

Study of Social Impact of Differentiated Soybean Production in Paraguay

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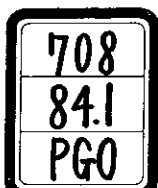


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ABSTRACT

The main objective of the present study focuses on the analysis of the current trends of the production of the different types of Soybean, in order to contribute to the process of decisions taking of public policies in aspects concerning to the future of the production of the oilseed in Paraguay, especially with respect to the use of genetically modified organisms (OGMs), and its socioeconomic and environmental impact in the rural society.

The study was carried out by the combination of different methodologies and investigation instruments, used for the treatment of economic, social and environmental dimensions. The study is structured by three longitudinal components, in which the next topics are analysed following the next order: i) Determination of the performance of the expansion of Soybean in the Oriental Region of Paraguay, ii) The analysis of the national and international legislation and regulations relative to the Soybean production, with emphasis on transgenics, iii) Trends of the international trading of Soybean and its derivative products in the medium term. The study also include a cross sectional component, in which, the evaluation of the social, economic and environmental impact of the expansion of various types of Soybean in different regions of the Paraguay is included. To carry out the cross sectional component, a field work based on farms surveys, and interviews to qualified informants has been done.

LIST OF INITIALS AND NOMENCLATURES:

ASA: American Soybean Association

ADPIC: Aspects of Intellectual Property Rights related to Trade

AFP: Previous Based Agreement

ALCA: Area of Free Trade of the Americas

APROSEMP: Association of Seeds Producers of Paraguay

APS: Soybean Producers Association

BCP: Central bank of the Republic of Paraguay

IDB: Interamerican Development Development

CAP: Agricultural Coordinator of Paraguay

CAPECO: Chamber of Exporters of Cereals and Oleaginous.

CDB: Agreement about Biological Diversity

ComBio: Committee of Bio Security

CN: National Constitution

CNTBio: National Technical Commission of Bio Security (Brazil)

CONABIA: National Commission Adviser of Biotechnology. (Argentina)

CONACYT: National Commission of Sciences and Technology

CBOT: Chicago Board of Trade

CRIA: Regional Center of Agricultural Investigation of the MAG

CCC: Commodity Credit Corporation

DGEEC: General Bureau of Statistics, Survey and Census

DISE: Bureau of Seeds

EFA: European Food Authority

FAO: Food and Agriculture Organization

FECOPROD: Federation of Cooperatives for Production

GEF: Global Environmental Facilities

GTZ: (International agency of German Cooperation) (in German)

IDEC: Brazilian Institute for Defense of the Consumer Rights

IICA: Interamerican Institute of Cooperation for the Agriculture.

INAN: National institute of Feed and Nutrition

INTN: National Institute of Technology and Normalization.

IP: Identity Preserved

JICA: International Japan Cooperation Agency

MAG: Ministry of Agriculture and Livestock

MAPA: Ministry of Agriculture, Livestock and Supply (Brazil)

MERCOSUR: Common Market of South America

MIC: Ministry of Industry and Commerce

MRE: Ministry of External Relations

MSP & BS: Ministry of Public Health and Social Welfare

NAFTA: North American Free Trade Agreement

NQS: Nematode Cyst of Soybean

WTO: World Trade Organization

HWO: Health World Organization

OGM: Genetically Modified Organism

OVMs: Modified Alive Organisms

PCSB: Protocol of Cartagena for the Security of Biotechnology

GDP: Gross Domestic Product

PNUD: United Nations Program for Development

PNUMA: United Nations Environmental Program

RR: Round-Up Ready or Round-Up Resistance (Soya Transgénica)

RAS: Asian Royalty of the Soya

RNCC: National Registers of Commercial Cultivars

SAGPyP: Secretary of Agriculture, Livestock and Fishes (Argentina)

SEAM: Secretary of Environment

SENACSA: National Service of Sanitary and Agricultural Quality (Argentina)

SENAVE: National Service of Sanitary and Vegetable Quality (Paraguay)

SPS: Agricultural Agreements relative to Sanitary Measures

STP: Strategic Techniques of Planning

TMO: Technology Mission Oilseed

USDA: United States Department of Agriculture

UE: European Union.

UPOV: Union for the Protection of Vegetable Developers

VCF: Strong Competitive Advantages

TABLE OF CONTENTS

ACKNOWLEDGEMENT	1
LIST OF INITIALS AND NOMENCLATURES:	3
STUDY ON SOCIAL IMPACT OF DIFFERENTIATED SOYBEAN PRODUCTION IN PARAGUAY	8
NARRATIVE SUMMARY	8
INTRODUCTION.....	30
CHAPTER I: PROBLEM OUTLINE	32
OVERVIEW.....	32
CHAPTER II: LONGITUDINAL COMPONENTS OF THE STUDY	37
MACROECONOMIC EFFECTS OF THE FLUCTUATIONS IN THE INTERNATIONAL MARKET OF SOYBEAN.....	38
(i) Introduction.....	38
(ii) Macroeconomic overview	39
(iii) Theoretical context	42
(iv) The methodology.....	45
(v) Empirical Evidence	46
(vi) Summary and Conclusions.....	61
ANALYSIS OF THE NORMATIVE FRAMEWORK FOR THE PRODUCTION AND COMMERCIALIZATION OF DIFFERENTIATED SOYBEAN.....	63
(i) Normative Framework at the National Level for Production and Commercialization of Soybean	63
(ii) Normative Framework and Constrictions at the International Level for the Commercialization of Soybean and Derived Productos.....	71
(iii) Limitations for the Commercialization of Genetically Modified Soybean and Derived Productos	75
CURRENT SITUATION AND PERSPECTIVES OF SOYBEAN INTERNATIONAL MARKET.....	82
(i) Past and present of soybean's international market.....	82
Supply performance.....	82
Evolution of the production among the main world soybean sellers.	83
Oil crops trade in the world market	85

Evolution and trends of international prices	86
Trends among the main soybean exporting countries	87
(II) OUTLOOKS OF SOYBEAN INTERNATIONAL TRADE DURING THE PERIOD 2004/5 TO 2014/15.....	90
Exports.....	91
(iii) Trends in consumers preferences with regard to GMOs and implications for the different types of soybean.....	94
GMOs in China	97
GMOs in the European Union.....	98
GMOs in Japan.....	99
(iv) Demand of organic soybean and soybean with preserved identity	100
Demand for organic products.....	100
Soybean with Identity Preserved	102
Paraguay and the new market niches.....	102
(v) Conclusions	103
 CHAPTER III: CROSS SECTIONAL COMPONENT OF THE STUDY.....	 105
 SOCIOECONOMIC AND ENVIRONMENTAL IMPACT OF THE SOYBEAN PRODUCTION	 105
(i) Methodology and Instruments	105
(ii) Results and discussion.....	110
 CONCLUSIONS OF OBSERVED RESULTS IN THE CROSS SECTIONAL COMPONENT.....	 173
 CONCLUDING REMARKS.....	 178
 LIST OF TABLES	 188
 LIST OF FIGURES.....	 191
 REFERENCES.....	 193

STUDY ON SOCIAL IMPACT OF DIFFERENCIATED SOYBEAN PRODUCTION IN PARAGUAY

NARRATIVE SUMMARY

Overview

Deep transformations have taken place in the productive and agro industrial structure of the country. The same ones were the result, as much as of active policies promoted from the State, as of the evolution of the process of occupation of the territory in the Oriental Region, of the dynamics of the international market in general, and of the regional one in particular. This process of change was facilitated, without a doubt, for the programs of *colonization, public and private, in latifundio areas*, as well as for the investments in infrastructure in the rural areas, that allowed to integrate to the country, extensive areas which previously where isolated and uninhabited.

Among the development policies applied to the rural sector that have been preponderant in the current agricultural development, stands out that applied at the end of the 60's, based in the credit support of the official banking and the assembly of *investigation programs and technology transfer, and other technical services of the public sector in the wheat program*. This program served as base for the appearance and consolidation of a new agriculture type, the automated one, specialized in the production of cereals and oleaginous, previously almost nonexistent in the country. This productive system was able to contribute also to the constant increase of the exports by means of the Soybean, main summer crop of rotation with the wheat, especially starting from the year 1974, when the international prices of the oleaginous increased considerably in the international market.

The dynamism of this agricultural sub sector has motivated an important peak of the agro industrial investments such as nets of silos, private ports for grains, mills, oil bottles and factories of animal feed, concentrating also the biggest presence of multinational investments on the country.

However, the peak of the agricultural sub sectors based mainly on the expansion of the *agricultural frontier* has had a negative impact in the forest sub sector, especially in the oriental region. Additionally, a deepening of the process of decrease of the number of properties of small producers has been evidenced, and of the number of fields for shepherding of the livestock, being accentuated the unemployment percentage and underemployment.

Objectives, Methodology and Instruments of Investigation.

The main objective of the present study consisted on analyse the current tendencies of the production of the different types of Soybean, in order to

contribute to the public policy making process, in aspects related to the future of the production of oleaginous in the Paraguay, especially regarding the use of organisms genetically modified (OGMs) and its socio-economic and environmental impact on the rural society. The specific objectives are:

- To increase the degree of knowledge on the national normative context and of international markets that determine the system of production of Soybean in Paraguay, as well as the impact of this productive system in socio-economic and environmental aspects at national, departmental and municipal levels.
- To delineate public policies to achieve an harmonic growth of the three types of Soybean production system studied, and actions to mitigate the negative impacts that could arise because of the use OGMs.

The study on "Socio-economic Impact of the Production of Differentiated Soybean in Paraguay" was carried out by the combination of different methodologies and investigation instruments, used for the treatment of their economic, social and environmental dimensions.

The study consisted on an econometric analysis for series of 20 years for the evolution of the production, consumption and export of Soybean. Also, in the forecasting to a medium term for the tendency of the supply, demand and prices of the international market, considering restrictions to the expansion of the productive system at country level. Both longitudinal components were based on the gathering, prosecution and analysis of available secondary data in the country, or consented through international sources of information. This information was extrapolated to estimate the possible medium term impact, based on the characterization and interpretation of the registered or perceived effect at the present time. While the last component is oriented to an investigation of cross sectional type, using primary data as much as secondary, applying a combination of qualitative and quantitative methods.

The description, in detail, of the methods and instruments used in the study, corresponding to each component is presented next:

Component 1: Determination of the evolution of Soybean in the Oriental Region.

Component 2: Analysis of the legislation and national and international rules relating to the soybean production, with emphasis in transgenics.

Component 3: Tendencies of the international commercialisation of the Soybean and their products to medium term.

Component 4: Evaluation of the social, economic and environmental impact of the expansion of differentiated Soybean production.

This last component does not presents a experimental and cross sectional design that uses statistical tools, mostly descriptive, correlations and interpretations, taking into account that the causes of variations have already happened.

Among the instruments of gathering of used data they are mentioned:

- a) **Surveys** at farm level, for the report of quantitative and qualitative information,
- b) **Interviews** to qualified informants, representatives of diverse community groups involve, such as cooperative managers, district majors, secretaries of agriculture of the main governments, specialized technicians, and other organizations, in order to gather qualitative information of knowledge, experiences, perceptions and opinions.

Production, Consumption and Export of Soybean and their macroeconomic impacts.

The evidence resulting of this study indicates that fluctuations in the international price of the Soybean are inversely correlated with fluctuations in the nominal exchange rate, what would imply that, a fall in the international price of this product would lead to an exchange depreciation.

The Central Government's tributary collections, on the other hand, are exogenous to the fluctuations in the market of Soybean, since the prices as much as the exports of the commodity are non correlated with the total tributary revenues. Nevertheless, this fact does not imply that in the future, if the Government increases the tributary pressure on the soybean sector, and this bears to a bigger dependence on the collections coming from this sector, fluctuations inside this market would continue having not very significant effects.

On the other hand, the data of imports of machineries, equipments and inputs related to the exporter sector of Soybean, together with the exports of this sector allow to conclude that, the advance of the Soybean could not necessarily affect the balance of trade in the short term; in spite of having induced growing import values, since the exports of Soybean have always been superiors to the value of the imports related to this sector.

Another important evidence founded, is that shocks of the Soybean price that affect the GDP and the domestic expense still persist in the medium term; despite that fluctuations of the Soybean price have transitory character. In other words, a fall in the international price of Soybean drives to a fall in the economic growth, consumption and investment that would delay in being reverted, even if the price returns more quickly at its long term levels.

Additionally, the discoveries also allow to affirm that the effects of fluctuations in the market of Soybean on the nominal exchange rate, will have

incidences, unfailingly, on the inflation, corroding or increasing the purchase capacity of the economic agents, according to which is the direction of the variation in the prices. Additionally, exchange rate fluctuations could affect the indebted position or worthy of economic agents that hold passives in foreign currency, affecting the capability of repayments and concession of credits in the financial system, the horizon of time in which the financial intermediation is made, and the investment decisions of the companies.

Legal Framework.

An effective revision of the country normatives with respect to the production and commercialisation of Soybean allows to verify that they can be considered incomplete. Great part of the Laws, Ordinances and Resolutions rule the topic in an indirect way. In the current National Constitution (C.N) promulgated in 1992, some principles have risen to the constitutional range, highlighting the environmental protection as consequence of the use of biotechnology, agricultural production and their possible effects on the human life, and of the right to inhabit a healthy and ecologically balanced atmosphere.

In this context, the prohibition for the commercial cultivation of transgenic Soybean continues technically effective, in spite of the inscription in the National Registration of Commercial Cultivars (RNCC) of a group of varieties of Soybean genetically modified, by the Resolution N^o. 1261/2004 emitted by the MAG.

This alternative is based in a clear over position of the competencies of institutions that are designated as authorities for the application of the laws that govern the production and transgenic commercialisation in our country.

Regarding the international regulations for application in Paraguay, there are the Agreement over Biological Diversity ratified by Law of the Nation N^o 253/93, the Protocol of Cartagena relative to security of the biotechnology, ratified by the Law N^o 2309/03, the Agreement relative to intellectual property rights and the International Agreement for the obtaining of vegetables, ratified by Law of the Nation N^o 986/96.

Among the topics that generate great restlessness are the payment of bonuses for the property rights over registered or patented genes in other countries, and that they are negotiated in our country and; the normative imposed by importer countries in the most important international markets of Soybean, that impose new requirements related to etiquettes as much as to the Trace ability for the transgenics. The new mentioned elements make necessary the revision and modernization of the effective Legal Framework, since it should be necessary to walk in the direction of a formalization of the transgenic market, considering the phenomenon beyond the cultivation of Soybean on other items of importance for Paraguay, like are cotton, other cereals and the oleaginous ones.

International Market of Soybean

The supply of Soybean in the international environment has grown significantly, taking the year 1992 as reference, and comparing the volume of production in this year and in the year 2004, it is observed that the production volume has been increased in more than 221%. The international market, in terms of export of Soybean, is strongly concentrated in some few countries: United States, Brazil and Argentina, that possess 82% of the quota of the international market. Paraguay is the fourth exporter country of Soybean, with 4%.

In absolute terms, United States continues being the biggest producer and exporter of Soybean, although its market share has been reducing gradually from 50% in 1990 to 37% in the year 2004. On the contrary Brazil, almost has quadrupled its production and, in relative terms, its market share has been increased from 15% in 1990 to 28% in the year 2004. Other countries that increased significantly their production of Soybean in the mentioned period have been Argentina and Paraguay, this last in 346% during the mentioned period.

As occurs with exports, imports of Soybean are highly concentrated in some few countries; China and the European Union almost care two thirds of all the Soybean marketed in the world. Among the main importer countries, changes are also observed, Asia has become the main importer of Soybean at world level, leaded by China, that during 2003 has reached records of import of 20.7 million tons, leaving the European Union in second place. The socio-economic causes that sustain this increment in the imports of Soybean on the part of China are the population's increase, the increase of the per capita income and changes in the habits of the population's life that goes being urbanized quickly.

The appearance of the transgenic Soybean in the market has generated a differentiated demand of oleaginous on the part of the consumers, and this generates concern, considering the estimates that indicate that Soybean shows 60% of the world surface dedicated to transgenics. One of the main demands of the consumers of Soybean is the right to the information, through which the same ones request the salespersons of foods to etiquette the Soybean, with the purpose to classify the commodity as OGM or Non-OGM.

In a beginning, cultivations of OGM were considered by the producing countries as a one different variety, without special requirements neither for they production nor they commercialisation. At the present time, the treatment of the production is subject to a change in the manipulation, particularly, when the product seeks to be sold to markets that demand the declaration that the Soybean is OGM or not. The degree of detail in the information of the etiquette will depend from the market of destiny of the product.

In this context, is the European Union the one that is taking with more caution the diffusion of transgenics inside its territory, in particular the OGMs.

Until 2003, 14 OGM vegetables had been approved for commercialisation in the UE. However, it does not exist clear regulatory framework, and the uncertainty in the market, with respect to the OGM foods is very high. In the side of the consumers, exists a widespread attitude of rejection toward the OGM products, especially toward those dedicated to the feeding.

Besides, China introduced the regulations concerning OGM products in 2001, few years after having entered to the World Trade Organization (WTO). According to the normatives that govern the OGMs, the shipments of transgenic Soybean require an individual certificate, emitted by a recognized organism in China.

Among the different market segments that exist in the international environment, the market of the organic products has a sustained growth. The premium received in the price by organic products is very attractive, and it takes values between 15 percent, to more than 100 percent. In spite of the high rate of growth in the sales and of the premium received in the price, the consumption of the organic products relative to the conventional foods is even very low.

Cross sectional components of the Study

When referring to the **social** impacts, about the assumption that the advance of the commercial farming system displaces peasant agriculture, it is observed that during the last agricultural campaigns, the sale of small farms seems to have decreased in the traditional districts of production. This would be mainly due to the fact that most of the small producers has already sold their farms. However, the expansion phenomenon is still happening in some districts of North Alto Paraná.

Some people estimate that commercial "farmers", before be increased in number, have increased their cropping area, what has lead to conclude that one of the main reasons for the sale farms would be the activation of the lands' market. This expansion in the cropping area has been motivated by attractive international prices of soybean, which gave place to an increment in the demand of lands in the traditional and not traditional areas of production of the grain. Land prices would be also stimulated by the lack of alternative of investments for the earnings of soybean farmers; this situation contributed to distort the land's market, pushing the prices of this production factor above their return possibilities.

The quick growth registered in soybean production is mostly explained by the incorporation of new large and medium-scale farms, either for the way of purchase or of leasing.

Another of the indicators of the displacement of peasant agriculture would be the emigration from the soybean areas. Some annalists perceived that the rural population's decrease in the departments enclosed in the soybean production traditional area (Canindeyú, Caazapá, High Paraná, Itapúa and

Caaguazú) would be in direct relationship with the expansion of this oilseed production. Statistics reflect (in a general way) the rural population's important decrease in the districts identified as soybean growers. This information is supported at community and institutional level with the testimonies obtained from qualified informants, who think that the reason for the migrations would be found in the current relationship between the advance and predominance of the soybean associated to a decrease in working opportunities.

It is observed that the main cause of "uprooting" of peasant production is awarded to the activation of the land market; the one which in turn has been determined by the international quote of the grain. The soybean is considered in the international market as an homogeneous product and, consequently, it lacks differentiated prices; therefore, it is difficult to find a relationship a priori among the production of differentiated soybean, the international (and local) prices of the grain and the lands' market.

Likewise, the "uprooting" of peasant producers would have had an important regional impact in the aggregated levels of rural employment. The family-based agricultural producers are adjusted to the category of independent workers, dedicating most of their time to activities in their own farms. It is important to mention that the family-based farms are characterized for the use of several family members in their productive activities. Therefore, a decrease in the number of small-scale farms has supposed the loss of a great quantity of work positions in the form of self-employment.

The first great loss of work positions would have happened as a consequence of the closure of the process of "advances of the agricultural frontier at cost of the natural forests." During the years of expansion of agricultural farms at cost of natural forests, the demand for manpower was very important for uprooting works, and for the cultivation of crops that constituted head of rotation (for example the mint).

In opposition, many "urban" activities -linked to the provision of services and products for agribusiness- have increased the demand for labor. Most of the districts visited have grain storage towers that offer seasonal occupation for workers. Likewise, the sale of agrochemicals, fertilizers and services (related to the mechanization) has increased the demand for laborers. It is important to keep in mind that many of the new labor opportunities require a worker profile more qualified than the displaced rural dweller.

On the other hand, the "mass adoption" of the no-till-farming technology has generated a significant saving in the use of agricultural machineries for land preparation; also causing a decrease in the demand of semi-qualified laborers dedicated to activities linked with the handling and maintenance of tractors as well as the tasks of hoeing of soybean crops became more difficult since the introduction of this technology.

The study analyzed about the additional damages caused by the adoption of GMOs on the agricultural laborer demand, and we observed that this

is marginal in comparison to the effects caused by the "closure of the agricultural frontier" and with the technological change impelled by the no-till-farming system.

It has been suggested that it may exist a relationship between the displacement of the rural producers and the technological change linked to the production of transgenic soybean. This technological change could contribute to the uprooting of peasant producers in two ways: i) the habilitation of new farms would have been facilitated by the possibility of using glifosato in post-emergency, and ii) the deepening in the use of agrochemicals has been a coercive factor for rural producers with neighboring land plots to commercial soybean farms.

On the other hand, GMOs soybean has opened possibilities for Paraguayan peasants, who are engaged in the cultivation of this commodity due to the easiness in the handling of transgenic varieties facilitate small-scale cropping, offering to the small-scale farmers the possibility to incorporate this cash crop to their productive system.

Also, in what regard to migration issues, the massive entrance of foreign immigrants from diverse origins has been analyzed, especially Brazilians. This process would have been characterized by an asymmetric relationship with the national producers, especially (but not exclusively) with the rural journeymen. There is a sort of social segregation among different ethnic groups attributed to the possible effects of economical, cultural and language differences. These differences have occasionally ended in conflict's situations and insecurity.

About the frequency of discrimination and conflicts among the different origin groups that would affect the participation in productive associations and with other purposes, we can say that although the proportion of hired Paraguayans is the most important, we should consider this as a relative indicator because of the weight of the population according to their origin in the productive regions. This would be reflected in the perception, about labor opportunities, of the head of the family interviewed according to their nationality. Most of the Paraguayans think is not very feasible to be employed in foreigners' farms.

Considering the **economic impacts**, we can say that the competitiveness of the soybean productive system, once finished "the opening of the agricultural frontier" at cost of the native forests, would be currently displacing semi-intensive cattle raising farms and peasant agriculture.

To effects of analyzing this vision, the indicators of economic performance of each productive system were studied and concerning information was raised about the evolution of the lease of lands to identify the types of producers, so much those that take as those that give in leasing. The profitability of one or another type of soybean is determined by several indicators. In the first place, the production cost favors to the transgenic varieties, which present a saving that, according to different interviewed

sources, can vary between US \$15 and US \$65. In second place, the yields of the transgenic varieties of soybean are seems to be lower than those observed in conventional soybean, some interviewees asserted that the yields difference is so sharpened and the difference of costs so insignificant that the collection of a fee for the transgenic ones can affect the profitability of the activity. The differentiation of prices does not seem to press a decisive role for the selection of the technology to be used. As it has been previously mentioned, we did not find significant prices discrimination between conventional and transgenic grains. However, soybean produced for human consumption seems to have costs and demands markedly more important than it would neutralize the benefits of the higher prices.

The introduction of RR varieties has facilitated the annexation of small properties to larger farms. This phenomenon would have had a negative economic impact at local level due to the decrease in the number of agricultural farms rent seeking oriented. On the other hand, the introduction of transgenic facilitated the adoption of this commodity with better profit perspectives for small-scale producers.

The concentration of the production factors has not only affected to the producers' universe at local level (less farmers with revenues), but rather it has resulted in consequences to other economic sectors of the communities, affecting the small trade as an outcome of the production's concentration and in the considerable reduction in the number of consumers. There is a narrow relationship between the concentration of the production factors and the re-distributive effect that could have the advance of the soybean production frontier. The perception of interviewees raised in this concern has been quite antagonistic.

On one hand, directives and partners of production cooperatives perceive a bigger flow of money during the last years. They asserted that the highest revenues obtained by producers through soybean production have been translated in more consumption, providing, thus, work and revenues for an important number of people. They consider that soybean has benefited in the same way to small and large-scale producers.

On the other hand, the local political authorities tend to perceive that the phenomenon of concentration of the production has had a null or even negative impact in the volume of flowing money in the region. It has been remarked that the concentration of revenues reduced in a general way the circulation of money, likewise there were complains for the behavior of Brazilian producers that, according to some informants, likely to spend their money exclusively in business from Brazilian fellows or they even repatriate their revenues to Brazil.

Among the possible re-distributional effects attributable so much to the production of soybean (in general) and to the transgenic varieties (in particular), it was demonstrated at farm level that conventional soybean producer's hire more laborers as the size of their cropping area increases. In contrast most of

the transgenic soybean producers' hire up to two laborers in farms of small and medium-scale producers, until approximately 200 ha, falling in larger farms.

The re-distributional indicators can also be observed in the producers' possessions. In this respect, it seems evident the high degree of poverty of the non-soybean producer; this is reflected in the scarce goods declared by this type of farmers compared with the small-scale soybean growers which possessed 8,4 times more goods (in total value), as well as in number of items and in possession percentage. Surprisingly, the survey also registers a marked difference in the possession of goods among the small-scale conventional soybean producers' compared to those producing transgenic varieties. In a same way, marked differences are observed between medium and large-scale producers of both types of soybean. We could assume that, in a succession of years, this situation reflects the accumulation of higher margins of profitability by the large-scale production strata and by those transgenic soybean growers.

In relation to the financial flow at local level as a result of soybean production, we found that in the districts enclosed in the soybean production traditional areas; it has been generated a market which stimulated the appearance of financial institutions in most of the urban centers, in contrast to the new soybean production areas where there is practically none financial institutions.

In relation to the effects of soybean expansion on the level of imports of productive capital goods it was found that the sales volume coincides closely with the years of strong increments of the international price. In the distribution of the investments in inputs and capital goods distributed by farm size stratum, it is appreciated that the investments are relatively higher in the medium size strata, especially in the range of 100 to 175 hectares, implying that this total investment could be comparatively more onerous because of limitations in the expected production volume.

Another point that was analyzed was the degree by which the soybean economic performance at local level benefits or not the municipal tax collections and it could be said that it didn't show negative effects, however it has been rescued among the interviewed informants the fear of the danger that represents that the whole local economy might depend on the annual performance of a single crop.

Among the specific effects of the soybean expansion on different indicators of the beef cattle production system it was detected in the traditional soybean area that the number of implanted pastures diminished as a result from its incorporation to soybean production. On the other hand, the evolution of the livestock stock it was not reported as preoccupant in none of the areas except in some isolated districts of the traditional soybean producing area, being slightly affected the livestock slaughtering at local level in the traditional area, not happening the same in the other areas. A fact was rescued that in half of the declared cases in the traditional soybean area the cattle related employment

was negatively affected while in the new areas negative effects were not perceived.

The **environmental** consequences of the mechanized productive system expansion with soybean as main crop and their effects on the natural resources were manifested, in first place, through the concerns for the natural resources degradation at local level. Among the main symptoms, the deforestation stood out as the main impact caused by the fast opening of the agricultural frontier. It is believed that in the traditional soybean area the forest loss is permanent, while in the new areas the soybean cropping currently advances on implanted pastures and very little on new forest land clearings.

Another of the most mentioned degradation symptoms in both areas, corresponded to soil erosion, however, it is necessary to keep in mind that in many places of the traditional area its importance fell to second plane due to the *widespread adoption of no-till farming*.

In third place with a much smaller incidence stands the *water quality and contamination*. Some brief references were also mentioned about the wildlife, the wood quality and, in some districts of the traditional soybean area, the artificial drainage of wetlands by canalization.

The main causes attributed by a wide majority of informants of the environmental degradation were both the expansion of mechanized agriculture and of cultivated pastures. The expansion of the family agriculture and the extraction of wood were also mentioned.

In the urban towns, the informants' declarations differ little of those manifested in the rural areas, where most declared to perceive extreme climatic variations, access and quality of water and a few problems of health for agrochemicals misuse. Among the soybean producers it was stood out the *climatic variations, decrease in the access and quality of water* like the main degradation symptoms remaining agrochemicals and soil erosion in a much smaller scale.

On the other hand, the decrease of wildlife was presented as the main negative effect on the indigenous populations as well as the population displacement and, in a single case, impacts on the autochthonous culture.

Conclusions of observed results from the cross sectional component.

Social Impacts

The secondary data reflect that during the 1991-2002 period the area of soybean cropping was widely increased considering also that a corresponding significant increase was not observed in the number of soybean producing establishments larger than 50 hectares.

The results mentioned above suggest: a) that the production of this crop has been developed in a system characterized by the increment in the farms scale of production, and b) that the fast growth registered in production area is mostly explained by the incorporation of new large and medium size farms since with the simple annexation of small properties it would not have been reached the current crop surface

Nevertheless, a fraction of the area increment of soybean sowing would have been developed on lots belonging before to family small farmers. Many small farmers would have sold or leased their parcels mainly due to the attractive prices offered by neighboring soybean growers that looked for larger production scale.

The introduction of transgenic technology would have had a marginal additional impact in this process . This technology allowed the valorization of small farmers rural lots which were before not very attractive for the soybean production, since the varieties RR facilitates the weed handling, besides reducing production costs and, in consequence, throwing higher profit margins.

Other important social effect of the soybean expansion is the related with the migratory movement at local level. It was found that in most of the *predominantly soybean producing Districts*, the rural population diminished and the urban population increased compared with the rate of population growth at national scale from the last decade. The perception is general in that the nearest urban centers have been the rural population's more frequent destination after they sold their parcels. This phenomenon is more characteristic in the traditional areas of production, contrarily to the new areas, in which the recent soybean expansion practically doesn't explain the rural migratory movement. It is important to mention, in relation to the migration, the apparent deceleration of the flows of Brazilian immigrants, even ending up by being reverted in the 90s decade.

The collected perception for the most part manifest that the mechanized system of soybean production doesn't generate employments when substituting the labor factor for the machinery and technology. Among the employment opportunities lost in consequence it has been identified the weeding and the jobs related to forest lumbering.

The farm surveys pointed out to the activities of temporary salary earners as the more frequent jobs source, being almost null the personnel hired in permanent positions, even in the larger farms. Likewise, it was found was a high correlation between the quantity of hired manpower and the soybean type produced. In conventional soybean, the higher cultivated surface, the higher personnel recruiting, while in the transgenic soybean cropping it is frequent to hire between one and two personnel in the medium and small farms, spreading later to diminish and even to disappear in larger parcels. When the transgenic soybean is produced at small and medium scale, it seems to grant higher possibilities of seasonal employment compared to that in the conventional

soybean varieties. However the big farms producers of soybean RR practically doesn't absorb manpower.

Surprisingly, the obtained added averages from the surveys analysis indicate a higher manpower recruiting for soybean RR producing farms. Those producing soybean RR hired on the average almost twice the temporary personnel than those producers of conventional soybean.

Economic impacts

The primary information confirms the higher profitability in the production of soybean in comparison to other traditional crops of the family agriculture or of the beef cattle production system. This fact could be the main reason that explains the soybean expansion over the other agricultural systems.

The price paid by leasing lots indicates a bigger return to the production of soybean in comparison to the beef cattle production. The offered rents have been sufficiently attractive to generate an important process of cultivated pastures re-converting to crops. However, this phenomenon would not have been the sufficiently significant enough so as to reduce the cattle slaughtering and increase the meat prices at local level.

The surveys reflect the fact that the leasing of plots for soybean production is currently quite frequent. However, it has not been possible to establish a pattern in these leases; mainly in what refers to the dimensions of rented parcels and prices paid.

Under the dry climatic conditions of this year, the average profitability of transgenic soybean went inferior to the conventional one in all the farm size strata but especially in the big farms. However, in more normal years the margin of profitability in the transgenic soybean surpass that of the conventional one by having inferior average production costs, between 15 and 65 U\$S / hectare according to production scale.

At community level, the perception on which are the groups of benefited or harmed actors by the advance of the soybean system in general, it shows that the large and medium size mechanized farmers, local merchants, merchants from outside of the community and lenders of services like mechanics, tractor drivers, truck drivers and even lumbermen, they were classified as benefited groups.

As for the groups negatively affected it was identified the agricultural laborers unanimously. Also, in the areas where it was registered the expulsion of small producers, the small merchants and middlemen dependent of that clientele were also affected.

Finally, it has been rescued that the adoption of transgenic soybean would also have benefited to a group of small producers since the use of glyphosate herbicide allowed them to adopt the no-till farming and to increase the production scale in their own farms, therefore facilitating to overcome the

production scale limitation imposed by the manual weeding required by conventional soybean cultivation.

Environmental consequences

In all the soybean producing areas it was raised that existed concerns for the natural resources degradation at local level. Among the main causes of environmental degradation that have been identified it was mentioned (with higher frequency) the mechanized agriculture expansion and, in second place, the expansion of cultivated pastures.

As for the perceived degradation effects in the urban towns, most of the interviewed informants manifested to perceive extreme climatic variations, less access and quality of water and problems of health due to agrochemicals. The claims of health for agrochemicals misuse comes mainly from the rural small farmers families of the rural area.

The complaints of agrochemicals misuse refer to the wrong use of water nascent and streams for loading of pesticide sprayer tanks, the imprudent deposition of empty pesticide containers, the low respect to a minimum security belt during the sprayings and the schedule of application of agrochemical products.

It is necessary to highlight that positive experiences have also been detected in the conservation of natural resources or for the mitigation of negative impacts. Isolated initiatives of reforestation, and relatively extended campaigns for empty pesticides containers recycling exist. Likewise an important infrastructure development has been verified for water supply for spraying that contemplate measures of environmental security.

Final considerations.

Economic importance of the soybean and legal mark.

The production of soybean at world and national levels has been framed during the last years in a series of events: i) the good prices in the international markets have stimulated the increase of the soybean production, ii) the incorporation of varieties genetically modified and iii) a growing concern for environmental questions.

The events at global level have rebounded importantly at national level. The aggressive expansion of the area of soybean cultivation has derived in a gradual dependence of Paraguayan economy toward the production of soybean. This situation is reflected clearly in the parallel increment from soybean exports and its production, ending up representing a significant fraction of the national exports total.

The trend of national exports to concentrate on soybean is positioning our economy in a vulnerable situation in front of the fluctuations of this

commodity in the international markets. As it was mentioned in the section referent to the macroeconomic effects study, it is suggested that the international prices fluctuations of soybean are inversely correlated with the fluctuations of the nominal currency exchange rate, what it might mean, in other words, that an increment in the international price of this product would derive in the local currency appreciation or viceversa.

In what refers to the impact of the fluctuations of the international price of soybean on the fluctuations in the real exchange rate, this doesn't seem to be direct. The real exchange rate is mostly explained by the fluctuations of the nominal exchange rate; therefore, the international market of soybean might have an indirect effect, estimated as marginal, on the fluctuations of the real exchange rate.

The scarce tributary pressure exercised at the moment on the soybean productive system allows the fiscal sector to have certain immunity in front of eventual fluctuations in the international markets of soybean. A change in the fiscal politics toward an increment of the tax pressure on this sector would bear a higher dependence of the fluctuations in the international markets of the grain on the part of the central government in what refers to tax collections.

In a same way, the analysis carried out in the present study indicates that any shock that takes place in the soybean market has an effect, in the same direction, on the national economic activity. Even more, the effects of the transitory disturbances of the soybean price have a persistent character on the real GDP and on domestic expenditures. In other words, a fall in the international prices of soybean leads to a reduction of the economic activity and the domestic expenditures that it would delay in being reverted, despite that these prices recover their level or stabilize in their long term average values.

Finally, the inflation and the financial system also can be affected by the fluctuations of the international prices of soybean. The effect on inflation is a derivation of the impact of international prices on the nominal exchange rate. Equally, the low prices could jeopardize the payment capacity of economic agents' passive holders in foreign currency. Considering that a high fraction of the loans portfolio is granted to the agricultural sector and in foreign currency; the unfavorable prices of the grain can contribute to make most vulnerable the financial system.

In summary, the high degree of visible dependence of the Paraguayan economy on the production of soybean, subjects the country to any change in the international markets, being able to cause important effects not only on the agricultural sector but on the whole economy in general.

The recent technological developments have resulted in the diferenciación of the soybean production in at least three product types: a) the conventional soybean, b) the transgenic soybean, and c) the organic soybean. These three systems of production of soybean that at the moment are developing in our country they are determined by a complex but incomplete

legal framework. The normative that regulates the production of soybean is shown particularly complex in what refers to genetically modified varieties. Two important groups of regulations keep relevance for this system: i) the environmental legislation, and ii) the regulations related to the property rights.

In the framework of the technological development it draws attention the importance of the *environmental legislation* in reference to the liberation, production and commercialization of transgenic soybean varieties.

The liberation of genetically modified varieties for commercial production is an attribution of the national governments. In Paraguay, the normative on this topic is not clear enough; in spite of being authorized the inscription of cultivars of some GMO varieties of soybean in the official variety registrar for their commercialization, the definitive and complete authorization for their production requires the expedition of other institutions like the Secretary of the Environment and the Ministry of Public Health.

The present document has also analyzed the implicancies of international agreements for production of transgenic varieties. One of the most relevant is the protocol of Cartagena, recently ratified by our country. This has as main objective assuring the trans-border movements of alive organisms genetically modified (AOGM). Their ratification forces Paraguay to declare the presence of GMO's in the export grains. The same protocol confirms the right of the signatory countries to establish their own norms with regard to AOGM's; in this way the receiving country retain the right of establishing the conditions as well as of accepting or not the exported cargo containing GMO's..

The protocol establishes the obligation of labelling the shipments of products that contains AOGM's, maintaining differentiated criteria: i) if the species will be intentionally introduced to the environment it is required the clear identification of the same one as containing AOGM's; ii) the products to be used for later industrial transformations should indicate (if being pertinent) that "can contain AOGMs". Supposing that, in the second case, the AOGMs is not intended to be introduced deliberately to the environment, it establish anyway precedents for the segregation, identification and traceability of the AOGMs. The labelling of the product intended to human consumption is not required by the protocol.

The *property rights* also keep direct relationship with the production of transgenic varieties. This is since the technology of soybean RR has been patented at international level by a single company, and that in our country clear rules don't exist for the registration of genes. This legal breach can give place to judicial conflicts with the purpose of settling the rights of the developers and users of the mentioned technology.

The inscription in the National Registrar of Cultivars of four varieties of soybean RR has been constituted as precedent for the negotiation on the rights of property that the Monsanto company began with 24 union organizations of producers and agricultural exporters. The agreement is based on a proposal

presented by the company for the payment for that technology, settling down that starting from the crop year 2004/5, Monsanto would begin to perceive a return (*contraprestación*) for the use of the Roundup Ready (RR) technology, according to a contract that grants authorization signed with operators of soybean companies (agricultural exporters).

The signed agreement would be based mostly on the patent rights which the company has in the destination markets. The Paraguayan legislation recognizes the right on cultivars, though not covering this technology. Therefore, it becomes difficult the collection of a canon for technology when the producers use seeds acquired in previous years.

The fulfillment of the above mentioned return (*contraprestación*) would depend in definitive from the will of the entirety of production and commercialization unions and organizations, and of the requirement of reasonable royalties on the part of the Monsanto company. While the national normative it doesn't contemplate the possibility to patent this technology, it does exist the risk that might happen similar litigations as those observed in the Republic of Argentina. Country in which the government is up to date opposed to the payment of royalties by this technology, because the national normative only recognizes rights of property on the seeds. Therefore, the producer that uses his own harvested grains of soybean RR like seeds is exempt of paying any canon for technology.

The impact that the aspects related to the *property rights* of property would have at local level would be reflected in a rise in the costs of production of soybean RR slightly affecting the competitiveness of this sector that had used this technology in gratuitous form. In spite of this and while the established canon is reasonable, the producers don't perceive a very negative effect in paying bonuses in return for this technology.

The connotations referent to the *environmental legislation* and the ratified *international agreements* for soybean production and export would be of another nature. Keeping relation with the consumers growing concern about the deterioration of the environment and the alimentary safety, this would end up affecting, at medium or long term, the demand in the international markets for differentiated soybean.

Implicancias of the tendencies in the international market of soybean:

In the precedent section it has been mentioned that the protocol of Cartagena has established the bases for the segregation, identification and traceability of the AOGMs. Most of the signatory countries have opted for the labelling of shipments that contain transgenic soybean grains with thresholds of mixture tolerance varying among 1 and 5%. That is to say, all shipments of conventional soybean that contain more than 1 or 5% should clarify that it contains alive organisms genetically modified.

The introduction of labelling norms could have two negative connotations, basically for the production of soybean in Paraguay: in the first place that the consumers of derived final products of soybean might reject GMO's causing a punishment in the price of the transgenic grains and, in second place, what refers to the implicit costs in the segregation of the soybean production.

In the same line it is perceived that the foods derived from transgenic crops would have experienced a strong resistance in the main markets of consumers like a consequence of the intense campaigns of information carried out by consumers' organizations and environmentalists noticing on the possible negative effects of transgenic products.

For some authors, some dispositions of the Cartagena protocol can facilitate the violation of previously ratified free trade agreements. For example, the prohibition of entrance of transgenic products imposed by some countries signatories of the Protocol of Cartagena can be appealed before the WTO for violating the agreements of free trade. Although this obstacle can be solved in international instances, the risk of changes in attitudes toward a negative perception of the consumers on GMO's should be considered.

The labelling demands would imply higher costs regarding the segregation of grains. Supposing that a differentiated market is developed that rewards the conventional soybean above the GMO, it is highly possible that this premium price would be neutralized by the over-cost that supposes the segregation. It is expected that is the conventional soybean producer the most concerned in identifying their product like non GMO and, therefore, he should assume most of the segregation cost.

Any modification in production cost or in the sale price that is derived from the introduction of new technology has a direct impact on the farmer. That is to say, the technology introduction can have a strong impact in the producing areas, as much at individual as collective level.

Eventual impacts at regional sub level.

The analysis of the research instruments results applied at departmental or municipal level has not determined much additional impact in relation to the social aspects just by the introduction of soybean RR. However, this technology can contribute to the peasants uprooting mainly for two reasons:

- a) The lower production costs derive in higher profit margins and this stimulates the expansion of soybean cultivated area. In consequence many rural small plots adjacent to entrepreneurial soybean establishments can be absorbed.
- b) The small rural communities remaining in soybean regions were generally established on lands not so suitable for the production of this oil crop. The incorporation of transgenic technology can allow to take out higher profit from these lands and to turn them attractive for the

entrepreneurial agriculture. In this context, the small peasant farmers would be tempted (once again) to sell their plots.

The economic impacts at sub-regional level will depend on the degree of segregation of the international price for the grain. Up to this moment it doesn't exist difference of prices, and therefore higher margins exist for those producing soybean RR because the transgenic technology reduces production costs. Although the yields of the varieties RR has been inferior during the surveyed year, it is expected that in the future better varieties are developed that neutralizes this yield difference.

The environmental considerations of the present study indicate that the Soybean RR doesn't present significant additional effects. It should be highlight that it has been taken into account mostly the effects on the population and on other productive systems. In this sense, the producers that opted for varieties of conventional soybean or other crops can run into risks of being economically damaged by malpractices in the application of agricultural defensives.

Recommendations

The main recommendations based on the obtained results from the Study of the Socioeconomic Impact of the Production of Differentiated Soybean in Paraguay are presented next, organized in function of the different components.

Performance of the Soybean crop and their macroeconomic effects.

- 1 - Considering the revealed competitiveness of the more important crops from the primary sector, support to investments in the agroindustrial sector should be prioritized and strengthen the initiatives in the framework of the Balanced Feed Cluster development strategies.
- 2 - In order to compensate the increasing export concentration of the country in a single crop, the Government should enhance its support to the production, industrialization and export of diversified crops, especially those originating from the family agriculture.
- 3- To elaborate a set of economic policies specific for compensing the macroeconomic effects which are not transitory.
- 4 - In the long term, the effort should be guided toward a larger development of the financial system in general, and of an improvement in the access to credit conditions in particular.

Legal framework

- 1 - It is recommended a revision of the current normatives of the country and their updating based on the advances imposed by the new technological innovations, the demanded requirements for the risk evaluation, the ratified

International Treaties and the rights to the intellectual property of the modified genes obtainers.

2 - to propose to Congress new legislation in the framework of the Agreement on Biological Diversity.

3 - the new national legislation should determine the instances of arbitration for the solution of disputes in judicial instances.

International market of Soybean

1- It is expected the strengthening and modernizing of the normative and inspection institutions.

2- With the objective of preserving or improving the competitiveness of the Paraguayan soybean, it will be deepened the technology diffusion and adoption for productivity increase.

3- The country should advance in the process of transparenting and legalizing the production of transgenic soybean. Also, a product segregation system should be established from production through export that prevents the uncontrolled mixtures.

4- In the face of eventual risk of adverse reaction from the destination markets to the transgenic products, it is important to assure the provision of genetic material (seed) for conventional cultivars (Minimum 30%).

5- It is required to modernize the legal normative and the institutional capacity to certify the presence or not of GMO seed in export shipments, and to define their application authorities. The responsible institution should be strengthened in its capacity and credited internationally. Also, a role definition is required, since the process of certification will be able to be exercised by certifying companies from the private sector, under the public sector control.

6- In the case that organic soybean or the ones destined to direct human food acquires important volumes of external demand, the commercialization logistics and export should be strengthened to allow the controlled segregation of the product.

7- The requirements to certify organic soybean demand a territorial or community focusing according to the current demands of the consumers. It is recommended to promote the organic soybean as alternative cash crop.

Social impacts

1- To impel support programs to the family agriculture in the neighborhood of the soybean production frontier advance areas at entrepreneurial scale.

- 2- To define support programs to the family agriculture that must include training and access to provision of services.
- 3- To impel training programs, directed credits and technical assistance for the creation and consolidation of urban employments in the areas of high concentration of soybean production.
- 4- To provide additional financial resources to the Municipalities of urban centers from the traditional soybean areas in order to stimulate the construction of urban or rural infrastructure of the district (public works employment creation).
- 5- As a way of changing the attitudes among farmers from different national origins should be explored the feasibility of promoting mutual services or complementary productive and commercial activities, looking to generate an cooperative vision in substitution of a competitive vision or of displacement.
- 6- To promote through the SENAVE and the Municipalities, the establishment of stricter normatives that regulate the agrochemicals use to minimize the negative impact of its indiscriminate use.

Economic impacts

- 1- To promote the transparency and legalization of the transgenic soybean production in order to capitalize the margins of profitability that increase the competitiveness of the Paraguayan soybean.
- 2- To identify better adapted genotypes to the soil conditions and climate of the different producing areas of the country that carry the RR gene.
- 3- To monitor the price paid by transgenic royalties in their incidence on the profitability of the crop.
- 4- To promote programs aimed to obtain higher productivity in the main crops of the family agriculture, especially cotton.
- 5- Monitoring of the application of the IMAGRO (rural real estate tax) to evaluate the tributary contribution of the mechanized agricultural exports and their redistribution for the achievement of economic and social objectives, especially at district level.

Environmental impacts

- 1- To revise the Law 536/94 of Forestry and Reforestation in order to establish a better compensatory mechanism for the investments carried out in the forest plantations.
- 2- To promote in Municipalities the definition and application of regulations and normatives relating to the agrochemicals use.
- 3- To strengthen and support the Municipalities for the establishment of deposits or controlled dumpings for empty agrochemicals containers or waste.
- 4- Monitoring of the water quality and the application of sanctions to the irresponsible contamination of water courses. Shared involvement of specialized institutions of national level jointly with the Municipalities.
- 5- To prohibit or to control the entrance to the country of agrochemicals prohibited by their toxicity to the human health or to the environment.

INTRODUCTION

The Paraguayan agricultural development has experienced historically diverse stages in the recent past, resulting in the evolution registered in the last three decades, during which accelerated sectorial changes were implemented aiming to modernize agriculture looking for an upgraded competitiveness. Among these it is emphasized the fast development and spread of mechanized cereal and oil cropping systems, having soybean as the most successful crop, surpassing in importance both the livestock and the family agriculture traditional sectors.

Soybean production as the main mechanized crop represents in value more than 38% out of the agricultural sector total, contributing as much as 7 % to the country Gross PNB, and 37 % of sectorial export value. In the 1992-2002 period, soybean gross production value increased in 103,96 % with an average annual rate of 7,72 %.

Internal production meets national demand in 99%. Imports generally is restricted to planting seeds (close to 10% of the volume utilized for sowing).

In addition to the hard currency generated through exports and raw material supply to local oil industries, it is estimated that there are more than 100,000 employed persons across the value chain (IICA).

However, in a parallel way, the soybean cropping system is increasingly being questioned because it supposedly caused or enhanced the process of small farms number decrease, as well as diminishing the cattle grazing fields, and contributing to unemployed labor number increase. Therefore it is presumed that it can lead toward a socioeconomic imbalance. Taking into account the different characteristics surrounding up this set of situations it is necessary to determine viable policy trends at medium and long terms for soybean production, either transgenic or conventional, to minimize or reduce the social, economic and environmental problems caused by its expansion.

The formerly described situation can be evaluated in practice given the current diffusion of previously unregistered genetically modified crop originated from non commercial seed supposedly introduced by growers from Argentina, where the crop was legally approved since the second half of the 90's.

There is no objective estimation of transgenic soybean production percentage produced in the country, but according to diverse sector's subjective opinions it probably had surpassed conventional soybean production.

In 2004, the Ministry of Agriculture and Livestock (MAG), through a resolution legally authorized four Roundup Ready (RR)-GMO soybean cultivars to be registered in the official Cultivars Registry, measure that opens the door for legalized transgenic soybean production in this country.

The fast evolving international awareness about the widespread predominance of GMO soybean grain traded in the international market is currently causing a

progressive de-commoditizing this product by differentiation to satisfy new market niches at the international level.

This new trend is the result of market demand pressures, mainly from the European Union, Japan and other Asiatic countries toward imports of: a) Segregated products according to specific intrinsic product quality characteristics in response to consumer or industry preferences, or b) Process attributes such as certified organic soybean. In fact, the new differentiated markets requirements includes from credence attributes, such as soybean produced under organic standards or for direct human consumption, which require internationally accredited organic certification systems, up to specific industrial quality attributes of grain components.

The same differentiation process is also being actively pursued by biotechnological means, consisting in producing and marketing, although still in small scale, in the U.S.A. and Argentina the so called second generation transgenic varieties under contract cropping. In fact, it is obvious the new research trends on GMO's in the sense of not only incorporating genetic characteristics of agronomic value (herbicide resistance, diseases and pest control, etc.), but also those genes causing alterations of intrinsic grain quality characteristics (high oleic acid, low linolenic, high protein, etc), in the recent events released by biotech multinational corporations.

This new scenario is already present in Paraguay based on the small scale production, certification and export to Japan of soybean grain for human direct consumption (Yguazú Cooperative), or organic soybean (in Itapúa region) produced from both large as well as small scale farmers especially from northern Itapúa region, and shipped to European countries by private exporting companies.

There is a need to evaluate these new ongoing developments, not only its environmental impacts but also considering the potential opportunities for small industries and farmers, which can be more efficient in performance in smaller segmented markets than the larger ones, thanks to the progressive product differentiation. In other words, this current trend could result in principle, in favorable socioeconomic impacts and opportunities, in contrast to the present day scheme favoring land and production concentration in the large and medium scale farmers strata.

The general objective of the present study consists on performing an analysis of the current production trends of different soybean types to contribute to the process of public policy decision taking on aspects concerning the future of this important oil crop produced in Paraguay, especially of genetically modified organisms (GMO's) production and utilization, and their socioeconomic and environmental impacts at the rural society level.

CHAPTER I: Problem outline

OVERVIEW

During the above mentioned period, important transformations occurred in the country's production and agribusiness structure. These were the result of both government active policies as well as the evolution of land settlement in the Oriental Region territory, international market dynamics in general, and changes in the regional market in particular. The structural transformation process was undoubtedly facilitated by land colonization programs, public and private, on former latifundia lands, as well as public investments realized on physical infrastructure in rural areas integrating extensive areas previously uninhabited and isolated.

In the 70's and 80's the social and economic development policy was based on import substitution and export promotion measures, followed by deregulating and liberalizing economic activities and international trade in the 90's, after the transition to democracy started.

From the second half of the 90's the membership of the MERCOSUR regional trading block resulted in the growing concentration of both import and export trade toward the neighboring countries (Argentina, Brazil and Uruguay).

The import substitution policy applied in the rural sector in the late 60's, consisted in supporting the wheat production program through access to public credit, agricultural research and extension programs, and other services among the most important public sector measures. This non traditional crop set the basis for the establishment and strengthening of a previously non existent mechanized cropping system specialized in cereal and oil grain crops.

This production system also contributed to the constant growing of exports, especially soybean since 1974, year when international prices experienced a sudden increase, triggering a widespread expansion of this crop, whose maximum upper limit has not been reached up to date, becoming the main leading crop for this production system.

In the entrepreneurial mechanized farming, soybean positioned as a relevant crop competitive in the international market, currently contributing with more than 60 % of foreign hard currency income by grain and agro industrial by-products exports.

Genetic materials adapted to the local environmental conditions were identified, due to both a result from the public research and diffusion public programs, as well as the access to new cultivars introduced from Brazil. Another important breakthrough consisted in the introduction, generation and validation of sustainable production technologies known as No Till farming, covering more than 90 % of the mechanized cropping land area, representing the record in the MERCOSUR region of relative adoption for this environmentally important production technology.

International technical assistance on soybean and other crops is remarkable, especially the Japanese (JICA) programs, for more than two decades, while the

German (GTZ) contribution focused mainly on conservation agriculture through the No Till farming system promotion and diffusion.

One of the last innovations registered in Paraguayan soybean production consists in the spontaneous fast adoption and diffusion process of genetically modified soybean varieties, considering the informal introduction by farmers of non commercial seed from neighboring countries. Even though the government had just recently released its production as commercial crop, it is internationally reported that the crop already has reached 1,2 million hectares¹.

This agricultural sub sector dynamics significantly explains the primary sector sustenance in its contribution to the PNB, even in the last years in which the secondary and the services sectors constantly decrease as a consequence of the regional socioeconomic crisis. In this production stratum an important investment boom in related agro industries was experienced such as terminal silos, grain terminal private port facilities, cereal flour mills, oil extraction plants and balanced feed pellets, concentrating also the main multinational enterprises investments in the country. The soybean and grain sub sector leads the category of Strongly Competitive Advantage of the country, and concentrates the main innovation and technology contributions to development in general, and to competitiveness in particular.

However, the rapid growth of agricultural sub sectors based mainly on the agricultural frontier expansion, had a negative impact on extensive forest areas, considering the accelerated deforestation registered, especially in the Western Region of the country.

Native forest destruction, biodiversity depletion and agrichemicals misuse, represent important challenges requiring proactive policies in joint public-private action approaches. The promotion of incentives for forestry management and reforestation, and appropriate agrichemicals use still represent a standing compromise, based on a recent legal and regulatory framework but lacking in financial funds for implementation.

The crisis in the wood and timber sub sector strongly affected these industries and their contributions to exports, asking for compensatory measures trying to overcome at least partially the damages caused by the mechanized agriculture expansion.

Methodology and Instruments

The Study on “**Social Impact of Differentiated Soybean Production in Paraguay**” was performed through the combination of different research methodologies and instruments utilized for determining the social, economic and environmental effects of differentiated soybean crop expansion.

Since the end of the 60's, the continued expansion of mechanized soybean production system and their rotation crops such as wheat, corn and sunflower in

¹ James, Clive. 2004, Isaaa, accessed in www.

lesser scale, is exerting deep multivariate effects on the above mentioned dimensions, both at the country level and the Western Region in particular.

This study consisted in a time series econometric analysis of the last twenty years evolution of soybean production, consumption and export. Also, in its projection on a medium term future of the predicted trends for soybean international market demand, supply, and prices, considering the expected expansion limits for that production system in Paraguay. Both longitudinal components were based on secondary data collection, processing and analysis, either available in the country or accessed through international information sources. That macro information was projected in a transversal study to estimate the predicted impact on a medium term basis, based on characterizing and interpreting the current registered or perceived effect.

This last study component was estimated by a time across research, using both primary and secondary data at a micro level, through a combination of both quantitative and qualitative research methods.

Following are described in detail the various methods and instruments that have been utilized in each research component.

Component 1: Determination of soybean expansion performance in Paraguay's Western Region.

Component 2: International market trends of soybean and by-products on a medium term basis..

Component 3: Evaluation of social, economic and environmental impacts of differentiated soybean production.

This last component was performed by economic analysis in combination with a social evaluation approach (SIA). The former consisted in a cost/benefit analysis of different soybean types produced in comparison to the other land use competing production systems, such as beef cattle livestock large scale production and the main cash crop typically produced by the small farmers family agriculture, which is cotton. These three main production systems relative competitiveness were interpreted as the main factor explaining both the current conventional and, lately, the transgenic soybean expansion.

On the other hand, the social impact determination allows the estimation of production reconversion effects and their consequences on the main involved social groups. That means their incomes, welfare and access to resources, discriminated at the farm, household and community levels. The SIA approach allow the understanding of the degree by which a technological change, as the result of technology adoption and diffusion had contributed to the achievement of social and economic objectives. In contrast to the traditional economic analysis approach, SIA requires a more holistic focus by using participatory methodologies of research that allows the analysis and interpretation of the facts being studied. This approach also permits the identification of the steps to be taken in order to maximize benefits and preventing or mitigating the adverse potential negative consequences of the change under study.

This study correspond to a non experimental, survey research design, considering that in this case the variation causes have already occurred, where this present component represent a cross sectional design using descriptive, correlation and interpretative statistics and information.

Among the primary data collection instruments utilized in this research it is mentioned:

- a) **Survey sampling** at the farm level, for both quantitative and qualitative information gathering.
- b) **Interviews** to qualified informants, representing diverse community involved groups, such as farm cooperatives, municipalities, governor's agricultural secretaries and specialized agricultural technical professionals from the public and private sectors, in order to collect qualitative information consisting in their knowledge, experiences, perceptions and opinions.

a) Farm Surveys:

The research design according to the consulting contract Terms of Reference (TOR) established the comparison among the soybean mechanized farming system with the family agriculture and the beef cattle livestock production systems. At the same time, the examination of the possible influence corresponding to the different soybean crop size strata within this crop production system (small: less than 20 hectares, medium: from 21 to 200 ha., and big: larger than 200 ha. of soybean produced)

It is also required to discriminate between conventional and genetically modified soybean varieties, in order to compare their production technologies and associated costs.

Research questions were structured in the survey questionnaire with the aim to characterize the operational variables for social, economic and environmental dimensions. The required information was a combination of quantitative and qualitative data organized in both open and closed questions.

The survey provides primary data information concerning the household (incomes, material welfare, employment and demographic characterization), the cropping technology used and their associated costs as well as the local natural resources use at the farm level (soils, natural vegetation, water, toxic waste)

The farm survey was a descriptive and correlation cross sectional study in most part, complemented by some retrospective longitudinal questions covering the last two to three years, in order to obtain some trends.

The study area corresponded to the four larger producing soybean Departments, Alto Paraná, Itapúa, Canindeyú and Caaguazú (88% of total soybean production according to the Sampling Survey 2002².

² Encuesta por Muestreo 2002. Dirección de Censos y Encuestas Agropecuarias, DCEA- MAG.

The population to be surveyed was constituted by 42 districts covering the above mentioned four Departments, where the observation units consisted in differentiated soybean producing farms stratified by crop size (with soybean) in comparison to neighbouring small family agriculture farms (without soybean). The sampling units included relevant information at the household and farm levels.

Total sample size was 100 farms, being established in advance considering total cost restrictions.

The selected survey method corresponded to the stratified cluster sampling, in order to maximize precision and costs. By using this design the population was divided in internally homogeneous strata (heterogeneous between), which were totally sampled (within).

As an internal homogeneity criteria within each stratum were used the following agrological and socioeconomic variables zoning:

- 1- **Caaguazú:** fragile soils (sandstone derived), areas of current soybean expansion, presence of all kinds farmer types including both large scale mechanized as well as family agriculture small farmers.
- 2- **Alto Paraná Norte and Canindeyú:** transitional soils, soybean frontier zone expanding over large scale beef cattle livestock producing areas zones mostly. Relatively scarce family agriculture population.
- 3- **Alto Paraná Sur and Itapúa:** highly fertile soils, low water deficit, prevalence of medium and small size soybean producers, extensive cooperative organizational development.

Within each stratum, clusters were randomly selected, represented by districts as the primary sampling units (psu), totaling 10 out of the 42 districts, according to the proportional to size method. Size was established by the number of districts constituting each Department., according to the following detail:

Table 1: Stratified cluster sampling selection of differentiated soybean farm units

Strata	Clusters(psu)				
Regions	Districts	Cumulative	Ranking	Selection psu	Nº de farms
A)Caaguazú	9	9	1-9	2,8,3,7	40
B)APN + Can.	9	18	10-18	10,12	20
C)APS + Itap.	24	42	19-42	19,21,41,35	40
Total	42				n : 100

*The selected districts were:

- 1- **Caaguazú:** R.A.Oviedo, J.E.Estigarribia, Repatriación and F.S.López
- 2- **Alto Paraná Norte and Canindeyú:** Saltos del Guairá and F. Caballero Alvarez
- 3- **Alto Paraná Sur and Itapúa:** Yguazú, Santa Rosa, Pirapó and Hohenau.

Clusters (districts) were considered internally heterogeneous because they contain all kinds of zone prevalent farmer groups, main reason why they were considered heterogeneous within, in agreement with the sampling model that assume districts should be homogeneous between.

Lastly, 10 stratified farms were selected in each stratum, including family agriculture small farms, still existing in some areas of Caaguazú according to information from MAG Sampling Survey 2002 (MAG-DCEA).

Farms represented the simple sampling units (ssu) having been randomly selected by stratum and farm size as defined by the mentioned research design.

b) Interviews to qualified informants:

The interviews to qualified informants are considered a valid research instrument for the analysis of distributional impacts on welfare for different groups which are involved in the changes introduced by the soybean farming expansion in general, and transgenics in particular. It is also considered to be an efficient instrument to investigate the impacts at the community and institutional levels. It is a complement to the farm level surveys that are used to estimate the impacts at the farm and household levels.

In order to achieve that purpose, the general impacts are disaggregated into their social, economic and environmental dimensions, to analyze how do they affect the main involved groups at the local level.

The main local involved groups focused in the interview questionnaire are: large, medium, and small scale soybean producing farmers, traditional family agriculture's small farmers, salaries-dependent rural and urban labor, beef cattle medium and big scale ranchers, local and foreign traders and shoppers, as well as local service providers (tractor and truck drivers, mechanics, etc.).

The interviewed community's qualified informants includes: local production cooperatives directors, representatives from municipalities, Department's government Secretaries of Agriculture, and technical representatives from the public and private sectors.

A basic questionnaire form was designed to collect the information, including both closed and open questions, organized around research hypothesis in their social, economic and environmental dimensions focusing on the community and institutional levels. In addition to the coded questions in the interview form, the informant's statements were taped and transcribed to record the informations, perceptions and opinions concerning specific aspects at the local level.

The relieved information was subjected to non parametric analysis.

CHAPTER II: Longitudinal components of the study

MACROECONOMIC EFFECTS OF THE FLUCTUATIONS IN THE INTERNATIONAL MARKET OF SOYBEAN

(i) Introduction

The objective of this work is to analyze the Soybean market performance and its relation with the Paraguayan main macroeconomic indicators. With this purpose, the possible effects in the fluctuations of the international price and the Soybean exports on the nominal exchange rate, the real exchange rate and the Central Government's tributary collection are studied on one hand and, on the other hand the relations with respect to the real GDP and the private domestic expense are described, measured by the private consumption and the gross formation of fixed capital. Not less important is the performance analysis that has had the Soybean imports and exports, and its link to the balance of trade, relation that is also approached in the empiric analysis.

The objective of this study emerge from the fact that the macroeconomic scenario that results from changes in the Soybean market, could bear to deteriorations or improvements of welfare. This fact motivate the necessity of predicting the macroeconomic effects of these eventual changes that will allow offering useful information to design policies and effective mechanisms of action.

The conventional vision in most of the studies on the external causes of the macroeconomic volatility in developing countries, is that in general, the macroeconomic environment is subject to external interferences of great magnitude, coming mainly from two forces: real trade and external financial markets; more specifically, terms of trade volatility, that refer to the relation between the export and import prices and; the international flow of capitals. Both forces have led to most of Latin American economies to support deep fluctuations in their GDP growth, that in general have been recessions, rather than expansions.

Given the main interest of this study, the analysis of the macroeconomic effects of the international flow of capital is not considered, the attention is totally oriented on the volatility effects of the terms of trade. However, to achieve the objective proposed initially, the focus of the analysis will be centered in the effects of the volatility in the Soybean market over the main macroeconomic aggregates. In this context, the methodology used to determine the effects mentioned above is the technique of cross correlations over the macroeconomic cycles of each variable; being the cycles extracted by using the Hodrick-Prescott filter. For such effect, this work is organized in the following way. The next section shows the evolution of the Soybean market and the aggregated economy. In the third section the theoretical concepts about the study of terms of trade shocks and their macroeconomic effects are presented.

In the fourth section, techniques used in the empirical analysis are shortly described, then the main empiric results are presented in the following section. The last section correspond to a summary and conclusions.

(ii) Macroeconomic overview

The Paraguayan exporter sector has been traditionally based on the primary sector. In the eighties and beginning of nineties, for example, products linked to the agricultural activity (cotton, Soybean and other), represented near 45 percent of total exports; then, from mid-nineties until the present, this sector has slightly reduced its participation to near 35 percent.

Although the primary sector has maintained its importance in the total exports of the country, its structure has shown important changes at products level. The Soybean exports have had a significant expansion in the nineties that has stayed to become the more important tradable product at the present.

Table 2: Exports 1980-2003

EXPORTS	1980	1985	1990	1995	2000	2003
AGRICULTURAL	41.3	46.5	45.2	25.1	32.4	38.7
Cotton fibres	26.8	26.5	23.8	14.9	6.9	3.9
Soybean	10.8	18.8	19.3	9.8	25.1	34.5
Other agricultural	3.7	1.2	2.1	0.4	0.4	0.3
CATTLE RAISIN	1.1	1.2	11.7	6.3	11.3	7.7
Meat	0.3	0.3	9.7	3.0	6.4	4.0
Leather	0.8	1.0	2.0	3.2	4.9	3.7
MANUFACTURES	6.7	2.8	2.9	4.5	4.6	7.5
Oil	5.9	2.8	2.5	4.1	3.8	6.7
Sugar	0.8	0.0	0.3	0.3	0.7	0.8
Alcohol and liquor	0.0	0.0	0.1	0.1	0.0	0.0
FOREST EXTRACTION	31.3	6.4	9.9	15.6	28.1	29.0
Wood	17.0	1.8	2.7	5.0	6.6	4.0
Other	14.3	4.6	7.2	10.6	21.5	25.1
TRADITIONAL	80.3	57.0	69.7	51.5	76.4	82.9
NON TRADITIONAL	19.7	43.0	30.3	48.5	23.6	17.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Source: Banco Central del Paraguay.

The attached chart shows that the structure of the exports for 1980, 1985, 1990, 2000 and 2003 has presented important changes. The Soybean seed has passed to constitute the main export product with a participation near to 35 percent of the total exports in 2003. Cotton fibers, traditionally the product of more participation, almost explained toward 27 percent 1980, but that importance was decreasing at the time in that the importance of the Soybean advanced, until constituting alone near 4 percent in 2003. Other important and traditional products have been meat, oils and products coming from wood

extraction, that constitute approximately 40 percent of total exports; while the non-traditional products constitute 23 percent.

The dynamic of changes that has been observed in the structure of the exports, especially the great importance that has acquired the soybean sector, bears the necessity to evaluate the evolution that has had this market, mainly with respect to its international prices, since a small economy as the Paraguayan, cannot affect the international prices; on the other hand, these prices are considered as given for the economy. In other words, our country is a price holder of Soybean. That condition, added to the growing dependence over the exports of Soybean makes the economy more and more vulnerable to fluctuations of this market.

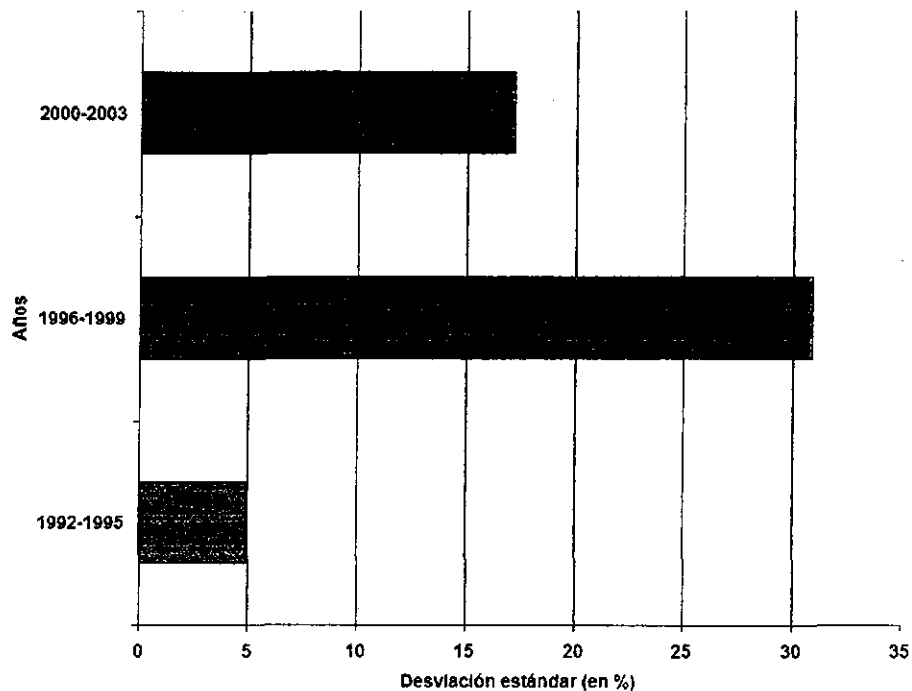


Figure 1: Volatility of the international price of soybean

The Figure 1 shows that the Soybean price has been highly volatile, particularly between 1995 and 2003, period in that the Soybean gains preponderance in the total exports of the country, and becomes the main product. Specifically, between 1992 and 1995, the standard deviation of the soybean price was near 5 percent; then between 1996 and 1999, this volatility measure increased up to 30 percent, constituting a six times bigger volatility. In the first three years of the new century, although the price volatility decreases in comparison to the period 1996 - 1999, it continues being very high, more than three times superior to the period 1992 - 1995.

At this point, it is necessary to wonder if this volatility in the Soybean price; and therefore in its market constitutes an important factor in the growth uncertainty of the external trade revenues, and mainly over the GDP.

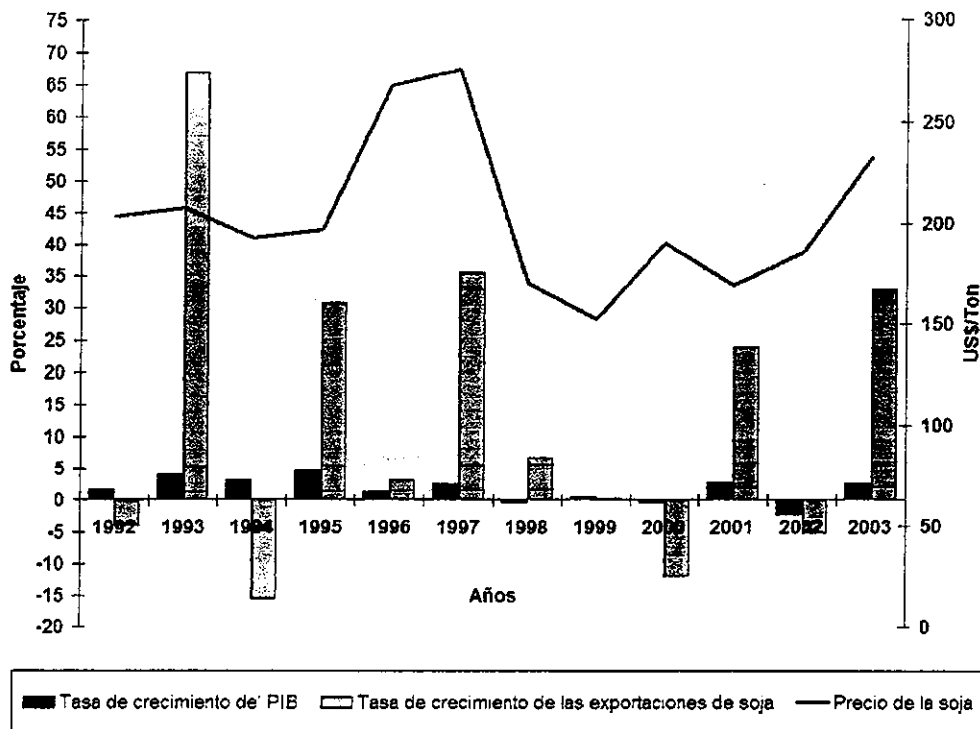


Figure 2: Comparison of price and exports of soybean with the grow rate of GDP

In this sense, in Figure 2 can be observed the Soybean price evolution and the growth rate of the exports of this product, compared with the real GDP growth. In most of the years in that the exports of the good showed a poor performance, the GDP growth was very low, near to zero or even negative, and this situation coincided with unfavorable rates in the Soybean price. On the contrary, when the exports had high rates growth, apparently they became in positive rates of growth on the GDP, and also coincided with increments in the international price.

The relation between the aggregated economic activity and the fluctuations that take place in the Soybean market can be only partially appreciated observing its evolution by graphics. In this case, at first sight, the relation seems to be positive, because increments in the economic activity are associated with increments in the prices level and exports of soybean. However, it is very difficult to determine the degree and the phase of causality in the relation among variables, by a simple graph analysis. In other words, the relation could be an answer of the economic activity in the presence of

variations in the Soybean prices level of previous periods, in a context of the spider's web theorem postulated by the microeconomic theory. Or, worst, the observed relation in the graph could be completely casual or spurious, that is to say, at random without really exists an important association among the fluctuations in the Soybean market, the GDP and other important macroeconomic variables as the consumption, the private investment, or on nominal variables as the nominal exchange rate. In case that the observed relation in the graph is due to random, they will be other more important variables that would be explaining the behavior of the mentioned macroeconomic indicators.

Therefore, in posterior sections the links between the fluctuations of the Soybean international price and the main macroeconomic indicators are analyzed, applying stricter methodologies to determine the interrelations. These methodologies are shortly explained in the methodological section.

On the other hand, the macroeconomic effects of international prices volatility of primary products like Soybean, are in general studied inside the macroeconomic literature by analyzing the shocks of terms of trade. Next the main concepts are shortly outlined.

(iii) Theoretical context

Several empiric studies about the sources of macroeconomic volatility in Latin America have found three important explanatory forces: external shocks coming from the market of goods, external shocks coming from the financial markets, and the uncertainty about the future success of macroeconomic policies (De Ferranti et al (2002); Loza (2002); Vial (2002); among others).

Paraguay has been subject to internal as much as external perturbations; the second one coming either from the trade of goods and from the financial markets. This is, shocks caused by the volatility in the terms of trade and the international flows of capitals.

Focusing the attention in the terms of trade as sources of macroeconomic distortions, these can be very volatile due to three key questions:

1. The basket of exports is very concentrated in few products with very volatile prices.
2. Very concentrated imports in terms of products and countries that are commercial partners.
3. A third case is one in that the country has a very diversified basket in terms of goods or products which can be exported, but is very concentrated in a

single market of destiny, therefore the business cycle of the economy that import is transferred directly to the exporter country.

Of the three causes of volatility in the terms of trade, the first two have played a more important roll in the Paraguayan case. But the key factor behind the great variability of the terms of trade is the high share in the total exports of some few primary products, such as cotton in the last decades, and recently the Soybean, which prices have been subject to constant changes.

In the context of this discussion, there are two important questions that should be clarified: the concept of shocks or crashes and the concept of persistence:

Types of shocks:

A shock is an abrupt change that affects the economy, and whose origin can be determined by changes under external or internal conditions that govern the national economy. Given the main roll that they have in the fluctuations of the main economic variables, it is important to define its characteristics. Therefore, the following classification is presented:

Source of the shocks: shocks can be of "supply" or of "demand". The first ones are of real type, as changes in the productivity. The seconds can be of nominal type, as changes in the level of prices, or real, as changes in the level of public expenses.

Geographical origin: the origin of shocks can be domestic or external. As examples of external crashes, changes in the international interest rates can be mentioned, or changes in the international prices of export products (shocks of terms or trade), changes in the world demand, among others. Examples of domestic shocks are a change in the fiscal policy, in the monetary policy, in the preferences of the economic agents, a flood, etc.

Duration: while a temporary shock is bankable, a permanent crash requires a process of slower adjustment.

Persistence:

This is a concept very related to the inertia of the shocks, and in the economic theory the persistence is defined as the continuous effects of a shock for a long period of future time. Thus, the question of economic interest is centered in determining the memory or inertia inherent to the lagged values of the macroeconomic variables, since the same ones can be assimilated as the result of perturbations or interferences with different frequency and magnitude.

In any economy, economic disruptions take place permanently. In these circumstances, is important to know if their effects will be persistent or if they will only last a short period of time. In general, the analysis of the persistence of

a shock that affect a variable is important to define the type of public policies to face them.

In the presence of variables with low persistence, the specific policies that would be designed are those of assistance character, that in a transitory way help to palliate the effects a shock, but that do not have specific effects on the evolution of the affected variables in the long term. Contrary, if regular shocks have persistent effects, the institutional mechanisms would be unable to make that the variable returns quickly to its normal value. In this last case, since shocks are persistent, public policies to reestablish the balance will be effective, still when they are implemented late, since after the occurrence of a shock, the value that shows the variable at the moment of implementation of the policy, will not be very different from the value that generate the execution of the policy.

Focusing the attention over the terms of trade, it is obvious that the variability in the price of tradable primary products causes uncertainty in the export revenues, affecting, subsequently, the disposable incomes of the economic agents, the consumption, the exchange rate, the economic policies, the investment and the economic growth, among others. It is hard to find controversies in the economic literature about the fact that the fall of export revenues will affect the disposable income of the individuals, however, one of the most complicated problems that the private agents, governments and financial firms should solve, when they face abrupt changes in the prices of the products that are sources of its revenues (shocks), is to decide if they are permanent or transitory, that decision will determine adjustments in their expense levels, facing the new levels of incomes. In this sense, the policies that the IMF recommended in the face of imbalances derived of the fall in the export revenues were two, basically: the compensatory financing of an emergency; and the funds for stabilization of the prices of specific products. Nevertheless, these measures were sustained in a focus of transitory imbalances.

In an ideal world, the financial markets play a central roll in cushioning the effects of transitory shocks that impact the economy. Companies and consumers that are affected by the loss of revenues when the prices of the product that is exported fall, can still take credits and maintain their normal levels of investment and consumption, the government can make the same thing to compensate the loss of fiscal revenues and, if the shock has macroeconomic effects for its magnitude or the importance of the affected sector, the companies, the government and the financial system can take external credits to finance a transitory deficit in the Current Account of the Balance of Payments.

In the reality of developing countries as Paraguay, the already high concentration of exports in some few products makes that abrupt changes in their prices to have a macroeconomic effect, necessarily. What would be a sectoral shock in a relatively big and diversified economy, in these countries is almost always a macroeconomic shock with significant effects in the monetary and fiscal variables. The experience also shows that the flows of capital toward the economy tend to fall notoriously during recessions, and to rise during

expansions; then, in the presence of a fall in the prices of export products, these flows will be contracted, limiting the possibilities of the government, as much as to the private sector, to access to international credits (De Ferranti et al (2002); Gavin et al (1996)).

(iv) The methodology

To determine the effect of fluctuations in the Soybean market over the main macroeconomic indicators, we studied the cyclical co movements and persistence between this series.

a. The cross correlations methodology

The comovement between two macroeconomic series is estimated to determine the type and degree of connection that exists among this series; if that relation is positive or negative and how strong is that connection among the two variables. In general, the co movement, or the relationship between two variables in the short term, is calculated by a statistical measure called "cross correlation coefficient".

Once the correlation coefficient is estimated, the maximum correlation value indicates the degree and the direction of the existent lineal relationship between the series or variables. Thus, if the resulted coefficient of correlation is positive: the relationship is "procyclical", since both variables move in the same direction. If the value of the calculated correlation coefficient is negative, the relationship is "counter cyclical", since both variables move in a different direction. Lastly, it is said that the relationship is "acyclical or uncorrelated", when the correlation coefficient is not different from zero in a statistical sense.

In turn, the maximum value obtained of the correlation coefficient will indicate if the fluctuation of the price or the exports of Soybean leads, synchronize or lag the short term fluctuations of other macroeconomic variables, considered in an individual sense. In the first case, it can be said that the effects of fluctuations in the price or the exports of Soybean influence the fluctuations on the main macroeconomic indicators. In the second case, if the fluctuations are synchronized, changes in the price or the exports of Soybean are related with changes in the macroeconomic indicators in the current period; nevertheless, in this case a double causation could be found. Finally, if the short term fluctuations of prices or exports of Soybean lag the short term fluctuations in the macroeconomic variables considered, these will determine the fluctuations inside the Soybean market.

Taking the Soybean price, the GDP, the private consumption and the gross formation of fixed capital as examples, the concepts mentioned above can be expressed more formally in the following way: if the coefficient of correlation presents a maximum in absolute value for " $t < 0$ " (a period previous to the current period or " t "), the fluctuations of the price of Soybean leads to the

fluctuations in the other variable (GDP, private consumption and gross formation of fixed capital). Thus, if it reaches a maximum in "t", the fluctuations are synchronized, in the sense that the short term variations in the price of Soybean affect and are affected automatically by the other variable. Finally, if the maximum correlation occurs in " $t > 0$ " (a later period to the current "t"), changes in the other variable are responsible for variations in the price of Soybean.

b. Methodology for the extraction of the cyclical component

The determination of the co movement, (or the relationship between two variables) as much as the determination of the effects of a shock on a variable in terms of persistence, it is necessary to obtain the cycle of each variable. For the removal of the tendency of each series and the later obtaining of the cycles, will be used the Hodrick - Prescott filter.

The Hodrick-Prescott filter (1980) is the more used procedure to extract the tendency of the macroeconomic series in the last years (Kydland and Prescott (1990), Kamil and Lorenzo (1998)). The idea behind this methodology is that the observed series are conformed by a tendency and a cyclical component, then the problem will be to filter the tendency of the original data, in a manner to interpret the deviations around this tendency as the cyclical component.

Additionally, this filter is based on the idea that the tendency of the series is stochastic and has a smooth profile along time, and it assumes that the cyclical component is uncorrelated with the tendency. The Hodrick-Prescott filter calculates a tendency like the one that would be drawn by an investigator that seeks to delineate the smooth trajectory of the analyzed series.

Once estimated the tendency component "T", the cyclical component "C" is obtained simply by taking the difference of the original series minus the tendency.

(v) Empirical Evidence

It is pretended that the empirical estimation uses an annual sample of data from 1980 to 2003. The variables to be considered in the analysis will be the following ones:

a. Data for statistical analysis:

- i. Effect of fluctuations of the Soybean market on the nominal and real exchange rate:

- ⇒ *International Price of Soybean*: variations in the international prices of commodities; in this particular case of Soybean, can have direct effects on the production and exports of this good; and therefore on the GDP; or they can have effects on relative prices as the real exchange rate, and for this indirect way affect again to real variables as the total exports and imports and the production or GDP.
- ⇒ *Real Exchange Rate, TCRE*: is a variable of relative prices that determines the competitiveness degree regarding the rest of the world. It is internationally built as the relation between the tradable goods prices, regarding the non tradable good prices or domestic goods. The fluctuations in the Soybean international price could have effects on the real exchange rate since this prices represent to an international tradable good, affecting in turn the Balance of trade, or to move these effects on the general level of prices or inflation. Therefore, the real exchange rate, that is the price of foreign goods or tradable expressed in national goods or non tradable that we will denominate ε , comes given for:

$$\varepsilon = \frac{EP}{P}$$

The real exchange rate is an index, equal to 1 in the year that is chosen as base year. Were P is a measure of the general price level of Paraguay, P^* is a measure of foreign prices general level and E is the nominal exchange rate; then, multiplying for the exchange rate, E , we obtain the price of the foreign goods denominated in Guaranies, EP^* .

- ⇒ *Nominal Exchange Rate, TCN (Gs/US\$)*: the nominal exchange rate, or the price of the foreign currency in terms of the national currency, can be affected by the variations in the Soybean international price, for example through the movements in the export value of the product that in turn determine an important part of the flow of entrance of foreign currencies to the country.
- ii. Effects of fluctuations in the Soybean market on the tributary collection:
- ⇒ *Soybean exports*: the effect of fluctuations in the exports of the good on the government's collection will be studied.
 - ⇒ *Soybean International Price*: fluctuations in the prices could also determine a fall in the collection through their effects on the production decisions, or on the revenues (terms of trade).
 - ⇒ *Tributary Incomes*: the total tributary revenues of the Central Government's are used.
- ii. Effect of fluctuations in the Soybean market on to the domestic expense and the aggregated production:
- ⇒ *Gross Domestic Product*: it will be introduced in the analysis of cyclical fluctuations as measure of the economic activity.

- ⇒ *Private Consumption*: according to the economic theory, a shock on the terms of trade (shock of revenues) could affect the consumption, if the economic agents consider that the effects of this shock will be permanent or they will last for a long time.
- ⇒ *Gross Formation of Fixed Capital*: it is a measure of national investment. The same as the consumption, the investment can also react in a procyclical way in the presence of terms of trade fluctuations. In other words, if a fall takes place in the Soybean international price, it will mean a fall in the terms of trade or a fall of revenues for the economy that could lead to a later fall in the capital investments.

b. Effects on the balance of trade

The other face of the coin with respect to the Soybean production and commercialization at international level constitutes the imports. In this sense, it has been stated that the advance of the Soybean increases the imports of goods of productive capital and inputs related to the production, and this can bear problems in the balance of trade. In Table 3 can be observed the value of the imports of machineries, equipments and inputs corresponding to the agricultural sector, and those that are directly related to the Soybean production.

In the case of the imports of inputs, the tendency has been toward the increment, except for the biennium of 1998 and 1999, in that the total value of the imports fell. In 1998 the fall was related to smaller purchases of chemical products, fertilizers and fungicides, but not the herbicides that indeed were added to the reduction in the purchases of the other components of the inputs in 1999, determining even smaller imports in comparison to 1998.

After 1999, the imports of fertilizers and herbicides have accelerated causing a strong increase of the total imports of inputs, reaching in 2004 an amount near to US\$ 210 millions; amount three times superior to the value of the imports of 1995.

On the other hand, the behavior of the imports of machineries and equipments have been similar to the inputs, having a sustained increment, except in 1998 and 1999, and taking up again the growing path in the following years with an ostensibly acceleration in the last two years, to culminate 2004 with an amount of four times bigger as of 1995.

Table 3: Imports of machinery, inputs and equipment related to the Soybean sector

Description	1995	1996	1997	1998	1999
Inputs	62.246.416	88.003.040	97.919.949	94.882.007	81.021.964
Plaguicidas	8.134.000	6.653.000	7.483.212	6.640.200	4.113.890
Fertilizantes	21.481.943	38.492.937	41.136.237	37.539.861	38.719.558
Funguicidas	4.159.409	7.853.451	5.448.707	4.892.452	3.046.815
Herbicidas	28.471.064	35.003.652	43.851.793	45.809.494	35.141.701
A base de 2,4-D, 2,4-DB y derivados	1.655.555	1.505.484	1.747.109	1.031.482	336.369
A base de Atrazina y otros	610.943	347.442	475.345	869.235	514.222
A base de Glifosato	11.585.698	12.804.594	15.066.031	14.847.778	7.501.674
A base de Dicloruro de Paraquat	829.731	451.835	613.514	579.223	768.877
Otros	13.789.137	19.894.297	25.949.794	28.481.776	26.020.559
Machinerías and equipments	12.113.513	24.441.479	28.656.522	19.459.955	10.078.752
Total	74.359.929	112.444.519	126.576.471	114.341.962	91.100.716
Description	2000	2001	2002	2003	2004
Inputs	93.691.109	104.240.410	104.070.422	159.666.109	209.539.886
Plaguicidas	4.316.657	6.896.789	6.262.453	6.124.512	6.089.146
Fertilizantes	39.228.997	45.239.019	53.087.712	90.830.872	131.491.683
Funguicidas	7.338.807	9.601.986	10.777.977	18.906.559	30.085.031
Herbicidas	42.806.648	42.502.616	33.942.280	43.804.166	41.874.026
A base de 2,4-D, 2,4-DB y derivados	1.351.502	1.415.763	1.262.597	1.262.903	383.899
A base de Atrazina y otros	1.424.328	1.194.121	1.174.686	949.549	1.467.833
A base de Glifosato	11.910.431	23.215.564	16.681.461	26.171.767	23.311.124
A base de Dicloruro de Paraquat	1.463.195	1.195.081	711.613	2.109.216	1.536.135
Otros	26.657.192	15.482.087	14.111.923	13.310.731	15.175.035
Machinerías and equipments	12.448.523	17.252.672	19.157.328	53.912.213	50.359.646
Total	106.139.632	121.493.082	123.227.750	213.578.322	259.899.532

Source: Banco Central del Paraguay.

The puzzle about the possible effects on the balance of trade of the imports increments related to the Soybean producer/exporter sector, can be analyzed in a more evident way in Figure 3 that opposes the values of the exports and the imports related to the Soybean sector. The exports have always been superior more than twice regarding the imports related to the sector.

Therefore, the Soybean balance of trade has been in surplus and; except between 1998 and 1999, has grown. In those two years falls took place in the Soybean exports that determined smaller results in the balance of trade, but although the imports of machineries, equipments and inputs practically did not change, the smallest values of exports were not enough to result in a deficit on the balance of trade related to Soybean.

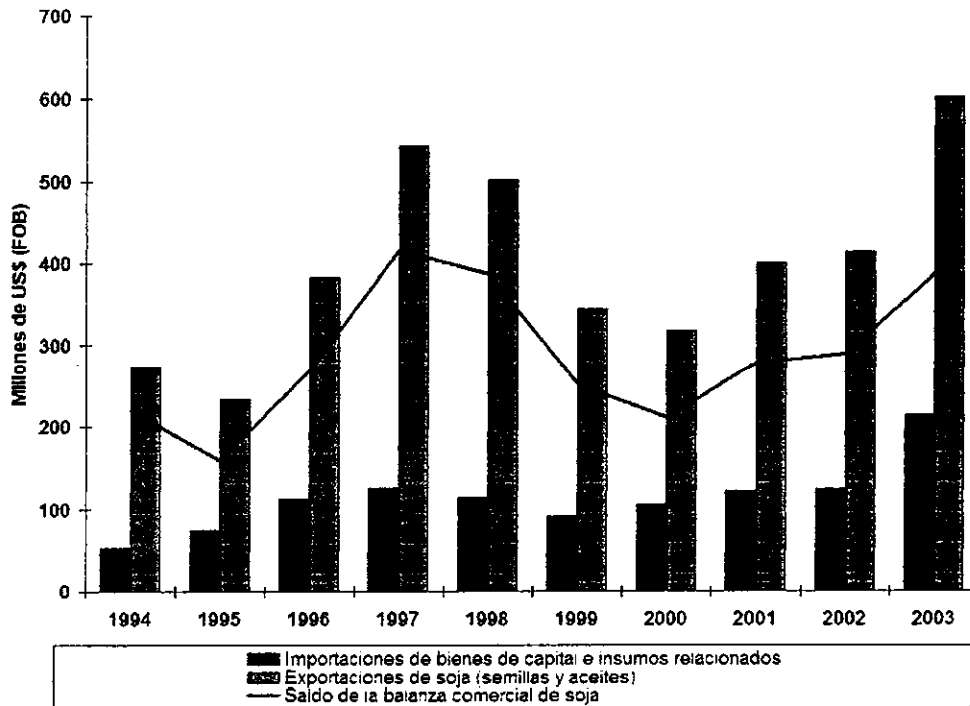


Figure 3: Soybean: Comercial Balance

To deepen even more in this topic, Figure 4 shows the share of imports of goods related to the Soybean sector, with respect to the aggregate imports, and the share of Soybean exports in aggregate exports. Clearly, the share of the imports of capital goods and inputs related to the Soybean sector, although growing, it has been inferior to 10 percent until 2003, in that reached a percentage near to 14 percent. On the contrary, the exports related to the Soybean sector have had a preponderant role inside the aggregate exports during the period under analysis, where, except in 1995, they have always been superior to 30 percent of the total and, in the last years even near to 50 percent³. This implies that it would be the behavior of the related factors to the Soybean exports those that could determine unfavorable results in the country balance of trade, as it was already visualized above in the text.

³ The exports of the Soybean sector were built as the sum of the seed exports and Soybean oils.

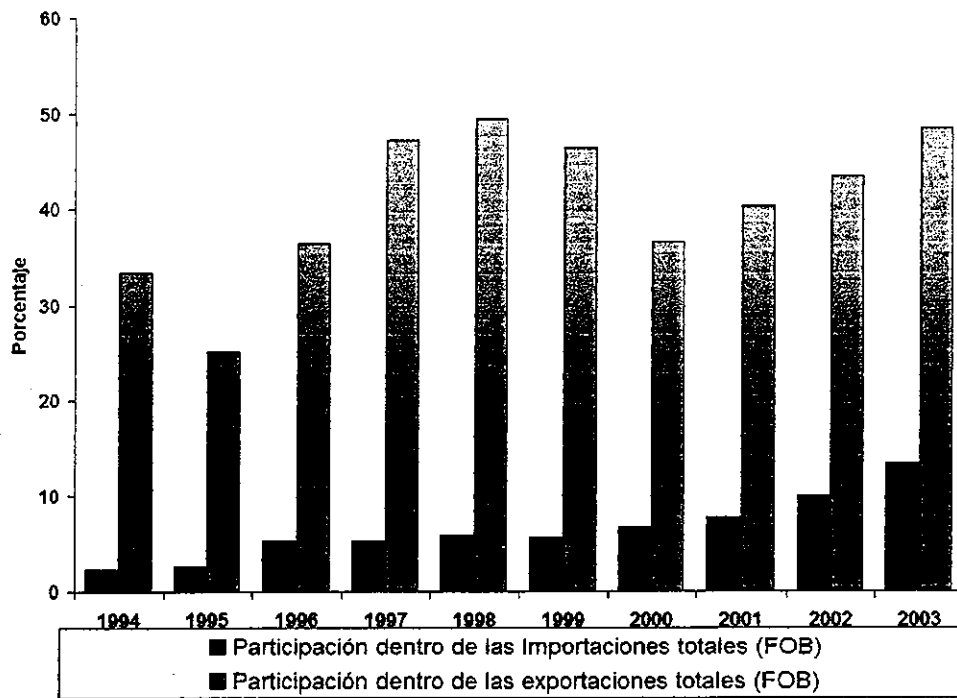


Figure 4: Soybean: Share of imports an exports related to the Soybean market in the aggregate

c. The effects over the nominal and real exchange rates

The Figure 5 shows the cyclical fluctuations of the Soybean price and the nominal exchange rate. At first sight, it seems to exist an inverse relationship between these two variables. Among 1980 and 1985 the price showed a fall higher than 40 percent, while the nominal exchange rate rise in more than 60 percent. Since 1985 until the middle of the nineties, the nominal exchange rate showed a downward that result in an appreciation of almost 30 percent. On the other hand, the Soybean price was more volatile with periods of deep growth and falls in terms of amplitude, and more frequent in terms of occurrence. In spite of the differences in terms of amplitude and frequency observed between the Soybean price and the nominal exchange rate, the inverse relation among these two variables seemed to prevail, since periods of fallen in the Soybean price were related to increments in the nominal exchange rate and, in a similar way, increments in the Soybean price were associated to exchange rate appreciations. Perhaps, in the period between 1989 and 1997 the relation between nominal exchange rate and inflation is less clear, but, it was in this period in that the nominal exchange rate has not fluctuated freely in the face of forces of the exchange market and, on the contrary, it was controlled by the monetary authority in order to play the roll of nominal anchor of prices. In other terms, in that period prevailed an exchange rate system denominated "crawling peg", consistent in pre announced and controlled depreciations of the exchange rate, determined by the monetary authority, in order to maintain the inflation

under control. After the abandon of the "Plan Real" for the Brazilian authorities in 1998, the nominal exchange rate has fluctuated more freely.

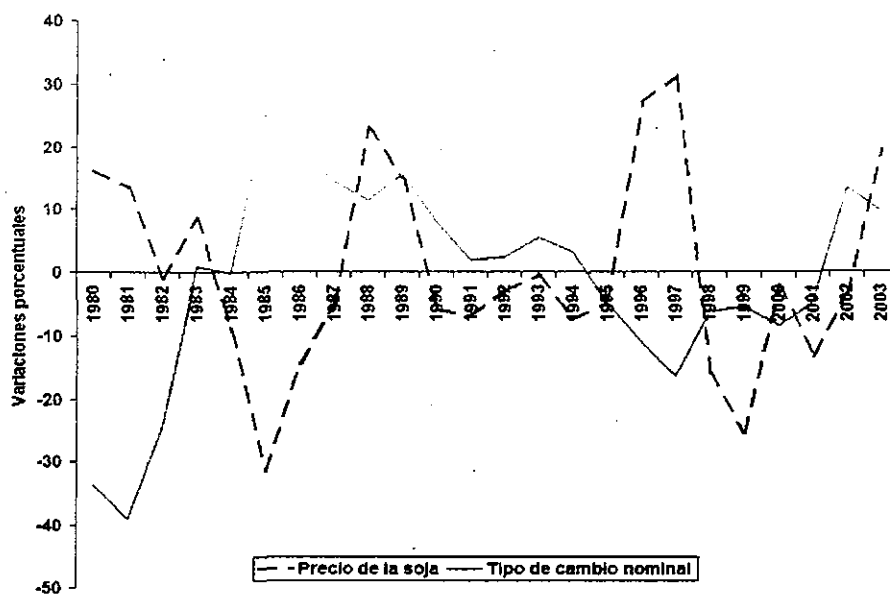


Figure 5: Cycles of the price of Soybean and the nominal exchange rate

Additionally the Figure 6 represent the evolution of the cycles of the price of Soybean and of the effective real exchange rate. This chart allows to visualize that the relation among these two variables has also been inverse or negative. The real exchange rate has shown upwards in the same periods in that the Soybean price has fallen and, downwards when the price has grown. In other words, depreciations of the real exchange rate were associated to fallen in the price of the Soybean; and appreciations of the real exchange rate happened when the international price of the Soybean improved.

However, clearly the cycles of the nominal exchange rate and of the real exchange rate are very similar, almost identical, since historically the nominal exchange rate has been the determinant of fluctuations in the real exchange rate. For that reason, the relationship between cyclical fluctuations of the Soybean price and the real exchange rate should be analyzed with supreme care, since the real exchange rate is completely determined for the variations in the nominal exchange rate, then, bigger attention should be given to the possible relationship among the fluctuations in the nominal exchange rate and the price of Soybean. Therefore, the correlation coefficient is estimated to deepen into these relation, this coefficient will allow to obtain better and more realistic conclusions.

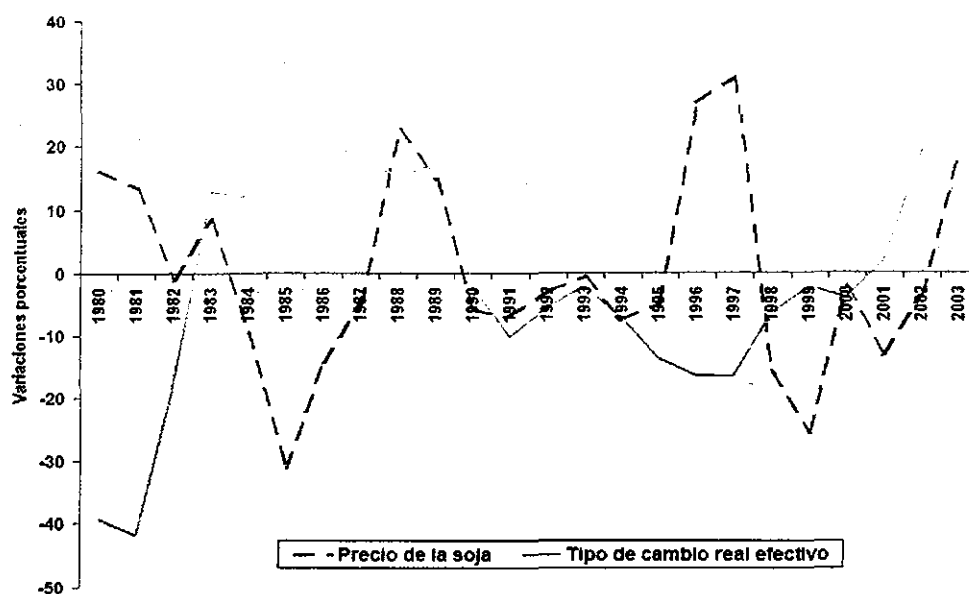


Figure 6: Cycles of the price of Soybean and the real exchange rate

To corroborate what was exposed in previous paragraphs, the Table 4 shows the results of persistence and co movements among the Soybean price and the nominal and real exchange rate. Focusing the attention firstly on the co movements, the results are the following ones:

- ⇒ Considering firstly the cycles of the price of Soybean and the nominal exchange rate; the maximum value of the correlation coefficient is of 0.40, of negative sign; besides it takes place in the current period or " t ". Therefore, the relation among these two variables is counter cyclical (negative) and synchronized. This implies that a variation in the international price of Soybean, will be related with a change in the nominal exchange rate in a contrary manner. For example, if a fall in the price of Soybean takes place in the current year, it will also be observed a depreciation of the nominal exchange rate immediately. Even more, an improvement in the international price will imply an exchange rate appreciation. This counter cyclical reaction in the nominal exchange rate when a variation in the price of Soybean occurs, is explained, in general, for the fact that a fall (ascent) in these prices determines a smaller (bigger) entrance of foreign currencies to the country, and for that reason a contraction (expansion) in its supply that drives to a depreciation (appreciation) in the exchange rate .
- ⇒ On the other hand, the relation among the cyclical fluctuations of the Soybean price and the real exchange rate resulted "statistically" not significant. Therefore, it can be said that the relationship is "uncorrelated or acyclical". In other words, changes in the market of Soybean do not have effects on the real exchange rate in a direct way. However, because of the relation between the nominal and real exchange rates, the relation between

the real exchange rate and the Soybean price could be given in an indirect way.

Table 4: Analysis of persistence and comovements relative to the nominal and real exchange rates

Variable	First order autocorrelation coefficient (measure of persistence)	Cross correlations relative to the price of soybean in the period:				
		k = 1	t-2	t-1	t	t+1	t+2
Nominal Exchange Rate	0.69	0.12	-0.36	-0.40*	-0.4	-0.2
Effective Real Exchange Rate	0.68	-0.18	-0.34	-0.36	-0.17	0
International price of soybean	0.30	...	...	1	...	...

*Statistically significant.

Source: Own calculations. Note: Cycles were extracted using the Hodrick-Prescott filter.

⇒ The high correlation among the nominal exchange rate and the effective real exchange rate in Paraguay, can be observed without ambiguities in the graph presented below, where fluctuations in the nominal exchange rate have been reflected totally in the real exchange rate. This is not surprising, since the inflation rates between the rest of the world and Paraguay are very different. Nevertheless, variations in the levels of prices are slow since United States, Japan and the European countries have maintained its inflation under control. Thus, from one year to another or even in a period of several years, changes in the real exchange rate were owed mainly to variations in the nominal exchange rate. The figure also shows that, in the decade of the nineties, foreign goods were much cheaper, since the real exchange rate was falling at the same time that the price of the American Dollar was decreasing in terms of Guarani. Then, starting from 1998, the effective real exchange rate has been depreciated continually, denoting that national goods, on the average, were more competitive in terms of the rest of the world. This fact has been coincident with the strong increment suffered by the price of the American dollar, after the abandon of the Plan Real by the Brazilian authorities, the crises of the national financial system, and the turbulence unchained in the region after the collapse of the *currency board* of Argentina.

Regarding to the persistence of the nominal exchange rate and the real exchange rate against any sort of shocks that affect them, Table 4 also shows these results. According to the first order autocorrelation coefficient, the nominal exchange rate, as much as the real exchange rate denote a persistence or memory of medium term, with values of 0.69 and 0.68, respectively. In detail, after a shock of any nature, for instance, a sudden deterioration in the international price of Soybean, and given that, this abrupt fall could have consequences over the variables mentioned above, the effects of this interference will take a long time in disappear, which should lead to the adoption of specific economic measures to counteract the effects of the shock, and this way, to return them again in their average or long term values.

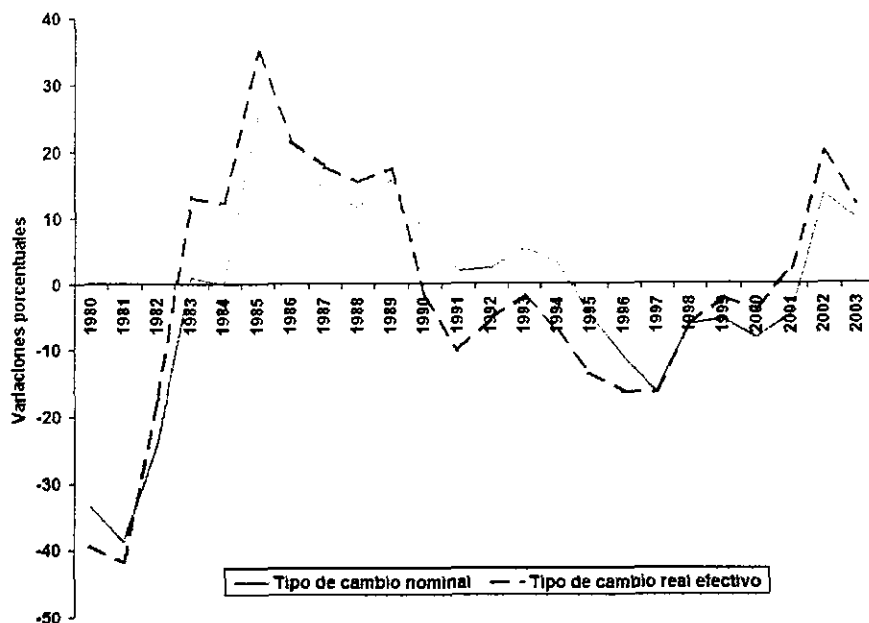


Figure 7: Cycles of the nominal and the real exchange rates

Finally, this section cannot be concluded without mentioning that several studies in the economic literature have found that the inflationary process is determined by the excess of liquidity in possession of the economic agents. However, this relation has been much stronger in the medium term while in the short term the variations of the exchange rate, wages and of certain regulated prices, constituted the most important sources to explain the variations of aggregate prices in enclosed periods of time. Using annual as much as monthly information of the Central Bank, this situation is not different in Paraguay, where Rojas and Cresta (2004), using Vector Autoregression models found that fluctuations in the exchange rate explain near 46 percent of the inflation in the short term. In other words, the inflationary process in Paraguayan has been governed in the last years by the exchange rate variations, while money has played a secondary roll in this process. This is important for the fact that, as this section has noticed, the correlation between fluctuations in the price of Soybean and the nominal exchange rate is significant, and this could be a channel for which those fluctuations could be transmitted toward inflation, affecting the real disposable income of economic agents or, in other words affecting the welfare of the agents.

The relation between exchange rate variations and inflation can be examined through the Figure 8, in this graph a narrow relationship is observed between variations of these two variables. However, this answer of the inflation to the changes in the exchange rate is not immediate, were certain lags could be observed.

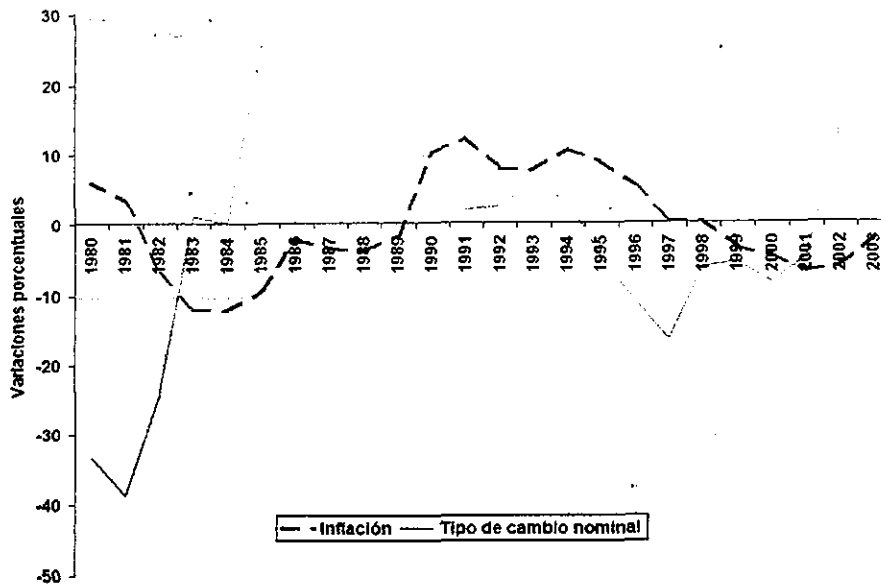


Figure 8: Cycles of nominal exchange rate and inflation

d. Effects over the tributary revenues of the Central Government

Focusing the attention on the analysis of a possible relationship among the fluctuations in the market of soy and the Central Government's collections; Figures 9 and 10 show the price and exports of soybean, compared to the tributary revenues.

The graphics indicate that as much in one as in another case, tributary revenues suffer very little incidence, but any, from the variations in the price and exports of Soybean.

To enlarge more the premise of the scarce incidence of fluctuations in the market of Soybean over the tributary revenues, the technique of cyclical cross correlations is used to allow us to capture the co movements and persistence of this variables.

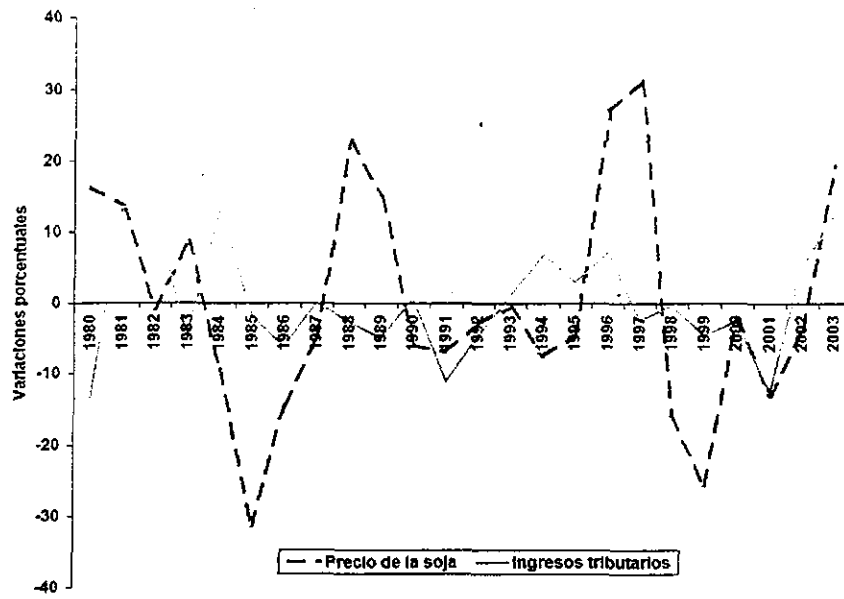


Figure 9: Cycles of the price of soybean and tributary revenues

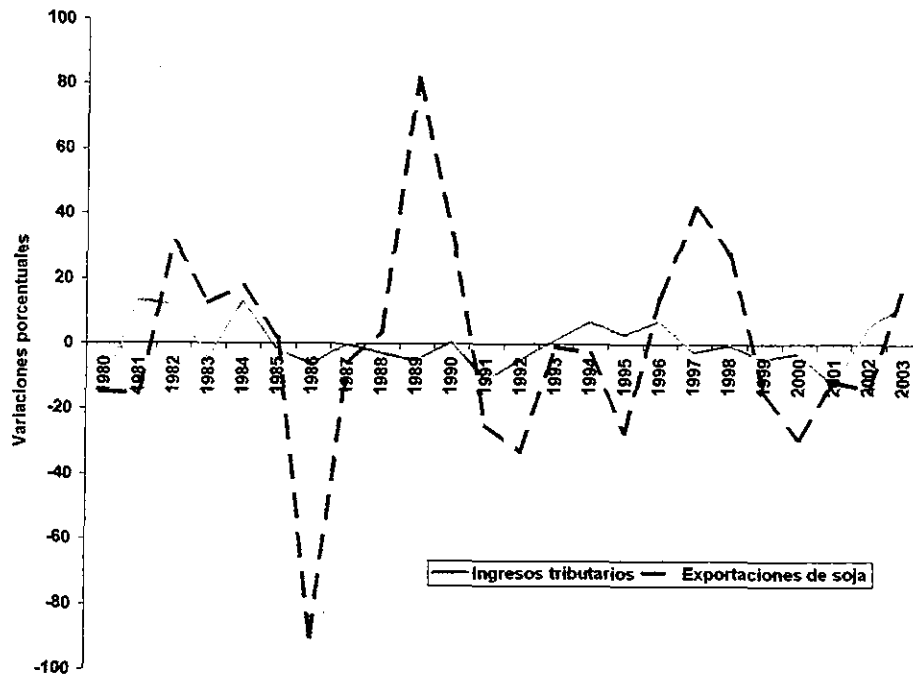


Figure 10: Cycles of exports of soybean and tributary revenues

Table 5: Analysis of persistence and comovements relative to tributary revenues

Variable	First order autocorrelation coefficient (measure of persistence)	Cross correlations relative to the price of soybean in the period:				
		k = 1	t-2	t-1	t	t+1	t+2
Tributary revenues	0.65	-0.05	0.18	0.27	0.22	-0.14
International price of soybean	0.30	...	...	1	...	...

*Statistically significant.

Source: Own calculations. Note: Cycles where extracted using the Hodrick-Prescott filter.

⇒ The Table 5 exhibit the co movement of tributary revenues and the soy price, using the cross correlation coefficient among this variables. These resulted statistically not significant. Therefore, it can be said that the relation is "acyclical or uncorrelated". In other words, changes in the soy price will not affect the tributary revenues. Regarding the persistence, the tributary revenues presented a first order autocorrelation coefficient value around 0.65; determining a medium term persistence. In other words, the effects of any disruption that affects these variables will take a long time in disappear.

⇒ In the Table 6 can be observed the relationship between the exports of soy and the Government's collection. This relation is also "acyclical or uncorrelated", because the maximum value of the cross correlation coefficient is 0.19, which is not significant in statistical terms. The persistence of the tributary revenues was already analyzed in Table 5. The exports of soy resulted with a low persistence after any sort of shocks (value around to 0.23).

Table 6: Analysis of persistence and comovements relative to tributary revenues

Variable	First order autocorrelation coefficient (measure of persistence)	Cross correlations relative to the price of soybean in the period:				
		k = 1	t-2	t-1	t	t+1	t+2
Tributary revenues	0.65	-0.03	0.02	0.19	0.10	-0.03
Exports of soybean	0.23	...	...	1	...	...

*Statistically significant.

Source: Own calculations. Note: Cycles where extracted using the Hodrick-Prescott filter.

The results of persistence and co movements indicate that, if the effective tributary structure is maintained without any change, the Central Government's collection will not be affected by fluctuations in the market of Soybean, and for that reason the adoption of compensatory fiscal or tributary measures will not be necessary to counteract fluctuations in this market. In other words, tributary revenues are quite exogenous to the events that take place in the soy market.

e. Effects over the economic activity and domestic expenses

This part of the empiric analysis focuses on the relation among short term fluctuations of the international price of Soybean, with respect to the fluctuations of the economic activity, measured by the real GDP, and with respect to the domestic expenses represented by the private consumption and the gross formation of fixed capital.

The direction of the variation in the GDP will depend in that the fluctuation of the price of Soybean has been positive or negative. For example, a fall in the price of Soybean, that constitutes a worsening in the terms of trade, will lead to a fall of the GDP, due firstly to the smallest revenues for the exports of Soybean. Later, these changes in the level of the economic agents' disposable incomes can affect the domestic expenses, either because a smaller consumption or a smaller investment; that in turn affects negatively to the GDP again.

Nevertheless, the effect on the domestic expenses will depend in that the economic agents see the shock of international Soybean prices as permanent or transitory. If the agents suppose that the fall of revenues, as consequence of the smallest prices of Soybean, will be transitory, they will not change their consumption levels. On contrary, they will look for to get in debt to finance their expense, maintaining it constant. But, if they consider that the fall of revenues will be permanent, they will adjust their expense levels, reducing them according to their smallest levels of revenues or disposable income.

The Table 7 shows the relations mentioned above. The results are the following:

⇒ Considering the short term fluctuations of the Soybean price and the real GDP; the maximum value of the cross correlation coefficient is 0.50, positive; and it takes place with a year of anticipation. Therefore, the relation among these two variables is procyclical (positive) and lead the GDP in one period. This implies that a variation in the international price of Soybean will affect the real GDP in the same direction of this variation, and are the fluctuations of the price of Soybean that take place in the previous period, those that have the most significant effect on the fluctuations in the GDP of the current period. For example, if a fall of the price of Soybean takes place in the current year, the negative effects on the real GDP will be more notorious in the incoming year, or what is the same, a fall in the GDP of the current period can have their causes in a fall in the Soybean price of last periods (last year).

- ⇒ Regarding the relation between short term variations of the price of Soybean and private consumption; the maximum value of the correlation coefficient (0.51) takes place with a year of anticipation, and it is of positive sign. Therefore, as occurs with the real GDP, it can be said that fluctuations in the price of Soybean cause fluctuations of the same direction in private consumption.
- ⇒ Finally, the relation between the price of Soybean and the gross formation of fixed capital (investment) is also procyclical and lead one period. In this case, the maximum value of the correlation coefficient is positive 0.55; and also takes place in " t-1 ". Consequently, the effects of price fluctuations from previous periods have effects that take place with more intensity over the gross formation of fixed capital in the present.

Table 7: Analysis of persistence and comovements relative to GDP and domestic expenses

Variable	First order autocorrelation coefficient (measure of persistence)	Cross correlations relative to the price of soybean in the period:				
		k = 1	t-2	t-1	t	t+1	t+2
GDP	0.50	0.14	0.50*	0.27	0.08	0.04
Consumption	0.54	0.01	0.51*	0.32	0.18	0.32
Gross Formation of Fixed Capital	0.51	0.28	0.55*	0.32	0.18	0.32
International price of soybean	0.30	...	...	1	...	...

*Statistically significant.

Source: Own calculations. Note: Cycles were extracted using the Hodrick-Prescott filter.

The Table 7 also exhibit the results of persistence of the soybean price, the real GDP, the private consumption and the gross formation of fixed capital. According to the first order autocorrelation coefficient, the real GDP, the private consumption and the gross formation of fixed capital denote a persistence of medium term in the face of any interference that affects them, with values of 0.50; 0.54 and 0.51, respectively. Specifically, in the face of a shock of any nature, like a sudden fall in the international price of Soybean, and due to the fact that this abrupt fall will have consequences on the mentioned variables, the effects of this interference will take a long time to vanish, that could be approximately one year.

On the other hand, the first order autocorrelation coefficient resulting for the price of Soybean was 0.30, which implies that fluctuations in this variable, contrary to the real GDP and the domestic expenses, show a very low persistence or they are transitory; this means that, in the face of any unexpected interference that takes place in the market of Soybean, the price will return quickly at their average levels. For example, if a sudden deterioration takes place in the world supply of Soybean (as consequence of a drought in the United States, for instance), this shock will increase the international price of this product; nevertheless, these positive effects will disappear quickly,

returning the prices in the short term to their average level. But, the positive effect on the GDP, the private consumption and the gross formation of fixed capital of Paraguay, will take a much bigger time in being reverted.

Finally, about the results of persistence and comovements, the economic literature postulate that changes in terms of trade (that are views as a shock over the disposable income) do not affect the domestic expense and production, if these changes are transitory, because they do not affect the permanent income, therefore they are absorbed or financed. In contrast, the evidence for Paraguay shows that the domestic expense and real GDP are affected by fluctuations in the international price of Soybean (shock in terms of trade), even though the fluctuations of this price are transitory.

In this context, according to the evidence for Latin America found by Gavin et al (1996); De Ferranti et al (2002); and Gavin and Hausmann (1998), among others: the fact that fluctuations in the term of trade (product for example of a change in the price of Soybean), in spite of being transitory, affect the private consumption, the gross formation of fixed capital and the real GDP, and this fact obeys to the existence of restrictions to access to credits, either from the national financial system, or the international financial markets that impede the economic agents to finance the transitory fall on their income, and this way to avoid an adjustment from the domestic expense to the new levels of revenues, that always implies a lost of welfare.

(vi) Summary and Conclusions

This study presents an analysis of the effects over the main macroeconomic indicators that take place due to fluctuations in the Soybean market. With the purpose, the cyclical comovements methodology through the cross correlations is used.

The resulting evidence indicates that fluctuations in the Soybean international prices are inversely correlated with the fluctuations in the nominal exchange rate. On the contrary, they have null effect on the fluctuations in the real exchange rate that is mostly explained by fluctuations in the nominal exchange rate.

The Central Government's tributary collections, are exogenous to fluctuations in the Soybean market, because as much as the price as the exports of Soybean are uncorrelated with the total tributary revenues. Which, given the effective tributary system, implies that it would not be necessary to adopt compensatory measures of fiscal or tributary policies (regarding the collection) to counteract fluctuations in the Soybean market, in spite of the high persistence to the shocks shown by the tributary revenues. Nevertheless, this does not imply that in the future, if the tributary pressure is increased over the Soybean producing sector and this bears to a higher dependence of the Government from this sector, a variation under the conditions of that market will continue with low effects.

On the other hand, the data of machineries, inputs and equipments imports related to the Soybean producing/exporter sector allows to conclude that the advance of the Soybean could not necessarily affect to the balance of trade in the short term; in spite of having induced growing import values. Rather, the most preponderant effect, positive or negative, would occur because of factors that determine the production decisions and exports of Soybean, in a more direct way.

It was also found that shocks that affect the real GDP, and the domestic expenses still persist to medium term, while the interferences of the Soybean price have transitory character. Additionally, co movements of cyclical fluctuations give evidence about a positive lineal relation of the Soybean price with the economic activity and the domestic expenses, denoting, that this fluctuations, in spite of being transitory, affect to the domestic expenses and the economic activity with one period ahead phase. In other words, a fall in the Soybean international price leads to a fall of the economic activity and the domestic expense, that would delay in being reverted, although the price of Soybean would return more quickly at its long term levels.

The arguments that have been mentioned in the previous paragraphs, allow to affirm that, even if fluctuations in the Soybean market, that lead to falls of the exports revenues, does not affect the disposable income of the whole population in a direct way. The effects on the nominal exchange rate will have incidences, unfailingly, on the inflation, decreasing or increasing the real income or purchase capacity of the economic agents', according to the sense of the variation in the prices.

Additionally, the exchange fluctuations could affect the position of creditors and debtors that sustain assets in foreign currency, affecting in turn the capacity of repayments and concession of credits in the financial system, the horizon of time in which the financial intermediation is made, and the investment decisions of companies.

Concluding, changes under the conditions of the Soybean market have important macroeconomic effects that are not transitory, and bear to high deterioration of welfare, and, for that reason they require the construction of specific economic policies to accommodate or counteract them in the short term. While in the long term, the effort should be guided to advance in the path of a high developed the financial system in general, and an improvement in the conditions for access to credit, in particular.

ANALYSIS OF THE NORMATIVE FRAMEWORK FOR THE PRODUCTION AND COMMERCIALIZATION OF DIFFERENTIATED SOYBEAN.

(i) Normative Framework at the National Level for Production and Commercialization of Soybean

The convergence of several factors has characterized soybean cropping in the last times; i) the good international prices, ii) the varieties of soybean resistant to glyphosate in the no till farming system and, iii) the patent expiration of the herbicide (glyphosate). In coincidence with these factors, the soybean cultivation has been expanded to non traditional growing zones; many times at the expenses of forests, reserves, native grasslands, fallow lands and non agricultural marginal areas.

The expansion of the area sown with the soybean crop generates the need for a revision of the regulating norms to evaluate the possible impacts that the extensive soybean cropping could exert on the environment, fauna, flora, and including the rural population. For the analysis of the applicable regulations to this case it is necessary in first place to explain the order of prelación of the country's regulations.

The supreme law of the Republic of Paraguay is the National Constitution; then we find the approved and ratified treaties, covenants and international agreements, followed in third place by the Congress dictated laws and other sanctioned legal dispositions of lower hierarchy, all of which integrate the Paraguayan positive rights. Subsequently we will present an exhaustive list of the norms that keep relation with the stated problem.

Constitutional norms

The present National Constitution (C.N) promulgated in the 1992 year has raised to the constitutional rank, some prominent principles, which are not only relevant to the production and commercialization of soybean (either genetically modified or conventional) but fundamentally to the environmental protection as a result of the use of biotechnology in agricultural production and its possible effect on human life.

It is so that in the last part of the Article 6th it express: "The State will promote the investigation of the factors of production and its bonds with the social and economic development, with the preservation of the environment and with the quality of life of the inhabitants".

In turn the Article 7th prescribes: "every person has the right to inhabit in an ecologically stable and healthy environment, establishing as priority objective and of social interest the preservation, conservation, recovering and the improvement of the environment, as well as its conciliation with the integral human development".

The Article 8th went further in its foresight when establish: "The activities susceptible to produce environmental alteration will be regulated by law". Likewise this law will be able to restrict or prohibit those activities that are qualified as dangerous".

These Constitutional consecrated principles represent an advance since in none of the former Constitutions that Paraguay has had previously has been even mentioned this type of postulates. By way of justification it is needed to indicate that these are relatively new facts that arise with the advance of applied technology applied in the field of agricultural production (cereals, oil and other crops).

Continuing with the preclacy of the regulations it corresponds the subsequently analysis of the Covenants and International Agreements, approved and ratified by the Government of Paraguay.

Covenants and International agreements:

Covenant on Biological Diversity ratified by National Law N° 253/93.

The objectives that presents this treaty are: the biological conservation, the sustainable utilization of its components, and the fair and equitable participation in the benefits derived from the utilization of genetic resources. In its Art. 8°, clause g it prescribes: "It will be established or maintained means for regulating, administering or controlling the risks of the utilization and liberation of alive organisms modified as results of Biotechnology, that would be able to have adverse environmental repercussions that can affect the conservation and sustainable utilization of biological diversity, taking into account the risks for human health. Finally it recognizes the sovereignty of the States on its genetic resources. The authority of application of this Law is the Office of the Secretary of the Environment (SEAM).

Protocol of Cartagena on security of biotechnology.

This Protocol was ratified by Paraguay through the Law N° 2309/03. It will be undertaken and analyzed subsequently in a more exhaustive way in this document. The Protocol is linked with the previous Covenant. The authority of application is likewise the Office of the Secretary of the Environment (SEAM).

Agreement on aspects of intellectual property rights

This agreement is found related to the Aspects of the Intellectual Property Rights related to Trade (TRIPS) of the World Trade Organization (WTO), signed in Marrakech in April, 1.994. The section b), paragraph 3 of the article 27 of the same one establishes: "patentable material". The members will be able to exclude likewise of patenting: the plants and animals except the microorganisms and the essential biological procedures for the production of plants or animal that are not non biological or microbiologic procedures. It continues saying: that

the Members will offer protection to all plant obtentions; by means of an efficient *sui generis* system or by means of both of the above mentioned procedures.

These agreements corresponds to the application authority of the Department of Industry and Commerce (Direction of Intellectual Property) as well as the Patent Law commented further on.

In the WTO framework, are also applicable the Agricultural Agreements known as Sanitary and Phytosanitary Measures (SPS) as well as the ones related to them called technical obstacles to commerce that keep relation with the specific norms that rule the agricultural international trade with regard to their intrinsic sanitary status, and in second place to quality and / or inocuity norms.

The sanitary and phytosanitary measures corresponds to the application authority of the National Service of Animal Health (SENACSA) and the National Service of Plant Health and Quality (SENAVE), as well as of other technical agencies dependent from the Ministry of Agriculture and Livestock (MAG).

In relation to the food inocuity of farm origin, it can be said that are applied the food guidelines defined and agreed by consensus in the international trade under the joint FAO and WHO supervision, internationally known with the denomination of Codex Alimentarius. These are internalized respectively in member countries through National Commissions that act as "mirrors" reflecting what was arrived at by international consensus as Codex norms. These Commissions belong to the application authority of the Ministries of Industry and Commerce, and of Public Health. In our country they correspond to the National Institute of Technology and Normalization (INTN) and to the National Institute of Food and Nutrition (INAN), respectively.

International covenant for plant obtainments.

According to the 1978 Minutes, ratified by National Law N° 986/96, it has as an objective the recognition and guaranty of property rights on a "new" plant variety in favor of its obtentor or heir. This right refers fundamentally to the efficient *sui generis* right which is referred in the WTO TRIPS agreement. This Covenant is in the realm of application authority of the Ministry of Agriculture and Livestock through its technical agency SENAVE, recently created.

Relevant laws

Among the relevant laws can be mentioned those that do not have direct relationship with the soybean crop, but that by their consequences it can produce effects in this economic subsector, especially in respect to biosafety.

Law N° 836/80 "Sanitary Code".

It has as a fundamental function that the State be empowered of the regulation in the integral care of population's health and of the rights and obligations of the people. Its agency of application is the Department of Public Health and welfare (MSP and BS).

Law N° 123/91 "That provide new Norms of Phytosanitary Protection".

This law considers as fundamental objective the adoptions of norms for phytosanitary protection, without affecting what is established in the Sanitary Code and other laws and regulations. It should be indicated that this law does not mention in explicit form the genetically modified materials neither of regulations on biosafety. Its agency of application is the SENAVE.

Law N° 96/92 "Of wildlife".

It specifies as its fundamental mean the protection of the social interest and public utility, the protection, management and conservation of the country's wildlife, mainly through the control of the country imports of fauna and exotic flora, for whose effect it must include the permit or the corresponding authorization emitted by the Authority of Application which is SEAM.

The Law N° 81/92 "That establishes the functional and organic structure of the M.A.G."

In this law it is established the objectives to be pursued by the Ministry of Agriculture and Livestock referent to the protection of productive activities in agribusiness, forestry, and agroindustry, besides of the evaluation and supervision of the application of sanitary norms and the quality of products and supplies, like a means to protect to final consumers, against the possible presence of toxic residues or other harmful materials, for their subsequent commercialization at the national and international level.

Law N° 294/93 of "Evaluation of the environmental impact".

Which in its article 7th *in fine* establishes the obligation to perform the study of the environmental impact for any work or activity that by its dimensions or intensity could be susceptible to cause environmental impacts. Its authority of application is the SEAM.

Law N° 385/94 of "Seeds and Protection of Cultivaes" and its Regulation Decree N° 7.797/2.000.

The objectives of this Law are: a) to Promote an efficient activity of cultivar obtaining and to protect the right of their creators; b) to promote the production, circulation, commercialization and quality control of seeds assuring to farmers and users in general the identity and quality of the seed that is acquired, all this in harmony and agreement with the international norms signed and to be subscribed. Its agency of application is the SENAVE.

Law N° 716/96 "That sanctions the transgressions against the environment".

Among its main objectives is the sanction to those that practice genetic manipulations without express authorization of the Authority of Application or

diffuse epidemics, epizootias or plagues. Nowadays the regulation established in this law acquires great importance, considering the indiscriminated deforestation in the country, the enlargement of the agricultural frontier, and the use of agrochemical products that eventually can damage the environment. Its authority of application is the Public Ministry (Attorney's Office of the Environment).

The Law N° 1.334/98 "Of Consumer and the User Defense".

In this Law the consumer basic rights are enunciated, just as the election of goods to acquire or of the service to hire, the protection of life, health and the security against the risks caused by the provision of products and lending of services considered harmful or dangerous, being the information one of the main instruments that gives viability to the operation of those rights. In this respect, the consumer has the right to be provided with "clear information" on the different products and services with the corresponding specifications on the composition, quality, price and risks that eventually they can present (clause I of the Art. 6° of the law). Its authority of application is also the Ministry of Industry and Commerce (MIC).

The Law N° 1.561/2.000 "That creates the National System of the Environment and the Office of the Secretary of the Environment-SEAM"

The Application Authority in everything that keeps relation to the environmental regulatory laws.

The Law N° 1.630/2.000. "Of Patents and Inventions".

It acquires special importance at the moment to analyze their content, especially the Art. 5, clause b that excludes the plants and animal patents protection, excepting the microorganisms and the essentially biological procedures for the production of plants or animals that are not non biological or microbiological procedures. It alludes especially to several obligatory dispositions for the member signatories of the TRIPS/WTO. Its authority of application is the MIC.

Also it fits to stand out in this work, among the prominent laws that keep relation with the production of soybean in the country: the Law N° 986/96 "That approves the International Covenant for the Protection of the Vegetable Obtainments", that was mentioned before, and whose agency of application is the SENAVE.

Decrees

Decree N° 18.481/97 "By which it is created a Commission of Biosafety".

Appointed to the Ministries of Agriculture and Livestock, and of Public Health and Welfare, indicating as objective "to register and evaluate the genetically modified materials in the country, appart of authorizing their entrance to the national territory, as well as also to judge in all that is related to the

introduction, field trials and liberation to the environment of genetically modified materials.

The Decree defines its fundamentals from the need to have a norm that regulates the introduction, field trials and the liberation of genetically modified plants, and recognizes the possibilities and potentialities of the modern biotechnology and the genetic engineering.

It is relevant to indicate that two fundamental points of the Commission are the reduction of the scope of action of the Commission to the genetically modified plants and their more favorable modalities to employ the benefits of the alive modified agents (OVMS), centered in their threats and risks, although it recognizes the need to have a regulatory framework to assure and guarantee the measures of indispensable security for the protection of health and Environment.

Out of the Decree context, it can be inferred that the Commission has a consultative character, whose appraisals requires an express mandate that can convalidate it. Nevertheless, by the reading of the articles 3 and 4 it would seem likewise that it has an executive character with faculties to authorize, monitoring and overseeing, and even in some cases, to revoke the permission granted (article 14). The Decree establishes the integration of the Commission with representatives of different agencies, from both the public as well as the private sector; and besides creates a Technical Secretary Office, which receives the requests on introduction, field trials, liberation of genetically modified plants and of all that is related to biotechnology.

It corresponds to indicate in favor of this Commission that it has completed until today important tasks in spite of the difficulties that many times it should confront, economical as well as structural, considering their field of action. Also, it corresponds to say that the Commission has played an important role through the elaboration of regulations, the development of awareness-raising campaigns with farm producers, with the agri-exporters, in reporting for the formulation of resolutions for regulatory measures to be taken by the state institutions, resolutions to which we will be mention further on.

Decrees: N° 10.661/00, 13.952/2.001 and N 19. 222/02.

Through which, it has been prohibited the utilization with commercial purposes of genetically modified organisms (GMO's) during several agricultural campaigns. That is to say, that temporary dispositions were dictated, which having fulfilled their objectives, they finished their mandate.

It is worthwhile to indicate that the prohibition for the commercial production of genetically modified soybean continues technically in force, in spite of the fact that, according to informations from different sources, cultivations of that type in great quantity does exist. This statement is supported by the fact that several documents does exist in which it is mentioned that for their commercial liberation it should be cleared by the SEAM, as authority of application for law enforcement under the Law 294/93, "of Evaluation of Environmental Impact", while the suitability for human consumption by the MSPyBS, authority of application of the Sanitary Code, and a market analysis to predict possible negative impacts in the destination markets of Paraguayan soybean, that could emanate from the Ministry of Foreign Affairs, of Industry and Commerce and even of Agriculture and Livestock.

Decree N° 4.819, promulgated on February 3, 2.005

"By the which a mechanism is approved to facilitate the soybean byproducts export, resultant from the Agricultural Campaigns 2.003/04 and 2.004/2.005.

This Decree refers to the new Brazilian regulation SARC N° 03 of 02/08/04, referring to a new demand in the sense that the exporters of grains and sub-products of agricultural origin, they must declare under the faith of oath, the condition of genetically modified or not of the exported shipment, and the constancy that for the effect will emit the SENAVE, of recent creation.

MAG Resolutions

Several Resolutions in the framework of the Ministry of Agriculture and Livestock have been formulated prohibiting the use of genetically modified soybean for commercial purposes, and in other cases authorizing the introduction of genetically modified soybean seeds to the country only for experiment studies. These are mentioned subsequently.

MAG Resolution N° 207.

When the firm Monsanto Argentina S.A.I.C. presented an application to introduce to the country genetically modified soybean varieties resistant to Glyphosate with experimental purposes during the soybean crop campaign 98/99, the M.A.G. promulgated the Resolution 207 dated March 19, 1.999 denying the request. The same denial was also resolved by the MSP and BS through the Resolution N° 63 of May 3, 1999 .

MAG Resolution N° 554.

This resolution has been emitted on August 23, 1999 . The same prohibits the utilization of materials or genetically modified organisms with commercial purpose during the agricultural campaign 1999-2000; clarifying that the utilization for investigation and experimentation could be admitted under the rigorous norms established in the technical form of the Commission of Biosafety.

Based in this Resolution, the firm Monsanto Argentina SAIC requested authorization to introduce 4,5 Kg. of specific varieties of genetically modified soybean with experimental purpose. The authorization was granted to them. These experimental trials were carried out in the Regional Center of Agricultural Research (CRIA) under the Direction of Agricultural Research of MAG, being indicated to the referred firm that to this effect it must constitute a subsidiary or branch office in the country.

MAG Resolution N° 397.

In June 6, 2.000 takes effect the Resolution N° 397, emitted by MAG, by which it was prohibited the utilization of any material or modified organism. Consequently, the seeds and genetically modified grains could not be utilized as seed material for sowing, clarifying that all genetically modified cropping must be adapted to the dispositions of the Law N° 385/94 and other dispositions in force that regulate the matter.

MAG Resolution N° 201.

By which it is authorized to the Monsanto firm the import with experimental purpose of genetically modified soybean originated in Argentina, being mentioned the authorized varieties.

MAG Resolution N° 631.

Resolution based on the Decree N° 13.952 / 2001, that prohibits the utilization with commercial purpose of materials or GMO's during the crop campaign 2001 and 2002. Nevertheless, this decree authorized the seed multiplication originating from the transformation event 40-3-2 (Soybean RR).

The authorization is supported on a presentation of the Direction of Seeds (DISE) (organ of law enforcement N° 385/84 "Of seeds and Cultivars") requesting the deregulation of the transformation event (resistance to glyphosate) after being tested in the Experiment Station of CRIA, Captain Miranda. The DISE document considered that the documentation presented on genetically modified soybean indicated that the homologous gene forms specifying the same function (soybean RR) are found in all plants, including in conventional soybean, and that the analysis of available information revealed that the mentioned transformation event (soybean RR), complies with the requirements of low risk for the agroecological and natural ecosystems in which soybean is produced in the country. The document adds that the biological and agronomic characteristics peculiar of this species in general, and of the genetically modified soybean in particular, would not present environmental problems, having being authorized its commercialization in various countries.

It should be mentioned that this resolution clarifies explicitly that the same did not imply the authorization for commercialization of the multiplied soybean seeds.

Resolution N° 1261/2004.

By which it was authorized the inscription in the National Registry of Commercial Cultivars (RNCC) of the soybean varieties AW 7110, AW 5581, M-AM 7878 and M-AM 8080, constituting in this way the first material of genetically modified soybean inscribed for its cultivation in our country. (to explain so that type of cultivation, to expand)

(ii) Normative Framework and Constrictions at the International Level for the Commercialization of Soybean and Derived Products

BRAZIL:

Given the importance of our neighboring country we should mention Brazil in first place, towards which the majority of our export flows. We will mention subsequently the regulations that norm the production, traffic and commercialization of soybean in its territory.

The liberation of OGMs in Brazilian territory has been regulated since 1995 by the Law of Biosafety, Federal Law N° 8.974 that establishes the norms for the use of genetic engineering and the liberation to the environment of genetically modified agents. Its coordination is in charge of the National Technical Commission of Biosafety (CNTBio) that has also been created in this Law.

The before mentioned Law initially has been regulated for the decree N° 1753 / 95 that establish the links, competence and composition of CTNBio, and gives other providences. Subsequently this decree has been amended by the decree N° 2.577 / 98.

In December 1998, the CTNBio emitted the regulatory instruction N° 18 that establish the planified liberation to the environment and for commercial use of the Soy Roundup Ready. In the article 1 of this regulatory instruction it was given to this variety the favorable conclusive technical opinion.

Nevertheless, the commercial liberation of the variety of genetically modified soybean Roundup Ready has been hindered in June of 1999 by the decision of the Federal Justice N° 260. The sentence was favorable to the Brazilian Institute of Consumer Defense (IDEC), and among others aspects established:

- i) That the enterprises MONSANTO DO BRAZIL LTD and MONSOY LTD must present a Prior Study of Environmental Impact as indispensable condition for production of soybean round up ready at commercial scale.
- ii) The referred enterprises remained impeded to market the genetically modified soybean seeds, until being regulated and defined, by the competent public authority, the norms of biosafety and labeling of genetically modified agents.

- iii) Remained suspended the cultivation, in commercial scale of the referred product, without being sufficiently clarified, in the course of the instruction procesal, the technical questions presented by renowned researchers, regarding the possible failures presented by the CNTBio in relation to the examination of the liberation request for the soybean round up ready.

In December 2.000 month, by Resolution of the Executive Power and through a Provisory Measure (N° 2137), it was established and defined precisely the competence of the CNTBio in order to overcome the existing legal actions on unconstitutionality. Thanks to this measure it was enabled, through the Ministry of Agriculture, the formalization of registrations that would permit the subsequent commercial liberation of soybean RR.

The Decree N° 3.871 of July 18, 2001 established, beginning from 1/1/2002, the obligatory food labeling when that contain or are derived from GMO's, setting a tolerance threshold of 4%.

In spite of the regulatory dispositions emitted by the Brazilian Executive Power, the prohibition by judicial means of commercial cultivation of GMO's was maintained in force for more than 4 years. The judicial measure has been reinforced by regulations of some federal states that prohibited the commercialization of products that contain GMO's. For example, both the Law N° 396/02 of the State of Rio de Janeiro, like the Law N° 307/03 of the state of Paraná have blocked the commercialization of GMO products. The state of Paraná has gone further in the prohibition, since also it forbidded the cultivation, manipulation, importing, industrialization and the Commercialization of GMO's in the state of Paraná.

Despite the legislation in force, it is estimated that the genetically modified technology has had a great penetration in the southern agricultural states. For such motive, the Brazilian executive power has emitted annual decrees that "it was permitted" the commercialization of GMO's, with the condition to register this operation in the Ministry of Agriculture of Brazil.

In fact, the provisory measures N° 113 of March 2003 and the N° 131 of September 2003, have facilitated the commercialization of GMO's grains. These dispositions have been, however, object of questionings and legal actions on the part of followers of the GMO's prohibition⁴.

We should not avoid mentioning, inside the Brazilian regulations, the Law N° 11092 of January 12, 2005 that establishes the norms for cropping, commercialization and production of genetically modified soybean corresponding to the 2004/05 harvest year, and that modifies the Law N° 10814 of December 15, 2003 .

A recent relevant fact is the decision of the brazilian Parliament authorizing the research, cultivation and commercialization of GMO's and

⁴ http://www.checkbiotech.org/blocks/dsp_document.cfm?doc_id=9794

enlarging the CTNBio attributions. This Law has been promulgated for the Brazilian Executive Power in March 2005 and would signify that the genetically modified soybean is found practically freed in Brazil. Knowing that the majority of our production used to travel through the Brazilian territory we can say that this measure will have great repercussion in our country in respect to new materials availability as well as with respect to the grain commercialization.

Nevertheless, it is still early to infer that the legal controversy on the GMO's liberalization in Brazil have finished. In fact, recent publications from followers of transgenics prohibition in this country have interpreted this law as unconstitutional and they have announced the possibility to resort to justice so that it will sentence on its constitutionality⁵.

REPUBLIC OF ARGENTINA:

The examination of the legal framework for production of GMO's in Argentina requires a different focus to that utilized in the analysis of the same situation in Brazil as well as in Paraguay. In Argentina the production of the genetically modified soybean has been freed in 1.996, constituting nowadays more than 90% of total production with only a small margin of conventional soybean. Its influence in our country has been through the continuous introduction, year after year, of genetically modified commercial grain and even material for sowing in an illegal way.

The institutions that regulate the matter in that country are the Office of the Secretary of Agriculture, Livestock and Fishing (SAGPyA) dependent from the Ministry of Economy, the National Advisory Commission on Biotechnology (CONABIA) and the National Service of Health and Quality of food and agriculture (SENASA) and the Directory of Markets. These institutions dictate the regulations for investigation, production and commercialization of soybean grains, both genetically modified and conventional.

The requests of liberation of a genetically modified cultivation are presented to the CONABIA⁶, subsequently to the conclusion of experimental trials that are carried out by research institutes or Universities. These trials should contemplate an impact evaluation at farming-ecosystem levels of the new event. The CONABIA emits a specific opinion founded on the biosafety of the massive production at commercial scale of the crop based on the trials and presented documentation.

According to Moses Burachik (s.f)⁷, the main criteria utilized to decide on the commercial liberation of the event are: i) the biosafety and ii) the precautionary focus. The biosafety criterion is based on the definition, evaluation and management of risks, while the precautionary focus keeps in mind the following aspects:

⁷ Burachik, M (s.f). Bioseguridad de Organismos Genéticamente Modificados: Marco Regulatorio. Accedido desde: http://www.argenbio.org/hv/biblioteca/libro/39_IX_2.pdf

If exists sufficient information on the system.
If the risks are acceptable in base to reasonable presumptions.
The evaluation is conclusive.
The complexity of the system.

Once the favorable opinion of the CONABIA is obtained, the requests are remitted to SENASA. This institution is responsible for evaluation and judgment on the "harmlessness (inocuity) of these products" to be utilized as food for human or animal consumption.

Finally, the process of liberation of an OVGM requires the aproval of the Directory of Markets as advisor to the SAGPyA. This institution analyzes the implicancies of the liberation of the product in refernce to destination markets (national and international), and on the effects that they can have in the positioning of Argentina as supplier of commodities in the world⁸.

Once the opinions of these three institutions are presented, the seed or variety is registered in the Direction of Seeds and the SAGPyA emits the official approval. With this procedure the procedure of registration and liberation of OGMs is concluded in Argentina.

Though the process of registration and liberation of GMO's in the Republic of Argentina seems to be clearly delimited by the legal framework, the patent registration process stirred up a recent controversy. In fact, the Monsanto company has come maintaining a dispute with the Argentine government around the recognition of patents and payment of royalties by the Soybean RR production in this country.

In a first instance, the Monsanto enterprise requested patenting the seed from Soybean RR in the year 1995. This request was denied, after a long wait, in the year 2.001. As a consequence, the company does not count on the intellectual rights granted by patent in this country.

In Argentina, the intellectual property rights on the seeds itself are based on obtentor rights. The rights of obtentors are controlled by the Union of Protection of Plant Obtentors (UPOV). This agency had emitted two minutes that regulate the matter: the 1978 Minutes confers less rights to the enterprises than that of the 1991 Minutes, therefore recognizes two principles:

- The privilege of the farmers to keep seeds for their own use or
- The exception of the plant breeders, that is to say that they can use registered seeds to use them in programs of genetic improvement.

The 1991 UPOV Minutes recognizes the rights of intellectual property on varieties essentially derived from those registered, for example, by spontaneous

⁸ Roca, C (2.003) Impacto Económico de la soja y el algodón transgénicos en Argentina. Asociación semilleros Argentinos. Accedido desde: <http://www.argenbio.org/h/biblioteca/pdf/impacto-economico.pdf>

mutations. Nevertheless, the farmers can keep seeds protected by intellectual property rights to sow again their lands⁹.

But the Monsanto company thinks in a different way, arguing that the repeated use and nonpayment of its seeds refuses the company an adequate return by its investments. Besides, the company remarks that some producers have not even paid once for the seeds. Many seeds are sold without authorization in the submerged market, depriving to the company of their legitimate sources of income¹⁰.

In view that the requests from Monsanto have not found solutions on part of the Argentine government, the company began to exert pressures. In February of 2004 it announces that it will withdraw out of the Argentine market of soybean, arguing that the main reason of the retreat is the high diffusion among the farmers of illegal seeds¹¹. This threat has fed the fear that farmers will lose the advancements of the biotechnology and the new seed varieties¹².

At the beginning of the present year, the Multinational enterprise has threatened the soybean grain exporters with placing demands in the ports of destiny, where they have being granted with patents. The company advanced its pretensions to claim \$15 by metric ton in the main importing countries of Argentina's soybean.

In June of the present year, the Monsanto finally begins a demand for intellectual property rights on a cargo of Argentinian soybean in Denmark. The Argentine government announced that it will suspend its conversations with the company to adapt the national legislation in search of an alternative for the collection of royalties. Likewise it advanced that it will fight the legal action promoted by the multinational company.

(iii) Limitations for the Commercialization of Genetically Modified Soybean and Derived Productos

In the international context it is mentioned as main characteristics of the regulations in relation to the security of the biotechnology the following:

- The instruments that regulate the safety of biotechnology have the form of Laws, Decrees, Executive directives that should be harmonious to the realities of the countries.
- The existing national legislation is utilized and the national and international regulatory framework.

⁹ Bravo, E (s.f). Derechos de Propiedad Intelectual y OGMs. EcoPortal.net. Accedido desde: <http://www.ecoport.net/layout/set/print/content/view/full/45478/printversion/1>

¹⁰ <http://www.geinfo.org.nz/102004/02.html>

¹¹ http://www.grain.org/articles_files/atg2-es.pdf

¹² <http://www.gene.ch/genet/2005/Mar/msg00073.html>

- The activities subjected to control are: the introduction, investigation, manipulation, production, utilization, distribution, application, transportation, storage, expending , publicity, commercialization, uses and the liberation of the genetically modified organisms.
- It is provisioned the determination, evaluation and management of risks, besides the procedures and the authorizations.
- The National Authorities are defined which offer the corresponding authorizations.
- A National Committee on Biotechnology Safety for the case by case study of requests for executing activities with genetically modified agencies is defined, as well as for the elaboration of regulations, which has a multisectorial and interinstitutional character.
- Registrations for physical or legal persons that carry out activities with this type of agents are created as well as for the requests and corresponding authorizations.

The reality of our country in this respect is the following:

It does not exist in our country specific legislation on the theme of biotechnology safety. As it was exposed in another part of this study, only exists the Decree N° 18481/97, of the creation of the Commission of Biosafety, advisory and dependent from both MAG and MSPyBS.

Several initiatives have been generated to save this need, among the ones it can be mentioned the elaboration of the Agribusiness Biosafety Law draft, through the FAO/TCP which was submitted by MAG and the message from the Executive Power to Legislature, specifically to the Chamber of Senators, from where it was derived to special commissions for their study. In parallel there are other documents in the parliament concerning this problematic, which have in common the need to establish a regulatory framework, the definition of a regulating agency, an administrative authority and a committee / technical commission responsible for attending the requests, to carry out the analyses of risks and to authorize or to reject the introduction of genetically modified materials.

In relation to the international regulatory framework, our country has ratified the Protocol of Cartagena by virtue of the Law N° 2309/03 but it has not being defined an Authority of application, even having into consideration that this Protocol is binding to the Covenant of Biological Diversity, that has the SEAM as focal point. Our country is participating of the follow up meetings of the Protocol, abouts whose results there is not known information outside of the ones that circulates within the Office of the Secretary of the Environment.

It is urgent to determine the authorities of application of the Protocol, to establish the corresponding administrative measures and above all to coordinate the participation of the national delegations in the negotiations in the framework

of the WTO (MRE, MIC, MSPyBS, MAG, SENAIVE, SENACSA) and of the UNEP-GEF (SEAM, MRE, STP, etc.)

In relation to the existence of a technical Committee/Commission to attend the technical aspects of the requests, analysis and management of risks, authorizations, monitoring, follow up, supervision, etc. the Commission of Biosafety (ComBio) that had been created in the environment of both MAG and the MSPyBS has remained outdated in what concerns to the Decree content that created it, and to the institutional representation of its members (extinction of the Natural resources and Environment Subsecretary of MAG and of its Directions of Environmental Ordinance and of National Parks and Wildlife due to the creation of the SEAM; the recent creation of the SENAIVE that fuses among others, the Directions of Plant Defense and of Seeds, both members of the ComBio by the Subsecretary of State of Agriculture).

It is to rescue, in spite of this, the active ComBio participation in the administration of this theme at multidisciplinary and interinstitutional level, of *dialoguing with the public sector (other Departments, CONACYT, INTN, etc.)*, the private sector (Guilds of the production, seed businesses enterprises, and of agrichemicals), and the International Cooperation (FAO, GEF, IICA, UNDP, WHO, IABD, GTZ, JICA, USA, Canada, etc).

There has been various intents of modification/updating of the Decree for creation of the ComBio as a provisory or alternative measure, interim a Law could be promulgated that can attend this field of action of various State agencies.

Likewise it is needed to have an instance of contacts and negotiation among the public sector (Ministeries and other regulatory companies), the private sector represented by the guilds of production, the academic sector, the international technical cooperation related to this topic and the civil society as a way to build in a participatory and inclusive form a National Policy for the incorporation in a rational way and according to our reality of GMO's and its derived byproducts. This in some way is being faced in the context of the FAO TCP PAR/3001 "Project of support to the formulation of a National Politycy on Biotechnology", which counts on FAO support and the execution is in charge of the Ministry of Agriculture and Livestock, initiative that should be taken advantage of to give the GMO's its long-term adequate context and to its implicantions a final solution.

EXHAUSTIVE ANALYSIS OF THE PROTOCOL OF CARTAGENA, RATIFIED BY PARAGUAY THROUGH THE LAW N° 2309/03 AND ITS IMPLICATIONS FOR THE PRODUCTION AND COMMERCIALIZATION OF GENETICALLY

MODIFIED VARIETIES WITH EMPHASIS ON SOYNEAN GRAINS AND DERIVED BYPRODUCTS.

The Protocol of Cartagena on Biotechnology Safety (PCSB), was adopted on January 29, 2000, in Montreal, Canada, and represents the culmination of three and a half years of formal negotiations. Is a binding document to the Covenant on Biological Diversity (CBD).

Paraguay is a signatory part from May 3, 2001, having ratified it by the Law of the Nation N° 2309 of 2003 and it is found fully in force from September of the same year, after 50 countries have placed their instruments of ratification, acceptance, approval or corresponding adhesion.

The objective of the Protocol is "to contribute to guarantee an adequate level of protection in the sphere of transfer, manipulation and secure utilization of the AMO's (alive modified organisms) resultant of modern biotechnology that can have adverse effects for the conservation and sustainable utilization of the biological diversity, taking also in account the risks for human health, being centered concretely, in the transbordering movements".

It establishes the fundamented prior Agreement (FPA), which grants to the Parts, the right to receive information that will be applied before the first intentional transborder movement of an AMO destined to the deliberately introduction to the environment of the importing Part. The country where it is intended to introduce it can approve, prohibit or restrict the AMO's importings. The decision of the importing Part should be based on a risk evaluation performed in a scientific way and considering internationally recognized techniques.

The Protocol establishes the countries rights to regulate more strictly through the national legal frameworks and even to expand the dispositions to cover the Protocol established exonerations. It it is recognized the reduced capacity of many countries, especially countries in development, to control the nature and the magnitude of the known and potentials risks derived from the AMO's.

It recognizes that the agreements relative to commerce and the environment should be mutually supporting looking to achieve the sustainable development. The adoption of the PCSB constitutes a milestone in the expression of the political commitment of the Governments to maximize the benefits and to manage the risks that derive from modern biotechnology. These commitments themselves initially had been contracted in the Earth Summit, in Rio do Janeiro, in 1992.

The PCSB concentrates on the intentional transborder movements of the AMO's; to manage that process it was established a Center of Information (Clearing House) which will be notified of the decisions relative to domestic use, including the commercialization of any AMO's that could be object of transborder travel for its direct use as food, fodder or for its subsequent procesing. Once the notifications have been fulfilled on genetically modified events freed to

commerce, and that they were mutually accepted between both the producing and the receiving countries, they will be able to circulate freely without requiring no another type of advanced notice.

Nevertheless in case of having new scientific information relative to potential effects of the AMO's on the conservation and the sustainable use of biological diversity including the human health, the parts will be able to revise or to modify any prior decision relating to the transborder movements of the involved events.

It is indicated that the countries would be able to establish more restrictive measures than those established in the Protocol, based on the Precautary Principle stated in the introduction of the CBD, whenever does not exist information scientifically verified on the AMO's effects on the sustainable use of biodiversity including human health.

As for the AMO's destined for its direct use as food, fodder or for procesing, it is established that the same should be accompanied by documentation that identify clearly the possible presence of AMO with a legend of "it can contain AMO's" and that are not destined to its deliberate introduction to the environment (sowing), opening the way to those genetically modified crops destined to its incorporation to the food chain they should be segregated, and in second place that they should be identified in detail according to their origin (traceability), being feared therefore that the combination of the precautary focus and the traceability of the GMO's could mean the obligatory labeling of all products that are processed from said commodities for their sale to the importing market including at retail level.

This would be a deviation of the general rules of the multilateral system of commerce where it is only considered, the evaluation of sanitary risks or phytosanitary (MASPS) and can fits in the called technical obstacles to commerce. In concrete the PCSB establishes a procedure to consider an identification and more detailed documentation of the "commodities" than that established in the framework of theWTO. Likewise it stipulates the information that should be included in the documentation that accompanies to the AMO's that are destined to confined use, included any requirement of manipulation and contact points to obtain additional information and for the consignatary. Also a clause of safeguard is included by which the agreement will not be interpreted like a change in the rights and obligations of the Parts under any another international agreement, including for example, the Agreements of the WTO.

Another aspect to mention is that the Protocol does not refer neither to food harmlessness (inocuity) questions, of which it takes charge the Codex Alimentarius (FAO-WHO).

The Protocol does not require the labeling of the product at the consumer level. The mandate of the PCSB concentrates on the risks of the intentionally introduced AMO's on the sustainable use of biodiversity and the human health. Questions related to the consumer preferences were not part of the negotiations. The documentation requirements that identify the basic products

that would be able to contain AMO's is referred to the documentation that accompanies the shipment.

The established procedure requires that the exporter must request consent of the importing country before the first shipment of the first cargo of an AMO directed to be introduced intentionally to the environment. The importers have to decide on the corresponding import considering the risks analysis pertaining to each type of event and within the 270 days of notified the intention of exporting via the Information Exchange Center (Clearing House). As for the "commodities", the Agreement requires that the Governments provide to the Information Exchange Center, every information on the decisions taken on the internal use that will be given to the commodity, within 15 days of taken said decisions.

Within the regulatory framework of the PCSB, the Art 14th. can be emphasized given its reference to the authorization to the parts to arrive at agreements and multilateral, regional, and bilateral arrangements related to the intentional transborder movements of AMO's provided that these are compatible with the Protocol objectives, and they do not constitute a reduction of the required level of protection, neither putting sideways the notification among the parts by conduit of the Information Exchange Center. These agreements can be previous or after the Protocol was in force, and they can be carried out among States that are parts or non parts, in which case that fact should be clarified to the Center.

It should be indicated that the different articles still are object of regulations, interpretations and explanations through follow up meetings of the so called monitoring Conferences of the Parts, in which the national focal Points participate, which in the case of our country corresponds to the Office of the Secretary of the Environment (SEAM). The SEAM complies with the role in the sense of conforming the work strategy for the implementation of the competent National Authority (still pending to be appointed) and as Focal Point of the PCSG, being also headquarters of the Information Exchange Center on Safety of Biotechnology and the executing agency of the Project on Development of the National Framework of Safety of Biotechnology for Paraguay UNEP-FMAM GFL/2716-03-4662 whose initial objectives have been:

- A Regulatory system. Elaboration of missing legal instruments to legally support the activities of biotechnology safety.
- An Administrative System: nomination of the organizative structure to evaluate and manage the risks, and for complying with the administrative obligations contracted before the Protocol.
- A System for the decisions adoption: capacities building to evaluate the risks and to take the corresponding decisions.
- A mechanism for public participation and information. Capacity building for training and exchange of information at all Society levels.

As it was mentioned before, it is important that our country can strengthen their participation mechanisms in the discussion forums of the measures established in the Protocol, through a coordination and search of consensus for the presentations to to be carried out by the different national negotiating groups which participate in the International Agreements in the framework of the WTO, in world regional blocks (RAZORBILL, NAFTA, CAIRNS, EU, etc.) and in the framework of the CBD and the Summit of Rio, that generally results in uncoordination among what Paraguay presents in its commercial negotiations and what pursues in its environmental objectives and for sustainable development (UNEP-GEF framework).