁸³ (Bertello, 2010).

The spillover effects of the technological revolution in Argentina are not only narrated by some actors in that country, but also used by actors aiming at influencing the Mexican debate about agrobiotechnology. In the quotation below, Manuel Madero, commercial director from Monsanto in South America, was interviewed by El Economista in the Agrícola Argentina 2009 and published in the Mexican newspaper:

He used as an example that in Argentina's agriculture an increase in productivity of only 1% generates additional income of between 35 and 40 million dollars "and that obviously translates into more jobs, investments in sectors like transportation and other services". He added that all technological revolutions that happened did so through the use of technology and that "they represent a huge opportunity, especially if one wants to supply the world's enormous demand of food, which makes it necessary to increase the production of the same arable land"⁸⁴ (Martínez, 2009d).

⁸² In the original: "Escolhido ontem presidente da CTNBio (Comissão Técnica Nacional de Biossegurança), o agrônomo Edilson Paiva defendeu a liberação comercial de plantas geneticamente modificadas e criticou a oposição a esses organismos. "Trabalhamos com a fronteira do conhecimento, e os grupos contrários são muito eficientes em assustar", disse à Folha. (...) Para Paiva, variedades transgênicas "são uma necessidade, uma realidade para a qual não há retorno". Pesquisador da Embrapa por 35 anos, com doutorado em engenharia genética, ele cita que culturas geneticamente modificadas já ocupam mais de 140 milhões de hectares no mundo".

⁸³ In the original: "Con la Argentina convertida en un actor clave de la producción, nadie en el sector parece querer volver a aquellas etapas".

⁸⁴ In the original: "Puso como ejemplo que en la agricultura de Argentina sólo 1% de mayor rendimiento genera divisas adicionales de 35 a 40 millones de dólares "y esto evidentemente se traduce en más empleos, derrama económica en sectores como transporte y otros servicios". Añadió que todas las revoluciones tecnológicas que se han dado han sido a través de aplicación de la tecnología y "significan una oportunidad enorme, sobre todo si se

Madeiro not only speaks of a technological revolution; he also frames GMOs as the solution to food security. Claims that focus on pressing global issues to justify the adoption of the new technology will be describe next.

b) The solution to food security and climate change

In all countries actors defend biotechnology to be a solution to food security, using Malthusian arguments mentioning figures of population increase in contrast to the volume of food production. In Brazil and Argentina there are general references for the need to feed the world, such as in the quotation from a Monsanto spokesperson in Brazil:

When the world population increases by 50%, we will have to double the production of food. And biotechnology is the answer. Organic agriculture cannot fulfil that⁸⁵ (Freitas, M. 2009).

While Brazil and Argentina are amongst the countries considered as the food providers of the world (Lopes, 2010), in Mexico food security arguments have first of all a national aim, since the country imports corn from the USA. Some actors contrast Mexico and the US as importer and exporter of corn to make the argument that biotechnology accounts for that difference. In the article bellow, AgroBio Mexico uses that reasoning and is successful in having it adopted by the newspaper El Economista as well:

According to AgroBio, Mexico is not self-sufficient in the production of corn and imports from transgenic producing countries more than 40% of its consumption. Thus, since over a decade Mexico imports, processes and consumes this kind of food, withholding the access to such technologies to the agricultural producers from our country⁸⁶ (Martínez, Maria (2009a).

The food security argument assumes a strong national connotation in Mexico, indicated by the use of words such as “our country”, “feed the Mexicans”, and “Mexico” in many quotations. Therefore, biotechnology is claimed to be the solution not only for the problem posed to humanity, but also as a means for the country to reduce its dependence on food imports. This is a common media frame in the country, present in the discourse of El Universal quoted bellow:

But the commercialization of Genetically Modified Organisms (GMOs) in Mexico goes beyond a new source for generating more profitable businesses. It is above all the choice for our country to become self-sufficient in the production of food (Lombera, 2009).⁸⁷

Some actors take as their starting point the need to feed the world’s population and add to that challenge the negative effects of climate change. Biotechnology becomes the solution to increase productivity and also to address new climatic situations. On the occasion of the FAO International Technical Conference on Agricultural Biotechnologies in Developing Countries, which took place in Mexico, this strategy was the framing strategy adopted by the representative from FAO, Modibo Traoré:

UN statistics show that, nowadays, the world population is 2.5 times bigger than in 1950, counting up to 6.800 billion people. For 2045 it is estimated that the population will be of 9 billion people, what will result in an enormous demand for food production. Therefore, Traoré noted, we consider that biotechnological innovations may represent an important assistance in duplicating the

quiere cumplir con la enorme demanda de alimentos que se tiene en el mundo y que hace necesario ampliar los rendimientos en la misma tierra cultivable”.

⁸⁵ In the original: "Quando a população mundial crescer 50%, teremos que dobrar a produtividade de alimentos. E a biotecnologia é a saída. A agricultura de orgânicos não consegue isso".

⁸⁶ In the original: "De acuerdo con AgroBio, México no es autosuficiente en la producción de maíz e importa de países que cultivan transgénicos más de 40% de su consumo. Por tanto, desde hace más de una década, México importa, procesa y consume este tipo de alimentos, excluyendo del acceso a estas tecnologías a los productores agrícolas de nuestro país".

⁸⁷ In the original: "Pero la comercialización de Organismos Genéticamente Modificados (OGM) en México va más allá de una nueva oferta para generar negocios más rentables. Es en primera instancia la opción para que nuestro país sea autosuficiente en producción de alimentos".

food production for the year 2050 and help cope with the uncertainties raised by global warming. “In the last decades the field of biotechnologies has progressed at great speed and generated a number of innovations, particularly in the field of pharmaceuticals and in some cases in that of agriculture. The biotechnologies can be very useful to fulfil the needs of an urbanized population that grows each day”, pointed out Traoré⁸⁸ (El Universal, 2010b).

Quotations connecting biotechnology to climate change alone were not found so often in the material. In Brazilian media, there were announcements of GM crops being researched to address climate change (Barros, 2009), but the most assertive claim of biotechnology being the solution for the effects of this phenomenon in agriculture was again to be found in the Mexican material as the quotation below:

With climate change the sowing cycle of corn in Sinaloa will get reduced a month by the end of the century, estimated the IMTA researcher. With the current varieties of the grain the seeding cycle will last between January and April only, and for that biotechnology is an alternative to provide seeds that are more resistant to the effect of the climate. Ojeda is not pessimistic about the effects of global warming in agriculture. He just alerts about the modifications that the production schemes will require. “The agriculture is not going to end, we need to adapt”, he said. The case of potato reflects the challenges facing the cultivation of corn. To maintain the national harvest of 60 000 hectares the use of biotechnology to produce new varieties that withstand climate change is required⁸⁹ (Lombera, 2010).

c) Science-based decision making: no room for politics

Some claim makers defend that decisions regarding the adoption of biotechnology should be based solely on scientific and technical grounds. Below, a quotation from a FAO representative, Shivaji Pandey, published on the coverage of the mentioned conference:

He said that at the meeting information will be given concerning the available tools, their advantages and disadvantages, so that the developing countries can decide what suits them to solve their problems. “It is a Technology conference, based on science, not on politics”⁹⁰ (Martínez, A. 2010).

The emphasis on the scientific basis of decision-making sometimes unfolds into the attempt to make a clear separation between technical and political issues. From this point of view, political issues are laden with ideology and not amenable to a rational debate grounded in scientific information, as can be seen in the quotations from the President of the Brazilian Biosafety Commission (CTNBio):

Identified as one of the main internal opponents of the groups that preach more caution at the liberation of transgenics, the new president affirms that the ‘new stage’ of CNTBio should have less

⁸⁸ In the original: "Estadísticas de las Naciones Unidas indican que, hoy en día, la población mundial es 2.5 veces más que en 1950, llegando a los seis mil 800 millones de habitantes. Para 2045 se estima una población de nueve mil millones lo que se traducirá en una enorme demanda de alimentos a producir. Por ello, anotó Traoré, consideramos que las innovaciones de la biotecnología pueden suponer una importante ayuda para duplicar la producción alimentaria para el año 2050 y hacer frente a las incertidumbres que plantea el cambio climático. "En las últimas décadas el campo de las biotecnologías ha avanzado a una velocidad formidable y generado numerosas innovaciones, en particular en el campo farmacéutico y en algunos casos en el de la agricultura. Las biotecnologías pueden ser muy útiles para satisfacer las necesidades de una población urbanizada que cada día crece más", destacó Traoré".

⁸⁹ In the original: "Con el cambio climático el ciclo de siembra de maíz en Sinaloa se va a reducir un mes para fin de siglo, estimó el investigador del IMTA. Con las variedades actuales del grano el ciclo de siembra durará sólo entre enero y abril, por lo que la biotecnología es una alternativa para contar con semillas más resistentes al efecto del clima. Ojeda no es pesimista sobre los efectos del calentamiento global en la agricultura. Sólo alerta sobre las modificaciones que requerirán los esquemas de producción. "La agricultura no se va a acabar, tenemos que adaptarnos", afirmó. El caso de la papa refleja los retos que enfrentará el cultivo del maíz. Para mantener la cosecha nacional de 60 mil hectáreas se requiere el uso de la biotecnología para generar nuevas variedades que resistan el cambio climático".

⁹⁰ In the original: "Sostuvo que en la reunión se informará sobre las herramientas disponibles, las ventajas y desventajas de ellas, para que los países en desarrollo elijan lo que les conviene para solucionar sus problemas. “Es una conferencia de tecnología, basada en ciencia, no en política.”

ideological disputes. “We need to separate the technical discussion from the political matters at the debates”⁹¹ (Zanatta, 2010f).

According to this view, scientific knowledge and rationality will eventually lead to a consensual decision, as shown in the quotation below from a Mexican scientist from Centro de Investigación y Estudios Avanzados (Cinvestav) from Instituto Politécnico Nacional, director for the development of a draught-tolerant corn.

Concerning the existing opposition to the cultivation of transgenic corns in Mexico, Beatriz Xoconostle said that it is “very valid” not to want to have genetically modified organisms in a place of origin; however, the topic should be opened towards a ‘rational debate’ between ecologists and specialists that possess all scientific information in order for an “appropriate consensus” to be reached⁹² (Zaragoza, 2010b).

2. Critique

Political claims coded as adopting a “critique” frame accounted for 7, 6 and 26% of all claims in the Argentinean, Brazilian and Mexican debates, respectively (Table 8). In Argentina and Brazil media actors are the first carriers of these frames. While in Argentina social movements share with media actors the role of carrying these frames, in Brazil, besides social movements, also political actors express critical voices regarding the relationship between technology and society. In Mexico all types of actors make claims using this type of frame, with some particularities. There, not only do scientists and market actors appear as carriers of “critique frames”, but also they are active in doing so: scientists are the second claim-makers of this type after social movements, and market actors share the third position with media actors. Only political actors are not prominent in expressing arguments of this type in Mexico.

Examples of claims coded as adopting a “critique frame” are described below along four clusters: (a) "victims of the technological revolution"; (b) "blaming the winners "; (c) "challenges posed to humankind" and (d) "political decision making regarding the adoption of technology".

d) Victims of the "technological revolution"

In Brazil, the possible victims mobilize to be protected in face of the advancement of GM production; above all, they demand the right to coexist:

The organisations demand the suspension in use of GM corn until there is no guarantee of coexistence. Representatives of civil society demanded the federal government to comply with the promises of "pacific coexistence" between conventional, organic, agroecological and transgenic soy that the president Luiz Inácio Lula da Silva made in the opening of the meeting COP 8, in Curitiba. They said that Lula supported the release of market cultivation of GM seeds under the condition that there was guarantee of coexistence between conventional and transgenic crops⁹³ (Brito, 2009a).

In Argentina, the expansion of the soy model and its technological package (GM soy, no till farming and glyphosate) is held responsible for land concentration, reduction in employment and the threat to the coexistence of different models of agriculture:

⁹¹ In the original: "Identificado como um dos principais adversários internos dos grupos que pregam mais cautela nas liberações de transgênicos, o novo presidente afirma que a "nova etapa" da CTNBio deveria ter menos disputas ideológicas. "Precisamos separar as discussões técnicas e as questões políticas nos debates".

⁹² In the original: "Sobre la oposición que existe a la siembra de maíces transgénicos en México, Beatriz Xoconostle dijo que es “muy válido” no querer tener organismos genéticamente modificados en un sitio de origen; sin embargo, el tema debe abrirse a un “debate racional” entre ecólogos y especialistas con toda la información científica para “llegar a un consenso apropiado”.

⁹³ In the original: "As organizações pedem que o uso do milho OGM seja suspenso enquanto não houver garantias de coexistência. Representantes da sociedade civil cobram do governo federal o cumprimento de promessas de "convivência pacífica" entre plantios convencionais, orgânicos, agroecológicos e transgênicos feitas pelo presidente Luiz Inácio Lula da Silva na abertura da reunião COP 8, em Curitiba. Eles dizem que Lula apoiou a liberação do plantio comercial de sementes OGM sob a condição de haver garantia de coexistência de lavouras convencionais e transgênicas".

This productive schema has a bias towards concentration that led thousands of small producers to abandon their farms and to become rentiers by leasing their fields. In turn, transgenic soy caused a decreased in the labor days required per hectare cultivated and harvested. In sum, the generalization of no-till farming diminished the numerical importance of the historic exploitations of family farming⁹⁴ (Rubinzal, 2010).

Some claims emphasize the collective identities and the cultural dimension associated with the modes of agriculture that are threatened by the expansion of GMOs. In Argentina, a survey made by the Red Agroforestal Chaco Argentina (Redaf) estimated that there had been 164 land and environmental conflicts, most of which they attribute to the expansion of GM soy.

89% of the conflicts started in parallel to the installation of the current agricultural model, with transgenic soy as emblem. (...) The indigenous peoples affected by this spread are, only to mention the high lands, qom, pilagá, mocoví, wichí, chorotes, chulupies, tapietes, guaycurúes, lules, vilelas y tonocoté. (...) Among the conclusions, it stands out that the conflicts are not only for land, but it is also a conflict over the use and control of territorial space by means of imposition from a culture over the other. It states that for the entrepreneurs dedicated to agriculture and to the State "what is on stake is the in profits and the short term taxes, for them land represents an economic good necessary for production profits, regardless of the environmental, cultural and social costs involved". In contrast, they highlight that for the indigenous peoples and peasants it means much more than business. "It means a struggle to maintain an identity, to preserve a way of live, of producing, of living and being. The land is a social good and not an economic good, constitutive part from their worldview and religiosity", states the report⁹⁵ (Aranda, 2010b).

Among the victims, they name indigenous communities and small farmers, but above all, the emphasis is that the expansion of the soy model is part of a clash of cultures and identities in what regards land use. In Mexico, actors also build an identity, which is threatened by GM corn. In a petition organized by the Red en Defensa del Maíz to hand to FAO and to Mexican authorities, they name it "people of corn":

This document rejects the cultivation of transgenic corn in Mexico for considering it "a historical crime against the people of corn, biodiversity, food sovereignty, against ten thousand years of peasant and indigenous agriculture that bequeathed this seed for the good of all peoples of the world"⁹⁶ (Norandi, 2009).

The quotation shows also a linkage between local identities and the humankind: again, in Mexico, the argument assumes a more drastic tune, referring not to specific victims such as small or

⁹⁴ In the original: "El sesgo concentrador de este esquema productivo provocó que miles de pequeños productores abandonaran sus explotaciones y se reconvirtieran en rentistas mediante el alquiler de sus campos. A su vez, la soja transgénica ocasionó una disminución de los jornales requeridos por hectárea cultivada y cosechada. En síntesis, la generalización de la siembra directa disminuyó la importancia numérica de las históricas explotaciones chacareras familiares".

⁹⁵ In the original: "El 89% de los conflictos comenzó en paralelo con la instalación del actual modelo de agropecuario, con la soja transgénica como emblema. (...) Los pueblos originarios perjudicados por ese avance, sólo en las provincias relevadas, son el qom, pilagá, mocoví, wichí, chorotes, chulupies, tapietes, guaycurúes, lules, vilelas y tonocoté. (...) El relevamiento demuestra que las víctimas del modelo agropecuario son pequeños productores. (...) Entre las conclusiones se destaca que los conflictos no son sólo por la tierra, sino que se trata de una disputa por el uso y control del espacio territorial a partir de la imposición de una cultura sobre otra. Afirma que para los empresarios dedicados al agro y para el Estado "está en juego el aumento de ganancias y retenciones en el corto plazo, para ellos la tierra representa un bien económico necesario para producir ganancias, sin importar los costos ambientales, culturales y sociales que impliquen". En contraposición, destaca que para los pueblos indígenas y campesinos implica mucho más que negocios. "Se trata de una lucha por conservar una identidad, por mantener un modo de vida, de producir, de vivir y permanecer. La tierra es un bien social y no un bien económico, parte constitutiva de su cosmovisión y religiosidad", asegura el informe".

⁹⁶ In the original: "En este documento se rechaza enérgicamente la siembra de maíz transgénico en México por considerarlo "un crimen histórico contra los pueblos del maíz, la biodiversidad y la soberanía alimentaria, contra 10 mil años de agricultura campesina e indígena que legaron esta semilla para el bien de todos los pueblos del mundo"".

organic farmers. Rather, the whole humanity and its traditional knowledge is victim of a crime, if one considers that the domestication and the millenary selection of corn is a civilizational conquest in the human history. The adoption of GM corn is thus framed as a historical crime and a crime against humanity, as stated in the quotation above and, below, by the professor from the Universidad Autónoma Metropolitana, Luciano Concheiro:

At a press conference, Luciano Concheiro, profesor and research of the Graduate School in Rural Developmen from the Universidad Autónoma Metropolitana (UAM), considered as a "crime against humanity" that in national territory, center of origin of maize, "the contamination of basic grains by transgenics is allowed". He added that "not only it damages the immense richness in terms of biodiversity, since it is worth recalling that Mexico is listed among the four megadiverse countries in the world, but also what is on stake is the civilizatory richness that we bequeathed to the world, after thousand years of selection of grains, which has not been produced by nature, but by our ancestors"⁹⁷ (Solano, 2010).

e) Blaming the winners

Beyond stating that the adoption of GMOs victimizes groups of people, types of agriculture, types of knowledge and the whole humanity, some actors identify, on the other side of the spectrum of winners and losers, those who they accuse of concentrating the profits from biotechnology. They name mostly transnational corporations, but in Argentina there are two other targets of blaming, the representatives of agribusiness and their allies in the media, as published in Página/12:

Employer organizations from the rural sector and international agricultural companies maintain a model of monoculture to feed with transgenic the animals from Europa and China. (...) They blame the firms Cargill, Dreyfus, Bunge, Nidera, Syngenta, AGD and Monsanto, among others, as responsible for the agriculture model in Argentina and reserve a paragraph to the role of the big media groups: "We repudiate the manipulation of information by the many communication media that have obscured the diversity of Argentinean countrysided and have desfigured the faces from the genuine rural worker"⁹⁸ (Aranda, 2010c).

In Mexico, social movements blame transnational corporations for using illegal means to force the adoption of biotechnology and thus control de market of seeds. In Mexico, social movements blame transnational corporations for using illegal means to force the adoption of biotechnology and thus control de market of seeds. But also social movements count on transnational strategies to counter corporations. This is what a group of German SMOs proposed:

With the idea of avoiding that GMOs spread throughout the world—in this case, maize—, we will start working in international networks and will exert political pressure to attain protection of the center of origin, which is Mexico, said in an interview Jochen Fritz, from the Alliance GM-Free Zone Hohenlohe. He said that the plan from Monsanto is that "since here is the center of maize, let GMOs contaminate it, and as the enterprise holds patents on processes, this would be a form of appropriating the grains. It wants to sell its seeds to the peasants and apply its moto: 'there will be no plants that are not owned by us". He recalled that 80% from the seeds that are marketed globally are

⁹⁷ In the original: "En conferencia de prensa, Luciano Concheiro, profesor-investigador del posgrado en Desarrollo Rural de la Universidad Autónoma Metropolitana (UAM), consideró como un "crimen de lesa humanidad" que en el territorio nacional, centro de origen del maíz, "se permita la contaminación con transgénicos de los granos básicos". Agregó que "no sólo se daña una enorme riqueza en términos de biodiversidad, pues hay que recordar que México se encuentra entre los cuatro países megadiversos del mundo, sino que también está en juego la riqueza civilizatoria que aportamos al mundo, luego de miles de años de selección de granos, que no fue producida por la naturaleza, sino por nuestros ancestros"".

⁹⁸ In the original: "Las entidades patronales del campo y las compañías internacionales del agro sostienen un modelo de monocultivo para alimentar con transgénicos a los animales de Europa y China. (...). Apuntan contras las empresas Cargill, Dreyfus, Bunge, Nidera, Syngenta, AGD y Monsanto, entre otras, como las responsables del modelo agropecuario de Argentina y guardan un párrafo al rol de los grandes grupos mediáticos: "Repudiamos la manipulación de la información por parte de muchos medios de comunicación que han ocultado la diversidad del campo argentino y han desfigurado los rostros del genuino trabajador y trabajadora rural".

owned by Monsanto, "this means that it is neither the peasants nor the countries that can have seeds, what deepens the dependency"⁹⁹ (Enciso, 2010).

The campaign against GMOs in Mexico protested in front of the firm Monsanto with slogans such as "Out of Mexico, Monsanto!" ("¡Fuera Monsanto de México!") (Perez, 2010).

f) Threat to food sovereignty

Given that one of the main arguments used to defend the introduction of agrobiotechnology in Mexico is that it is a solution to food security and climate change, actors in the sampled material from the Mexican debate make vehement contestations to such claims, for instance, in this news article from La Jornada covering a protest during the mentioned FAO Conference:

*Activists and citizens tasted cobs of creolle corn and handed in a letter addressed to Modibo Traore, Vice-Director from FAO to remind him that the problem of hunger in the world won't be solved with transgenics and that the alternative to fight poverty and hunger is peasant and sustainable agriculture*¹⁰⁰ (La Jornada, 2010).

Beyond contesting the claim that biotechnology is the solution to pressing global issues such as food security, social movements transform it into a source of the problem, i.e., as a threat to food security. Notice that, as with the "progress frames", actors in the Mexican debate move back and forth from national and global framings of the food security issue, sometimes adopting a nationalist appeal, as in the quotation above, other times extending their frame of the issue to achieve a global relevance, as in the quotation below:

*Delia Patricia Couturier, expert in rural development from UAM-Xochimilco, highlighted that "we are the only country that allows experimental cultivation of GMOs in a grain basic for its population, situation that does not occur in Asia, with rice, or in Europe, with wheat, because it is clear for them that it is an enormous risk for the food security of a nation (...) and this sets in risk one of the basic food for Mexicans, but also for many other nations that depend on this seed"*¹⁰¹ (Solano, 2009).

One of the reasons claim makers give for why GMOs pose a threat to food security is the application of IPRs over seeds and, consequently, the prohibition imposed on farmers to reproduce seeds without paying royalties for it. As Mexico is the center of origin of corn, the claim that patents over seeds is a menace to food security receives an additional element that gives it more resonance. The intellectual property over corn means that the product of millennia of seed selection conducted by Mexicans is yielded over to multinationals i.e. a patent is granted over a human heritage. In a protest, the campaign "Sin Maiz no hay país" made a simulation in which they handed to the president of Monsanto the national and human heritage: the corn (Perez, 2009b). The framing strategy is to emphasize such historical and cultural dimension of seed improvement to strengthen the claim that GM corn is a threat to food security. The use of such wording as "crime against humanity" and

⁹⁹ In the original: "Con la idea de evitar que los transgénicos se extiendan en el mundo –en este caso el maíz–, se comenzará a trabajar en redes internacionales y se ejercerá presión política para lograr la protección del centro de origen, que es México, dijo en entrevista Jochen Fritz, de la Alianza Región Hohenlohe Libre de Transgénicos. Indicó que el plan de Monsanto es que "como aquí está la cuna de maíz, que los transgénicos la contaminen, y como la empresa tiene patentes de los procesos, esto sería una forma de apropiarse de los granos. Quiere vender sus semillas a los campesinos y aplicar su lema: 'no habrá plantas que no sean propiedad de nosotros'". Recordó que 80 por ciento de las semillas que se comercian a escala mundial son propiedad de Monsanto, "eso significa que ya no son los campesinos ni los países los que pueden disponer de las semillas, se profundiza la dependencia".

¹⁰⁰ In the original: "Activistas y ciudadanos degustaron elotes de maíz criollo y entregaron una carta dirigida a Modibo Traore, Director Adjunto de la FAO para recordarle que el problema del hambre en el mundo, no se solucionará con transgénicos y que la alternativa para combatir la pobreza y el hambre es la agricultura campesina y sustentable".

¹⁰¹ In the original: "Delia Patricia Couturier, especialista en desarrollo rural de la UAM-Xochimilco, destacó que "somos el único país que admite siembras experimentales de transgénico en un grano básico para su población, situación que no ocurre en Asia, con el arroz, o en Europa con el trigo, porque se tiene claridad del enorme riesgo que esto implica para la seguridad alimentaria de una nación". (...) y esto pone en riesgo uno de los alimentos básicos para millones de mexicanos, pero también para muchas otras naciones que dependen de esta semilla".

“human heritage” imply another regime of protection than that adopted in case of IPRs. Such claims resort not to individual, but to collective rights, to constitutional rights and to the regime of human rights. At the same time, actors transform or slide the use of the expression “food security” to that of “food sovereignty” to advocate public control over the seeds as a means to achieve that goal. Thus, in the celebration of the National Day for the Corn, social movements protested against GMOs and

(...) demanded the Congress to approve the constitutional right to food, together with a law with a plan regarding food and nutritional sovereignty and security, with the aim of guaranteeing sufficient and quality food for Mexicans¹⁰² (Zaragoza, 2010a).

g) Not less, but more politics

If it is a question of guaranteeing constitutional rights, such framing unfolds into a claim that public decision making regarding GMOs should be guided by the principle of defining the public interest in contrast to the private interests, as in the case of the rhetorical question from the coordinator of the National Commission for the Knowledge and Use of Biodiversity (Conabio), José Sarukhán, commenting on the content of the Mexican Biosafety Bill:

(...it has significant gaps, it must be revised. It was made in hurry, amidst pressures, there were few consultations. These are important things and there should be room to do it well done. Yes, there are many economic interests behind this, but in food issues the question is: do we put economic interests from one, two or three firms above the social interest of the Mexican population? Private interest above social interest? I believe not¹⁰³ (Enciso, 2009a).

Also in Brazil, actors blame government authorities of corruption, especially that there are conflicts of interest, for instance, officials who have worked in the past for biotechnological firms, such in the quotation bellow from a social movement organization which organizes the newsletter and campaign "GM-Free Brazil" (Por um Brasil Livre de Transgenicos), ASPTA:

In a tense moment, the representative of the NGO ASPTA, Gabriel Fernandes, affirmed that the members of CTNBio had links with the biotechnological firms. (...) The environmentalists pointed the agronomist and genetic engineer João Lúcio de Azevedo as a member of CTNBio who would have connections with Monsanto¹⁰⁴ (Valor Econômico, 2009d).

Denouncing such preferential treatment that biotechnological firms have in the access to the authorities responsible for the decision regarding the adoption of GMOS, actors demand from the Mexican President to meet also with social movements. They claim for public participation in decision making over agrobiotechnology, emphasizing its political dimension in opposition to the view that it is a technical decision. In the quotation bellow, Édgar Cortez, director from the human rights network Todos los Derechos para Todas y Todos, states that public participation is lacking:

It "demonstrates that there are no effective forms of participation from citizens, because it is the President who decides, without caring that the cultural and food heritage of the population are under risk", he added¹⁰⁵ (Perez, 2009a).

¹⁰² In the original: "demandaron al Congreso aprobar el derecho constitucional a la alimentación, acompañado de una ley de planeación para la soberanía y seguridad agroalimentaria y nutricional, con el propósito de garantizar alimentos suficientes y de calidad para los mexicanos".

¹⁰³ In the original: "tiene huecos importantes, hay que darle una revisada. Se hizo al vapor de las presiones y prisas, hubo pocas consultas. Son cosas tan importantes y se debería dar espacio para hacerlo bien. Sí, hay muchos intereses económicos detrás de esto, pero en cuestiones de alimentación la pregunta es: ¿ponemos los intereses económicos, de una, dos o tres compañías por encima del interés social de la población mexicana? ¿El interés privado sobre el interés social? Yo creo que no".

¹⁰⁴ In the original: "No momento mais tenso, o representante da ONG ASPTA, Gabriel Fernandes, afirmou que os membros da CTNBio teriam ligações com empresas de biotecnologia. (...) Os ambientalistas apontaram o engenheiro agrônomo geneticista João Lúcio de Azevedo como um membro da CTNBio que teria ligações com a Monsanto".

¹⁰⁵ In the original: "Se "demuestra que no hay formas efectivas de participación ciudadana, porque es el Presidente quien decide, sin importarle que está en riesgo el patrimonio cultural y alimentario de la población", añadió".

In sum, ethical and political questions are highly disputed between proponents and opponents of GMOs, each taking opposing sides around the main issues: how to interpret the adoption of agrobiotechnology (a technological revolution or another form of expropriation which creates winners and victims?); how to frame it in what regards food security and climate change (either as a solution or as a contributing cause or menace to it); what should be the criteria and form of decision making about it (a technocratic or a participatory decision process; science-based or based on political considerations of the public good?). Although with varying intensity, such topics appear in all countries. However, in Mexico they are much more debated and account for 36% of all claims coded. As in other dimensions, Mexican claims assume often a nationalistic tune, have a higher participation of transnational actors such as biotechnological firms and social movements organizations, with more dynamic and complex framing strategies.

IV. Conclusions

The public debates about agrobiotechnology in Argentina, Brazil and Mexico attest to ongoing interpretative disputes regarding GMOs. This study identified the main actors and arguments in such debates by looking at media material from the period between 2009 and 2010 and conducting a media analysis and a frame analysis. Four research questions guided this project; the answers are summarized in the following paragraphs.

In what regards the first research questions - namely, 1) How is agrobiotechnology depicted on the national media of these countries? 2) What are the main issues regarding GM crops that were debated between 2009 and 2010 in these three different cases? -, the results of the media analysis showed that the debate about genetically engineering in agriculture refers, in each country, to different issues and products. In Argentina, GMOs are treated as part of a technological package - including glyphosate and no-till farming - and are almost a synonym of GM soy and, together with new organization principles, of the “soy model”. Accordingly, together with the specific coverage on the topic itself, agrobiotechnology received some media attention in the coverage of the controversies regarding glyphosate and the soy model. These issues were depicted in very contrasting ways according to the sources: while GMOs appear mainly as an economic topic in *La Nación*, *Página/12* depicts it as pertaining more to politics and society in general than to economics.

In the other countries, agrobiotechnology was more covered as topic in itself, but in different ways. In Mexico, GMOs come to the spotlight of media attention when referring to corn. The debate is about the specificity of applying biotechnology to this crop, which is native to Mexico and important part of the food culture in that country. The

Mexican sample is very different: most articles on agrobiotechnology are published in the section of national politics and, also, in *La Jornada*, in the section “Sociedad y Justicia”. This classification made by that media might explain the high coverage of ethical and political considerations made by many claim makers. In Brazil, where there were previously product-oriented debates (prior to the approval of GM soy and GM corn), there is now a debate on coexistence and on the overall legal framework for agrobiotechnology – but this debate was triggered with the harvests of corn because of its specific polinization characteristics in comparison to soy. The foregoing shows that beyond the debate in favour or against GMOs in general, there are peculiarities specific to each crop that influence the debate, be they agronomic, cultural, or any other.

The majority of the Brazilian debate emphasized the economic aspects of GMOs and related to the issue of coexistence as well as the burden of regulation of agrobiotechnology. In Argentina, health and environmental aspects prevailed, given the salience of the media attention given to the debate about “glyphosate”, but there was also very strong economic arguments about glyphosate and the soy model. Being mainly depicted as an economic issue of innovation in agriculture both in Brazil and Argentina, there is not much space for ethical and political considerations. In Mexico, by contrast, given the cultural resonance of corn and the successful framing strategy of actors opposing GM corn to adopt a pro-native corn campaign, biodiversity became a main issue of debate, and thus, the emphasis on impacts on health and environment. Also, given that the decision was in the making, Mexican material offers a particularity in that the ethical and political dimension of agrobiotechnology is fiercely debated.

Such findings indicate the answers to research question 3) How are GMOs interpreted (framed)?. Whereas emphasizing economic benefits in Argentina and Mexico leaves no room for claims about “costs”, these come to the spotlight and are the leading frame in Brazil, outweighing by far arguments about “benefits”. Concerning effects to health and environment, claims about risk lead the debates in Argentina and in Mexico, and receive three times more coverage than claims on “biosafety”; while in Brazil “biosafety” claims prevail over (bio)risk. In the ethical and political dimension, critical arguments more than double the favourable ones in Mexico and in Argentina, whereas in Brazil there is a balanced coverage in this dimension. In Mexico, “critique” is the second top frame. Altogether, there is a prevalence of framing negative aspects of biotechnology in all countries. Next, the main similarities and differences among countries will be summarized for each frame.

Benefits: Contrasting to Argentina, where the agronomic benefits of agrobiotechnology are taken for granted by its proponents and are not specified, but only mentioned in the context of the big package, actors in the Brazilian and Mexican debates clearly need to emphasize and compare the economic advantages of the new technology vis-à-vis the conventional seeds. The use of benefit claims is aimed at influencing the discourse about GMOs, because market decisions as well as policy regulations are evolving. The debate thus is more focused on the specific agronomic benefits of agrobiotechnology such as productivity, cost reduction, quality, among others. A particularity of claims in Mexico is that they are always future-oriented (prognostics of higher yields, less losses with pest control and draught) or inferred from experiences of other countries, in particular Argentina, Brazil and USA, in the defence of the need for Mexico to catch up in competitiveness with other countries. But the narrative of “delay” in innovation is not restricted to Mexico. Multinational firms always portray their activities in each country as crucial for its competitiveness, often in comparison to the other countries leaders in the use of agrobiotechnology, which are used as benchmarks. Nevertheless, in Argentina and Brazil, national firms are mentioned more often in their research activities, portrayed as bringing the country to join the club of exporters of biotechnological inventions, not only of crops. The Argentinean case stands out as to the issue of IPRs: the importance of a regime applied to seeds is especially praised, and actors claim that its absence will jeopardize the ability of biotechnological firms to profit from its wide adoption and of farmers to have the latest launchings at their disposal.

Costs: Possible economic costs of agrobiotechnology are taboo in Argentina. By contrast, in Brazil and Mexico these are included in the debate by actors seeking to influence policy decisions

about GMOs. Farmers in Brazil openly discuss their experiences and complain against the rising costs of pesticides and of pest resistance. In Brazil, cost arguments abound especially regarding economic externalities of the adoption of GM corn, the costs of which are fiercely disputed. Actors warn against threats to the coexistence of other crops and farmers fear market rejection, contamination and thus, litigation from biotech companies; they demand availability of conventional seeds; and there is a big debate about the distribution of the costs of segregation in the whole chain. In Brazil, resistance to GM crops is also framed as an issue of consumer rights to be informed and to take decisions. Another claim about rights come from Brazilian farmers denouncing the system of payment for IPRs as illegal and unfair. Without putting into question their choice for GMOs and their agreement that royalties must be paid for the purchase of seeds, they contest the payment of royalties over the harvest and claim the right to multiple seeds. Thus, the debate in Brazil is much more about regulation and mainly national in character. Although there are demands for rights of farmers to decide to adopt or not GM seeds, to coexist, to be protected from enforcement (abusive) practices from transnational corporations; and rights of consumers to decide, these are framed in the context of the market and in a regulatory view, in which each (economic) actor has a institutional framework that guarantees its freedom to take informed rational decisions according to preferences and interests.

Biosafety: In all countries the authorities responsible for approving GMOs usually manifest themselves publicly for the safety of the products under their scrutiny. Besides those generic claims, arguments about the safety of GMOs vary in each country according to what is claimed to be the risks involved, which are systematically denied by proponents of the biotechnology. While the issue of pesticide is more urgent in Argentina and Brazil, which have long time exposure to the technological package, in Mexico it is the threat to biodiversity due to the flux of genetic material from GM corn to native species that is primarily addressed in the claims assuring the safety of GMOs. But also in Brazil the flux of genetic material from GM seeds to conventional varieties is object of disputes in what regards the possibility of coexistence. Accordingly, for each of these issues, actors assure that the risk management rules are sufficient to guarantee safety, control and responsibility. A particularity of the Brazilian sample is the high presence of claims for deregulation, with actors defending that the risk assessment conducted by CTNBio must be trusted and, consequently, all further regulation is superfluous. In Argentina and in Brazil, proponents of agrobiotechnology also frame positive effects on health and environment, avoiding the "risk/safety" dichotomy and the focus on damage, by adopting a positive framing of "benefits".

(Bio) risk: A common node of debate was the knowledge base of claim-making regarding damage to health and environment attributed to GMOs. Answering to the question "are there risks?", a similar structure is present in all claims in a continuum that starts with the affirmation that there is no knowledge to assure the absence of risks, highlights the importance of the willingness to know risks, and ends with claims that there is enough knowledge confirming the existence of risks associated with GMOs. As to the specific damage related to such risk claims, there are considerable differences among countries: in Argentina, the debate is centered on the effects of pesticide use associated with the widespread adoption of GM seeds; in Mexico, while many types of damage are brought to debate, the threat to biodiversity of corn is the most sensitive issue; whereas in Brazil, the main issue also regards risks of flux of genetic material, but not its damage to biodiversity; rather, to the coexistence between GM and non-GM corn. Notwithstanding such differences, they share the characteristic of pointing to the beginning of the food chain, namely, the farming of GMOs, as the locus of the burden of damage from agrobiotechnology. In any case, in all countries actors advance claims that, in face of such risks, there is disjunction between legality and reality because they are out of control. Whereas in Mexico actors claim for bringing the rule of law in face of illegal presence of GM corn, in Argentina and in Brazil, the legal framework is considered inadequate to control risks of pesticide use and of contamination. The tension resides in the fact that the "reality of risks" challenges the existent legal measures designed to control them; according, actors argue for a revision of the rules of risk management. In face of such diagnosis, in all countries actors demand more responsibility from political authorities, but in different ways: Brazilian actors react fiercely to proposals of deregulation, while in Argentina and in Mexico, they advance radical risk management measures, such as moratoria.

Progress: The narrative of biotechnology pertaining to a path of linear progress from which there is no coming back is found in all countries, whereas in Argentina it is accentuated by the expression of a technological "revolution". In all countries actors defend biotechnology to be a solution to climate change and to food security, using Malthusian arguments mentioning figures of population increase in contrast to the volume of food production. A main difference is that, while Brazil and Argentina are framed as world food providers, in Mexico food security arguments have first of all a national aim. Finally, the claim for a clear separation between technical and political issues by means of grounding decision in science is mostly found in the Brazilian and Mexican material, since in Argentina the decision-making about GMOs is not present in the agenda.

Critique: Although most claims of these type came from the Mexican material, in the three countries claim-makers identified victims of agrobiotechnology, with some variations: Brazilian farmers demanded the right to coexist; in Argentina, peasant movements denounced land expropriation, land conflicts, and the loss of the peasant identity; in Mexico, in addition to these forms of victimization, the identity of "pueblos del maíz" is seen as threatened. In Argentina and Mexico, multinational firms are by far the preferred targets of "blaming the winners" claims. Given that food security is one of the main arguments advanced by proponents of GMOs trying to influence the Mexican debate, movements against GM corn use the same agenda issue to frame opposition against GMOs. As a counter-theme for the claims defending a decision based on science and without political considerations, claim-makers in Mexican articles defend public participation to define the public interest in contrast to the private interests. Moreover, they blame authorities for being corrupted by biotechnological firms, an accusation that can also be found in the Brazilian material.

The findings show many issues situated at the boundaries between two frames. For instance, intellectual property rights were an economic and a political theme of the debates about agrobiotechnology. It was interpreted in different ways: as a legal institution beneficial to the economy, as a costly regime, as part of blaming transnational corporations for being the main winners of the adoption of biotechnology (because the payment of royalties), and also as a threat to food security. In the latter case, the demand for control over seeds is different from the demand found in the economic dimension, since it is not a matter of costs of the royalties to be paid, which can be calculated by economic actors counter-weighting the benefits. Rather, the claim refers to the belief that there should not be patents over seeds at all and that farmers should have the right to reserve part of their harvest to re-use as seeds. Another example was innovation in technology: it was interpreted as an economic input and as part of an ideology of progress. Also, the role of scientific knowledge entered into different arguments when referring to risks to health and environmental risks and its place in the hierarchy of criteria for decision-making.

The transnational character of the phenomena is apparent in many instances of the debates. When framing GMOs as an economic issue, actors situate the adoption of agrobiotechnology in the context of an international agriculture market, claiming both its desirability to assure competitiveness (progress) and its negative economic effects in the face of the possibility of market rejection in other countries. Thus, both proponents and opponents of GMOs in each country acknowledge that such a decision cannot neglect the market interdependencies. At the same time, global issues are translated into the national agenda, in which their legitimacy is constructed. Although intellectual property rights are object of multilateral agreements in the WTO and WIPO, they need to be adapted into national legislation; its application to seeds and farming practices poses special challenges (Morales, 2001). The Brazilian system of royalties and the Argentinean debate over IPRs regulation show two contrasting experiences. This is also why claim-makers in one country refer to the other: some Argentinean farmers desiring a system like the Brazilian, since biotechnological firms have stopped launching new products there because of intellectual property rights; Brazilian farmers criticizing the payment of royalties over harvest, and looking at the Argentinean model that guarantees farmers rights over seeds. In this translation from international to national legal regimes, the distribution of rights among subjects comes to the fore: transnational rights or national rights?

The debate about the health and environmental effects of biotechnology has a strong transnational character in that it is informed by international regimes of environment, health and trade rules. Thus, given that political decisions to either adopt or prohibit agrobiotechnology must be based on a scientific assessment of its risks to human, animal and plant health as well as risks to the environment, it is expected that such dimension of the issue will be fiercely disputed. However, the concrete issues that come to media attention are very different in each country. In all cases, there is a strong appeal to international science to validate both claims pro and against GMOs. A particularity of the Mexican debate is that it is at the same time nationalistic in tune and open to transnational influences —actors refer to the Argentinean and Brazilian examples either to prove the absence or existence of risks.

Also, the transnationalization of the phenomena under debate becomes evident in what concerns ethical-political issues. The ideology of progress encourages the interpretation of GMOs as part of a (global) technological revolution- which will spread from centers of innovation to all countries. The critical dichotomy between winners and losers is also framed in a global scale: winners are usually identified to be multinational corporations, whereas losers are the local groups of farmers in their traditions and cultural heritage. Also, in national debates actors relate to issues that are on the global agenda such as food security and climate change. Not less important, in the competing views about how decisions about agrobiotechnology should be, common tales are, on one side, the authority of "international science" to avoid local political interferences in the path of technological evolution; on the other, the subjugation of scientific considerations to (local or national) participative politics in order to decide what is the public interest. In the latter case, often claim makers identify transnational corporations as targets of blaming together with national authorities and scientists, corrupted by the corporations. The State level as the ultimate authority on GMOs is thus put into a fragile position for not being able to face such globally powerful actors in the protection of national and public interest; authorities are accused of conflict of interests and for lack of transparency.

Finally, in what regards research question 4) Which actors defend each type of argument?, results will be summarized below per dimension. The most active claim-makers to frame GMOs as an economic issue are the same in all countries: not surprisingly, "market actors" i.e. farmers and their associations, biotechnological firms and the food industry. Political authorities in Mexico are the second most active type of actors in this dimension and they always frame the economic benefits of biotechnology, whereas in Brazil and Argentina, when politicians do make claims with economic considerations, they alerted to the costs of GMOs. In those countries, media framing is the second most active in this dimension of the debate, highlighting both benefits and costs. Scientists and social movements almost do not refer to economic aspects of the issue, with the exception of Brazil, where they alert to benefits and costs.

The actors who emphasize environmental and health issues also vary from country to country. The common denominator is the contrasting framing of market actors and social movements, the former opting for biosafety, the latter, for (bio)risk. In Brazil and in Argentina, political actors are the most active to frame GMO as risk. A distinct characteristic of the Brazilian sample is the leadership of political actors both in terms of biosafety and biorisk. In Mexico, the lead carriers are social movements. It was in this dimension that scientists engage the most in the debate about agrobiotechnology in Argentina and Mexico, and, in Brazil, they frame just as much economic issues about agrobiotechnology. A distinction of the Argentinean case is the high participation of media framing in this dimension.

Also in the ethical-political dimension, all countries share the characteristic contrasting framing from market actors and social movements: on the one side, market actors are the main carriers of progress frames in all countries; on the other, social movements are by far the leader carrier of critique frames in Mexico, while in Argentina and in Brazil this is first of all a media framing. In all countries, media framing is overwhelmingly against GMOs in this dimension, but in Mexico media actors also frame "progress". Another difference from the Mexican material is the strong participation of scientists in this dimension - what does not happen in the other countries - , adopting almost always "critique" frames. Political authorities are the second more active as carriers of "progress" frames in all countries, but in the Brazilian material these only slightly surpass claims coded as "critique".

Actors who cross the national political-administrative borders also participate in the debates, in particular in Mexico, where they respond for about one third of claims. Mainly two types of actors are transnational: social movements (Greenpeace Mexico) and transnational corporations and their associations (Monsanto and AgroBio Mexico). Also political authorities appear in the context of the FAO meeting held in Guadalajara. The sample from Brazil and Argentina shows predominantly national actors, although in Brazil the participation of transnational corporations is important. Greenpeace also makes claims in the Brazilian debate but in a less conspicuous way as in Mexico. Political authorities appear in the material in two different situations: representatives of international organizations such as FAO and PAHO/WHO or as foreign governmental authorities, usually making claims about requirements for importing GM products.

An interesting result was the degree of transnationalization of Monsanto: the corporation is actively present in all three countries, being the main international economic actor in Argentina and in Brazil and, in Mexico, the second most active one in Mexico. While in Mexico Monsanto shares its leadership with AgroBIO Mexico, in Brazil there is a bigger plurality of voices and different transnational corporations appear in the media material. In the economic dimension, Monsanto and biotechnological firms make similar claims on the agronomic advantages of the technology and the importance of innovation for the competitiveness of the countries, but Monsanto has a special demand on the Argentinean debate for the protection of IPRs. On the other hand, Monsanto is a target of blaming in Brazil for the increasing costs of adopting GM seeds. All biotechnological firms engaged in frame transformation strategies in what regards effects to health and environment, not only shifting risk to safety but also bypassing this dichotomy and framing beneficial effects of their products. They are blamed for hiding or not conducting risks studies. A curious feature of the Argentina debate on glyphosate is that farmers (national) associations speak in defense of glyphosate, while Monsanto does not speak up for its own product. In the ethical-political dimension, transnational corporations as a group—but also Monsanto in particular—are identified by critics as the winners of adopting agrobiotechnology and criticized for corrupting governments.

In sum, it is important to reiterate that the focus of the study was to identify what is discussed about GMOs, by mapping and comparing the main dimensions of interpreting the issue, the actors and their arguments. It is a descriptive work and does not aim at advancing explanations for the discursive choices of actors. It highlights instead similarities and differences among countries and looks at how actors and frames cross national borders trying to shape shared meanings about a global issue, the adoption of biotechnology in agriculture.

To conclude, the results has proven the value of studying these three countries for at least three reasons. First of all, the controversies about biodiversity (Mexico), coexistence (Brazil) and pesticide use (Argentina) refer to risks related to the cultivation of GM crops. Such emphasis at the farming level reinforces the importance of conducting research about GMOs in countries where crops are farmed on large scale and where agribusiness and small farming coexist. Without implying that risks to consumer health are less important, these findings show that an emphasis on concepts such as "Frankenfoods" misses many other points of controversy, such as biodiversity, small-scale farming, workers' health and pesticide contamination. A second reason refers to the conflicts about the distribution of economic benefits and costs among transnational and national actors (i.e. debates about IPRs in Argentina and Brazil; debates on the economic externalities in Brazil), which become even more pressing in a context of strong international market competition which challenges the relative autonomy of political authorities to decide vis-a-vis the influence of global corporations. At least in Brazil and in Mexico there are evidences of illegal practices which created a de facto adoption of GM crops. A third valuable contribution of synchronically comparing these countries is the possibility of bringing together three very distinct time orientations regarding agrobiotechnology: in Argentina, the diverging interpretations of the consequences of past decisions to adopt the technological package of GM seeds resistant to glyphosate; in Brazil, the debate about present decisions on how to deal with present risk management issues such as coexistence and market monitoring; in Mexico, the focus on the threat to biodiversity, framed mostly in a future-oriented fashion, although it also includes claims about the actual incidence of contamination.

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Annex

TABLE A.1
DOCUMENTS ANALYSED,
NEWS ARTICLES FROM ARGENTINA

Media	Date	Title	
La Nación	04/21/09	El agro teme que se prohíba el glifosato	
	04/24/09	No aparece un estudio crítico sobre el glifosato. Tierra arrasada	
	05/08/09	Glifosato no, fueloil sí	
	10/14/09	Rusia dejaría de comprar harina de soja argentina	
	12/09/09	Para comprar alimentos, Europa tiene cinco exigencias principales	
	05/05/10	Defienden el uso del herbicida glifosato para la producción	
	06/07/10	Avanzan en un acuerdo por el pago de regalías de la soja	
	07/02/10	Monsanto retiró un juicio por la soja RR en Europa	
	10/10/10	Sostienen que el glifosato no genera riesgos para la salud	
	12/03/10	Semillas: dura advertencia	
El Cronista Comercial	01/20/09	Por primera vez, Monsanto le gana una pulseada al Gobierno en el conflicto por patentes	
	01/22/09	Obama, entre la recesión y la biotecnología	
	02/13/09	Argentina mantiene liderazgo en producción de transgénicos'	
	02/24/09	E, como em toda guerra, a maior parte do ônus fica com a sociedade civil, que é obrigada a conviver com a negação de um direito básico: saber o que está comendo.	
	02/26/09	Giorgi pidió por productos agrícolas a Estados Unidos	
	03/02/09	Desde la disolución de la Junta de Granos, la producción creció 165%	
	03/09/09	Aprueban a Monsanto su algodón transgénico	
	03/17/09	Renuencia brasileña a la soja transgénica	
	03/31/09	Una nueva base para la biotecnología regional	
	04/21/09	Fuerzas Armadas, sin glifosato	
	04/24/09	Critican veda a siembra de soja en cuarteles	
	06/09/09	Globalización, propiedad intelectual y economía	
	06/15/09	Descubren la primera semilla transgénica tolerante a la sequía	
	10/07/09	Precio de harina de soja se dispararía en estos meses	
	10/14/09	Rusia se endurece contra la soja argentina	
	11/20/09	Empresa local exporta gen para crear semillas contra la sequía	
	12/07/09	Bioceres levanta un laboratorio de US\$ 3,5 millones en Rosario	
	01/11/10	Don Mario ya es la segunda semillera de soja de Sudamérica	
	02/24/10	Brasil desplazó a la Argentina en la siembra de transgénicos	
	03/10/10	Revés para un reclamo judicial de Monsanto	
	03/19/10	Acuerdo entre la Argentina y la UE	
			La Argentina llega a un acuerdo con la UE sobre transgénicos
	05/11/10	La soja no tiene techo	
05/20/10	Monsanto apuesta por América Latina		
05/25/10	La soja pasó de promesa a cultivo del Bicentenario		
06/21/10	La exportación de semillas ya mueve más de US\$ 200 millones		
07/07/10	UE falla contra Monsanto en la pelea por las patentes		

Table A.1

	09/27/10	En pleno boom sojero, Monsanto apuesta al maíz
	10/28/10	Innovación, motor de la economía argentina
	11/18/10	Por la siembra directa los agricultores ahorraron US\$20.000 millones
	11/26/10	Rusia negocia con Argentina la compra de 3 millones de toneladas de maíz
Página/12	01/12/09	El veneno que asoló el barrio de Ituzaingó Los costos sociales Un tema prohibido
	01/15/09	Para que no se extienda la mancha venenosa
	01/21/09	Glifosato, parte de un modelo
	01/31/09	El alcance del glifosato
	02/01/09	El disparate sojero
	02/02/09	"Se está perdiendo la soberanía alimentaria de los pueblos" Un militante de la agroecología
	03/10/09	Fiesta de unos pocos
	03/21/09	La salud, más importante que la soja
	03/22/09	Soja Power
	03/30/09	"Quien controla las semillas, controla la comida y la vida" Periodismo y denuncia
	04/13/09	El tóxico de los campos
	04/15/09	Alemania prohíbe maíz de Monsanto
	04/21/09	Soldado, no plantes más soja
	04/26/09	Verano del '96
	05/02/09	El glifosato pegó mal
	05/03/09	"Lo que sucede en Argentina es casi un experimento masivo"
	05/10/09	El estudio de campo El modelo sojero Glifosato y economía Precisiones
	05/11/09	Agronegocios o soberanía alimentaria
	06/21/09	"El glifosato estimula la muerte de las células de embriones humanos" Tecnologías de punta y desarrollo
	07/04/09	La era...
	07/09/09	Elogio de la semilla
	09/02/09	Dudas, Monsanto y la Conabia El glifosato, con más polémica
	09/17/09	Dilemas de un frente político
	10/14/09	Los desafíos del futuro
	12/24/09	La agroindustria y el impacto sobre la salud
	01/15/10	"Donde antes había diversidad, ahora hay solamente soja y veneno"
	03/15/10	Un herbicida cuestionado
	04/04/10	La tierra para quiénes y para qué
	04/11/10	El modelo del poroto
	05/10/10	"Rehenes de un modelo productivo poco sustentable"
	06/06/10	Los dueños de la tierra

Table A.1

07/21/10	Cómo comunicar
08/01/10	La timba...
08/04/10	El Mocase, un hito en la defensa de la tierra
08/15/10	Soja transgénica y glifosato, ésa es la cuestión
08/17/10	"Deformaciones similares a las de embriones humanos"
08/18/10	Carta a Aldo Ferrer
08/27/10	Encuentro de pueblos fumigados
08/31/10	"Paren de fumigar"
	Un límite para las fumigaciones en el campo
09/10/10	Hablando de reforma agraria
09/19/10	¿Modelo Grobo? No, gracias
09/24/10	Glifosato, una brecha entre ricos y pobres
09/26/10	Soja, ambiente, intereses
10/01/10	Guardianas de la semilla
	No somos campo, somos tierra
10/03/10	La agricultura del futuro
10/12/10	Otra Campaña del Desierto, ahora por la soja
11/09/10	Una ley para mantener la vida campesina
11/15/10	Un nuevo estudio para los agrotóxicos
11/27/10	El maíz se va para Rusia
12/05/10	Actores clave de la expansión

TABLE A.2
DOCUMENTS ANALYSED,
NEWS ARTICLES FROM BRAZIL

Folha de São Paulo	01/23/09	Foco: Crítico da transgenia, MST planta soja com alteração genética em assentamento
	02/12/09	Agricultura: Lavoura transgênica no Brasil avança menos que no mundo
	02/13/09	Vaivém das commodities
	03/13/09	Pax Transgênica
	03/31/09	Vaivém das commodities
	05/10/09	Análise: Pressão de ruralistas libera transgênicos Controle é luxo desnecessário, diz governo País perde controle dos transgênicos Para ministério, regra não evita contaminação Produtor perde dois contratos por contaminação Produtores descartam separação Teste não garante alimento 100% livre de transgênico
	05/11/09	Veto: Milho transgênico autorizado no Brasil foi proibido na Alemanha Idec cobra ação sobre descontrole de transgênico
	05/12/09	Editoriais: Sem controle
	05/17/09	Vale por um bifinho
	06/19/09	Organizações pedem ao governo veto para o milho transgênico Outro lado: CTNBio nega dificuldades com lavouras Vaivém das commodities
	08/05/09	Vaivém das commodities
	08/15/09	PR conclui que controle de transgênicos não funciona Saiba mais: Vantagem dos transgênicos é alvo de polêmica
	08/22/09	Vaivém das commodities
	09/12/09	Vaivém das commodities
	10/13/09	Mônica Bergamo
	10/23/09	Vaivém das commodities
	11/02/09	Entrevista da 2ª
	11/29/09	Mercado Aberto
	12/07/09	Rotulagem de produtos "biotech"
	12/09/09	Transgênicos serão menos monitorados
	12/10/09	Lixo transgênico
	12/11/09	Empresa fica livre de rastrear efeitos de transgênicos
	12/22/09	Sistema de cobrança foi adaptado ao país Soja transgênica deve chegar a 67% da produção
	02/11/10	Biossegurança: Novo presidente da CTNBio se diz contra rotular transgênico
	02/24/10	Brasil lidera avanço de cultivo transgênico
	03/19/10	Vaivém das commodities
	03/31/10	Vaivém das commodities
	04/20/10	Milho transgênico afeta vizinhos, diz estudo
	05/14/10	Transgênico mata uma praga e traz outra
	06/16/10	Vaivém: Produzir soja transgenica custa mais em MT
	06/17/10	Sabatina Folha

Table A.2

	08/11/10	Brasil é 2º mercado para a Monsanto
	08/17/10	Commodities: Brasil deve ter a primeira cana transgênica do mundo em 2015
	08/25/10	Vaivém das commodities: Produtor quer mais semente de soja convencional
	09/03/10	A agricultura que o Brasil almeja
Valor Econômico	01/16/09	Governo avalia elevar tarifa sobre o glifosato chinês
	01/28/09	Mudança de avaliação sobre taxa do glifosato chinês
	02/02/09	Infração ambiental
	03/19/09	Discussão e acusações mútuas tumultuam audiência pública Embrapa manifesta-se contra o plantio de arroz transgênico Sojicultor gaúcho vai a Justiça contra a Monsanto
	03/20/09	Começa a colheita da 1ª safra brasileira de milho transgênico CTNBio aprova um parecer favorável a liberação de novo algodão modificado
	04/30/09	País financia pesquisa da Embrapa com transgênicos
	05/12/09	Milho reacende o debate sobre os transgênicos
	05/13/09	Rotulagem de OGMs
	05/22/09	CTNBio avalia liberar novos transgênicos sem análises prévias UE recomenda mais controle ao Brasil
	05/28/09	Ministério deve fiscalizar apenas as denúncias de irregularidades Soja contrabandeada deflagrou disseminação
	05/29/09	Indústria teme 'febre' do milho transgênico
	06/19/09	CTNBio recua em aprovação automática
	07/24/09	Novo presidente da Embrapa define programas e diretrizes
	08/14/09	Basf e Embrapa licenciam semente
	09/23/09	CTC e Dow firmam parceria no combate à broca da cana
	10/19/09	Aplicação na produção de alimentos deve ser o grande "divisor de águas"
	10/26/09	Milho transgênico ganha terreno na safra 2009/2010 Projeto pode barrar semente 'salva'
	11/16/09	Milho renova o ânimo da Syngenta no Brasil
	12/07/09	CTNBio livrará transgênico de análise de risco
	12/10/09	CTNBio terá que explicar nova regra para OGMs
	02/10/10	CTNBio faz hoje eleição para novo presidente
	02/11/10	Edilson Paiva, agrônomo geneticista da Embrapa, é eleito presidente da CTNBio
	02/12/10	Syngenta eleva aposta em sementes Velhas polêmicas marcam início da "nova etapa" da CTNBio
	03/12/10	Novo cenário para transgênicos
	03/17/10	Parecer aprova mudança em regra de transgênicos
	03/19/10	Mudança na regra de monitoramento de transgênicos volta a perder ímpeto
	03/29/10	Nortox pede fim de antidumping sobre glifosato chinês
	04/06/10	Adiada a decisão sobre o glifosato chinês
	04/07/10	Estudo aponta ganho com transgênicos
	11/22/10	CTNBio aprova mais duas sementes de milho transgênico Governo autoriza limite maior para resíduo em milho Indústria busca nova geração de agrotóxico menos agressivo

Table A.2

	12/10/10	Os impactos da Lei de Biossegurança
Carta Maior	01/31/03	Lula e o Conselho Internacional do FSM
	03/12/09	CTNBio se prepara para aprovar arroz transgênico
	03/27/09	Liberção de arroz da Bayer é rechaçada em audiência pública
	09/25/09	Agrotóxicos no seu estômago
	05/09/10	Rio +20: o Brasil e a agenda de futuro no mundo
	09/19/10	Contra os três grandes monopólios: do dinheiro, da terra, da palavra

TABLE A.3
DOCUMENTS ANALYSED,
NEWS ARTICLES FROM MEXICO

El Universal	02/11/09	Prevén duplicar producción de alimentos para 2050
	02/24/09	Confirman contaminación de maíz salvaje en México con transgénicos
	04/07/09	Atrasado México en biotecnología
	05/28/09	Mercado de transgénicos valdría 2,800 mdp
	07/28/09	Virus no está fuera de control: Salud
	10/16/09	Autorizan siembra de maíz transgénico
	10/26/09	Reprueban uso de transgénicos
	10/30/09	Greenpeace: ilegales, los permisos de transgénicos
	11/15/09	Expertos: necesario, el maíz modificado
	01/27/10	Greenpeace alerta daños a mamíferos por transgénicos
		Transgénicos-aprobación
	01/29/10	Empresas reprueban estudios de Greenpace sobre transgénicos
	01/30/10	Cofepris acepta importación de maíz transgénico
	02/03/10	Greenpeace: transgénicos
	02/07/10	Científicos prevén caída de 20% en producción de maíz
	03/01/10	Campo-tecnología
	03/31/10	Campo-sequía
	07/19/10	Documentan perjuicios de transgénicos
	08/13/10	En Texcoco la colección más grande de maíz y trigo
08/25/10	Presumen éxito en siembras de maíz transgénico	
09/05/10	La ilegalidad del maíz transgénico	
09/23/10	Piden en Sinaloa reflexionar sobre productos transgénicos en el campo	
10/19/10	Invertirá Monsanto 20 mdd durante 2011 en México	
12/03/10	Cambio climático, verdadera amenaza del maíz	
El Economista	01/09/09	En semillas mejoradas de maíz, atraso de 11 años
	03/09/09	Impulsa México la biotecnología
		Monsanto acelera el paso
	03/11/09	Transgénicos
	03/27/09	Transgénicos
	07/28/09	Permisos para transgénicos, en octubre
	09/17/09	Alza en azúcar es mundial, dice la Sagarpa
	09/25/09	En un pozo sin fondo
	09/29/09	Afinan permiso para maíz transgénico
	10/28/09	Autorizan siete permisos más para sembrar maíz transgénico
	02/05/10	Biotecnología frenaría importación de maíz
	08/26/10	Van por segunda ronda de permisos para siembra de maíz transgénico
	10/20/10	Monsanto prepara tierra para invertir hasta US20 millones
La Jornada	01/03/09	Corrupción transgénica al descubierto
	01/27/09	El gobierno, cómplice en siembra ilegal de maíz transgénico, acusan
	01/30/09	El gobierno minimiza reportes sobre maíz transgénico en cultivos, lamentan expertos
		Incautan 2 mil 500 toneladas de maíz transgénico en Chihuahua
	01/31/09	Transgénicos: ¿ciencia? y ¿para quién?
	02/10/09	Contaminar cultivos con transgénicos, estrategia de Monsanto: Greenpeace

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02/12/09	Pueden coexistir transgénicos y cultivos tradicionales, revela informe de agrupación
02/19/09	Preocupante, la erosión genética del maíz, alerta Martha Astier
02/24/09	Exigen ONG al gobierno federal que cumpla acuerdo sobre transgénicos
02/25/09	Campeños de Oaxaca reciben transgénicos Etanol de maíz transgénico: peligro inminente
02/27/09	Transgénicos dividen a científicos
03/10/09	Tiene luz verde el cultivo experimental de maíz transgénico: titular de Semarnat
03/11/09	Maíz transgénico, funcionarios delincuentes
03/17/09	Origen del maíz
03/21/09	Tortillas transgénicas
03/26/09	México consume maíz transgénico desde hace 13 años: agricultores
04/17/09	El banderazo fallido
04/25/09	Maíz transgénico: ilegal e inútil
05/07/09	La gran pandemia: influenza, pesticidas y transgénicos
05/14/09	El maíz transgénico podría ser tóxico para algunos insectos, revela ONG
05/16/09	México, nuevo basurero de Monsanto
05/20/09	Planea Monsanto iniciar la siembra experimental de maíz transgénico en septiembre u octubre
05/24/09	Científicos piden rigor con solicitudes para la siembra de maíz transgénico
06/06/09	Alerta médica: los transgénicos amenazan la salud
06/09/09	Piden frenar cultivo de maíz transgénico
06/26/09	Agravará el maíz transgénico los problemas económicos y sociales
07/01/09	Estudio involucra a Sagarpa en la contaminación transgénica del maíz
07/10/09	Rechazan 796 organizaciones de 59 países la siembra de maíz transgénico en México
07/11/09	Monsanto amenaza plantíos del orbe, alertan
07/12/09	Transgénicos ponen en riesgo 59 variedades de maíz criollo
07/27/09	Campaña contra Monsanto
08/18/09	Enfrentar minerías y transgénicos
08/24/09	Greenpeace, en alerta por transgénicos
10/02/09	Recomiendan científicos medidas para proteger el maíz nativo
10/05/09	Avala Sagarpa algunas solicitudes para sembrar maíz transgénico
10/09/09	Revela Greenpeace infiltración en el gobierno de dos ex empleadas de DuPont y Agrobio
10/16/09	Luz verde al cultivo de maíz transgénico
10/20/09	ONG: permisos para cultivar maíz transgénico, tiro de gracia al agro
10/22/09	Dio Semarnat 15 permisos para maíz transgénico; no se podían retrasar En riesgo, la seguridad alimentaria de México, advierte unión de científicos
10/23/09	Falta estudio preciso sobre distribución de maíz transgénico
10/24/09	Maicidio racista
11/04/09	Delito de lesa humanidad, imponer al maíz el modelo Monsanto: expertos
11/16/09	Asamblea de Afectados Ambientales "Rechazamos la autorización de siembras de maíz transgénico y denunciaremos que es un crimen ambiental y cultural"
12/01/09	Campaña en Sonora contra los transgénicos
12/23/09	Prueba estudio peligrosidad del maíz transgénico autorizado por México

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01/19/10	Anuncian iniciativas para proteger conocimientos y territorios indígenas
01/20/10	Implacable avance de Monsanto
01/31/10	Los transgénicos usan más tóxicos
02/06/10	Científicos secuenciarán genoma del frijol y del aguacate criollo
02/26/10	La biotecnología garantizará la seguridad alimentaria: FAO Presentan denuncia popular ante Profepa por siembra a campo abierto de maíz genéticamente modificado
02/27/10	Asusta a grupos europeos avance del maíz transgénico en México FAO y transgénicos: apuesta equivocada
02/28/10	FAO, aliada de transnacionales para impulsar biotecnología: Grupo ETC FAO: transgénicos y afectaciones
03/02/10	La biotecnología puede ayudar a reducir en 50% la hambruna, asegura la FAO Maíz transgénico y derecho indígena
03/03/10	Cibiogem: deben considerarse las opciones tecnológicas para mejorar el grano criollo Raíces neoliberales de los cultivos transgénicos Severas consecuencias de salud en México por el maíz transgénico
03/04/10	El mayor riesgo en el cultivo del maíz son los bajos rendimientos: director del Cimmyt
03/05/10	Piden discrepantes promover modelo de agricultura campesina ecológica
03/06/10	La FAO, contaminada transgénicamente
03/13/10	¿TRANSGÉNICOS? ¡NO, GRACIAS! El monopolio de la simiente
04/28/10	Exigen opositores a transgénicos que la empresa Monsanto salga de México
05/07/10	Pide Nestlé patente en México para grano de café transgénico
05/22/10	Tratado de libre comercio, transgénicos y migración, nuestros retos
06/09/10	Crean alianza para alertar sobre el riesgo de las semillas transgénicas
06/19/10	Maíz transgénico: farsa y violencia
07/03/10	Transgénicos y crimen organizado
07/17/10	Agricultura industrial vs agricultura campesina Amenaza transgénica Movimiento nacional para la protección de maíces nativos
07/31/10	Transgénicos: pérdidas para los agricultores
08/17/10	Maíz transgénico llega a etapa piloto: Agrobio
08/19/10	Reclaman suspender la siembra de maíz transgénico
08/28/10	Celebrando la dependencia: el maíz a las transnacionales
09/07/10	Reitera Sagarpa: continuará la siembra de transgénicos
09/21/10	Desarrollan en el Cinvestav planta de maíz resistente a la sequía
09/27/10	Realizarán ONG feria en el Zócalo para instituir el día nacional del maíz
09/28/10	Celebrar al maíz
09/30/10	Calderón simula interés por la gente ante el cambio climático: campesinos
10/06/10	Transgénicos atentan contra el país, dicen
10/09/10	Máquinas de guerra: Blackwater, Monsanto y Bill Gates
11/13/10	El maíz corazón del pueblo
11/16/10	Absurdo, importar chile habanero transgénico, opinan productores

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11/22/10	Expertos en biotecnología avalan el consumo de los transgénicos
12/04/10	Constituyen programa para rescatar y cuidar el maíz criollo
12/18/10	Las promesas de la industria biotecnológica: ignorancia o engaño?
12/28/10	No se investigará denuncia por cultivo de maíz transgénico



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