

(Format No. 3)

## SUMMARY OF DOCTORAL THESIS

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### **An Empirical Study on the Trade of South American Soybean Commodities**

南米産大豆および大豆油貿易に関する実証研究

Argentina, Bolivia, Brazil and Paraguay are occupying important positions in the global soybean commodities trade. South American production and trade is characterized by rapid expansion of production and strong gains in commercial performance. Until recently, the United States enjoyed a dominant position in soybean production and exports; accounting for around 70% of global production. However, that number has now dropped to around 40%, and soybean production in South American countries has increased faster than domestic consumption, contributing to rising exports and the erosion of the US share.

We search for empirical results to represent the economic role of soybean commodities, especially during the influence of high prices of energy and food commodities. Our purposes are focused to create the tools to incentive the debate on the construction of policies, based on the observations of changes in the trade pattern and the expectations from the elasticities created by the world consumers.

This study will examine the changes in the elasticities from the point of view of the world consumers by the use of a demand analysis. Also, other effects derived from the price volatility are observed by the mentioned analysis, which is calculated based in the trade statistics, covering the monthly exports of soybeans (free on board FOB prices) from Argentina, Brazil and the United States, during the period 2001-2008. In South American countries, the production of soybean commodities has increased faster than domestic consumption, contributing to rising exports and the erosion of the United States share of the export market. Through the utilization of Relative Comparative Advantage indices (RCA), the representation of the changes and shifts on technology and trade is possible; this research analyzes the pattern and evaluates the expected changes by the complementary use of the Flying Geese (FG) model theory.

During the period 2006-2008 the soybeans from Argentina and the United States became more luxurious and elastic. An unusual luxurious behavior is observed due to the reaction of consumers to the high prices. The increases of expenditure elasticity of soybeans can demonstrate that the soybeans are adjusting its condition to unusual situation, behaving like a luxury good during this price volatility period.

By considering market domination by the US, Brazil and Argentina, as well as the existence of smaller exporters like Paraguay and Bolivia, the present research demonstrated that minor exporters are performing suitable development and improvement in terms of competitive performance, despite the small volumes traded. At the moment, Bolivia is losing its competitive position, allowing Uruguay the opportunity to expand in the global soybean market. Additionally, while soybean grain is losing its comparative advantage, the crushing industry is gaining an important position. Based on these findings the comparative advantage indices explain patterns of trade in terms of differences in factor abundance, and considers that a comparative advantage can best be attained in the products of a country that use its relatively abundant factors of production most intensively. Superior indices for soybean oil commodities are an indication that Bolivian exports shifted to processed and higher-valued soybean commodity production from unprocessed soybean

production and trade.

At the moment, the soybean market is dominated by the United States, Brazil, and Argentina. However; this may not mean that they have a higher comparative or competitive advantage than other soybean exporters. By calculating and comparing RCA indices, this review considers that Paraguay is the best-positioned country in terms of comparative advantage, while Bolivia is also very competitive in terms of soybean oil. Thus, the future success of Bolivia, Paraguay and Uruguay will basically reside in their ability to build market share and attract large amounts of investment.

We observe that the United States augmented its production and exports in both commodities, but the knowledge and technology of production of these commodities expanded to other regions like South America. The acceptance technology for competitive production occurred around the beginning of the 1970s. The 1970s and 1980s marked the appearance of new competitors for the United States, established in South America.

In the case of soybean oil all the countries improved its comparative advantage in contrast to the United States, who lost its competitive role from the year 2000. The sequential appearance of RCA is initiated by Brazil at the beginning of 1970s, and followed by Argentina around 1980 and also Paraguay and Bolivia at the end of the 1980s. During the price volatility period Brazil and Paraguay improved; Argentina showed improvement in 2007 and reduce in 2008 due to trade restrictions.

From the use of trend polynomial lines we can expect improvement of Uruguay; the further years can represent an important role for this country and, following the theory, its improvement can be associated to the decrease of comparative advantage of other participant like Paraguay, Argentina, Bolivia and the United States. In the case of Bolivia, looks like is focusing on the production and trade of soybean oil, the soybean grains are losing resources. From this experience we expect the continuous production of soybeans destined to vegetable oil production.

This research has tested the validity of the RCA interpretation; major findings include the fact that the lnRCA patterns for different commodities from South America suggest that a catch-up effect originated with the loss of the comparative advantage of the United States position in the global market. Through the RCA indices we rediscovered a historical analysis of development in the production and trade of the most important exporters of soybean commodities. At difference to other studies, the inclusion of small-medium exporters, like Bolivia, Paraguay and Uruguay, gave the study a more complete panorama of the soybean market. In theory we can demonstrate an influence from the United States to the South American countries, and we suppose that the knowledge and technology used to produce and trade the soybean commodities is similar in all the countries. Based on values and traded volumes we state that the improvement of RCA in South America is also due to the rapid increase of traded volumes.

In general terms, we observe the price volatility as a positive opportunity from the point of view of exporters; the situation on 2007-2008 supported the South American countries to improve its performance in the world market. The soybean demand for biofuel production is creating more attractiveness and acceptance of these commodities in the international market.

From the observed trends, we expect that the production and trade of soybeans and soybean oil will be on hands of Argentina, Brazil and Paraguay; these countries shown that have capacity to grow and the opportunity to improve in intra-industry technological shift like the production of biofuels. A new intra-industry technological shift on biofuels in Bolivia is a little probable and also Uruguay, their production capacities, logistic and resources looks limited. The production of biofuels is possible, but not a comparative advantage or an important role in the international market. Instead, the most probable technology shift in Uruguay can be done from soybeans to soybean oil.

Definitely, from the analyze of the period 2006-2008 we conclude that price volatility was good from the point of view of exporters; but also was observed as a luxurious good from the point of view of the consumers.