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# The Brazilian soy boom

An analysis of the broader societal impacts of the Brazilian  
soy expansion from 2000-2012

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# Abstract

The goal with this thesis is to analyze the expansion of Brazilian soybean cultivation since 2000, through a World Systems Analysis perspective. The exploratory objective is concerned with how the soy expansion relates to the notion of periphery, as this has been conceptualized through the theoretical construct of periphery conditions by Terrence Hopkins and Immanuel Wallerstein (1982).

The paper relies upon a triangulation of methods, combining secondary literature, expert interviews and statistical analysis. An analysis of global demand increase and the developments within the regulatory framework for soy production is conducted, in order to understand how this has affected expansion of soy cultivation. A commodity chain analysis of the Brazilian soy commodity chain is performed, in order to trace indicators pertaining to the notion of periphery conditions within a range of social, economic and environmental dimensions, affected by the process of soy expansion. The examination of the expansionary process indicates that this has been markedly associated with the emergence of periphery conditions in the Brazilian soy frontier regions, and that the soy sector's political leverage has increased proportionately with its economic significance.

*Key words:* Brazil, Soy, World Systems Analysis, raw materials, commodity chains

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# 1.0 Introduction

Since the turn of the millennium, demand for Brazilian raw materials has increased markedly. This has become the basis for a new optimism about the role of natural resources, and the hope that these might serve as a stable path for economic development. These hopes have also extended to the prospects for the future of the country's largest agricultural commodity; the soybean.

Soy cultivation, which began in the sixties in the southern part of Brazil, has now spread throughout the country. From the outset of this millennium, soy cultivation has accelerated, from 13.6 million hectares in 2000 to 27.7 million hectares in 2012 (Brazil, Embrapa, 2013). Though, due to both the pure extend and the velocity of soy expansion, as well as the industrial scale of the production, this process has implied a series of different impacts, spanning from social to environmental and economic spheres (Schlesinger 2008, pp.3-4) (Meyer & Cederberg, 2010, p.37). Hence, soy expansion has generated a range of divisions and counter-acting pressures between economic development, as opposed to socio-environmental needs. This has also given way to a range of divisions within the political sphere, as to how this area should be regulated (Sauer & Leite 2011). Thus, in spite of its undeniable importance as a central component within the economic emergence of Brazil, soy production still stands as a highly disputed issue in today's Brazil.

## 1.1 Aim of the study

The fundamental goal of the study is to understand the broader societal consequences of Brazil's positioning within the global division of labor, in relation to the rapid expansion of soy production. Though the increased wealth generated by the surging commodity exports of Brazil has contributed significantly to economic growth, the question still remains as to whether the mode of production in the expanding sectors also is compatible with a socially, environmentally and not at least politically sustainable development.

The historical role of raw material exporting countries in the global periphery, as characterized by a detrimental or lacking development, has been a very central object within the Dependency and the World Systems Analysis IPE schools. Though the large amount of wealth generated by Brazilian raw material exports may come at odds with some central theses of this academic camp, the social tensions that have been associated with the quick production increase of raw materi-

als - and particularly of the soybean – raise the question of whether the domestic consequences of this contemporary development differs fundamentally from those of previous times.

The external incorporation and determination of a country's production processes, the concentration of these activities on a narrow range of exportable products, the exploitation of its labor pool and a simple reproduction of commodities, are conceptualized by Terrence Hopkins and Immanuel Wallerstein as basic conditions characteristic of peripheral regions or rather; periphery conditions (Hopkins & Wallerstein 1982, p.126). The objective is to understand whether these conditions are associated with the contemporary expansion of soy production in Brazil, but also how the political level has been capable of influencing this process with the broader societal considerations in mind.

Authors from the adjacent Dependency perspective emphasize the significance of the political system associated with reliance upon raw materials, and how groups associated with these economic sectors come to wield a disproportionate political influence, reproducing a systemic bias in favor of raw-materialism (Frank, 1978) (Cardoso & Faletto, 1979). It thereby becomes relevant to examine the influence of the Brazilian agricultural interests and how regulatory developments at the political level have influenced the scale and defined the mode of the expansion of soy production.

These considerations lead towards formulation of the following research question;

**Research question:**

**How has the increase in global soy demand affected periphery conditions within Brazil from 2000 to 2012 and how has political regulation influenced this development?**

## 1.2 Clarification of research question

**The increase in global soy demand** is perceived as a fundamental and necessary development for the expansion of Brazilian soy production, which means that it gains the character of an independent variable. Though as this demand increase has been easily quantifiable, most of focus is directed towards *how* it has affected the independent variable, the:

**Periphery conditions**, are theoretically derived from the works of Hopkins and Wallerstein (1982), and operationalized into more specific indicators to be exam-

ined in relation to the expansion of soy production within Brazil. Periphery conditions are treated as the dependent variable in the paper.

**Political regulation** refers to the legislative measures which have been identified as significant in influencing the expansion of Brazilian soy production, either targeting soy specifically or in some cases export-agriculture more generally. The examination of the regulatory period stretches back to the 1990s, because many developments at that time have been found to be critical for understanding the conditions for the later expansion of soy production. Because global demand increase, and not the regulatory environment, is considered to be the fundamental factor spurring soy expansion, the regulatory developments are considered as a moderating variable.

**From 2000 to 2012**, the time period during which the soy commodity chain is analyzed begins in 2000 because the global demand increase largely took off at that time, and the analysis of the Forest Code from 2012 provides the ending point. The focus is on the dynamic developments *through* the time period, rather than as a comparison between the situation in 2000 and that of 2012. In cases where data and information has not been exactly parallel to this time period, the goal has been to understand the developments which can be identified through the period, as part of the overall conjunction of tendencies from 2000-2012.

### 1.3 Sub-questions

In order to answer the research question, this has been divided into three differently emphasized sub-questions, structuring the analysis.

**Sub-question 1: How has global demand increase spurred the expansion of Brazilian soy production from 2000?**

Sub-question 1 is answered in the first analysis of global demand increase and is seen as a necessary exploratory goal in order to establish the link between developments in the global economy and their impacts upon the domestic level within Brazil. (10 % emphasis)

**Sub-question 2: How has the political regulation of the soy sector affected its expansion?**

Sub-question 2 is answered in the second analysis of regulatory developments and addresses the political regulation influencing soy production since the 1990s. (40 % emphasis)

**Sub-question 3: To which extent can periphery conditions be identified within the Brazilian soy commodity chain as a consequence of production expansion from 2000 to 2012?**

This sub-question is directed towards the identification of periphery conditions within the Brazilian soy commodity chain, as conceptualized by Hopkins and Wallerstein (1982), and operationalized in the chapter 2. This sub-question is mainly answered in the third analysis of the soy commodity chain, though the synthesized periphery condition of 'disproportionate political influence of agribusiness' is treated in the analysis of regulatory developments. (50 % emphasis)

## 2.0 Theories and concepts

### 2.1 World Systems Analysis and the periphery

The main conceptualizations of periphery and semi-periphery within this paper are derived from the WSA perspective. Though the wording of periphery implies geographical connotations, the concept mainly refers to the workings of productive processes interrelated with the world economy, within a given area: a dominance of peripheral processes – related to certain periphery conditions - defines the given place where they unfold as periphery or semi-periphery (Hopkins & Wallerstein 1982, p.13).

Periphery processes are intrinsically intertwined with the mode of production and its spread effects upon society. The core specializes in capital intensive and high technology production, peripheral regions specialize mainly in agriculture or resource extraction, while semi-periphery refers to regions that are characterized by a relatively equal mix between these two types of productive activities (Ibid 1982, p.59). Peripheries develop parallel to cores, and can only be understood in their relation to core areas, because they occupy a necessary position within the axially structured division of labor of the world economy (Ibid, p.125).

Wallerstein and Hopkins divide the notion of periphery into four fundamental patterns, encapsulated in the concepts of periphery conditions:

- 1) **Incorporation**, which implies that the production processes are adapted to the needs of the world economy and inserted within an axial division of labor. Governance processes are similarly integrated within, and subjugated to the needs of global market structures.
- 2) **Concentration of production processes**, leading to a very limited range of products being produced, and mainly for consumption for core industries or domestic households.
- 3) **Conversion of labor power**, into labor-in-relation-to-capital and particularly low wage labor, in primary sectors, living on a subsistence minimum.
- 4) **Simple reproduction**, both of capital and inputs into the production process, sometimes implying a scalar expansion, though without any significant technological improvements associated with this.

(Hopkins & Wallerstein 1982 p.126)

These four groups of periphery conditions are scrutinized in the following parts, where each is connected with some more specific indicators derived from the WSA and Dependency literature.



### 2.1.1 Incorporation

Incorporation refers to the process through which an area or a group of people is structurally incorporated into the world economy. This process both implies a geographical dimension of expansion of the world economy to new regions of the world, but also a classifying dimension in which the newly incorporated areas are inserted into the axial division of labor within the world economy. (Hopkins & Wallerstein: 1982, p.126) Local production processes and governance structures are integrated into the world economy, and structured towards the transferring of products required in core production, to these regions (Ibid 1982, p.129).

Hall has elaborated the notion of incorporation and underlines that it is a process which often wields a negative impact on the regions/peoples incorporated, provokes resistance and usually tends to unfold as a self-enforcing one-way trajectory (Hall 2012, p.48). Gareau & Borrego also emphasize how this process of expansion has become an integral part of modern cash-crop farming, as the constant search for yields lead agribusiness to expand its production systems worldwide, but also to unsustainably intensify production (Gareau & Borrego 2012, p.358). A basic condition for the expansion of industrialized agriculture in peripheral regions has been the large inputs of pesticides, herbicides, fungicides and fertilizers (Ibid 2012, p.357). This both entails the degradation of soil and biodiversity loss, but is likewise associated with a model of petro-dependent agriculture which also relies on the input of patented biotechnology. Thereby the principle of incorporation also comes to comprise of the incorporation – and eventual exhaustion – of resources such as soil fertility and naturally occurring water reserves, into the production process (Ibid p.359).

The indicators derived from the general concept of incorporation for further examination in the analysis will therefore be;

- The environmental effects with the indicators of **soil degradation and agrochemical usage** as the incorporation of soil quality into production and the biosphere loss due to **deforestation** of land areas.
- The degree of **foreign control** of soy production processes and level of penetration of transnational capital, shaping production processes.

### 2.1.2 Concentration of production processes

A fundamental periphery condition has to do with the production processes of a region or country being concentrated on a very short range of activities, as part of

the division of labor within the world economy. These activities are primarily directed towards generating goods for sale on the world market and meeting the demands of core economies (Hopkins & Wallerstein 1982, p.126). Frank also points to the negative implications of primary material specialization due to the dependence upon external rather than internal markets, as the main source of development (Frank 1978, p.110).

The increasing specialization of agriculture in the direction of export-oriented monoculture, and the many-folded implications of this mode of production, has been examined by many contemporary WSA scholars. Especially the high degree of capital intensity, combined with global tendencies of liberalization of agriculture, is often highly related to the displacement of smaller agricultural production units (Gareau & Borrego 2012, p.359). Scanlan similarly underlines how large-scale specialized agriculture is associated with a market focused distribution, which may hold negative consequences for local food security (Scanlan 2012, p.369). The conglomeration of agriculture thus comes to constitute a cluster of intertwined issues regarding food sovereignty, land access, and biodiversity loss due to monoculture (Ibid 2012, p.370). In this respect, Gareau and Borrego underline how the tendency that they refer to as *the neoliberal shift in agriculture* has produced a governance structure which is largely inconsiderate of the needs of local rural populations, particularly regarding food production (Gareau & Borrego 2012 p.359).

These observations lead to the inclusion of the following indicators for later analysis of the concentration of production processes in the Brazilian soy sector;

- The issue of arable land inputs in terms of local **land access** and **food security**.

### 2.1.3 Conversion of labor power

The conversion of workers into labor-in-relation-to-capital, also exemplified by Hopkins and Wallerstein as low wage plantation field hands, has also been stated by these authors as one of the main periphery conditions. Workers are inserted within an economic system, in which they live on a subsistence minimum, which only reaches a wage level needed in order to reproduce the labor power. (Hopkins & Wallerstein 1982, p.126) Because the economic dynamics in raw material exporting countries never has been based upon mass consumption, Frank also points towards a historical tendency of labor in such economies, being considered as an expense which preferably is kept as low as possible (Frank 1978, p.137).

Scanlan refers to the expansion of modern agriculture as the *proletarianization* of the rural labor force; displacing it from small scale production and reincorpo-

rating it into the plantation economies as low wage labor (Scanlan 2012, p.370). Gareau and Borrego also state that within conventional capitalist agriculture, the need to increase yields also comes to rely on labor inputs as a recourse which can be fully exploited to the point that it debilitates this factor, with detrimental health consequences being internalized by workers (Gareau & Borrego 2012, p.357). Hence;

- Labor inputs in Brazilian soy production will be examined through the indicators of; **labor conditions** and **rural employment**.

#### 2.1.4 Simple reproduction

Simple reproduction refers to the reproduction of capital, according to Wallerstein and Hopkins, only being realized in a simple fashion with equipment maintained or replaced and stocks replenished. This also implies that the organic composition of capital and the technical level of production and organization of production largely remain at a constant, stagnant level. Furthermore, whenever technical innovations and organizational improvements of production occur, this implies very limited structural ramifications within the surrounding economy. (Hopkins & Wallerstein 1982, p.127)

As the notion of simple reproduction is conceptualized by Hopkins and Wallerstein, it does appear to diverge to some degree from the way modern agriculture is presented by WSA scholars in contemporary intermediate theorizing. Technical and organizational development is central to both Gareau & Borrego (2012) and Scanlan (2012). Though capital intensive agriculture does indisputably appear to be characterized by dynamic technical and managerial developments, the question still remains as to what degree these imply structural ramifications and spill over into the broader economy. This issue has also been elaborated by Frank, who emphasizes the tendency of economic multipliers of raw material production being transferred abroad, because of lacking domestic elaboration capacity and value added productive activities (Frank 1978, p.117).

Hereby, the indicators connected to the concept of simple reproduction are defined as;

- The lack of domestic soy **processing capacity** and productive links to the broader economy.
- The lack of a **research and development (R&D)** complex associated with soy production and links to the domestic economy.

### 2.1.5 Export class interests

A characteristic of peripheral, or dependent societies, which has been emphasized by different WSA and Dependency theorists, has to do with the role of the export-oriented sectors and classes, serving as a link to the global economy and often wielding a significant degree of political influence.

Through a historical retrospect, Frank points to a tendency of primary commodity exporting classes being very influential in defining industrial and commercial policies within dependent economies, due to an already established dominant economic position within society. By serving as the internal political agent for upholding the status-quo positioning of a country within the international division of labor, the interests of these sectors are often aligned with dominant forces at the international market with interests within the country. (Frank 1978, p.100)

Frank establishes a link between the gearing of the regulation of the domestic economy, towards the exportation of primary commodities, and the political foundations of such a system, based on the alliance between domestic and foreign export interests. This political alliance is further underpinned by international monetary institutions and other mechanisms exacerbating financial dependence of the core (Ibid 1978, p.119). The pressures from the international institutional level upon developing countries to adopt agricultural policies, based upon comparative advantages and cash-cropping, are also drawn up by Scanlan as a significant factor within the modern food system (Scanlan 2012, p.369).

Cardoso and Faletto likewise establish the concept of *structural links*, between dominant domestic and international classes. These links are not to be seen as aggressive external attempts to influence the peripheral state, but rather as a convergence of interests between domestic and foreign economic sectors and classes (Cardoso & Faletto 1979, p.xvi). These authors angle the analytical focus towards the intertwinement between external and internal relations of political domination, in explaining the political dynamics of society (Ibid 1979 p.xvii). In situations of dependency in countries where domestic upper classes control much of the economy - as is the case in rural Brazil, - accumulation takes place through the appropriation of natural resources by these classes and the exploitation of local labor for primary commodity production. The starting point for capital accumulation and some possible valorization activities is thus domestic, but the international market is required to perform the final realization of capital. (Ibid p. xvii-xix)

In a more contemporary outlining of political processes in raw material booming economies, Ciccantell underlines how increased global raw material demand from ascending nations tends to make enterprises and elites in the periphery, work closely together with authorities and even foreign enterprises, in order to meet this demand. The state, often attempts to facilitate this process, in some

cases by direct subsidies or infrastructure provision, with the goal of national development in mind. (Ciccantell 2012, p.386)

Scanlan expresses a similarly critical perception of the role of the state in many countries where agribusiness is strongly represented. This takes place through the creation of an overly permissive environment and the facilitation of the conversion of land used for local food provision, into production for the global market (Scanlan 2012, p.370).

Though not associated with the dependency or WSA schools, the neo-pluralist perspective of Lindblom & Woodhouse also provides some theoretical insights into the different modes and channels, through which business exercises influence upon policymaking in pluralist democracies, such as the Brazilian.

The authors mention that in systems characterized by historical ties between prominent interest groups and political parties, these links are then often activated as a means to obtain influence by business (Lindblom & Woodhouse 1993, p.80). Direct persuasion can also be applied as the 1) assumption of direct contact with policymakers, in order to present a point of view, or 2) through more specific technical suggestions and sharing of information (Ibid 1993, p.83).

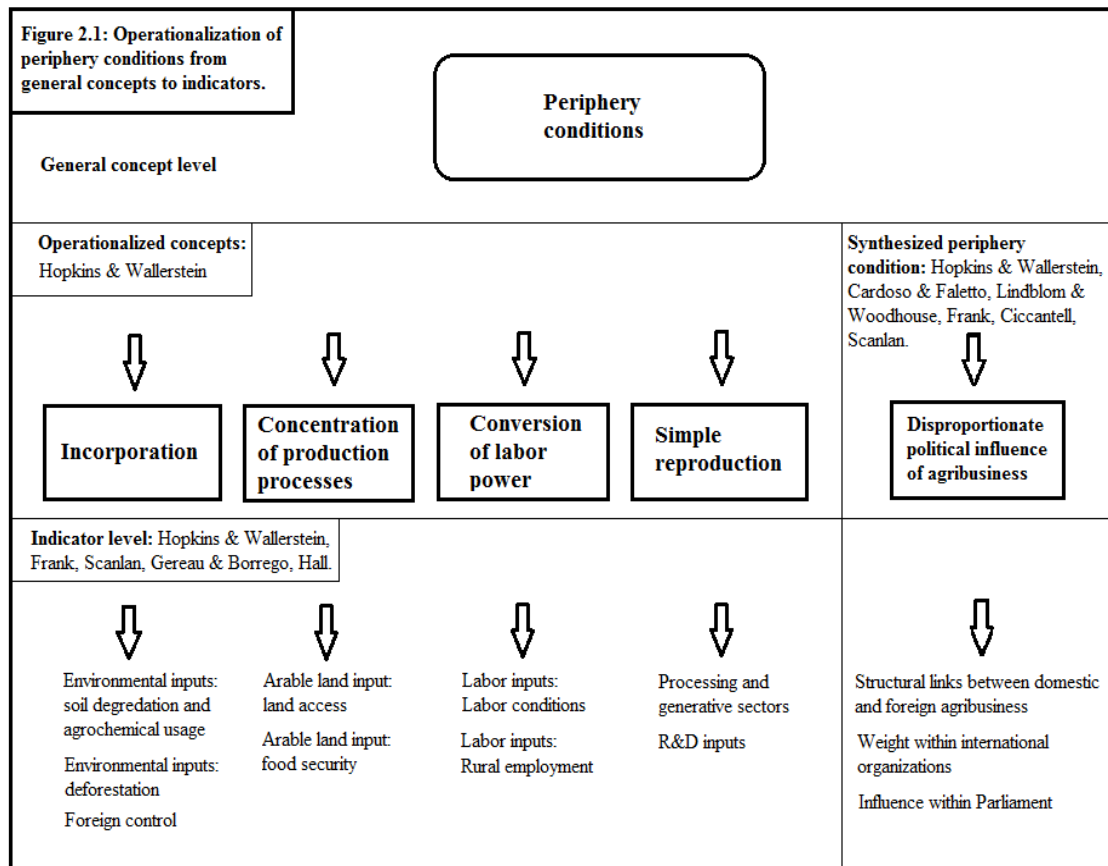
Lindblom also points to what he perceives as the 'privileged position of business', and underlines that when business articulates certain needs or interests, these are generally treated with particular heed by politicians, relative to the interest articulations of other societal segments (Lindblom 1977, pp.174-175). In line with this logic, policymakers also enter into a process of mutual adjustment, in which they incorporate the necessity of offering inducements to private enterprises. The accommodativeness to business interests is thereby supplemented by a proactive behavior, through which governments systematically offer inducements to ensure that particular branches of business perform well (Ibid 1977, p.173).

- With these theoretical contributions in mind, a synthesized periphery condition of **disproportionate political influence of agribusiness** is established. This is treated as the situation in which the alignment of domestic and international private agricultural interests produces a disproportionate influence on the political level, at the expense of other societal considerations.

## 2.1.6 Operationalization of indicators

The four periphery conditions conceptualized by Hopkins and Wallerstein and the indicators which they have been operationalized into are presented in figure 2.1. The periphery condition of disproportionate political influence of agribusiness, -

which is not derived from Hopkins and Wallerstein - but which has been composed on basis of different observations from the WSA and dependency perspectives, is also presented with its indicators to the right.



## 2.2 Critique of the WSA perspective

Skocpol (1977) has contributed with a critique of Wallerstein's strong emphasis upon fundamental global market structures. Skocpol sustains that Wallerstein reduces society's socioeconomic composition to a question of insertion within the global economy and its political structure to depend upon interests of dominant classes (Skocpol 1977, pp.1078-1079). The author recognizes the significance of market imperatives and trade patterns, but stresses the importance of the independent effect of existing institutional frameworks and historical patterns of class relations, in defining societal development (Ibid 1979, p.1087).

Therefore, reflections in the analyses to follow are directed towards also assessing the degree of impact of the institutional framework governing the soy sector. The regulatory analysis likewise implies a focus upon how agribusiness has been obtained influence *within* the institutional framework and not independent of this.

Worth also problematizes the original concept of semi-periphery, in relation to the contemporary process of globalization. Worth underlines that while neo-Marxist theorists previously have been emphasizing the importance of an inwards oriented developmental path, globalization has made most semi-peripheral states – including Brazil - engage in an internationalization strategy. Hence, the semi-periphery has moved from largely being shielded from international markets, towards seeking active engagement within these. (Worth 2009, p.12)

Consequential of this critical observation, later discussion will not revolve around the desirability of international participation in itself, but rather problematize the specific mode through which this participation occurs.

## 2.3 Global Commodity Chains

The concept of commodity chains is derived from the WSA literature, but it has also given rise to an independent analytical approach, the global commodity chain (GCC) analysis, which is employed in order to analyze the expansion of the Brazilian soy frontiers.

The relevance of a specific focus upon commodity chains has also been emphasized by Hopkins and Wallerstein (Hopkins & Wallerstein 1982, p.59). Commodity chains become an essential object of analysis within WSA research, due to their significance in defining hierarchies within the world economy, and because they connect global production systems to the social reproduction of labor (Bair 2005, p.155). This entails an analysis of the social division of labor along the lines of geographical division of labor (Parnreiter 2012, p.235).

The focus upon commodity chains also becomes relevant in order to understand how productive processes affect the environment, and thereby also produce what Ciccantell and Smith refer to as ecological inequalities, which is an increasingly important dimension to consider below the notion of periphery. (Ciccantell & Smith 2009, p.363). Ciccantell and Smith state that GCC analysis can be a useful extension to classic WSA analysis in order to understand more contemporary issues of *ecologically unequal exchange* (Ibid, p.364). Though many GCC studies have often focused upon commodity chains from the beginning of manufacturing, Ciccantell & Smith sustain that the examination of the upstream point of raw material production should not be neglected, when examining conditions for workers and environment effects. (Ibid, p.362)

Generative sectors also play an important role in the analysis of commodity chains through a WSA perspective, due to their role in capital accumulation and surplus distribution along the chain (Bair 2005, p.158). These sectors are also

closely connected with the raw material stage, linking this product stage with further processing through the commodity chains as one of the first steps in this process. Generative sectors, apart from representing a step beyond the exclusive extraction stage of a product, may also provide spread effects and costs reduction throughout the economy (Ciccantell 2012 p.385). Thereby, they provide both backward and forward links, but also produce technical knowhow, foster specialists and stimulate knowledge based institutions. They furthermore entail the creation of both informal and formal ties between sectors, enterprises and the political level, and also affect the legal provisions regulating the area (Ciccantell & Smith, 2009, p.369).

In spite of commodity chains stretching across nation state boundaries, this unit also often holds some significance in defining the functioning of the production chains and in regulating the conditions below which different actors operate (Parnreiter 2012, p.236). This points towards the relevance of examining the role of the political level, in establishing the institutional context for the workings of commodity chains.

Bair also sustains that analysis of the governance structure of a commodity chain implies some important insights about the questions of ownership, control and value distribution, the intra-firm networks and hierarchical structures, as well as the producer or buyer driven dynamics of the chain (Bair 2005, p.159).

As a more specified procedure for embarking on GCC analysis, Bair points to four dimensions that may serve as a starting point. The mapping and general structure for examining the soy commodity chain is based on the dimensions indicated below:

- **The structure of inputs and outputs** – including a strong emphasis on environmental and labor inputs in the beginning of the chain and the exchange relations at the point of export.
- **The territoriality of the commodity chain** - mapping the links from the point of inputs through processing towards export.
- **The governance structure of the chain** – regarding relations of ownership and control, value distribution and buyer/producer driven dynamics.
- **The given institutional context** – Addressing the regulatory framework of soy production chain (separate analysis).

(Bair 2005, p.159)





### 3.0 Methodological considerations

The main analytical focus of the World Systems Analysis is on the world economy as a whole, with all its economic links and dynamics, rather than on the delimitations around any specific subunit within this system (Hopkins & Wallerstein 1982, p.160). The holism of the world system-perspective implies that no independent object can be isolated from its place within the context of the world economy (Bach 1982, pp.166-168). Through this perspective, a concept such as commodity trade gains importance when it is applied in order to understand the broader global production structures, with which it is interconnected (Hopkins & Wallerstein 1982, p.36). In this respect, attention towards production structures and commodity chains becomes of primordial importance (Ibid 1982, p.59).

This implies that the main focus in the analytical part will be on the increasing soy demand as a consequence of a fundamental structural shift within essential global commodity flows, which constitute a central dynamic within the system level of the global economy. This also entails the intention to understand the social and economic dynamics of Brazilian soy expansion ideographically, through the particularities of the global economic context within which this process unfolds, rather than by any nomothetic comparison to formally similar cases. Yet, focus is nevertheless limited to a very specific set of local consequences of changes in the global economy, and not a system-wide analysis of soy trade.

This paper largely relies upon the analysis of observable, experienceable and documentable phenomena, a part of which also comprises of quantitative material and statistical elaboration of this. In this sense, the objects of analysis could approach what Jackson refers to as the phenomenalism, or experientialism, of post-positivism (Jackson 2011, p.61). Yet, some of the processes examined in the analysis of the political framework regulating soy production, as well as the basic constructs of periphery conditions and the structures of the world system, hold some clear transfactual features, due to their unobservable nature (Ibid 2001, p.36). As Jackson underlines, the transfactual ontology becomes necessary in order to study unobservable concept-dependent structures and objects (Ibid 2011, p.89). Thereby, an acceptance of the stratification of reality in line with a critical realist world view, - in terms of observable and unobservable phenomena - becomes necessary (Wikgren 2004, p.16)

Though initially departing from the “deep” concept level, the operationalization of these concepts into more specified indicators leads the bulk of the analysis towards the examination of observable phenomena and objects. The need to constantly re-evaluate and examine the sub-constructs, below the broader conceptual schema of the world system, is also emphasized by Hopkins and Wallerstein

(Hopkins & Wallerstein 1982, p.37). The potential of the concept of periphery conditions for analyzing contemporary Brazilian soy production within this paper is therefore considered to be dependent upon adopting a contemporary, contextual and empirically specific focus.

## 4.0 Methods and research design

### 4.1 Research design

In the following, the research designs of the three analysis chapters within this paper are presented.

#### 4.1.1 Global demand analysis

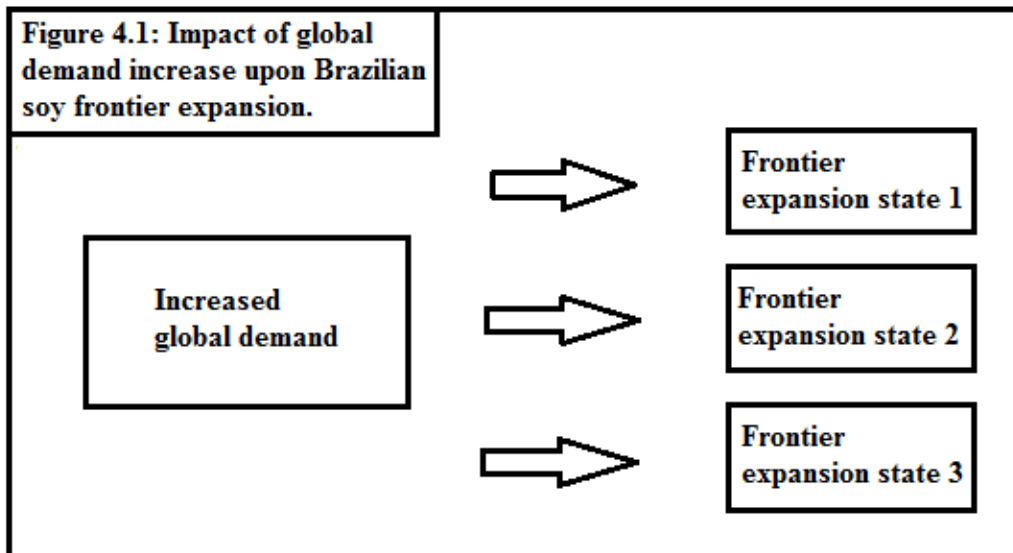
The first analysis chapter of this thesis addresses sub-question 1, formulated in the following way;

**How has global demand increase spurred the expansion of Brazilian soy production from 2000?**

The WSA perspective stresses the importance of understanding the internal economic situation of peripheral and semi-peripheral countries, as being largely determined by trends at the world economy (Hopkins & Wallerstein 1982, p.42). Thereby, the shifts in global demand become a natural starting point.

**The first part** of the global demand analysis is directed towards understanding which external sources have led to the increase in global demand for soy, as the necessary underlying driver for expansion of the soy production within Brazil. The increased global demand for soy is linked to fundamental developmental trends on the global market.

In **the second part** of the analysis, focus is directed upon the impact which increased global demand has had in terms of stimulating soy expansion within Brazil. Initially, the goal is to examine the geographical dimension of the expansion from 2000, in order to understand which regions the process of expansion mainly can be traced to. The impacts of increasing global demand upon soy cultivation within Brazilian states is analyzed through a correlation matrix, between the value of internationally traded soy on one hand, and area planted with soy within the individual states on the other, with the years from 2001-2011 serving as observations (see figure 4.1).



#### 4.1.2 Analysis of regulatory developments

Within the second analysis, which is focused upon regulatory developments, the goal is to examine the institutional and regulatory dimension of the Brazilian soy sector, with the intention of answering sub-question 2:

##### **How has the political regulation of the soy sector affected its expansion?**

**The first objective** is to answer the part of the research question which relates to the issue of how regulatory developments at the national political level have affected soy expansion within Brazil, pertaining to sub-question 2.

**A second goal** within this analysis is to trace the periphery condition of disproportionate agribusiness influence within the political level, during the course of the regulatory developments, pertaining to sub-question 3.

The analysis of the regulatory developments commences in the 1990s, because it has been found necessary to stretch the analysis back in time to comprise of significant regulatory developments then, when agricultural reforms impacted much upon the ensuing expansion of soy production.

The analysis has been divided into 4 main parts, each analyzing some fundamental developments within the institutional/regulatory dimension of the soy sector, influencing the expansion of soy production within Brazil:

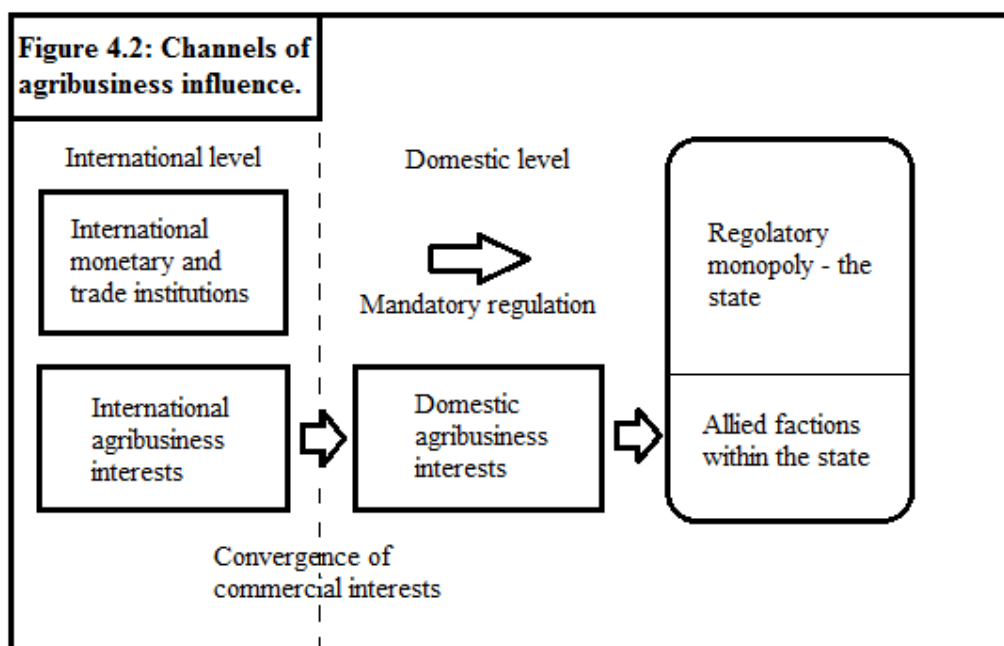
- **International liberalizations and the mobilization of Brazilian agribusiness** focuses upon the impacts which international trade agreements in

the 1990s had upon Brazilian agriculture, and how the Brazilian agribusiness sector acted in order to influence this process.

- **Reforms of Brazilian agriculture and withdrawal of the state** during the 1990s are examined, in order to understand how this changed the competitive position of soy within Brazilian agriculture and spurred the surge of export-oriented farming.
- **Legalization of transgenic soy production** and the developments leading towards this decision in 2005 is examined, with focus upon the process through which a coalition of national agricultural interests, rural parliamentarians and foreign enterprises became important players in changing this legislation.
- The formation of **the New Forest Code** with its relatively permissive regulatory framework is analyzed, including the political process leading towards its adoption in 2012, which reflects a present peak in the influence of rural interests within Brazilian politics.

The examination of these issues thereby comes to represent the analysis of the developments within the institutional dimension of the Brazilian soy sector and addresses sub-question 2.

The secondary goal within this analysis is to examine the development of the periphery condition of disproportionate political influence of agribusiness interests. Figure 4.2 illustrates the presumed channels of influence, through which the conjunction of national and foreign interests related to the agribusiness sector will affect regulation of the sector.



In the first instance, the international legislation and institutions impact regulation on the national level through directives and mandatory regulation. It is not presumed that these institutions necessarily represent agribusiness interests, but as the literature relied upon indicates, they have the potential of functioning as a vehicle for such interests to impact upon domestic agricultural policies (see section 2.1.5). Therefore, this potential connection is examined.

In the second instance, the convergence of interests between foreign and national agribusiness creates what Cardoso and Faletto refer to as structural links, resulting in a unified pressure on the state in the direction of shaping legislation favorable of their demands (see section 2.1.5). The channels through which these pressures become manifest are as Lindblom & Woodhouse conceptualize, either through allied segments within legislative or executive branches of the state machinery, or through the internalized economical imperatives to accommodate exports interests, which many governments in the global periphery and semi-periphery, are subjected to (see section 2.1.5).

A partial conclusion addresses the question of how the regulatory developments have affected soy expansion in relation to sub-question 2. The same conclusion also evaluates to which extend a disproportionate political influence of agribusiness can be traced within this process, - the synthesized periphery condition related to sub-question 3.

#### 4.1.3 Soy commodity chain analysis

The third analysis is directed towards answering sub-question 3:

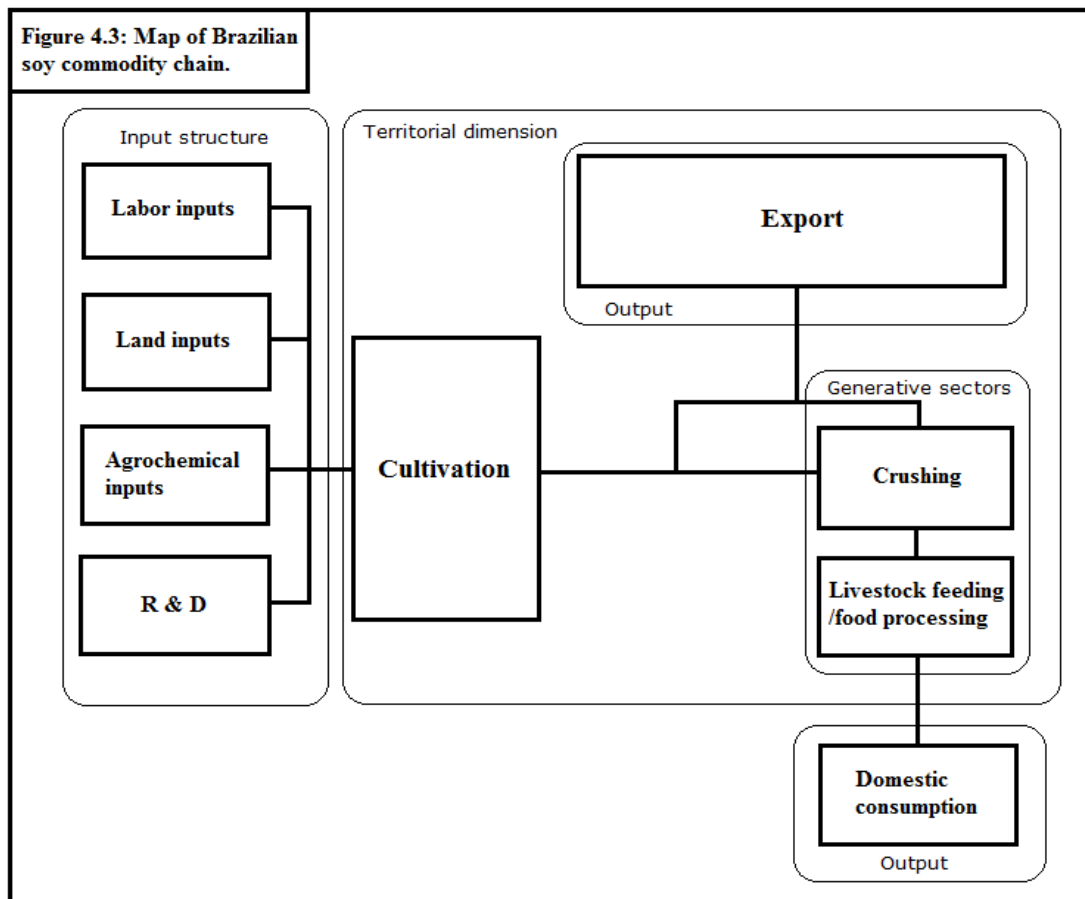
**To which extend can periphery conditions be identified within the Brazilian soy commodity chain as a consequence of production expansion from 2000 to 2012?**

The objective is to examine the developments within different links of the Brazilian soy commodity chain from 2000-2012, in order to trace the possible emergence of periphery conditions, earlier conceptualized and operationalized into indicators (see section 2.1.6).

Attention is directed towards the evolution of periphery conditions dynamically *through* the time period, and not as a static “snapshot” documenting their possible presence in the soy commodity chain at some point within the period. Though the soy commodity chain transgresses state boundaries, attention within this analysis is restricted to the Brazilian part of the chain, because the domestic consequences of expansion are the focal point. The goal is to trace the evolution of periphery

conditions to the dynamics of expansion of the Brazilian soy commodity chain, and not those circumstances that are more generally embedded within Brazilian agriculture. Though this distinction may be blurred in some instances, it nevertheless constitutes a central aim and parameter for later conclusions.

A map of the Brazilian part of the soy chain, intending to grasp the dimensions of, 1) input/output structure and 2) territoriality, is presented in figure 4.3:



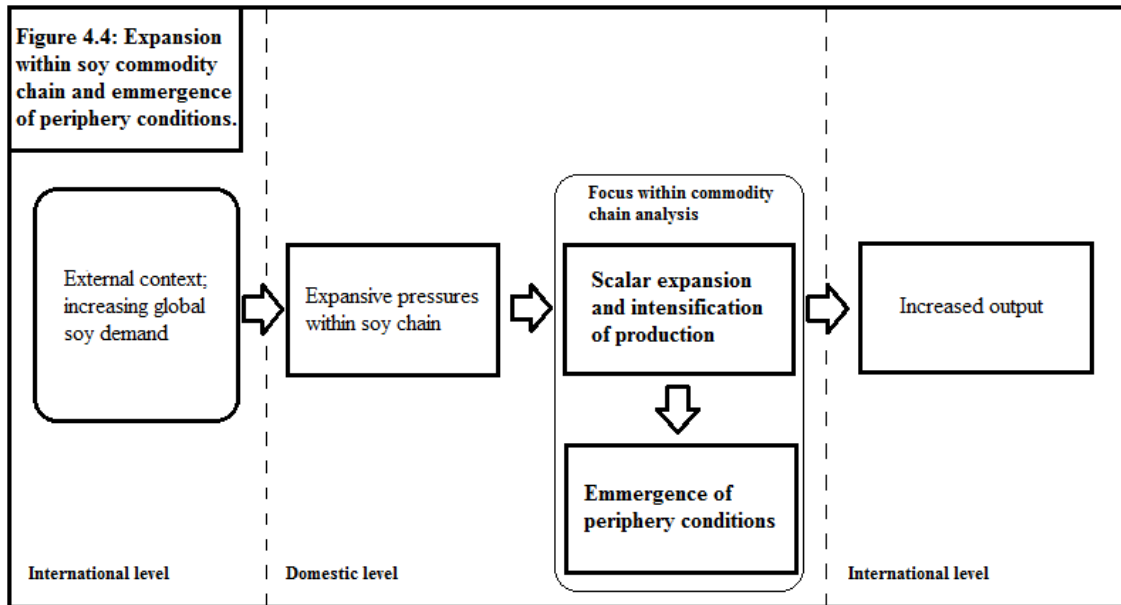
The indicators pertaining to the concept of periphery conditions are examined within the chain. As result of the earlier operationalization, indicators related to *incorporation* and *concentration of production processes* are sought within the category of land and agrochemical inputs, *conversion of labor* within labor inputs and *simple reproduction* within the categories of R&D inputs and generative sectors (see sections 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.6).

Many indicators of socioeconomic and environmental character are expected to have been affected by developments within the input structure serving as basis for soy cultivation, which is why this part of the commodity chain has been strongly emphasized. These links within the chain thus constitute general subject categories, which are examined from 2000-2012 with an eye to the development



of the indicators of periphery conditions within this period.

It is presumed that the pressures for expansion are transferred from the international to the domestic market, and that periphery conditions thus are derived from the many-folded impacts of the process of expansion, which affects all links within the chain. A model of this relationship is presented in figure 4.4:



The development of the governance dimension of the chain, including relations of ownership and control of the productive forces, as well as the impact that this might have on indicators of periphery conditions, is examined along the different links throughout the chain. The institutional dimension of the commodity chain, seen as the developments within the regulatory framework covering the soy sector, has been particularly emphasized and is examined separately within the analysis of regulatory developments.

## 4.2 Empirical sources and data

### 4.2.1 A mixed methods approach

The central theme examined within this thesis - the developments within the Brazilian soy sector - spans over differing political, environmental and economic dimensions. In order to capture these many-folded impacts, it becomes relevant to analyze them on the basis of the inclusion of different sources of empirical material. A data triangulation approach makes it possible to examine particular phenomena through the use of multiple sources of evidence, and thereby develop

converging lines of inquiry (Yin 2009, p.115).

The analysis part therefore relies upon expert interviews, research papers, statistical analysis and review of news articles. Through different channels of inquiry, the intention is to gain a wider array of tools matching the research problems at hand, ultimately supporting the construct validity within the analyses (Ibid 2009, p.116). Yet, in some instances when one method or type of data source provides more extensive ground for understanding the problem at hand, it can be emphasized accordingly. The expert interviews have been chosen in order to obtain information from people in Brazil, who have specific knowledge of different aspects of the recent process of soy expansion.

The secondary literature, in form of research papers and news articles, constitutes a very extensive source of both general, and more specific information about the issues studied. They furthermore provide a clear static picture of the debates and agendas of the specific time period under examination and serve as a useful basis for triangulation with other sources of information (Matthews & Ross 2010, p.278). The research articles have been chosen from both international and Brazilian academic journals, the quarterly journal from the Brazilian Ministry of Agriculture and organizational reports. The review of news articles primarily becomes relevant when studying the evolution within the regulatory dimension of the soy commodity chain, where these may serve to corroborate events and to trace a course of episodes unfolding on a timescale (Yin 2009, p.104). News articles are mainly used to report factual events, such as statements, dates and laws passed. The media mainly used are the largest Brazilian daily newspapers of Folha de São Paulo and Globo.

The statistical analysis is based upon the elaboration of secondary data and focused upon providing a perspective of general tendencies and developments, regarding the world market and long term trends within the Brazilian soy sector, through the use quantitative tools. Further considerations regarding the statistical analysis are presented in the research design and the procedural steps and results are presented in the analysis part. The inclusion of secondary data provides a recourse efficient overview of the developments studied and also makes it possible to trace them back in time through a longitudinal investigation (Matthews & Ross, 2010 p.286). Time series data has been gathered from the Brazilian governmental institutes and international databases.

#### 4.2.2 Interview Strategy

A number of semi-structured interviews have been conducted in order to obtain more specific information about the developments within the Brazilian soy sector.

The semi-structured interviews provide a “raw” data source, seen fit to combine with other data collection methods within the analysis (Matthews & Ross 2010, p.232). Lodge also suggests that this method is used as part of a data triangulation strategy (Lodge 2013, p.190).

The interviewees are selected through a purposive sampling procedure due to their knowledge of different aspects of the Brazilian soy expansion. The goal has been to gain specific information of either technical character, regarding the developments in soy production, or more intimate knowledge about the regulatory developments of the sector, during the period examined. Hereby, the semi-structured interview implies the possibility of gathering in-depth knowledge within an established range of general topics (Matthews & Ross 2010, p.225). Because the aim with the interview is to make the interviewees express their knowledge and understanding of certain relatively specific social phenomena and their change through a time period, the interview mode approximates that of an evaluative interview (Ibid 2010, p.224).

A semi-structured group interview has been conducted through Skype with two researchers behind a study of soy expansion in northern Brazil. Another interview has been conducted through email with an executive from an international developmental organization based in Brasília (Appendix 1). Two semi-structured interviews have been conducted with a high-level European diplomat in Brazil, and a Brazilian researcher and NGO consultant within the soy field.

The interviewees have been offered to have the questions send to them beforehand. The nature of the study was presented to the interviewees at the outset of the interview and the permission to record the interview clearly requested from the interviewees, in accordance with the guidelines of Lodge (Lodge 2013, p.192). An interview guide has been used in the interviews, and is presented in the appendices (Appendix 2). Due to the limits imposed by time and resources, meaning that the possibility of conducting the study within Brazil has been excluded, the interviews have conducted through telephone/Skype and the conversation recorded.

## 5.0 Analysis of global demand

The goal within the global demand analysis is to understand the connection between the evolution of global soy demand and the process of expansion of the Brazilian soy sector since 2000, in an empirically guided analysis in order to answer sub-question 1.

### 5.1 Increased worldwide soy demand

Soybeans have a wide variety of uses in the modern food industry, especially as livestock feed, cooking oil and in the food processing industry. Turzi particularly ascribes the drastically increased demand for soybeans from the turn of the millennium, to the basic global demographical developments and the economic ascend of developing countries (Turzi 2012, p.3). China clearly stands out as the most dynamic source of demand for Brazilian soybeans. The Chinese share of global soy imports increased from 15 % in the year of 2000 to a level of 53 % in 2009, also displacing the European Union as the largest importer of Brazilian soybeans in the course of the past decade (Brown-Lima et. al. 2010, p.4).

Interviewee 3 sustains that especially the Chinese entry into the WTO in 2001 and the exponential increase of its demand for raw materials since then, has wielded a heavy impact on the Brazilian production of oil seeds,- of which soybeans are overwhelmingly predominant (Interviewee 3). Though table 5.1 below does not include the exports of soybean crush and oil, the significance of China as a purchaser of Brazilian soybeans is clearly expressed:

<b>Table 5.1: Evolution of Brazilian raw soybean exports from 2000 to 2009 (in million metric tons).</b>	<b>2000</b>	<b>2009</b>
<b>Total exports</b>	11.4	28.4
<b>Exports to China</b>	1.8	15.9

Source: Brown-Lima et al. 2010 p.9 & Rural Centro 2011.

As can be seen above, Chinese purchases of Brazilian soybeans constitute nearly all of the increase during the first decade of the millennium, which strongly indicates the importance of the emerging Sino-Brazilian commercial relationship, regarding soy production.

## 5.2 Global ties to local expansion

The goal in the second part of the analysis is to understand how the increased global demand for soy from 2000-12, has provoked the expansion of soy frontiers in Brazil. This is done in a quantitative analysis, consisting of a series of correlations between the total annual value of international soy trade on the one hand, and the area sown with soy in the Brazilian states, on the other. The value of international soy trade is used as a proxy for global demand, because it automatically reflects the quantitative amounts of soy which is traded globally, and the price level of soy. The goal has also been to trace the expansion of soy frontiers within the individual states, in order to understand in which regions this development has been particularly significant. This will also aid the understanding of how regional interests affect regulation on the national political level in analysis 2 and serve as a base for understanding the basic layout of the territorial dimension of soy expansion, examined in analysis 3.

A series of bivariate Pearson's products moment correlations were conducted in SPSS, between the annual value of internationally traded soybeans including soy crush, as the independent variable, and the number of hectares sown with soy within the given state, as the dependent variable. The years from 2001-11 served as observations (data for 2000 and 2012 were not available). Some preliminary analyses were conducted to check for any possible violation of the linearity, normality and homoscedasticity assumptions (See table 5.2).

<b>Table 5.2: Results from correlation between the value of internationally traded soy and cultivation expansion for each state. (See appendix 3 for all outputs.)</b>			
<b>Name of state</b>	<b>Assumptions of linearity, normality and homoscedasticity</b>	<b>Level of significance</b>	<b>Strength of relationship</b>
<b>Acre</b>	<b>No production</b>		
<b>Alagoas</b>	<b>No production</b>		
<b>Amapá</b>	<b>No production</b>		
<b>Amazonas</b>	<b>Linearity and distribution problems</b>	<b>,005</b>	<b>-,80</b>
<b>Bahia</b>	<b>Checked</b>	<b>,002</b>	<b>,85</b>
<b>Ceará</b>	<b>Checked</b>	<b>,010</b>	<b>,80</b>
<b>Distrito Federal</b>	<b>Linearity problems</b>	<b>,189</b>	<b>,45</b>
<b>Espirito Santo</b>	<b>No production</b>		
<b>Goiás</b>	<b>Linearity problems</b>	<b>,408</b>	<b>,29</b>
<b>Maranhão</b>	<b>Checked</b>	<b>,001</b>	<b>,86</b>
<b>Mato Grosso</b>	<b>Checked</b>	<b>,038</b>	<b>,66</b>
<b>Mato Grosso do Sul</b>	<b>Linearity problems</b>	<b>,253</b>	<b>,40</b>

<b>Minas Gerais</b>	<b>Linearity and distribution problems</b>	<b>,435</b>	<b>,28</b>
<b>Pará</b>	<b>Checked</b>	<b>,010</b>	<b>,76</b>
<b>Paraíba</b>	<b>No production</b>		
<b>Paraná</b>	<b>Checked</b>	<b>,020</b>	<b>,69</b>
<b>Pernambuco</b>	<b>No production</b>		
<b>Piauí</b>	<b>Checked</b>	<b>,001</b>	<b>,89</b>
<b>Rio de Janeiro</b>	<b>No production</b>		
<b>Rio Grande do Norte</b>	<b>No production</b>		
<b>Rio Grande do Sul</b>	<b>Problems of distribution</b>	<b>,061</b>	<b>,61</b>
<b>Rondonia</b>	<b>Checked</b>	<b>,003</b>	<b>,83</b>
<b>Roraima</b>	<b>No production</b>		
<b>Santa Catarina</b>	<b>Checked</b>	<b>,002</b>	<b>,84</b>
<b>São Paulo</b>	<b>Linearity problems</b>	<b>,106</b>	<b>-,54</b>
<b>Sergipe</b>	<b>No production</b>		
<b>Tocantins</b>	<b>Checked</b>	<b>,032</b>	<b>,67</b>

Source: IBGE 2013, International Trade Centre, 2013

Highlighted in table 2 are the states where these assumptions were not violated and at least a one-tailed significant relationship between the variables was identified. The strength of the relationship for all these cases found significant was between 0,66 and 0,89, which Pallant characterizes as strong relationship (Pallant 2010, p.134).

The states where soy cultivation appears to respond most to the increase in global demand, are mainly situated in the central and northern part of the country, in what it also known as soy frontier regions, on the Cerrado savannah, or in the outskirts of the Amazon. As international demand has risen quickly since 2000, the high correlation with cultivation expansion in the frontier regions also reflects the fact that due to large amounts of uncultivated land, these states also represent the largest inclusion of new lands for soy production. Thereby, the most dynamic expansion of soy production to meet international demand after 2001 can be traced to these frontier states, and not the “old” but still significant soy producing states, such as Mato Grosso do Sul, Minas Gerais, Rio Grande do Sul, Paraná and Goiás, where new land has been scarcer.

It can thereby be concluded that the increased soy cultivation – and the possible impacts of this, - can be traced to some fundamental tendencies of primary commodity demand within the global economy, in line with the basic presumptions within the theoretical notions of periphery conditions (see section 2.1).

## 6.0 Analysis of Regulatory Developments

The analysis of regulatory developments is directed towards sub-question 2, in order to understand how these have impacted upon the expansion of soy production. The analysis also focuses upon examining the political influence of agribusiness, which is a synthesized periphery condition pertaining to sub-question 3.

### 6.1 External influences on agricultural policies

During the 1990s, the Brazilian economy passed through a process of international opening, which took place in a global context of liberalization, not at least regarding agricultural policies (Braun et al. 2007, p.41). The Uruguay Round negotiations from 1986 – 1994 below GATT gave way to the formation of WTO, which Brazil joined in 1995 (Cassel & Patel 2003, p.11). The WTO agreement, established in August 1994, was based on reforms within three fundamental pillars; the reduction of domestic support, market access and price subsidies (Rodrigues 2006, p.37). The Uruguay Round thereby represented a significant step in the direction of liberalization of agricultural markets.

Brazil, which was within the group of developing countries, was obliged to reduce export subsidies and import tariffs with 24 % and domestic price support with 13.3 % through a compliance period of 10 years (Cassel & Patel 2003, p.11). The Mercosur membership from 1991 also implied the reduction of public support for agriculture, along with the opening of markets within the group of signatories (Ibid 2003).

This led to a large increase in international trade and agricultural exports, in a situation in which control with import and export had passed on to be regulated only by exchange rate and tariff instruments (Braun 2007, p.41). Agricultural exports surged to nearly double during the period; from US\$ 5.4 billion in 1990 to US\$ 10.1 billion in 2001. Notably, the international integration had also created a climate in which the export of soybeans gained a large potential for growth (Ibid 2007, p.42).

These developments have largely been welcome at the political level, due to the important economic role that agricultural exports gained in the 90's. Roberto Rodrigues, who was Minister of Agriculture during the first term of the Lula Government, wrote in an article in 2001 how the future goal should be to increase the agribusiness participation in exports, through a series of favorable policies at both the national and the international level (Brazil, SPA, 2001). As Scanlan (2012) emphasizes, these developments follow imperatives from the international institutional level of bringing agricultural production in line with the logic of compara-

tive advantage and export-orientation.

Delgado (2008) assumes a critical posture towards this development, which the author refers to as the “constrained adjustment to globalization and its manifestations, by the Brazilian economy.” Such development enforces what Delgado considers an unfortunate division of Brazilian agriculture into two different branches in terms of social participation and the destination of production; one tied to the internal market and the other tied to the external market and export. (Delgado 2008, p.29)

### 6.1.1 Rural mobilization at the international level

The international trade negotiations in the 1990s also came to spur the articulation of a common agenda amongst Brazil’s different rural interest groups, which subsequently came to influence policymakers acting through negotiations. In the course of the the Uruguay round, the Brazilian Agricultural and Livestock Confederation (CNA) began accompanying the negotiations, followed by a range of smaller sectorial interests’ organizations. At this early stage, the rural interest’s organizations participation in the negotiations, - which previously had been very limited - was characterized by a lack of coordination and their posture was mainly defensive. (Brazil, SPA. 2000 pp.3)

In the late 1990s, a series of agricultural interest groups created the Permanent Forum for International Agricultural Negotiations, defining mutual interests for Brazilian agriculture. In cooperation with the Brazilian Agricultural Ministry, a joint agenda for negotiations at the international level was formulated. Though Seattle 1999 produced small negotiation results, this became a landmark for Brazilian rural mobilization. Through strengthened organization and a strong common ground, rural interests significantly influenced the government’s posture on a range of critical issues discussed within the WTO, regarding market access, internal assistance and export subsidies. (Brazil, SPA 2000 p.4)

After concentrated efforts, Brazilian agribusiness then reached a point at which it had become capable of affecting international negotiations (Brazil, SPA 2000, p.9). Thereby, an indirect channel was also established for influencing the domestic regulatory framework through mandatory regulation.

Beyond any considerations regarding the possible embedded ideological biases of international monetary and financial institutions, the trade negotiations provided a forum within which the alliance between export-oriented agricultural interests could be cemented. The state, furthermore, came to serve as an important participant within this alliance, and as Frank emphasizes, the international institutions



came to function as a vehicle for the regulatory consensus reached between private and public participants at the international sphere, to be extended to the domestic level (see section 2.1.5). Brazilian agricultural interest had thereby come to participate in a process of legislative formation, which would ultimately result in mandatory regulatory requirements at home. The international institutions also functioned as a forum within which the structural links, conceptualized by Cardoso and Faletto, between national and international export-oriented agricultural interests, could be formalized through the participation of nation states (see section 2.1.5).

## 6.2 Internal agricultural liberalizations

International obligations and fiscal crisis led to a wave of liberalizations of Brazilian agriculture in the 1990s, and the soy sector moved into a situation with an unprecedented low degree of governmental intervention (Brazil, SPA (1) 1999, p.79). Some of the most significant changes within the sector were the tendencies of dismantling of the public support schemes, the opening of the economy and commercial liberalization, deregulation and monetary stabilization programs (Delgado 2008, p.28).

In line with the requirements of the Mercosur and WTO agreements, state support for domestic agricultural production was strongly reduced (Cassel & Patel 2003, pp.23-24). Within a domestic context of fiscal crisis, this led to strong reduction in public credits for agriculture and to the substitution of price guarantee policies with cheaper and less extensive programs (Brazil, SPA (2), 1999, p.13).

The rural credit cuts became manifest through the abandoning of low interest loans. Hereafter, loans from private sources mainly became available for large scale agriculture, which could provide the necessary collateral and which was better economically bolstered for enduring a period with high interest rates (Cassel & Patel 2003, pp.24-25). Beraldo underlines how the reduction of state intervention and support schemes made agricultures ever more dependent upon deposition on the international market (Brazil, SPA, 2000 p. 3). Cassel and Patel encounter a tendency of credit reduction policies in the mid-1990s to wield a stronger impact upon crops for domestic consumption, than it did upon export crops: rice and wheat experienced heavy support reductions whereas soybeans were relatively spared, with much lower aggregate cuts (Cassel & Patel 2003, p.24). Furthermore, in 1996 soybeans and its derived products became the object of a specific exemption of the internal circulation tax (ICMS), which raised profits for producers and led to an immediate hike in exports (Brazil, SPA (1), 1999 p.78).

The monetary stabilization program, the Plano Real, wielded a significant im-

pact upon Brazilian agriculture, meaning strong valorization of the real exchange rate until 1997 and a period of high interest rates (Delgado 2008, p.19). Still, these impacts were partially offset by a favorable development of global prices for soybeans and other export-crops in the later part of the 1990s (De Melo 1999, p.148). The disadvantageous effects of high exchange rates upon agro-exporters disappeared with devaluation policies from 1999 (Ibid 1999, p.155). Thus, the effects of the elevated interest rate below the Plano Real, combined with the impacts of commercial liberalizations and reduction of public agricultural support, came to imply a range of significantly negative consequences for smallholders, producing for local consumption (Delgado 2008, p.29).

The fiscal crisis of the 1990s represents an external pressure which many governments in developing countries historically have been subjected to. Often the attempts to stabilize the economy, such as the Plano Real, have unwillingly wielded significant social consequences. In this regard, the broad array of agricultural policies adopted during the 1990s in Brazil, appear to imply a favorable edge towards export-oriented agriculture. This tendency is largely in line with both Ciccantelli's (2012) and Scanlan's (2012) conceptualizations of the state in raw material exporting countries, tending to disproportionately favor these interests, with the goal of capital inflows and national developments in mind (see section 2.1.5). Such perceptions are again expressed by earlier Minister of Agriculture, Roberto Rodrigues, who underlined the great importance of the agribusiness exporters during this period, as the "savior of the balance of payments" (Brazil, SPA, 2001 p.8). In explaining favorable attitudes of politicians towards export-oriented agriculture, interviewee 5 points to some essential global comparative advantages of this sector, which industry and service sectors lack, turning agriculture into a vital source of external revenues (Interviewee 5). The favorable edge of the reforms towards export-agriculture could in that case be explained by Lindblom and Woodhouse (1993), as the systematic concession of inducements by policymakers towards business sectors, which are considered of special importance, as part of a process of pro-active adjustment to its needs (see section 2.1.5).

This raises the question of whether a disproportionately favorable attitude towards export-oriented agriculture, such as the soy sector, is mainly the product of an internalized logic, -partly related to international economic consensus of a given period - or whether it can be perceived as the consequence of direct interest group pressures. The behavior and direct influence of the rural pressure groups in Brazilian politics during the first decade of new millennium will be the central issue in the following part.

## 6.3 The legalization of Transgenics

The political representation of rural interests has historically been very strong in Brazil, but the roots of the present parliamentary coalition, referred to as the 'bancada ruralista', can be traced back to the constitutional assembly of 1986-88. Rural representation increased drastically with the legislature of 1995-1999, when the bancada ruralista reached a representation of 116 deputies. Vigna defines membership of the bancada ruralista in terms of the stated profession of the deputies, but also underlines that the group is able to mobilize much greater parliamentary support from time to time, through sympathies and bonds to other parliamentarians. (Vigna 2007, pp.7-8)

Simionatto and Costa emphasize this capability for mobilization and creation of alliances and cross-parliamentary coalitions, as the true strength of the bancada ruralista, which often mobilizes much larger support than the immediate number of its constituents would suggest (Simionatto & Costa 2012 p.224). With a tradition of low partisan discipline and a representational system implying strong regional/rural representation within parliament, the ruralistas often work closely together in broad parliamentary coalitions (Interviewee 5).

The bancada ruralista has managed to occupy a range of influential positions within the national governing sphere. Vigna underlines that the way that the bancada normally exercises political power is qualitatively different from the way political parties work; its goals can often not be defined in terms of the pursuit of any particular governing strategy, but rather through the obtainment of the largest possible amount of budgetary resources and concessions for the broader export-oriented agricultural sector. (Vigna 2007 pp.13-14)

The ruralistas have also had a strong support in the Senate since 2003, where especially states in the soy frontiers regions of Mato Grosso, Tocantins, Piauí and Maranhão have been characterized by a high degree of representation from this political faction (Ibid 2007 p.24). Barcelos and Berriel also state that the pro-transgenic struggle has been one of the most important factors in strengthening the bancada ruralista as a highly significant parliamentary force today (Barcelos and Berriel, 2009 p.14).

Through Frank's terminology, the bancada ruralista can be perceived as the political agent for drawing the configurations of the internal system in the direction of raw material export, on behalf of the economic interests of these sectors (see section 2.1.5). Such merger of economically strong groups and their extensions within the political realm, also appears as a necessary premise within Cardoso and Faletto's description of dependency, when they state that "the understanding of capitalist development requires the analysis of social classes and political context

that allow or prevent the actualization of different forms and phases of capital accumulation” (Cardoso & Faletto 1979, p.xx). Similarly, the increasing weight of the soy sector cannot be understood independently, from the favorable regulatory environment and the concessions acquired through its political representatives in form of the *bancada ruralista*.

#### 6.4.1 Illegal planting and pressure for legalization

Brazil’s obligations below the TRIPS agreement of 1994, regulating intellectual property rights under the WTO auspices, led towards the implementation of the Patent law, - *Lei de Patentes* - in 1996 and later in 1997 to the Crop Species Law, - *Lei de Cultivares*- extending patent rights to the biological realm. Thereby, the juridical-commercial foundation had been laid for the introduction of transgenic crops. (Daroit 2007, p.119)

The following year, in 1998, the US based agribusiness concern Monsanto applied for permission to commercialize the RoundUp Ready (RR) soybean, which was granted by the public body regulating the liberalizations of transgenic products, CNTB. Hereupon, the Brazilian Institute for Consumer Protection and Greenpeace raised the case at The Federal Justice court, which blocked the liberalization of transgenic soy on grounds of precautionary principles. (Taglialegna 2005, p.36)

In 1998, the first reports began to appear of transgenic soybeans being planted illegally in the Southern State of Rio Grande do Sul, after having been smuggled in from Argentina, where it had already been legalized (Daroit 2007, p.28). In 2003, agricultures who had been planting illegally began to pressure the government to legalize the cultivation and commercialization of transgenic soy, as the farmers claimed that they otherwise would be subjected to great losses (Ribeiro 2003, p.1). In March 2003, large demonstrations were held in favor of legalization, which also made the Ministry of Agriculture pledge to start investigating the possibility of liberalizing legislation on the issue (Daroit 2007, p.152). In a context of great pressure from rural interests but also from within parliament, the Temporary Measure 113, which permitted the commercialization of transgenic seeds until the 31 of January 2004, was signed by Brazilian President, Lula da Silva (Medida Provisória N° 113, 2003).

The temporary permission to commercialize transgenic soybeans did not put an end to the issue, but rather exacerbated the many-folded pressures for a permanent legalization. Short after the ballot, *ruralista* factions in parliament initiated a political campaign to remove the existing legal obstacles for a permanent legalization. The *bancada ruralista*, which before then had been mainly associated with parties

to the right in Brazilian politics, could now also muster support from centrist parties within the governing coalition, and even sympathizers from Lula's workers party, PT (Alencar, 2003). The continued pressures led to the adoption of the Temporary Measure 131 of Sept. 25, which further prolonged the period for legal commercialization of transgenic soy, to the 31 of December, 2004 (Medida Provisória N° 131, 2003).

The debate also came to be influenced by multinational agribusiness companies, and in particular Monsanto, which as the patent holder of the illegally used RR seeds, held high stakes in their possible legalization. Monsanto worked in close conjunction with the Agricultural Federation of Rio Grande do Sul, in order to convince public opinion and politicians that the rejection of transgenic crops would imply a stagnant and backwards agricultural sector (Dariot 2007, p.139). In December 2003, Monsanto ran a grand countrywide campaign in television, radio, newspapers and cinemas, propagating the introduction of transgenic crops (Ibid, p.142).

Lindblom and Woodhouse (1993) describe the importance of historical bonds between private interests and parliamentary groups, which also depicts the process, through which agricultural interests obtained the concessions of MP 113 and 131. By seeking to influence public opinion, Monsanto's extensive media campaign falls in line with what these authors refer to as the control process of targeting policymakers by bringing the electorate's demands in line with business interests. Lindblom and Woodhouse see this strategy of bending public demands as an important supplement to exercising other types of pressures on public officials by business (Lindblom & Woodhouse 1997, pp.96-97).

The process leading towards the temporary legalization of transgenics also seems to display a governmental attentiveness and accommodativeness, towards the economic needs of the agricultures who initially planted RoundUp ready soy illegally. This reflects a tendency of internalization of private actors' economic wellbeing, which these neo-pluralist authors ascribe to policymakers. Thus, it appears probable that the conjunction of private pressures from the triangle of international agro-enterprises, Brazilian agribusiness and the bancada ruralista, along with the incorporated imperative for economic growth, made policymakers take the first steps towards legalization of transgenic soy cultivation.

#### 6.4.2 Towards a new biosecurity law and permanent legalization

The Temporary Measures 113 and 131 did not succeed in halting the expansion of cultivation with transgenic seeds, which hereafter came in high demand by farmers all over Brazil (Folha, 2003). The Temporary Measure 113 in particular, - which was considered a partial victory for the proponents of legalization, - spurred farmers to continue planting illegally, expecting further future legal exemptions (Dariot 2007 pp.152-153). This led towards a situation in which broad segments of society, both those in favor and against legalization, demanded clarity on the issue and a new biosecurity law, - the basic legal framework regulating transgenic products (Taglialegna 2005, p.8).

In the early drafting of the law, the bancada ruralista became one of the principle channels for reception of amendment proposals from actors favoring legalization. Amongst the most active entities in this process were the National Confederation of Agricultures and Monsanto (Ibid 2005, p.56-57). Within the special Parliamentary Commission charged with its initial formulations, Aldo Rebelo of the bancada ruralista was at first made chairman, but after strong lobbying efforts by then Minister of Environment, Marina Silva, he was substituted with the environmentalist Renildo Calheiros (Agência Brasil, 2004). Consequently, a proposal implying relatively strong precautionary measures concerning the use of transgenic products was then passed on to the Senate, which approved the law with a range of amendments, meaning that the it had to return to the deputy chamber (Folha, 2004). At this point, the bancada ruralista had once again managed to place one of its constituents, Darcísio Perondi, as chairman of the Special Commission which had to elaborate the draft, again changing the draft to favor legalization (Taglialegna 2005 p.64). Having been integrally approved by the Senate, the law was passed in the Deputy Chamber on March 2, and after 7 partial vetoes with small significance for the final content, the new Biosecurity law was signed by President Lula da Silva on March 24, 2005 (Christina, 2005).

A long range of the demands from pressure groups in favor of the legalization of transgenic products, were incorporated within the final version of the law. The only limitations for legalization would hereafter be a veto from the Ministerial Council (Taglialegna 2005 p.78). Yet, with strong forces within the Lula government favoring the introduction of transgenics, the first authorizations for the legal use of transgenic soybeans could be given the same year.

The dispute over the legalization of transgenic products from 2003-2005, was characterized by lines of conflict between NGO's, environmentalists and the Ministry of Environment, as opposed to rural groups, the bancada ruralista and the Agricultural Ministry (Ibid 2005 pp.42-43). Throughout the process, the governmental institutions assumed a mitigating posture, attentive of the arguments of both sides, though importantly, the final decisions came out with a clearly favora-

ble edge towards the coalition propagating legalization. This would support the neo-pluralist assumption of a 'privileged position of business' which grants it a preferential regulatory treatment above other groups within society, due to governing politicians' emphasis on the importance of economic growth (see section 2.1.5).

The channels of direct contact between private actors and policymakers, as it is drawn up by Lindblom and Woodhouse (1993), became activated in terms of the intensive stream of technical amendment proposals from pro-legalization interests and transmitted into policy through the *bancada ruralista*. The combination of direct pressure, historical rural bonds with parliamentary groups and the proactive behavior of offering inducement to business, also underlines the usefulness of the neo-pluralist perspective in order to account for the *bancada ruralistas* access and influence upon the decision to legalize transgenics. The regulatory processes were not circumvented in any instance, but rather, the safeguarding measures were constantly being moved in a permissive direction. Thereby, the regulatory framework came to accommodate the technological developments within Brazilian agriculture, which were already expanding due to intrinsic economic dynamics, and could not control this development according to its social desirability. The legalization of transgenics, and both the direct and indirect political influence exercised by particular market actors through a variety of channels to the political level, thus stands as a process characteristic of what Lindblom refers to as those of a market-oriented polyarchy (Lindblom 1977, 193).

Spanning over foreign agribusiness working in conjunction with domestic agricultural interests, represented both by private actors and as a dominant political class, the pro-transgenic coalition also came to be characterized by the type of structural links, which Cardoso and Faletto elaborate (see section 2.1.5). These authors underline that such links cannot be perceived as any direct exploitation or cohesion by external forces, but rather as the "coincidements of interests between local dominant classes and international ones" (Cardoso & Faletto 1979, p.xvi). In the case of transgenic legalization, a clear coincident of interests between national agricultures, international agribusiness and allied political factions, became influential in changing legislation. The pro-transgenic coalition also approximates Frank's conceptualization of the historical bonds between domestic and foreign export-oriented classes in Latin America, which through the appropriation of political power maintains a system biased for raw material production (see section 2.1.5).

## 6.4 The New Forest Code

The later part of the first decade of the millennium, as well as the beginning of the second, was characterized by an increasing soy production, which has led to continued demands directed towards policymakers of further improving the sector's competitive position.

The rural sector's links to policymakers and its representatives within parliament through the *bancada ruralista* has also been at a high. Some estimates have pointed towards the *bancada ruralista* as the most influential interest group within the political space, in the legislature from 2007-2011 (Barcelos & Berriel 2009, p.13). In the legislature of 2011-15, the *Bancada*, after having been formalized as a 'parliamentary front', reached 208 members of the Deputy Chambers 513 representatives, spanning over 14 different political parties.

Amongst the most significant political accomplishments of this parliamentary front, has been the revision of the Forests Code; an extensive framework of environmental laws, defining the basic limits for cultivation in environmentally sensitive areas as well as the overall extend of legally cultivable land (Brazil, Law nr. 4771). The dispute surrounding the formation of the law came to stand between mainly large agricultures' needs to expand production on one hand, and the conservation of the environment on the other (Brazil, SAE, 2012, p.2).

The legislative process leading towards the implementation of a new forest code dates back to 2009. In May 2011, the first draft for the law was passed in the Deputy Chamber. This draft contained the amendment n° 164, opening up for the possibility of continued cultivation on territories and environmental reserves, defying the line of President Dilma Rousseff, who had been strongly opposed to this amendment (Globo, 2011). The law passed on to the Senate where it was subjected to 26 amendments after it was finally voted through in December 2011. At that point, the law still exempted farmers for all land clearance from before 2008, approximately 34 million hectares, which in total amounted to an area the size of France (Falcão, 2011). In April 2012, a final version of the law, which had been made further flexible upon return to the Deputy Chamber, was passed, which was seen as a clear defeat for President Dilma Rousseff and a significant victory for the *bancada ruralista* (Falcão & Angelo, 2012). The following month though, Dilma Rousseff laid down 12 Presidential vetoes in form of a temporary decree, primarily limiting the cultivation on hillsides, hilltops, in river margins and mandating a more extensive replanting obligation on deforested areas. The decree was made permanent in October 2012 (Folha, 2012).

The final outcome granted wide amnesty for earlier transgressions of deforestation and generally resulted in a significantly laxer environmental regulation,



making the result of the new Forest Code a clear victory for agro-interests (Interviewee 5). Interviewee 4 underlines that the final outcome of the new forest code can be seen a backwards step for Brazilian environmental legislation, through what the interviewee characterizes as a general reduction of preserved areas, river buffers and native hilltop vegetation. The interviewee also connects the change of the forest code to the influence of large scale producers and domestic as well as foreign agribusiness enterprises, particularly emphasizing the soy sector. (Interviewee 4) Interviewee 5 leads attention towards the emerging contours of a more profound consequence of the process of the Forest Code formation; that the amnesty for past illegal deforestation combined with the display of rural political strength, leads even more agricultures to ignore existing legislation. In this regard, the interviewee points to recent increase in deforestation of the Amazon – the first in nearly a decade. (Interviewee 5)

In order to understand how the revision of the Forest Code could result in such a permissive legal framework as became the case, Cardoso and Faletto's concept of structural links strongly approximate the way both domestic and foreign agribusiness, along with allied segments within the state have been working in conjunction to shape legislation in favor of agribusiness. Frank's illustrations of how the state becomes an active agent in shaping a system, dependent upon and biased in favor, of raw material exports is also largely in line with those of Scanlan and Ciccantell, and closely approximate the evolution of Brazilian export-agriculture and the soy complex. (See section 2.1.5)

What stands as particular to this process is that President Rouseff was outmaneuvered by a majority in parliament. Thereby, the parliamentary rural coalition was capable of inflicting a major defeat upon the elected president, resulting in very favorable legislation for future monoculture expansion. From the WSA perspective, Wallerstein points to the danger of perceiving the state as a unitary actor, but rather emphasizes how the state reflects the interests of enterprises, which to a large degree again depend upon governmental concessions in order to compete in a global perspective (Wallerstein 1984, p.7). The state gains an important function by mitigating the ability of different economic groups to profit from participation in the world market (Ibid 1984, p.30). In a context of large prospects for agro-export based profits, the question stands as to whether any political regulation significantly restraining this development, is in effect possible.

## 6.5 Agricultural Interests Today

In describing the broader development of agribusiness influence within Brazilian politics, interviewee 4 emphasizes how the political leverage of these interests has become proportional to their economic strength (Interviewee 4). Interviewee 5 points to the same tendencies in recent years, when a low national growth of 1-2 %, has been dwindled by a 6-7 % growth rate within agriculture. Hereby, the interviewee underlines that this sector gains even more political leverage, especially through its role as a vital exporter, in a national context where Brazil begins to experience falling external surpluses (Interviewee 5).

This indicates the presence of a feedback loop, between the dependent variable of soy expansion and the moderating variable of regulation, forming a reciprocal dynamic in which a more permissive regulation generates higher profits, which in turn is realized into even more political leverage and influence. Although the increase in global demand appears as a necessary premise in order to kickstart the process, the intertwining of expansionary pressures and political concessions in an escalating circular development, stands clear through the period examined.

In contrast to Skocpol's concern of WSA scholars' excessive attention to the significance of dominant classes, the rural coalition did manage to exercise a high degree of political influence, though through a strong foothold within existing political institutions (see section 2.2). Not even the use of political capital of President Dilma Rousseff was sufficient to halt the approval of the Forest Code. This does not only point to the trade-off between economic inflow and social and environmental considerations, which governments in many recourse abundant third world countries must face. What rather becomes evident, are the domestic political implications of a country's insertion into the global productive system, in terms of how a narrow range of highly performing economic sectors come to obtain a disproportionate political leverage.

## 6.6 Conclusion upon regulatory developments

In the following, the conclusions of the analysis are summarized, with each regulatory measure presented in relation to its impact on soy expansion and the identification of the periphery condition of disproportionate influence of agribusiness.

<b>Regulatory measure</b>	<b>Impact on soy expansion</b>	<b>Disproportionate agribusiness influence identified in its formation</b>
1990s WTO and Mercosur membership: export subsidy reduction, import tariff reductions and domestic prices support cuts.	No significant previous <b>export subsidies</b> on soy. <b>Import tariff reductions</b> were not damaging soy which was globally competitive. <b>Domestic price support cuts</b> relatively favoring soy production vis-à-vis other crops.	Brazilian negotiation agenda mostly influenced by large-scale agricultural organizations.
1995 Plano real: High exchange rates and high interest rates	<b>High exchange rates</b> negative to all export-oriented agriculture, but only until devaluation in 1999.  <b>High interest rates</b> favoring financially strong large-scale agriculture relative to smallholders.	Nil
1996: ICMS exemption	Exemption of soy from internal circulation tax, increasing production incentives and exports.	Pro-active political measure favoring the soy sector.
2003: MP 113	Legalizing transgenic soy production and commercialization until January 31, 2004.	Strong pressure from agricultures and rural groups in parliament.
2003: MP 131	Legalizing transgenic soy production and commercialization until December 31, 2004.	Strong pressure from agricultures, Monsanto, rural groups in parliament and factions of government.
2005: New biosecurity law	Permanently legalizing all transgenic crops approved by the Ministry council (de-facto legalization of transgenic soy).	Joint pressure from agricultures, domestic agribusiness, Monsanto, rural groups in parliament and factions of government.
2012: New forest code	Relaxing environmental restrictions on areas for cultivation.	Strong pressure from national agricultures, international agribusiness and rural groups in parliament.

## 7.0 Analysis of the soy commodity chain

The analysis of the soy commodity chain is aimed at understanding the evolution of indicators pertaining to the concept of periphery conditions from 2000 to 2012, an objective below sub-question 3.

### 7.1 Land Inputs

#### 7.1.1 Equality in land tenure

Privately owned land in Brazil is characterized by a markedly unequal distribution. Table 7.1 below illustrates how the large group of small properties below 10 hectares, constituting nearly half of all rural properties, only accounts for 2.36 % of private land holdings, while the marginal group of properties above 1000 hectares, owns 44.42 %.

<b>Table 7.1: Extend and distribution of rural property.</b>	<b>Percentage of registered properties.</b>	<b>Total area of the properties (hectares).</b>
Less than 10 hectares	47.86 %	2.36 %
10 to 100 hectares	38.09 %	19.06 %
100 to 1000 hectares	8.21 %	34.16 %
1000 + hectares	0.91 %	44.42 %

Source: Brazil, IBGE, 2006

The rural Gini coefficient, referring to equality of land distribution, has likewise increased from 0,857 to 0,872, in the period 1995-2006; meaning an increased inequality in land distribution during the period (Brazil, IBGE 2006). The Brazilian Institute for Geography and Economics ascribes much of the increase in land concentration to the surge in export-oriented farming - and soy in particular, - the expansion of the agricultural frontiers and the professionalization of agriculture (Folha, 2009). The two later factors have also constituted marked tendencies within the expansion of the soy complex, and have thus become intrinsically linked to this development.

Interviewee 4 also draws a more direct connection between soy expansion and land concentration, through what the interviewee perceives as an ever stronger tendency of land concentration due to the very efficient mode of production of modern soy cultivation (Interviewee 4). Thereby, agricultural reforms pushing many smallholders out of business in the 1990s, have been working in conjunction

with the emergence of an extremely efficient large-scale monoculture as soy production, to increase land inequality through expansion of this sector.

### 7.1.2 Crop distribution and food access

The increasing concentration of land on soy production also poses some questions about diversity of food production and local food security.

Family based agriculture is a particularly essential source of local food supply, because of its more diversified output of basic foodstuffs such as cassava, beans, wheat, corn and rice. Reviewing the overall figures for crop distribution, a noticeable decrease in the area sown with rice and beans can be observed during the period of rapid soy expansion from 2000-2010 (See table 7.2).

<b>Table 7.2: Hectares sown with main crops in Brazil.</b>	<b>2000</b>	<b>2010</b>
Rice	3.664.804	2.722.459
Beans	4.332.545	3.423.646
Cassava	1.709.315	1.787.467
Corn	11.890.376	12.703.373
Wheat	1.138.687	2.181.567
Soy	13.656.771	23.327.296

Source: IBGE, 2013.

Though, apart from a small increase in wheat production, the extend of the area dedicated to the cultivation of corn and cassava has largely remained constant, while a rapid increase in soy cultivation can be observed, indicating that soy expansion has been accounting for most new land incorporated for agricultural production from 2000-2010.

The fall in the area sown with rice and beans and the increasing relative weight of the area dedicated to soy cultivation, from 26 % of total cultivated area in 2001 to 39 % in 2010, does raise some questions about the diversification of agricultural production. From their study in northern Brazil, interviewee 1 and 2 found that pressures to remain competitive made smallholders prioritize cash crops such as soy, at the costs of locally consumed crops or sell their properties to soy farmers. The interviewees also encountered tendencies of pest transfer, occurring when the use of pesticides on soy fields led to a concentration of insects on locally consumed beans. (Interviewee 1&2)

Interviewee 4 mentions that in some parts of the Cerrado region, up to some

90 % of basic foodstuffs are imported, which has led to higher prices and wielded a disproportionate impact upon low-income families. The interviewee partly ascribes this to a bias against smallholder agriculture at the local political level, which often is dominated by large scale export-agriculture, meaning that federal local food support programs are poorly implemented by municipalities and states (Interviewee 4). This indicates that the issue of food security in relation to soy expansion also may depend much upon the specific geographical and local political context in the soy frontiers.

### 7.1.3 Soy: A concentration of production processes

In effect of the high degree of concentration of agricultural production on the cultivation of soy - a production process strongly oriented towards meeting the needs of external markets –an increasing part of the Brazilian economy and territory has been inserted into the international division of labor through specialized primary production. So, with the expansion of this sector from 2000 and the rises in inequality of land distribution, a high degree of concentration of production processes, as conceptualized by Wallerstein and Hopkins (1982), indicates the presence of this periphery condition in contemporary Brazil. This circumstance, per se, is negative perceived by “classical” WSA and dependency scholars, because of their bias against large scale export-oriented primary production. Yet, contemporary WSA perspectives such as Scanlan (2012) and Gareau & Borrego (2012) tend to focus more upon the problematic effects of this mode of production in relation to a range of more specific issues. In this regard, the impact on food access seems to wield different impacts from region to region, yet, on a national level the growing relative share of area dedicated to soy production does indicate some trends of cash-crop concentration.

In summary, the growing land inputs to the cultivation phase of soy production from 2000-2012, exacerbating land tenure inequality and instances of foodstuffs scarcity, does seem to accentuate the increased presence of the periphery condition of concentration of production processes (see section 2.1.2).

## 7.2 Environmental inputs

### 7.2.1 Soil degradation and agrochemical inputs

The regions of the expanding soy frontier, such as the center-west and the north of Brazil, are characterized by a very extensive scale of rural properties, - often be-

tween 300 and 50.000 hectares. The mode of production is mostly that of a highly industrialized monoculture, with an intensive use of technology and non-renewable recourse inputs (Cavalett 2008, p.39). Rotation of cultivations is not commonplace, which often contributes to soil degradation (Nassar & Antoniazzi 2011, p.12). In addition to this, some farmers neglect to use techniques such as direct planting or contour plowing, further increasing the risk of both degradation and erosion of the soil. It is estimated that in the absence of these measures, for every kilo of soybeans produced, 6 to 10 kilos of soil is lost in the process (DSC 2008, p.24). Other estimates of the soil loss due to intensive soy production are set between 8 and 20 tons of soil pr. hectare every year (Cavalett 2008, p.11).

The use of agrochemicals and fertilizers is an integral part of industrialized monoculture farming like most of the Brazilian soy sector. Table 7.3 below illustrates how cost shares of fertilizers and agrochemicals since 2007 have been at a level between 33 % and 43 % of total production costs, with fertilizers amounting for the bulk.

<b>Table 7.3: Average participation of agrochemicals and fertilizers in total soy production costs from 2007.</b>	Agro-defensives	Fertilizers	Total share
2007	15.69 %	17.80 %	33.49 %
2008	15.73 %	25.60 %	41.33 %
2009	11.87 %	35.60 %	47.47 %
2010	12.08 %	23.42 %	35.50 %
2011	9.57 %	25.29 %	34.86 %
2012	12,58 %	30.48 %	43.06 %

Source: CONAB 2007,2008,2009,2010,2011,2012.

Between 2003 and 2008, the average use of herbicides in Brazilian soy production increased from 2.8 to 4.2 kilograms pr. hectare (Meyer & Cederberg 2011, p.5). The extensive use of fertilizers and agrochemicals presents an input combination which implies the danger of a degenerative circle. The agrochemicals work by “sterilizing” the soil, destroying the naturally occurring biological organisms, and thereby also much of its fertility. This increases the need of using fertilizer, the basic ingredients of which - nitrogen, phosphorus and potassium – constitute a suboptimal nutrition for the plants, making them more vulnerable to insects and plagues, which again increases the need for the use of pesticides, insectides and herbicides. (Barreto & Ribeiro 2006, p.5)

The introduction of transgenic soy cultivation has - contrary to the initial claim - been intertwined with the increase in the appliance of agrochemicals, of which

Brazil has been the world's largest consumer since 2008 (Interviewee 4). From the first permissions for transgenic soy cultivation were formally given in 2003, this has spread rapidly to cover nearly 90 % of the area dedicated to soy production within Brazil today (Reuters, 2012). The genetically engineered seeds are sold in a "package", along with the herbicides necessary for its use.

Public regulation appears to be accompanying the pressures for expansion. From 1998 to 2004 the maximum legal value for the active ingredient in soy herbicides, Glyphosate, was increased fifty-fold along with the introduction of transgenic soy; from 0,2 to 10 parts per million (Lazzarini, 2010). Research on the soy lifecycle inputs from 2008, indicates that for every kilo of soy produced in Brazil, 139 grams of fertilizer and 3 grams of agrochemicals are needed (Cavalett 2008, p.60).

The market for transgenic seeds and herbicides is characterized by a high degree of conglomeration, in which a few multinational enterprises, such as Monsanto (US), Syngenta (Switzerland) and Bayer (Germany) are central players (Schlesinger 2008, p.7). The increasing dependence upon herbicides for patented transgenic seeds, combined with the scalar expansion of soy production, has resulted in an increased flow of capital to these external actors on the Brazilian soy market. This has created a profit-repatriating mechanism in the very beginning of the soy commodity chain, before the actual cultivation phase, which diminishes the national share of income from this activity. Cavalett underlines how the excessive use of fertilizer and agrochemical inputs has made production profitable at the present price level, though, thereby creating a mechanism of dependence implying high production costs and environmental damage (Cavalett 2008, p.83).

### 7.2.2 Deforestation and biodiversity

The bulk of the territory incorporated for the expansion of soy production has been areas, previously characterized by native vegetation, and mainly the vast inland Cerrado savannah (Nassar & Antoniazzi 2011, p.5). From previously being an unfertile region due to the high acid content in the soil, new soil-treatment technologies have made soy cultivation possible, up until the point today, when some 62 % of total soy production comes from the Cerrado (Embrapa, 2013). Economic attention has been centered on the Cerrado because of its large potential for agricultural expansion. The Cerrado stretches over approximately a fourth of the Brazilian territory, and occupies some 2.116.000 km<sup>2</sup> (Klink & Machado 2005, p.149). The marginal costs for expansion of soy production in this region are amongst the absolutely lowest in the world (Economist, 2010).

Yet, the expansion into the Cerrado region has also come to markedly affect



the biosphere. The large amounts of territory needed for soy production presents some environmental problems regarding the loss of native vegetation, but also regarding biodiversity. In effect of its localization, hydrography, varying elevation and climate, the Cerrado savannah is one of the most biodiverse areas in the world (Schlesinger 2008, p.12). The region is home to half of Brazil's bird and reptile species, roughly a third of its mammal species and around an eighth of the country's plants species (Klink and Machado 2005, p.149).

Estimates based on satellite images made by the Brazilian Environmental Ministry suggest that by 2008, some 47 % of the native Cerrado vegetation had been lost (Brazil, MMA 2010, p.20). The rate of annual deforestation between 2002 and 2008 reached 14.000 km<sup>2</sup> (Ibid). Though most of this biosphere loss has been to livestock pastures, recent increases in soy cultivation have also been a major factor in this development (Interviewee 4). Studies conducted from 2002-2008 likewise indicate a high tendency of soy planting in municipalities also characterized by significant Cerrado deforestation (Vitali 2011, p.21).

### 7.2.3 Incorporation of the natural environment

The environmental recourse inputs into the Brazilian soy expansion have been an integral part of the present mode of production, which in the terminology of Hopkins and Wallerstein (1982) has come to incorporate land and entire regions within Brazil, into the axial division of labor of the world economy (see section 2.1.1). The inferior positioning of these types of production processes is not only due to the low economic value added, but also because of their exploitative nature. In line with Hall's (2012) theoretical descriptions, this trend of incorporation has also been unfolding as a one-way escalating process; increasingly consuming not only territory, at the cost of native vegetation, but also the very fertility of the soil as a depletable input to production (see section 2.1.1).

Seen from a global economic perspective, the incorporation of the Brazilian frontier lands for soy production is economically viable with a reasonably margin of profit, due to the present level of soy prices and structure of (non)valuation of inputs, in which land is abundant and nutrients of the soil can be freely exploited. Yet, calculations made by Cavalett, in which detrimental environmental impacts of the conventional mode of production are included, point to a negative profit margin of 14 % (Cavalett 2008, p.106). Thereby, Ciccantell and Smiths (2009) concept of ecologically unequal exchange comes to illustrate the non-valuation of depleted environmental factors, within commercial interactions between Brazil and the purchasers of its soybeans (see section 2.3). The regulatory framework during the expansion phase has thereby generated a subsidy-structure for soy pro-

duction, in which the exhaustion of natural resources becomes a necessary production input to ensure external balances.

## 7.3 Labor inputs

### 7.3.1 Employment?

The modern Brazilian soy sector tends to be characterized as a very knowledge and capital intensive production (Interviewee 1). The industrialized production system is widely mechanized and based upon the extensive use of fertilizer and herbicides, which is associated with a low need for labor power (Cavalett 2008, p.1).

Calculations of the average producer costs for soy production in the central Cerrado region, made first in 2007 by the Brazilian Ministry of Agriculture, concluded that of the total production costs, fixed and temporary labor costs only reached 1,23 %. In 2011, this number has risen to 1,84 %. By comparison, the average share of production costs for machinery, agrochemicals and fertilizer reached 49,2 % in 2007 and 54,29 % in 2011. (CONAB 2007, 2011)

At the outset of the extensive soy expansion in 2002, one employee in the center-west region could attend to an area larger than 200 hectares, whilst in regions where family agriculture was predominant, the same worker could see to only 15 hectares or less (Schlesinger 2008, p.6).

A general characteristic of modern soy farming is, that the larger the area cultivated, the less labor pr. hectare is needed, emphasizing the tendencies of large-scale monoculture producing rural exodus (DSC 2008, p.27). Interviewee 4 stresses that rural unemployment and exodus has been particularly strong in the south, where small and medium scale agricultures became the first to apply Glyphosate and plant transgenic soybeans, which are associated with a very low labor need (interviewee 4). Thus, even in spite of the rapid expansion of soy production during the past decade, the lack of potential to absorb rural labor force appears to have been a clear trend.

### 7.3.2 Labor conditions

In spite of the low relative weight of labor inputs to production, labor conditions on soy plantations are still often very poor. An analysis of 237 governmental reports on forced labor from 2000-2003 conducted by Folha do São Paulo, revealed

that the use of forced labor or labor coercion, accompanied the expansion of soy frontiers. The newspaper documented cases from the frontier regions of West Bahia and Mato Grosso, where several hundred workers at times had been released after official inspections of soy farms. (Lobato, 2004) As of 2008, the Brazilian Ministry of Labor was still investigating more than a hundred reports of slavery on soy farms (DSC 2008, p.26).

A 2011 report based on a research project by the International Labor Organization, conducted on a range of large scale agricultural operations in Brazil - amongst these a number of soy farms, - revealed some very detrimental labor conditions. The report treated the notion of slavery from a broader perspective, the concept comprising of deprivation of liberty, degrading work conditions, maltreatment or humiliations, and the retainment of salaries (OIT 2011, p.28). Deprivation of liberty became effective due to the geographical location of the farm, which made parting without assistance impossible, through the retainment of salaries as a tool to make workers stay, by indebtedness and through direct threats and the use of violence to retain workers (Ibid 2011, p.33).

Interviewee 4 underlines that the extent of the use of forced labor has been very difficult to quantify, though it is mainly used in the land clearance phase. Sustaining that soy production is characterized by a clear division in terms of labor, between low-skilled workers subjected to poor conditions on one hand and technologically skilled workers with much better conditions on the other, the interviewee states that the strongest trend has been the exclusion of the large majority of rural population from participation in production. (Interviewee 4)

### 7.3.3 Labor and modern soy farming

The recent evolution of mechanized soy farming in Brazil seems to have been associated with two parallel tendencies; exploitation and exclusion.

Exclusion; in terms of the low labor inputs to soy cultivation, where labor costs only account for a very marginal part of the input costs, which exacerbates the tendencies of rural unemployment and risk of exodus.

Exploitation; in terms of the low-skilled labor which is included within production often being subjected to detrimental conditions, a high degree of labor coercion and low remuneration. The proletarianization of rural labor force as it is drawn up by Scanlan (2012), implying the displacement of smallholders followed by a reincorporation –though in this case very limited - as cheap labor force on plantations, seems to approximate a description of the process of soy expansion in the past decade (see section 2.1.3). Such labor relations are also in line with Frank's (1978) conceptualization of labor exploitation in raw material based economies,

as well as Hopkins and Wallerstein's (1982) periphery condition of conversion of labor (see section 2.1.3).

Yet, the extremely low part of total production inputs which labor constitutes, does make it difficult to affirm that any significant profit generation within the sector, is derived from the exploitation of below subsistence-remunerated labor, as Wallerstein and Hopkins otherwise point towards. Though labor conditions in soy cultivation may be poor, the most pronounced tendency related to its expansion is that of exclusion of workers from the rural labor market. The more contemporary WSA perspectives, such as Gareau and Borrego's (2012) emphasis upon tendencies of smallholder displacement by industrialized farming, rather than exploitation, thereby seem to better describe the recent developments within the Brazilian soy sector.

## 7.4 R&D inputs

The research and development inputs to the Brazilian soy sector have been essential for its evolution beyond the southernmost states, and are still to be considered an important part of the input structure of this commodity chain.

R&D inputs to the soy production are probably most visible through the patented gene structure of transgenic soybeans, which today account for nearly 90 % of soy cultivation in the country (Reuters, 2012). An increasing part of total production costs are therefore constituted by seeds, which share of average total production costs increased from 3,85 % in 2007 to 9,83 % in 2012 (CONAB 2007, 2012).

The transgenic soybeans were first introduced and patented by Monsanto. The Brazilian state-owned agriculture research institute of Embrapa was quick to launch a partnership with Monsanto, resulting in three varieties of Roundup Resistant soybeans of its own, after the definitive legalization of transgenic cultivation in 2005. Monsanto though, retained a license for the use of the seeds, charged for every hectare sown with RR seeds. (Schlesinger 2008, p.8)

Embrapa has been a central entity within Brazilian agricultural research, especially regarding the soy sector: It was in the forefront of making the Cerrado cultivable by changing soil properties through lime and phosphorous treatment, it has developed the no-tilling direct planting technique, in which the soil is not plowed and thereby retains more nutrients, and through conventional breeding, Embrapa adapted soy to become a tropical crop and speeded up its growth period. (Economist, 2010)

Thereby, the main research inputs to soy production are partly characterized by a conventional monoculture, relying on foreign patents, and partly on a range of national adaptations to this production system, carried out by Embrapa. This rela-

tionship is also encapsulated in the partnership agreement between Monsanto and Embrapa.

The lack of structural ramifications of technology application, which is a characteristic of Hopkins and Wallerstein's (1982) concept of simple reproduction, is challenged by the mode of production within the Brazilian soy sector, which is highly specialized and characterized by technological innovation (see section 2.1.4). Embrapa's role in developing cutting edge environmentally sound techniques within the area and high degree of domestic research participation and knowledge proliferation, stands as a clear evidence of this. Though in effect of its patents on the widely used RR seeds, Monsanto still represents a dominant position of transnational actors within the input structure of the commodity chain and a system of repatriations of a substantial share of profits. The dynamics of industrialized monoculture are better grasped by Scanlan (2012) and Gareau & Borrego (2012), who rather lead attention towards the detrimental social and environmental consequences of this production system. Similar with the previous conclusion, regarding the exclusion of labor from highly mechanized production, the older WSA perspectives' conceptualizations of periphery conditions appear to be in need of some contemporary intermediate theorizing, in order to provide a more specific and consistent analysis of modern soy cultivation.

## 7.5 Crushing and processing

The crushing phase constitutes a central activity in the elaboration of soybeans after cultivation. The process of crushing leads out in two main products; soybean meal and raw soybean oil (Cavalett 2008, p.41). The crushing produces approximately 76 % soybean meal, mainly used for livestock feed and 19 % raw soybean oil, which is refined into the globally most consumed vegetable oil (Nassar & Antoniazzi 2011, p.7). Around half of the soybean meal is exported and the rest is used mainly for poultry feeding and pig breeding (Aprosoja, 2013).

The profit margin of soy crushing, - understood as the value added percentage of the crushed product above the raw soybean, - has been growing from 35 % in 2005 to around 50 % in 2009 (Nassar & Antoniazzi 2011, p.8). This underlines the increased potential for value added gains in the soy commodity chain, which this sector is capable of generating.

At the initiation of production expansion in the beginning of the 00s, the crushing sector was characterized by a rising presence of multinational companies, growing through acquisitions of smaller actors within the market (Goldsmith

2004, pp.97-98). As of 2005, the crushing sector was dominated by four foreign trading companies; Bunge, Cargill, Dreyfus and ADM, which accounted for some 59 % of crushing and 61 % of the exports of soybeans and its derived products (Schlesinger 2008, p.9). Bunge alone, accounted for some 28.3 % of Brazilian crushing capacity, but has also become a significant player in the food processing industry and even launched different retail products based on soybean oil (Albano & de Sá, 2011 pp. 63-64).

Yet, the potential value added gains from crushing activities have also resulted in political measures to subsidize this sector within many importing countries. China, which is an extremely essential export market for Brazilian soy, has obstructed the import of crushed soybeans through tariff measures and differentiated taxes, which has limited the potential for Brazilian soy crushing (Nasser & Antoniazzi 2011, p.7). In comparison to Argentina, which stimulates crushing by subjecting raw soybeans to export taxes, Brazilian exports are largely characterized by raw soybeans, as it is illustrated in table 7.4 below:

<b>Table 7.4: Exports of raw soybeans and soybean meal in million metric tons, 2011.</b>	Raw soybeans	Soybean meal
Brazil	32	14
Argentina	10	29

Source: Nasser & Antoniazzi 2011, p.6

Counted as product volume, more than half of Brazilian soy exports are in its rawest form, so although this sector does imply some structural ramifications, it is still far from reaping the full potential benefits of domestic product elaboration.

The presence of the soy crushing sector represents a step away from the simplest reproduction of capital as this concept is presented by Hopkins and Wallerstein (1982), because this activity does generate employment and some structural ramifications in the food and feeding industries. Yet, as less than half of soy production passes through this link in the domestic part of the chain, a large share of value added gains are thereby also lost. This risk of the essential economic multiplier also being transferred abroad, is strongly emphasized by Frank (1978) as a fundamental problem for many raw material exporting countries. The overweight of trading companies' dominance within crushing and their control of links to the food processing industries, also indicates how the process of incorporation has become manifest through the direct acquisition of much of the production systems within this sector by foreign entities (see section 2.1.1).

## 7.6 Output; the point of export

Exportation of the bulk of production is characteristic of the globalized cash crop farming system, of which the Brazilian soy sector has become an integral part (Schlesinger 2008, p.10). At this stage in the chain, multinational enterprises, and particularly Bunge and Cargill, have a strong presence through a large infrastructural and logistical network for global commercialization of soy products (Albano & de Sá 2011, p.66). As earlier mentioned, the chain presence of Bunge, which stretches all the way from input and through processing, is also strong at the point of exports, where the company possesses a significant logistical infrastructure as well as a network of port facilities for shipping (Ibid 2011, pp.62-63). The total share of Brazilian exports accounted for by the four largest trading companies within the soy sector – Bunge, Cargill, Dreyfus and ADM – reached 3.9 % in 1999, but had risen to 6 % in 2004; a number of which soy constituted a substantial part (Schlesinger 2008, p.9).

In some cases, trading companies are involved in all links of the chain, from provision of credit to farmers in the form of seeds up until the purchase and export of the final product (Interviewee 2). Albano & de Sá also emphasize the strong market position of the trading companies and their deep vertical presence throughout the soy chain (Albano & de Sá 2011, p.78). The authors similarly connect this dominant position, - including the part related to international commercialization, - to the development of the international logistics structure and conditions of competition (Ibid 2011, pp.65-66.).

Today, efficient supply chain management has become both an important tool for profit maximation and for achieving competitive advantage (Bizerra et. al. 2010, p.3). Therefore, control of the link between the Brazilian soy market and export destinations becomes essential for trading companies. Though the reference price for soy is determined at the Chicago Board of Trade, observers critical of trading companies' extensive market power claim that these have obtained an oligopolistic status, by which they in practice come to determine real prices through their negotiation leverage as buyers (Schlesinger 2008, p.9).

At the international market, Brazilian soy products have been competing with the largest worldwide producer, the US, which has been subsidizing domestic production significantly, with total subsidies from 2000 to 2012 amounting to 27 billion (EWG, 2013). In spite of this, an increase in global demand during the 00s has been driving prices upwards and incentivized expansion of production (Interviewee 3). Nevertheless, subsidies still function by generating counteracting downwards pressures on prices. This has resulted in a profit margin which isn't sufficiently high to incorporate the negative externalities of production and the environmental degradation related to this. As of 2005, the price received for 1 ton

soybeans of \$ 653 USD, generated a 31 % profit, considering average production costs. Estimates of negative externalities, suggest that with these accounted for in prices, the profit would have been turned into a deficit of -38 % (Cavalett 2008, p.82).

The output structure of the Brazilian soy chain reflects a governance dimension dominated by foreign trading companies and constitutes an essential link, through which the production processes have been integrated into an axial division of labor, central to the process of incorporation, described by Hopkins and Wallerstein (see section 2.1.1). The downstream weight of chain governance power and external definition of prices also creates a structure of incentives, favoring expansive low cost production and hindering the internalization of social and environmental costs, thereby exacerbating ecologically unequal exchange (See section 2.3). It may be worthwhile emphasizing that through the WSA perspective of Hopkins & Wallerstein, such detrimental consequences related to the emergence of periphery conditions, are not “distortions of capitalist development” but rather “conditions integral to the concept.” Hence, they are thereby to be seen as natural and continually reproduced consequences of the structure of accumulation processes within the world economy (Hopkins & Wallerstein 1982, p.127).

## 7.7 Conclusion upon commodity chain analysis

Below is presented the conclusion upon the examination of the emergence of periphery conditions due to production expansion from 2000, with indicators and findings leading towards the theoretical interpretation.

<b>Indicator:</b>	<b>Findings:</b>	<b>Theoretical interpretation:</b>
Arable land input: land access	Soy expansion resulting in unequal land distribution and rural displacement.	<b>Concentration of production processes</b> favoring extensive export-oriented soy monoculture above smallholders.
Arable land input: Crop displacement	Tendencies of regionally differing food access problems and general uncertainties about the implications of the increasing relative weight of soy cultivation.	<b>Concentration of production processes</b> favoring extensive export-oriented soy monoculture above local food production.
Environmental inputs: Soil and agrochemical inputs	In conjunction degrading soil quality which becomes a depletable production input.	<b>Incorporation</b> of the biological realm into the world economy through exploitation of soil nutrients and patenting of genetic material.
Environmental inputs: deforestation and biodiversity	Extensive deforestation of the Cerrado region and loss of biodiversity	<b>Incorporation</b> of the biological realm into the world economy through exploitation of native



		vegetation and biosphere.
Labor inputs: employment	Very low employment generation	<b>Conversion of labor</b> through displacement of smallholders but only a low degree of reincorporation into production.
Labor inputs: labor conditions	Indications of precarious labor conditions, though difficult to generalize.	<b>Conversion of labor</b> into the cheapest possible factor input to production.
Foreign control	Strong foreign presence in the input structure, processing and international commercialization.	<b>Incorporation</b> of the productive processes into an axial division of labor in which foreign MNC's wield a high degree of market power.
R&D inputs	Some structural ramifications from agricultural research though still high reliance on patented seeds.	<b>Simple reproduction</b> is not the case regarding the technological inputs though <b>incorporation</b> of the genetic plant structure generates external financial/technological dependence.
Processing capacity	Some significant value added gains from crushing though most of soy production bypassed this link. High degree of external control.	<b>Simple reproduction</b> due to lack of elaboration and structural ramifications, though is not the case for the smaller share of production being processed. Some small degree of spillover in food industries. <b>Incorporation</b> of processing into global corporate governance and <b>Concentration of production processes</b> on a single low value added capital good for core food industries.

# 8.0 Conclusion

## 8.1 Findings

The initial analysis of the sources for the increase in Brazilian soy production indicates that the surging global demand, brought about by the accelerated Chinese growth, has resulted in a significant expansion of Brazilian soy frontiers from the beginning of the millennium.

The regulatory framework for export-oriented agriculture and soy specifically, has undergone an almost unidirectional change, in favor of soy expansion. Though broad liberalizations in the 1990s cut some direct state support for soy cultivation, this sector was treated preferentially, and together with other concessions created a favorable climate for increased cultivation. The process of legalization of transgenic soy, as well as the formation of the new Forest Code also constituted two significant victories for soy interests and helped remove some regulatory obstacles for its further production expansion.

The process of expansion of soy production has been found to be paralleled by an increasing political influence of agribusiness interests. This has been manifest by the formation of what Cardoso and Faletto conceptualize as structural links between domestic and foreign agribusiness and allied political factions within parliament, significantly influencing legislation in favor of soy expansion. The high degree of influence of the soy sector also comes to closely approximate Frank's illustrations of how a system, dependent upon raw material exports, is politically upheld by the already influential interests related to this sector. Finally, the neo-pluralist perspective proves useful in order to describe the channels of agribusiness influence, as either direct contact through historical bonds to parliamentary groups or through the internalized imperative to accommodate business interest of a particular importance.

The soy expansion has resulted in a marked concentration of production processes, which has led to an increasingly unequal distribution of land in rural Brazil. Some indications of possible food access problems for local populations in soy areas were identified, along with an increasing relative weight of soy production.

The expansionary process has been dependent upon the incorporation of the Cerrado region – along with some parts of the Amazon – into the production processes of the world economy, as one of the most vital regions for global vegetable protein production. The incorporation has not only occurred horizontally in terms of Cerrado deforestation, but also vertically been dependent upon exploitation of

the soil nutrients, causing land degradation and erosion.

The conversion of labor was mostly found to be evident through rural displacement and exclusion by the expansion of technology intensive soy production. Some degree of labor exploitation could be identified, though the low labor intensity has meant that tendencies of exclusion from employment have been much stronger associated with the process of soy expansion.

In terms of the periphery condition of simple reproduction, the generally high level of technology inputs diverge from the notion of technological backwardness pertaining to this periphery condition, as it is conceptualized by Hopkins and Wallerstein. Yet, apart from some significant R&D contributions from Embrapa, soy expansion has been largely dependent upon foreign, patented technology, and also characterized by a high degree of foreign MNC acquisitions.

The cultivation stage for soy production is linked to the point of export, with only a limited degree of domestic crushing, resulting in very modest internal economic structural ramifications from this production, which is much in line with the notion of simple reproduction.

## 8.2 World Systems Analysis today

The main WSA perspectives of Hopkins and Wallerstein relied upon within this paper date back to 1982, though their conceptual framework is developed through historical analysis stretching centuries back in time. Yet, with a moderate supplement of contemporary WSA perspectives upon modern agribusiness, the “classic” WSA perspectives appear to provide some theoretical tools which are remarkably adapt to examine the present soy expansion in Brazil. The conclusion of the analysis within this paper is that the process of soy expansion has been highly associated with the emergence of periphery conditions. This highlights the paradox inherent in the circumstance, that one of the main economic bases of the Brazilian emergence, is constituted by a detrimental mode of production, characteristic of a historically exploitative development, or in Frank’s (1978) terminology; the development of underdevelopment.

The association of the twenty-first century’s Brazil, with the notion of periphery may seem to imply a certain degree of paradoxicality, due to the country’s indisputable clear economic ascend, significant social progresses and newfound confidence on the global stage. This underlines the relevance of partly reconsidering some basic presumptions, traditionally associated with the notion of periphery and semi-periphery.

A rough outlining of the connotations implied within the concept of periphery,

could be formulated as; exploitation and stagnation. While the concepts of periphery conditions hold a clear potential to explain the exploitative aspects of soy expansion, the notion of stagnation by no means fits this development, and therefore simple reproduction was only partly characteristic of the Brazilian soy sector. Worth's critique of the WSA School and the Dependency perspective's *per se* denial of the beneficial potential of international economic integration - especially integration based upon primary commodity exports, - appears to better capture the realities of today's raw material demanding world (see section 2.2). As with the Brazilian soy expansion, internationalization of markets holds potentially important revenues, but may also imply a range of negative socioeconomic and environmental pressures. A continued engagement by WSA scholars with the question of *how* and *to which extent* this market integration may take place on a socially sustainable basis, appears as an investigative path that would fully reap the benefits of their meticulous attention to local impacts of global productive processes.

### 8.3 Proposals for future research

In order to understand the fundamental problems of raw material dependence and their political intertwinements, the recourse curse literature provides a rich analytical framework. Yet, the focus within this perspective upon raw material dependence as related to authoritarianism, as Dunning (2005), violent conflict, in Kaldor et al. (2007), or dysfunctional institutions, as Bulte et al. (2005), does not exactly fit the Brazilian situation. Nevertheless, the disproportionate political influence of agribusiness does present a democratic problem and a challenge of balancing pluralist representation. The field between neo-pluralism and the recourse-curse camp could constitute a very interesting theoretical merger, in order to examine how a balanced political representation and regulation is ensured, in a context of increasing economic and political leverage of one particularly influential sector.

Revenues generated from raw material exports, and soy in particular, have contributed significantly to a rise in Brazilian living standards during the past decade. This poses the question as to whether a socially sustainable model built upon raw material wealth does indeed exist, or whether the imbalances created by an exploitative mode of production will at some point overshadow the positive externalities of revenues generated. This question becomes ever more relevant when environmental factors are taken into consideration: Social and environmental costs would have to be included in any attempt to base long term economic development upon primary commodities. Cavalet (2008) has made a very resourceful contribution through his work with internalization of environmental costs in soy

production. More transdisciplinary research, spanning over the interrelated and highly complex social, environmental, economic and political issues pertaining to soy production seems to become ever more important.

Evaluating the future prospects for soy exports, one would have to look for the source of this development; the increased Chinese demand. The apparent complementarities of commodity trade between China and Brazil, which not only have spurred increased commerce, but also a political relationship of strategic partnership between the two countries, also appears to contain the seed for future disagreement. The worrying of becoming interlocked in a raw material-for-manufacture commercial relationship is already becoming apparent on the Brazilian agenda. Such a relationship would also pose some questions, as to how the notion of core and periphery should be perceived in the context of the 21<sup>st</sup> century. A quickly growing body of literature dealing with the emerging South-South and BRIC cooperative relations seems as an appropriate starting point for further investigation into the economic underpinnings of Sino-Brazilian ties. The increasing interdependence between these two countries also presents the Institutionalist perspective, through its focus upon asymmetric vulnerability in interdependent relationships, with a fertile ground for further research in the years to come.

## Executive summary

Since 2000, global demand for Brazilian soybeans has increased markedly, which has resulted in a significant surge in production, but also fostered concerns about the socioeconomic, environmental and political aspects of this development. This has given rise to questions about whether the economic development and global ascend of Brazil, which to a large extent can be traced back to increasing demand for raw materials, is indeed bringing Brazil closer to the developed world.

With the goal of diversifying the notion of development, and in order to grasp its different societal implications, the present study has relied on theoretical conceptualizations from the World Systems Analysis (WSA) and Dependency IPE literature. In line with these perspectives, the issue of soy expansion is analyzed through a strong focus upon commodity chains and through an emphasis on the mode of production, in order to understand local implications of the present mode of Brazil's insertion into the global division of labor.

Some central concepts from the WSA literature, applied within this paper, are the 'periphery conditions', which have been operationalized into more specific indicators examined through an analysis of the Brazilian soy commodity chain. The thesis has been directed towards examining the emergence of periphery conditions as they have been conceptualized by Hopkins and Wallerstein (1982) as a consequence of Brazilian soy expansion, brought about by large surges in global demand since 2001.

In order to examine the political implications of raw material reliance, some perspectives of Frank, Cardoso & Faletto, and from the neo-Institutionalist school, Lindblom and Woodhouse, are included in an analysis with focus upon political regulation of the soy sector, and upon how this has influenced the process of expansion. Furthermore, the political processes surrounding this trend have also been scrutinized with an eye to rural interests' representation within the political field.

The study relies upon the inclusion of different sources of empirical material, through a triangulation of methods. Analytical conclusions are therefore based on a diversified range of empirical sources, spanning from quantitative material and statistical analysis, semi-structured expert interviews and secondary literature within the field.

The rise in global demand for Brazilian soybeans seems to have been particularly influenced by the economic ascendance of China and the Chinese entrance in the WTO in 2001, resulting in an exponential increase in Chinese purchases of Brazilian soybeans. The analysis of how global demand increases since 2001 have impacted upon soy expansion within Brazil, demonstrates a high correlation between

surging global demand and expansion of the area sown with soy in states in the center-west and northern part of the country, beyond the traditional soy states, where production has been more stagnant. Thereby, the world economy's need for soybeans, as an essential staple crop, has largely been translated into a dynamic incorporation of especially the Brazilian Cerrado savannah for export-oriented monoculture.

The analysis of the regulatory environment for soy production from the 1990s indicates that the accession into the WTO in 1995 and the establishing of Mercosur in the same period, led to a differentiated cut in agricultural support measures, - favoring soy production and export-oriented agriculture in general. The obligations of WTO members to lower import tariffs and export taxes and thereby created a more favorable environment for soybean exports.

During the 1990s, Brazilian rural interests also reached a higher degree of organization and gradually became a factor influencing the country's negotiation agenda within international fora.

The internal liberalizations of the agriculture and the Brazilian economy in general during the 1990s have had significant effects upon the performance of the Brazilian soy sector. The high interests rates resultant of the implementation of the Plano Real in this period had a differentiated impact upon domestic and export-oriented agriculture; putting many smaller farmers in the first category out of business, though providing financial stability and opening up for international investment in the later, which could better withstand the interests burden. In 1996, soy was also given an important stimulus in effect of its exemption from the ICMS tax, stimulating exports and expansion. Thus, these measures indicated a high degree of the internalized necessity to accommodate agro-export interests within government.

The analysis of the process of legalization of transgenic soybeans from 2003-2005 also demonstrates a highly permissive posture towards previous legal transgressions from agricultures, and a gradual yielding until de-facto legalization in 2005. During this process, domestic and international agribusiness actors worked in a close coalition with influential rural interests groups within parliament, towards a common goal, revealing a strong structural link between these groupings, as this has been conceptualized by Cardoso and Faletto (1979).

Through recent years, rural influence has continued to grow within parliament, underlined by the creation of the new Forest Code. In this process, the alliance between export-oriented agricultural interest and its support within parliament was further strengthened. This trend is in line with the historical tendency of raw material export group's dominant position, within politics and society in general, elaborated by Frank.

From the neo-pluralist perspective, Lindblom and Woodhouse also provide a variety of conceptual approaches to understanding the influence wielded by agri-business upon policymakers. This has mainly unfolded through either direct access and influence, or through a process of internalization of business interests as national interests, making policymakers engage in a process of mutual adjustment with business. These tendencies have been evident throughout the period examined, from the agricultural reforms in the 1990s, which were passed with a favorable edge to export-oriented farming and particularly soy, through the process of legalization of transgenic soy cultivation from 2003-2005, as well as through the formation of the new forest code in 2012.

An analysis of the Brazilian soy commodity chain was conducted with the intention of evaluating to which extent the expansion of soy production had influenced Brazilian periphery conditions. The notion of periphery conditions was derived from conceptualizations by Hopkins and Wallerstein (1982), summarized as 1) the concentration of production processes, 2) the incorporation into the global division of labor, 3) conversion of labor force into labor in relation to capital and 4) a productive mode of simple reproduction. The analysis of the commodity chain was based on methods for global commodity chain (GCC) analysis and focused upon the input and output structure, the governance dimension within the chain, and the generative sectors within this. Due to the nature of the soy chain, many of the issues pertaining to the notion of periphery conditions were examined in the input structure of the chain, especially labor, land and other environmental inputs, of which the soy expansion has come to depend.

Analysis of the land inputs to soy production reveal a high degree of concentration of production processes in terms of land access and land tenure, which tends to be more and more concentrated on the production of this single monoculture crop, highly dependent upon an increasing degree of agrochemicals and fertilizer. The displacements of other crops could not be directly concluded in terms of any decrease in the area dedicated to their cultivation, though soy did appear to have gained significantly regarding the relative share of land occupied by this crop.

The analysis of the expansion of soy production during the period examined demonstrates that it has been highly dependent upon the incorporation of much of Brazil's natural environment, both in terms of land area, soil quality and its biodiversity. Production expansion has been associated with a high degree of deforestation of the Cerrado Savannah. On the micro level, it has also incorporated the microorganisms of the soil and the biodiversity in the areas of cultivation, resultant of the Glyphosate dependent monoculture. A high degree of incorporation of productive activities under foreign control could be identified, further indicating the



emergence of the periphery condition of incorporation.

In relation to the periphery condition of labor conversion, some degree of extremely precarious labor conditions could be related to the expansion of soy, though the most significant tendency was that of exclusion of the rural population from participation in soy cultivation, due to its extremely efficient mode of production. In this regard, the expansion of soy production seems to be indicative of an exacerbation of tendencies of rural exodus.

Simple reproduction as it is defined by Wallerstein and Hopkins, does not appear to completely match the mode of production in the modern Brazilian soy sector, which makes use of cutting edge technology and undergoes constant innovations. A mixed dependence on foreign and domestic R&D and technology inputs seems to have been characteristic of soy expansion during the past decade. The participation by the national research institute of Embrapa in the technological developments within Brazilian agriculture stands as an example, that some technological developments and national spread effects have been associated with the process of soy expansion. The generative capacity and economic spillover of soy cultivation was nevertheless found to match the notion of simple reproduction due to its low degree of domestic structural ramifications and predominant tendencies of export of soybeans in the form of raw material.

It is concluded that the process of soy expansion within Brazil since 2001 displays many characteristics which traditionally are associated with the notion of periphery, implying a range of detrimental socioeconomic and environmental consequences, and a clear lack of structural ramifications and spread effects within the broader economy. In some respect though, the mode of production within modern Brazilian soy farming did not approximate the conceptualizations of classic WSA analysis, and some more contemporary perspectives upon the mode of production in modern monoculture became a useful supplement.

Through the analysis of developments within the political regulation of the soy sector, a high degree of agribusiness influence, as well as an increasingly permissive climate for soy expansion, could be identified. This appears as a feedback mechanism, where agribusiness pressure provokes a permissive legislation, leading to expansion of production, and more economic and consequentially political leverage.



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## **Interviews**

Interview conducted with interviewee 1 and 2.

Length 39:40 minutes.

Interviewee 1 and 2: Researchers with experience from an investigation of soy expansion in northern Brazil.

Conducted through Skype.

November, 14, 2013.

Interview conducted with interviewee 3.

Interviewee 3: Senior official at international development organization based in Brasília.

Conducted through email. See appendix 3 for responses.

November 20<sup>th</sup>, 2013.

Interview conducted with interviewee 4.

Length 41:48 minutes.

Interviewee 4: Independent Brazilian researcher and NGO's consultant with specific knowledge about soy production.

Conducted through Skype.

November 21<sup>st</sup> 2013.

Interview conducted with interviewee 5.

Length: 23:13.

Interviewee 5: high-level European diplomat in Brasília.

Conducted through Skype call to fixed telephone line.  
December 5<sup>th</sup>, 2013.

# Appendices

## Appendix 1: Responses interviewee 3:

*1) Percibes que hay una conexión entre las liberalizaciones del sector de la agricultura durante los años 90, y el siguiente significativo expansión del sector sojero Brasileño durante la década 00'?*

1- El sector agropecuario brasileño fue tradicionalmente bastante abierto y no sufrió de restricciones importantes para exportar. Creo que hubo dos factores claves que explican la expansión de la producción a partir de los '00. En primer lugar, la estabilización de la economía como resultado del Plan Real y el abaratamiento del crédito. La estabilidad económica generó las condiciones para que se produjeran grandes inversiones, principalmente por parte de los productores locales. En segundo lugar, la mejora de los precios internacionales (especialmente de la soja y el maíz) y la introducción de nuevas tecnologías (siembra directa y uso intensivo de fertilizantes) permitieron la expansión de la agricultura, en detrimento de la ganadería.

*2) Como describirías el papel macroeconómico del sector sojero Brasileño durante la década 00'?*

2- Tengo entendido que la soja era un cultivo relativamente marginal hasta los '90. La entrada de China en la OMC y el aumento exponencial de su demanda de materias primas provocaron la expansión sustancial de la producción de oleaginosas (soja, pero también girasol y palma) que todavía continúa.

*3) Como estima el significado del desempeño del sector de la soja desde el punto de vista de la gestión política del país?*

3- En un país como Brasil, con un fuerte sesgo pro-industrial, el sector agropecuario ha perdido mucho de su leverage político en las últimas décadas a medida que ha caído su peso relativo en la economía. Hoy, el sector es responsable por apenas 6% del PIB aunque concentra un porcentaje mayor de mano de obra que el sector industrial. Vale mencionar que en algunos Estados fuertemente agrícolas (por ejemplo, Mato Grosso do Sul) la influencia política del sector sojero todavía es muy fuerte.

*4) Hasta cual medida se percibe que los intereses ligados al sector de la soja son directamente o indirectamente representados en el nivel de la política nacional, y en tal caso; ves que esto es algo que influye en las políticas públicas dirigidas al sector?*

4- Como mencioné en mi respuesta anterior, el peso del sector es menor y en clara declinación. Es mucho mayor la influencia que ejerce el sector industrial (por ejemplo, por medio de la FIESP) sobre las decisiones políticas y las inversiones estratégicas. Sí ha sido importante el lobby ejercido por el sector, por medio de los

gobernadores y representantes de estados agrícolas, para mejorar las condiciones de la infraestructura que permitan reducir los costos de logística del sector.

## Appendix 2: Interview guide

### **Before the interview**

Make sure that questions in the given language, interview guide and recording equipment is clearly viewable and the equipment functioning, before calling the interviewee.

### **Introduction**

- Thank the interviewee for participating in the interview.
- Make sure that the connection is functioning and that the interviewee can understand what I say. Alternatively propose that I call from Skype to the interviewee's phone (if available).
- Present my study shortly and mention on what basis I have been interested in interviewing the interviewee.
- Mention the possibility for complete confidentiality both regarding personal identity and organizational affiliation. Ask the interviewee if he/she prefers this. Does this confidentiality of identity extend to the supervisor and the examiner?
- Ask permission to record, if granted, turn recorder on.

### **The course of the interview**

- Ask the interviewee to describe her/his attachment and/or experiences within the field of study.
- Mention that I have a range of questions which I will ask the interviewee, and if I get curious regarding a particular issue, I may ask the interviewee to give some further description about that.

- Proceed by asking the questions departing from a semi-structured approach where the questions are posed in a given order, though with the possibility for asking the interviewee to elaborate on particular details.
- Leave room for the interviewee to express him/herself freely. Any possible “detours” from the core issues are welcome and may imply some sort of valuable information.
- During the interview, I will intend to be aware of the possible sensible issues, especially regarding personal experiences/sentiments as well as the obligations towards the organization or enterprise which the interviewee is affiliated to. Avoid displaying any personal biases and respect any limits which the interviewee may feel obliged to stick within.

### **Ending the interview**

- When the last question has been asked, consider whether there is any final remarks that could be important to have from the interviewee.
- Ask the interviewee if she/he has any further statements or knowledge which they would like to share.
- Ask the interviewee whether there is anything that has been said which he/she would like to exclude from the interview.
- Thank the interviewee clearly for the contribution to the thesis and possibly ask whether any follow up questions can be made, possibly by email.
- Mention that the interviewee can contact me at all time regarding every eventuality that might arise.
- The interview is concluded by shortly thanking the interviewee another time and greeting goodbye.

### **Final considerations**

- Did the interview unfold as planned?
- Was the type of knowledge sought obtained, acquired?

- Did the interviewee appear to be comfortable and did the person in question display a high degree of willingness to express her/himself? Why?
- What could be done in order to improve the next interview?

### Appendix 3: Correlations output

Correlations		International- ly_traded_volu me
Amazonas_soy	Pearson Correlation	-,800**
	Sig. (2-tailed)	,005
	N	10
Bahia_soy	Pearson Correlation	,855**
	Sig. (2-tailed)	,002
	N	10
ceara_soy	Pearson Correlation	,800**
	Sig. (2-tailed)	,010
	N	9
DF_soy	Pearson Correlation	,453
	Sig. (2-tailed)	,189
	N	10
Goias_soy	Pearson Correlation	,295
	Sig. (2-tailed)	,408
	N	10
Maranhao_soy	Pearson Correlation	,863**
	Sig. (2-tailed)	,001
	N	10
MG_soy	Pearson Correlation	,660*
	Sig. (2-tailed)	,038
	N	10
MGdoSul_soy	Pearson Correlation	,399
	Sig. (2-tailed)	,253
	N	10
minas_soy	Pearson Correlation	,279
	Sig. (2-tailed)	,435



	N	10
para_soy	Pearson Correlation	,763*
	Sig. (2-tailed)	,010
	N	10
parana_soy	Pearson Correlation	,688*
	Sig. (2-tailed)	,028
	N	10
piaui_soy	Pearson Correlation	,890**
	Sig. (2-tailed)	,001
	N	10
rio_grande_sul_soy	Pearson Correlation	,611
	Sig. (2-tailed)	,061
	N	10
rondonia_soy	Pearson Correlation	,836**
	Sig. (2-tailed)	,003
	N	10
santa_cat_soy	Pearson Correlation	,846**
	Sig. (2-tailed)	,002
	N	10
sao_paulo_soy	Pearson Correlation	-,541
	Sig. (2-tailed)	,106
	N	10
tocantins_soy	Pearson Correlation	,675*
	Sig. (2-tailed)	,032
	N	10

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

On the scatters below volume is stated as a variable name, though total value of globally traded soy is what has been used in the correlations.

