SOYBEAN EXPANSION IN THE MERCOSUR - IS THE SKY THE LIMIT? ANALYSIS OF DRIVERS AND CONSTRAINTS FOR POLICY MAKING.

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Key Words: *Mercosur, soybean expansion, principal drivers, biotechnology*

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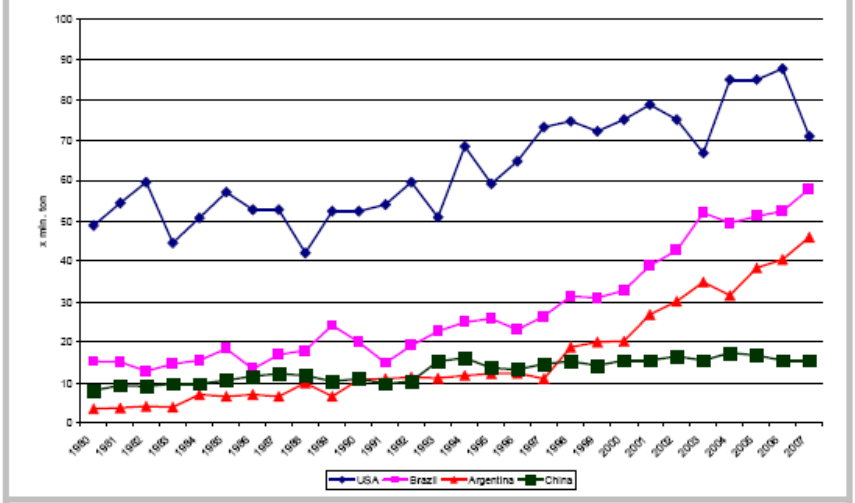
Introduction

During the last decade Argentine soybean supplies increased 130% to an estimated 45 million MT for the 2008-09 harvest. During the same period, the Brazilian soybean crop increased by 84% to arrive at 66 million MT (USDA-FAS, 2008). The Argentine growth rate is made up of 110% by area expansion, and 40% by productivity gains. In Brazil these growth shares are 62% and 20% respectively.

Figure 2.1 **Production of soybeans in the largest producer countries**



Source: FAO.

Area expansion occurred via three main paths. First, the combination of zero-tillage (*siembra directa*) agriculture and herbicide tolerant soybeans has allowed the intensification of the cropping cycle through the incorporation of soybeans as a second crop following wheat. This implied, over the ten year period covering 1996-2006, about 3 million has. The second main path is the crop substitution within the farm, as other crops - like sunflower, maize or cotton (depending on the region) – and livestock are substituted by soybeans.

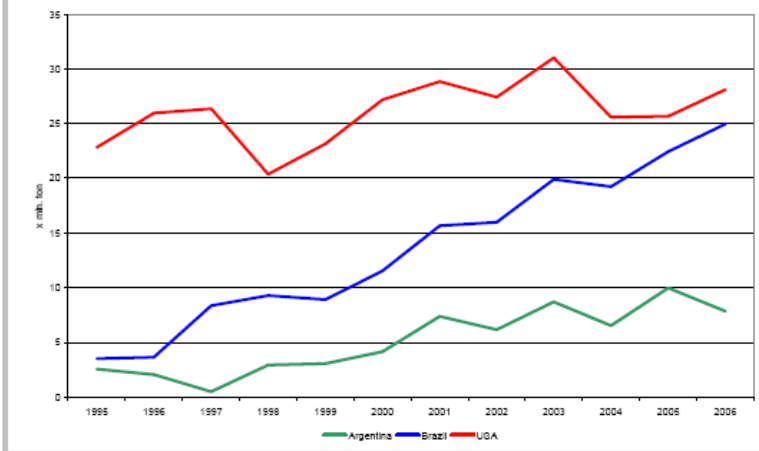
The third main expansion path is through new areas, in most cases previously underutilized in extensive cattle rising systems, or new deforested land, been incorporated to soybean production.[1] The main variables driving the expansion into new lands are, among others attractive relative crop and land prices, and transport costs favorable to soybeans *vis-à-vis* other crop alternatives, such a maize or cattle.

Looking backwards, probable the main factor explaining past soybean trends are the particular synergy between highly adapted (GM) varieties (and their fast adoption by producers), zero-tillage systems, precision planting, spraying, fertilizer and harvesting systems and improved associate cropping systems. Argentina is almost entirely planted with GM soybean, while estimations for Brazil range from 40-50%. The latter country deliberately limited GMO production as a non-GMO market access strategy (for the EU), at the early stages of the cycle, but since GMO soybean varieties were legalized, the proportion of total area planted with GM varieties is rapidly increasing .

[1] It is interesting to note, though, that even when soybean area replaced corn, sunflower and livestock, production in all these, including beef and milk went up by significant amounts, probably as a consequence of the fact that rising land prices forced the adoption of productivity increasing technologies and production practices also in these other productions (Trigo and Cap, 2007)

During the last decade, Argentine soybean exports have more than tripled, while Brazilian soybean products rose by an estimated 250%. For the 2008-09 soybean harvest season, these two countries are expected to account for almost half of global exports. On the other hand, two-thirds of global soybean (products) exports are absorbed by China and the EU (USDA-FAS). In addition, while until recently soybean demand was made up (besides grains) by oil for human consumption and meal/cake for animal feeds, an additional (derived) demand for bio-fuels has further boosted global soy demand.

Figure 2.3 **Exports of soybeans by Argentina, Brazil and the USA**



Source: UNSD, Comtrade.

Argentina and Brazil are part of the Mercosur trading block that have been discussing trade liberalization policy agreements with the EU since a first round of negotiation talks were held in 2000. Several studies have generated estimations regarding future impacts of the liberalization of current EU-Mercosur agricultural trade restrictions (Drogué et al.2006; Mulder et al. 2004). While they may differ in relative magnitudes, a common denominator is that in general, Mercosur agricultural commodity export volumes will increase significantly.

Given the historical trends showing already very high production growth rates, given that environmental policies have become stricter especially in Brazil, given that available land use and quality have been under increasing pressure, and given that biotechnology advances may be leveling off, the question that arises is "What are the limits of soybean production in these countries? Are there technical, economical, financial, logistical, organizational, export restrictive (GMO into the EU) or political limits to this crop expansion, especially in countries like Brazil and Argentina? What are the costs of the continued expansion and who carries the cost – the private or public sector?". In short, "what factors will set the limit?"

In light of the above, this paper assesses recent soybean production dynamics, regarding area expansion and technology development for productivity gains, in principal producer countries Brazil and Argentina. Taking some of the research evidence, current and future principal "expansion growth drivers" and their constraints and possible "ceilings" are analyzed[2]. Conclusions from this assessment will point out the need for appropriate policy formulations for a sustainable soybean continuum in Argentina.

[2] Most of the research results discussed is part of a bi-regional EU-LAC policy project[2], financed by the European Commission. The project focused on three themes (i) comparison of agricultural policies between the EU and Mercosur, (ii) analysis of ex-ante impacts from agri-food trade liberalization scenarios between the EU and Mercosur, and (iii) assessment of the capacities of Mercosur agri-food sectors to respond to future EU trade expansion. In this paper, some of the results from the latter theme will be discussed. In addition, complementary information is used from recent work on biotechnology advances in Argentina by Trigo et al. (2007; 2008).

Key drivers and implications of agricultural change in the region

Recent work by Van Berkem and Bindraban (2008) discuss the soybean expansion in Brazil from the economic, social and environmental perspectives, contrasting opportunities and risks (Table 1). They propose similar agronomic and management practices as earlier discussed, which have repercussions on the environment. Their principal driver is the expanding derived demands for soy bean products. The opportunities seem to be private gain enhancing variables, while most risks seem to be public goods costs.

Table 1 - Opportunities and risks associated with expansion of soybean production

	Opportunities	**Risks**
Economic	-Growing demand for soybean for food and animal feed -Growing demand for soybean as bio-fuel -Growing demand for meat	-Costs of more intensive use of grassland are higher than the costs of using ground with the original vegetation -Reduced growth in demand resulting from declining economic growth in soy/meat importing countries -Limited opportunities for export of meat due to trade barriers or to failure to meet quality and/or sanitary requirements -High transport costs
Social	-Employment conditions correspond with international standards (incl. banning of child labour) -Better/fair remuneration -Land ownership rights are assured by introduction of land registration system	-In the case of large-scale production, labour is replaced by machines -Livelihood of native population disrupted by expansion of soybean cultivation -Violation of labour laws due to poor enforcement
Environment	-Application of zero-tillage production methods -Application of a soy/grain/grassland rotation system -Application of Ecological Economic Zoning	-Loss of biodiversity resulting from expansion of soybean cultivation as monoculture -Soil degradation, water pollution and loss of biodiversity as agricultural land is used more intensively -Local government is not able to manage control soybean cultivation via spatial planning measures

Source: Van Berkum and Bindraban, 2008

Studies on agri-food sector competitiveness in the Mercosur region, led by Meirelles and Batalha (2008) bring evidence that the principal drivers that will enhance future soybean production in the Mercosur, (given EU market signals) are: technology development and transfer, and available land resources (except for Argentina). Of course there exist significant differences between countries in the region. For example, Brazil looks forward to a technology induced new land expansion, whereby new drought tolerant soybean varieties will offer new opportunities for soybean production in the available, cheap, environmental policy neutral, semi-arid regions of North-eastern Brazil. The significant added advantage of this new region is that soybean production will be close to deep-sea export ports on the coast. Relative to Brazil, Argentina's land availability is much less, although, new production areas are

opened where potential environmental impact is less of an issue (hence, away from the Northwestern regions).

The same study shows results concluding that the principal factors that constrain future soybean expansion in the Mercosur include: production and export taxation, and transport and storage capacity. A first comment regards the time frames of these constraints. Indeed, especially in Brazil the taxation issue is a structural longer term institutional constraints. However, in Argentina the current and very polemic export taxation (*retenciones*) could be seen as medium term political and hence conjunctural measure. A second comment is that technology can have a large impact on these constraints. For example, the former grain storage capacity problem in Argentina, has now been largely resolved by the introduction and massive adoption of the on-farm polyethylene "silo-bag" technology. However, due to different agro-ecological conditions, this has not been the case in Brazil. Nonetheless, as earlier discussed, the Brazilian "transport capacity" constraint, to some extent could be resolved by the future opening of soybean production in the North-East, close to seaports.

It is worthwhile to note that there exist different policies regarding the different soybean products between Argentina and Brazil. In Argentina, the *retenciones* are considerably lower for processed products soybean meal and oil, than for the whole grain exports. Hence, value adding is promoted. In Brazil, however the opposite takes place. Whole grain soybean exports are exempted from VAT, while soybean meal and oil exports are taxed at 12%. (Meirelles and Bathalha, 2008). This policy supposedly aims to "protect" the national soybean meal and oil market, which consumes almost half of the total soybean production.

Furthermore, these expansion limiting factors need to be put in perspective of the international trade environment with the following issues: While trade liberalization impact analysis models are based on reduced (or set at zero in the extreme case) tariffs and quotas, this does not affect non-tariff trade measures (NTM). In the EU-Mercosur trade relations several market restrictions are playing a role, although may not have been highlighted as such.

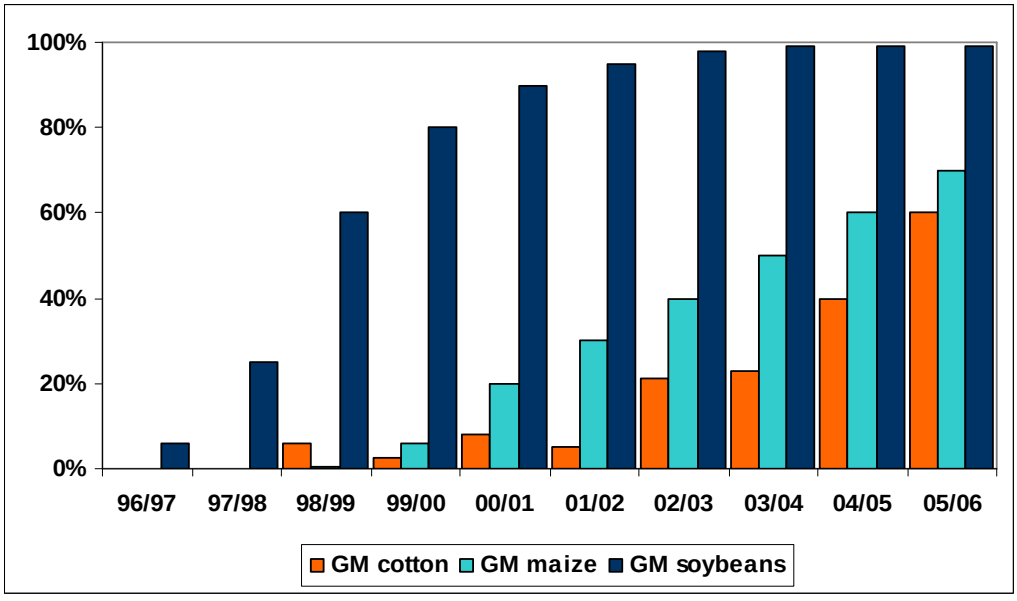
The unresolved issue about the regulatory environment on genetically modified organisms (GMO), including "food safety" restrictions, such as labeling, put a ceiling on the total volume that the EU will import either as primary commodity or as derived product. In this context, product traceability systems development (for the entire value chain) may pose a restriction on the volumes that are being produced. Furthermore, the fact that EU consumers are increasingly demanding policies (private or public) that guarantee "responsible soybean"[3] imports i.e. environmental responsible and socially respectful. In addition, there exists the increased pressure to curb land expansion policies within Brazil, coming from both international and national environmental agencies are a factor to consider, as they focus on the transition from pasture land, forestry of other types of land use for soy production. These restrictions have already impacted on the expansion of soybean areas in some parts of Brazil, and they will also be an issue in the Argentinean context, as existing forest protection legislation come into act.

The role of technology

[3] While already the 4th RTRS International Conference is being planned for May 2009 in Brazil, some sceptical voices argue that as long as the "main players" are sitting around the table together analyzing what should and what could be done, they have a valid excuse to consumers that "they are working on it"…..

Technology and particularly biotechnology, has played a key role to date and has had an important impact on soybean expansion. One of the most important issues emerging from the different technological behavior patterns between Argentina and Brazil, regarding soybeans and the GM (herbicide tolerance - HT) technology is that the story since the technology became available at world level, clearly highlights the importance of the "early adopter" factor. Once that the HT technology for soybeans became available in the early-mid 1990s it was accessible for all soybean producing countries. However, adoption time and rate was very different in the major producing countries reflecting, essentially, different policies regarding biotechnology. While in Argentina there was a proactive attitude, well supported by a series of earlier policy decisions, particularly in regards to the establishment of the needed bio-safety regulatory framework, in Brazil the situation was quite different and it has not been until 2006 that Brazilian farmers were able to legally utilize the new technology. Although farmers were using it illegally, first and then under temporary approvals, since around 2000, the fact is that this situations clearly has been reflected in the adoption rate and, consequently, in the benefits that the farmers – and the country – have been able to get out of the new technologies. While in Argentina, estimates set economic benefits in the order of USD 19 billion for the period since adoption (Trigo et.al. 2007), calculations for Brazil indicate that economic benefits range only from 1.6 billion USD to about 2.1 billion USD, depending on the hypothesis adopted regarding time and level of adoption. In the best case scenario, benefits in Brazil represent about 11.5% of those in Argentina, in spite of Brazil been a much larger soybean producing country (Celeres, 2008). This difference is, however, tending to disappear as the area with GM soy has been rapidly growing in Brazil since 2006, and it is now estimated at over 60% of all the area planted with the crop (James 2009)

Figure 3 – Evolution of the share of GM crops of the total planted area in Argentina, by species.



Source: www.argenbio.org

In Argentina, "early adopters" benefits and the technology adoption curves (Figure 3) have played major roles in the sector's performance, and still continue to influence its development, as later policy

developments have made soybeans still more competitive relative to other crops than in the past. The issue is how are on-going and future biotechnology developments going to evolve? In this sense there is the need to differentiate the short-medium and the long run impacts.

In the short run the situation may continue to evolve along the currently established pattern. The EU has approved RR2 for importation and there should be no significant external constraints to its rapid adoption in both Argentina and Brazil. Estimates indicate that the new varieties may bring an additional 10% productivity increase, which, given present conditions, is a significant gain possibility. However, a number of considerations should be brought to bear in terms of how quickly this would /could become a reality in Argentina. A first aspect is the Intellectual Property Rights (IPR) situation. The story about IPR conflicts between technology providers and Argentina has become a classic story in recent time's technology markets, and it is not fully resolved yet. This is not the place to elaborate on the case, but in it, there is sufficient room to raise the issue of whether future technological developments will become available to Argentinean production systems as rapidly as they did in the past, when HT soybean became available in the Argentinean market practically at the same time as it did in the USA, the market of origin of the technology. Present conditions could very well sustain the argument that for the next stage of the technological cycle, "early adopters" gains – with all their implications – may not be for Argentinean agriculture, but for Brazil….

A second aspect related to the above is what has been happening with the evolution of the bio-safety regulatory process in Argentina. While at the early stages of the system – early 1990s – the review process for new events took between 12 and 18 months, the length and complexities of the regulatory requirements have continuously increased since then, adding uncertainties and costs to new traits' developments and introductions. Most of the relevant short and medium term soybean technologies are already in the pipeline, but taking in considerations both the working of the bio-safety regulatory process and what could eventually be the commercial policies of the technology providers, it would be hard to predict when they could become effectively available for incorporation in the productive system. This issue may eventually become even more important and restrictive in the future as restrictions on productivity gains, disease resistance, drought resistance and more in general adaptability of crops vis-à-vis climate change, are to be handled by multi-gene technologies, adding still greater complexity to the process. Argentina, has been one of the greater, if not the greatest, beneficiaries of the first cycle of agricultural biotechnology, particularly with soybeans, but also in other products as maize and cotton. At this stage it is not clear that Argentina is in the same position to continue to be so in the future, although many of the technologies in the pipeline hold great potential to both continue to sustain productivity increases and to provide alternatives for some of the environmental problems mentioned above.

Conclusions :

While strengthened global derived soybean product demands have caused a soybean boom in the Mercosur region, the evidenced productivity increases, changed cropping patterns, production practices and (micro and macro) area expansion have seen different drivers and conditions by country. The more straight forward and better known arguments for soybean area expansion in Argentina, compared to Brazil, were discussed. However, the more significant differences prove to be technological and the technology-policy complex. More specifically, on the one hand, they regard the differences in biotechnology policies and institutions and how they have affected biotechnology adoption paths.. On

the other hand, they also reflect national and international policy regimes targeting environmental and social goals.

For the Mercosur region the production (and exports) of soybeans for food, feed and biofuels, the sky is not the limit, but future constraints do not seem to be coming from land availability for soybeans production, costly export restrictive policies, or transport or storage capacity. Futures limitations may be science based and closely connected to its actors, institutions and the public policies that have influence the access, uptake and diffusion of the new technological concepts.

Argentina and Brazil have both the potential to continue capture significant gains from expanding soybean production and trade. Higher productivity gains can be expected if the necessary investments in biotechnology and related services can be optimized. The basic concerns as to how the future will evolve stem from (i) the demand for sustainable production of soybeans and (ii) the institutional capabilities and policy environment to facilitate the scientific infrastructure and the soybean industry.

The sustainability debate as conducted in the Round Table on Responsible Soy (RTRS) production is a clear indication that major stakeholders in the world of soybean production, processing and consumption are increasingly working together to come to terms with civic society demands, especially those in the EU. The institutional capabilities pose a challenge for governments and the private sector to take up their responsibility for ultimately, feeding the world.

As to the relative position of the two major Mercosur partners, Argentina may have some structural and long term comparative advantages that will prove crucial for a needed cost advantage i.e. soils, sector actors and chain organization, environmental impacts, distance to ports, taxes (except for exports). However, Brazil may have a future edge regarding the creation of (more) effective policy based incentives and conditions to stimulate the needed biotechnology production, legalization, costing, introduction and uptake.

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