

THE SOYBEAN REPUBLIC

By Mariano Turzi

A global model of industrialized agriculture has been consolidating during the last decades. Agribusiness is based on the use of genetically modified crops, agrochemicals, and new sowing techniques. The control of the new means of production has empowered multinational chemical and trading companies, and their vertical integration along the production chain is generating a commanding production structure. Companies have used their scientific and technological superiority to advance the sale of their agrochemical products, integrating with traders and processors and leveraging scale advantages to establish dominant buying positions by drawing on financial strength. For South America, this is giving rise to new geopolitical fault lines. National borders are losing ground to a corporate-driven model of territorial organization. The new model is dictating production conditions and infrastructural developments; rearranging the geoeconomic space throughout Argentina, Bolivia, Brazil, Uruguay, and Paraguay into a single, unified “Soybean Republic.”

Introduction

Gold, silver, iron ore, copper, oil; commodities are the essential inputs for industrial development. In order to ensure continued economic growth, it has historically been critical to guarantee the steady flow of these inputs at minimum risk and a reasonable price. Securing resources has historically been assigned a strategic value, thus driving external actions of nations in more peaceful or belligerent ways. In the last decades, with emerging Asia playing an ever-increasing role in global markets, the focus has been in the increasing competition for energy and mineral products.

However, agricultural products constitute a much more vital – yet underemphasized – class of assets. If the absence of steel or gas can disrupt the normal functioning of a society, the potential is much more immediate and dire when the scarce resources are

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food and water. There are no substitutes for eating and drinking and the consumption of foodstuffs happens on a daily basis. International organizations like the United Nations Food and Agriculture Organization (FAO) and the World Bank agree that agricultural commodity prices will rise over the next decade; a 10 percent to 30 percent increase compared with the 1997–2006 averages.¹ Although not expected to approach the whopping 40 percent increase experienced during 2008, the Organization for Economic Cooperation and Development (OECD) has been warning that commodities prices will remain above historical averages and thus additional episodes of

strong price fluctuations cannot be ruled out.² The nature and composition of world demand for agricultural commodities indicates that despite the downturn in the global economy, the upward trend in real agricultural commodity prices will resume.³ The background demographic dynamic is in itself impressive: world population grows around eighty million people per year. To feed the world's population in the next thirty years, it is believed more food will have to be produced than in the last 10,000 years.⁴ The structural upward shift in food demands answers to steady demographic trends emerging throughout Asia. Feed demand is the correlate of the improvement in their economic conditions. However, if in twenty years' time China consumes resources at the current U.S. level, then two-thirds of world grain production will have to be destined to meet that consumption.

According to the World Resources Institute, by the year 2020, meat consumption in the developing world will double 1993 numbers.⁵ In March 2011, FAO reported its Food Price Index averaged 236 points in February, the highest record in real and nominal terms since it started monitoring prices in 1990.⁶ At the same time, U.S. Department of Agriculture (USDA) data shows that in the ten-year period between 1999 and 2009, China has doubled its share of world soybean consumption.⁷ The country also holds 25 percent of global population. Put simply, there are more people and more people eating animal protein such as beef, poultry, and swine than ever before.

Besides food and feed, a growing percentage of world grain has been earmarked for renewable energy sources.⁸ In 2008, the global peak oil expectations have triggered a growing energy demand for biofuels. Demand for ethanol-producing crops is increasing, supported by policy rather than by market competition. Driven by national subsidies, nearly 40 percent of the corn grown in the United States is used for fuel, with prices of corn on the Chicago Mercantile Exchange rising 73 percent from June to December 2010. According to the International Energy Agency, by 2030 the European Union (EU) will only be able to supply 50 percent of its biofuels demand.⁹ Attempting to diversify its energy matrix, both the developing and the developed world have instituted standards and mandated policy targets for renewable energy sources.¹⁰ The proportion of Chinese cassava used for ethanol went up from 10 percent in 2008 to 52 percent in 2010.¹¹

For the soybean supplying countries in South America, the combination of these three factors (increased demand for food, feed, and biofuels) has refashioned agricultural production. In Argentina, Brazil, Paraguay, Bolivia, and Uruguay, the reaction to the overriding demand has given rise to a single geoeconomic entity: the Soybean Republic. This integrated network of production, processing, and distribution is organized according to the needs of transnational interests and actors to leverage cost advantages across borders, raise efficiency, and take advantage of production-related infrastructural developments. This geoeconomic change in the allocation of economic benefits will impact the distribution of power within and between countries and will reorder the long-term geopolitical balances in the region.

1. Agribusiness as the New Mode of Production

The establishment of the Soybean Republic goes hand in hand with the consolidation of the agribusiness mode of production; itself the result of a technological revolution which radically transformed the means of agricultural production. In the 1990s, in an attempt to preserve the value of its core business in a competitive scenario, chemical companies capitalized on their expertise and ventured into biotechnology and genomics. The package encompassed three components: genetically modified (GM) seeds, agrochemicals, and no-till or direct sowing.

Producing higher yields, GM seeds spread worldwide like a brushfire. Soybeans displaced cotton as Paraguay's top export product and today represent more than 50 percent of the country's exports. Dominated by Brazilian emigrants, production has flowed from east to west, from eastern departments of Itapúa, Alto Paraná and Canindeyú to Caaguazú, Caazapá and the fast-growing San Pedro and Amambay. In Argentina, soybeans originated in the southern part of Santa Fe and north of Buenos Aires provinces. The "nucleus zone" covers southeastern parts of Córdoba and southwestern Entre Ríos. In the last decade, it has expanded to the northern provinces of Santiago del Estero, Chaco, and Salta. In Uruguay, production is concentrated in the northwestern departments of Soriano, Río Negro, Colonia, Flores, and Paysandú, along the Uruguay River basin. Brazilian soybean production at first belonged to the southern states of Rio Grande do Sul, Santa Catarina, and Paraná. During the 1970s and 1980s, immigrants from other regions of the country moved into Mato Grosso and gradually consolidated this state's position as the leading producer. From the center west region (including Mato Grosso do Sul and Goiás), the soybean frontier has been making its way into the north, toward the east and the more protected Amazonian west into southern Piauí, Maranhão, western Bahia and Rondônia to the west. In Bolivia, production is concentrated in rich eastern Santa Cruz department, on the border with Brazil. Today, Argentina, Brazil, Bolivia, Uruguay, and Paraguay are in the top ten "biotech mega-countries" list with a combined surface of over fifty million hectares of biotech crops; mostly soybeans.¹²

Agriculture is a set of technologies that are applied to natural resources in order to produce food.¹³ Seen in this perspective, the agricultural package completely altered the ecological, economic and political parameters of agricultural production. It raised *physical* productivity in the fields at the same time that it led to *economic* gains; the increase of the money value per unit produced. Profit opportunities in the new soybean

model or “package” empowered the chemical companies and created incentives for the permanent development of complementary assets that would enable the appropriation of the benefits of innovation. Agrochemical and seed companies consolidated their position by creating a dense web of subsidiaries and licensed distributors. Mutual licensing of traits and technology merged R&D capabilities to ensure the successful leveraging of biotech capabilities. Genetic use restriction technology (GURT) has the potential to achieve intellectual property rights protection by means of science rather than law. V-GURT “terminator” seeds are genetically engineered to be sterile in the second generation, while T-GURT “traitor” seeds would not germinate until the crop plant is treated with a chemical activator compound sold by the biotech company.

A revolutionary change in agricultural technology transformed the means (material forces) of production. As a result, a new mode of production evolved: agribusiness. Within this model, dominant actors are leveraging their proprietary assets and scale advantages to translate technological advantages into economic benefits. Control of food production and distribution has historically constituted a source of power, giving rise to specific social and political relations of production.

2. Trading and the New Patterns of Allocation

Just as the biotech revolution transformed the physical input and the mode of production, the international liberalization wave of the 1990s fundamentally changed grain trading channels and marketing structures. As chemical and seeding companies were experiencing a boom due to the explosion of biotechnology, trading companies gained market power as a result of the way in which grain commercialization was restructured.

The 1980s debt crisis forced the Latin American governments to decrease support and review agricultural policies. For much of the twentieth century, governments in South America sought to cushion the volatility effects of price swings of agricultural products on domestic food provision. Successive military and civilian governments attempted to maintain a single marketing channel for key commodities by intervening in – to control or direct – the functioning of agricultural markets. In the import-substituting industrialization model adopted throughout Latin America, agricultural rents were the key input to finance industrial development. But during the 1990s agricultural commodity markets were liberalized. Deregulation reduced state-created distortions, trade barriers were unilaterally reduced and private financial instruments introduced. With the structural adjustment and reform programs, the state withdrew from direct involvement in commodity markets: State owned enterprises were privatized, marketing boards dismantled, subsidies eliminated, export taxes ended, guaranteed prices terminated, and government owned stocks closed.

International grain traders used their financial, logistical, organizational, and informational resources in order to buy local firms and assert their position in the chain. Through backward integration – where a buyer of raw materials acquires its suppliers, or sets up its own facilities to ensure a more reliable, cost-effective supply of inputs – trading companies leveraged scale advantages in transport, storage, and finance.¹⁴ Since margins in grain trading are comparatively thin and percentages charged on commissions are not extraordinary, volume is the decisive factor. Scale advantages, volume, and technology

are the key assets to be leveraged in the agribusiness model of soybean production. Large, usually transnational companies are playing the central roles in coordinating production networks, including backward and forward (related to output utilization) and backward (related to derived demand) linkages. The shaping of production chains shows they are the result of the interaction of purposeful actors rather than a “natural” process. Also, trade patterns are not based on factor endowments alone, but on governance and control decisions by dominant players – private and public, foreign and domestic. The agribusiness model in South America is creating a single, regionalized soybean chain.

If the biotech revolution transformed the structure of agricultural markets, the liberalization of the 1990s reshaped its governance. Market deregulation and trade openness implied a new framework for the agricultural sector under the logic of international complementation, reorganization of the supply chain, and consolidation of its links. The capital- and technology-intensive agribusiness model eroded the division between the agricultural and the industrial sectors. Unleashing these productive forces has had such powerful impact that the agribusiness model cannot be contained by national borders or domestic political structures. Profit capture and market share are obtained via integration of the supply chain through flexible sourcing from diverse locations. Soybeans are harvested in Paraguay, sent by barge to Brazil for export or to Argentina for processing, and sold in Geneva to Asia after the operation has been authorized by headquarters in the United States. Source diversification gives traders more bargaining power vis-à-vis producers. The Soybean Republic allows traders to balance global presence and thus profit from differences in short-term costs in labor and environmental standards, tax structures, and subsidies. Because they play in multiple markets, traders can take advantage of international price differentials through a network of intra-firm operations. Purchases can be done from an extensive web of suppliers (producers) at relatively low cost, thus extracting favorable terms through bulk buying, playing off suppliers against each other or through the threat of including or excluding producers from their list of preferred buyers.¹⁵

Trading is only a chapter of a larger system of global grain trade, itself a link in an even larger food production chain. In an attempt to consolidate their supply base, traders are integrating with processors. Trading houses are not only grain buyers, but also retailers and cooking oil and meal processors by a variety of alliances with other players in the chain. Integrated agrifood chains are spanning their control through all stages of production: from input development (seeds and agrochemicals) to processing, trading, and final sale for end use. Through mergers, acquisitions, and more flexible arrangements like partnerships, contracts or joint ventures, the cluster of firms is the material base of the Soybean Republic. Companies provide farmers with seeds, fertilizers, and chemicals in return for harvested soybeans. Seed providers charge growers a premium for the new trait seeds. Growers recover these higher input costs when they deliver the soybeans to the trader/processor after harvest because they have negotiated these sales in advance. Processors want to process new trait seeds in order to be able to supply traders, who have secured contracts to supply food manufacturers.

The financial strength derived from the association between international trading and chemical companies allows companies to provide the funds for the farmer to adopt the

soybean “technological package” and to be an agent in the new agricultural economy. Because the adoption of the package by the producer is in the company’s interest, the credit conditions offered are economically attractive. But inputs for growing alternative, less profitable crops are not as cheap, as the private sector does not supply them so readily and the public sector cannot or will not finance them with the same ease. This is what is prescribing the conditions for agricultural production, reorganizing territory into a single productive and geoeconomic space: the Soybean Republic.

3. The Geoeconomics of Infrastructure

Regional integration has released the competitiveness of the soybean agricultural chain by reinforcing the complementarities to create value-added production. However, this added value is not being accrued to countries. Physical infrastructure developments are lowering costs for traders, processors, and input suppliers alone, signaling the direction of the geoeconomic pull toward a single, integrated regional productive unit.

The main centers of gravity in soybean trade have a correspondence with the most efficient logistical points along the chain. The most profitable locations organize the spatial distribution of production and prescribe infrastructural improvements. Trade flows operate not with reference to national borders but in a hub-and-spokes modal arrangement. Hubs are the main production centers and the spokes are constituted by the storage network that flows into the export terminals. Investments are made on the basis of current and potential trade flows, looking for the areas that could support necessary standards of infrastructural services. These geoeconomic dynamics have also impacted political centers of gravity. In Paraguay, where the locus of power has traditionally been local, the soybean boom has provided the resource base to further consolidate existing disparities. In Brazil, infrastructure developments have consolidated local engines of growth in the inner parts of the country. This has impacted political alignments, empowering local political figures that are not from the traditional Brazilian political alliance structure such as Governor Blairo Maggi in Mato Grosso. Finally, Argentina has also experienced “local empowerment,” sparking conflict between local producers and the central government for the rents of production.

Argentina has its main soybean production zone in a radius of 300 kilometers of the Santa Fe province ports. This gives the country a logistical advantage that has been leveraged heavily by traders and processors, building processing and storage facilities in the ports they control. Nevertheless, in the face of mounting production and the lack of appropriate dredging, the port of Nueva Palmira in Uruguay is becoming an alternative loading station. Because Bolivia has no direct access to ocean ports, 49 percent of its soybean production leaves from Nueva Palmira, thanks to an operation concession first obtained by President Siles Zuazo in the 1980s and later renewed in 1993 by Presidents Paz Zamora of Bolivia and Lacalle of Uruguay.

In Paraguay, as soybean production rose, so did the improvement of the waterways and its facilities: New loading locations along the Paraná river were built and 2,400 kilometers of water courses running to the port of Santos have been made navigable by the construction of three locks on the Tiête–Paraná waterway.¹⁶ Shipments are half the cost of land freights (trucks) to Brazil. In addition, “multimodal” arrangements allow companies to

make the time/cost cargo-equation more efficient: Through Itaipú, soybeans go up the river Paraná to Presidente Epitácio and from there are transported by train to the port of Santos. Waterways constitute the main avenue for transport of Paraguayan beans, which has sparked a naval barge industry and promoted investments in port development. These are badly needed, since there are around 3,100 kilometers of navigable waterways. Infrastructure updates at the main port of Villeta, south of Asunción, cannot keep up with the continuous rise in soybean volumes. Navigational difficulties, lack of shipping space, and high freight charges have complicated river transport to reach the Rio de la Plata basin. The big infrastructure projects in the region are guided by the soybean economic pull. A known example is the paving of BR-163 road (Cuiabá–Santarém), in which the transnational agricultural conglomerate, Cargill, is the principal actor that is interested. After modernizing the Santarém port, the company only needs an infrastructural improvement to this highway in order to efficiently get the soybeans from production sites to vessels with EU destinations. More recently, BR-158/MT is emerging as an outlet for the Mato Grosso soybean production to be driven northeast. Within Pará, BR-158 is already paved, but in Mato Grosso, finishing its pavement is of critical importance to the government. With rural constituencies, politicians like Governor Maggi have an incentive to manage resources responsibly and with relative political and ecological sustainability. Since resources are managed at the local level, there is a built-in interest on the part of local authorities to expand the agribusiness model as a source of financial and political independence vis-à-vis the central urban power forces.

For all its novel qualities, the Soybean Republic is but a regionalized, hi-tech reenactment of the extractive, commodity-dependent model of economic growth historically known to Latin America. From its origins, Peruvian gold and Bolivian silver monetized the European economies from the fifteenth to the seventeenth centuries. After independence, the countries repeated the same international trade insertion pattern based on a commodity lottery that inevitably led to boom and bust cycles: Paraguay's prime export, cotton, was wiped out from the international markets with the creation of U.S. surpluses in 1952. The same thing happened with Argentine wheat. Brazil suffered a succession of busts of its leading commodities: The dominant position the country enjoyed in the rubber market was crushed in 1914 under the weight of Malaysian and Ceylonese (now Sri Lankan) production, and the same scenario occurred with sugar under the competition from the Antilles.

Infrastructural dynamics of the Soybean Republic were also accompanied by politics: the return of democracy to the region helped deactivate the longstanding "war hypothesis" and transformed the geopolitical equations in the Southern Cone. Most notably, the longstanding rivalry between Argentina and Brazil came to an end. This bilateral relationship had – indeed, still has – the potential of driving most of the other political, strategic, and economic arrangements in the Southern Cone. Confidence-building measures were linked to schemes for economic and political integration that can be traced back to the 1985 signing of the Argentina–Brazil Integration and Economics Cooperation Program (PICE) by Presidents Alfonsín of Argentina and Sarney of Brazil. The shift in strategic geopolitical thinking gave rise to infrastructure development to connect both nations. Roads, bridges, ports, and other projects had been deliberately discarded for being

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perceived as vulnerabilities in case of armed conflict, rather than an opportunity to increase bilateral trade. But despite the good will of industries in Argentina, Brazil, Paraguay, and Uruguay in dealing with this integrated production system, such a system carries with it an inherent propensity toward superseding states. At present, agricultural production in South America is fast becoming an export-oriented sector. How would China react to a governmental decision to divert or cancel production that might threaten their domestic food consumption and political stability? Natural resources have a strategic nature in a world with increasing population and scarcer arable land due to urbanization and climate change. Will the determinants of the Soybean Republic become in the future the “sinews” of intensified resource competition in South America?¹⁷

4. Geopolitics: The Command of the Soybean Heartland

The strategic importance of the Soybean Republic is that it contains a “vital space” that secures access to food and water resources. In the coming decades, demographic and climate trends will determine the rise of these resources to a higher degree of importance than oil, as importing countries intensify their quest for food resources. As a result, the Soybean Republic will come under ever-increasing pressure. Its agricultural resources have a high degree of “lootability”¹⁸ because they have a fixed location and minimal defensive infrastructures. Moreover, the international competitiveness conditions of the Southern Cone for soybean production make it difficult for production to be relocated.

Within the Soybean Republic, already the stronger countries are capitalizing on the necessity of importers to keep production flowing in a stable and predictable manner. As a result, geopolitical alignments and the balance of power is beginning to shift. Brazil is expanding its influence into Paraguay and Bolivia. Indeed, the soybean chain in Paraguay has been colonized by Brazilian and Brazilian emigrant (*brasiguayo*) producers. Estimates of control of soybean production range between 50 and 80 percent of the total chain.¹⁹ Brazil has a tradition of intervening in its Paraguayan periphery, so the region would not become a “turbulent frontier.”²⁰ For Paraguay, this was a welcome counterbalance to its dependence on Argentina. At present, it is hard to discern the frontier between Paraguay and Brazil; and some parts of the border are just one green ocean of soybeans. In Bolivia, Brazil has an interest in maintaining stability and continuous production, even if that means subtly supporting secessionist groups in eastern Santa Cruz. The 2006–2008 conflict between the resource-rich provinces of Santa Cruz, Tarija, Beni, and Pando and the central government had worried the uppermost echelons of Brazilian diplomacy and armed forces; since it is estimated Brazilian companies control 15–25

percent of Bolivian gross domestic product through their stakes in the agricultural and gas sectors.²¹ Uruguayan fears of being wedged between Argentina and Brazil will likely increase in the future, as it is the politically weaker party in the emerging integrated soybean production system.

Moreover, the Soybean Republic sits on top of what is probably the largest underground freshwater reserve in the world, the Guaraní Aquifer. Just as it is happening today in the Middle East, in a world with increasing temperatures and desertification, water resources will constitute fault lines for conflict. After considering that it takes 2,200 liters of water to produce 1 kilogram of soybeans, it becomes apparent that the Soybean Republic is exporting water resources in each shipment of its agricultural products. China has been experiencing rapid urban land expansion, which has resulted in major arable land loss.²² In addition, the World Glacier Monitoring Service reported last year the accelerated shrinking of glaciers in the Himalayas and the Tibetan plateau. This poses an imminent threat to Asian food supply, which is especially grim when taking into account that China and India are the leading producers of wheat and rice. Ice melt sustains the major rivers of these two countries (Indus, Ganges, Yangtze, and Yellow); all of which provide irrigation during the dry season. The Soybean Republic creates an economic imperative for agricultural production, but national governments will have to deal with the challenges created by water shortages, which scientists estimate will become critical in twenty years.

The debate over natural resources will rapidly become politicized and control ever more controversial. How members of the Soybean Republic will act still remains to be seen. Although the use of force is not viewed as an option, the Brazilian armed forces have the protection of the Amazon as a cornerstone of Brazil's strategic defense plan. To such internal power calculations, extra-regional powers with a vested interest should be added. To avert a vicious circle of misperceptions and mutual distrust between the South American governments, joint strategic planning will be essential. It would also defuse security dilemmas with the potential to degenerate into uncontrolled conflicts. Domestic political pandering has in the past wrecked Latin American nations' strategic interest by capturing economic and foreign policymaking. Populist leadership is intimately tied to commodity-based economies. It is also true, however, that backlashes rise against export-oriented economic models that are (at best perceived as) extractive and exclusionary. The five countries of the Soybean Republic must strive to find their common interest in designing a regional framework for natural resource management. A renewed impetus for regional integration has the potential to include public and private actors, forging closer economic and political ties. This will enhance the economic and ecologic sustainability of soybean production, while establishing national commodity management systems that can accommodate multiple interests and move away from potentially escalating zero-sum games. ■

– *Sakari Deichsel served as the Lead Editor of this article.*

NOTES

- ¹ See, *Rising food prices: Policy options and World Bank response*, World Bank notes, April 2008 and *OECD–FAO Agricultural Outlook 2009–2018*, 30.
- ² *Rising Food prices: causes and consequences*, OECD, 2008, 3.
- ³ “The global food equation: food security in an environment of increasing scarcity,” *Deutsche Bank Research*, September 21, 2009.
- ⁴ United Nations University, Institute for Water, Environment and Health (UNU–INWEH), *Proceedings of the International Forum Celebrating the Centenary of Conservation and Restoration of Soil and Vegetation*, Selfoss, Iceland, August 31–September 4, 2007.
- ⁵ “Carnivorous Cravings: Charting the World’s Protein Shift,” *EarthTrends*, July 2010.
- ⁶ “Tight cereal markets as food prices increase again,” *FAO Press Release*, March 3, 2011. <http://www.fao.org/news/story/en/item/51913/icode/>.
- ⁷ See, Foreign Agricultural Service’s Production, Supply and Distribution (PSD) online database at <http://www.fas.usda.gov/psdonline>.
- ⁸ While in 2008 only 1 percent of world grain was dedicated to energy use, in 2010 that percentage was 6 percent. This is a 500 percent increase in only two years. The figure is even more staggering when one considers that the total global grain output has risen in that period from 300 to more than 350 million tons.
- ⁹ International Energy Agency, *World Energy Outlook 2009*.
- ¹⁰ The U.S. Congress has mandated that biofuel use must reach 36 billion gallons annually by 2022. The EU stipulates that 10 percent of transportation fuel must come from renewable sources by 2020. Countries like China, India, Indonesia, and Thailand have adopted biofuel targets as well. For a complete listing of policy guidelines for promoting renewable energy in the power sector, see International Energy Agency, Global Renewable Energy: policies and measures database at <http://www.iea.org/textbase/pm/index.html>.
- ¹¹ “Rush to Use Crops as Fuel Raises Food Prices and Hunger Fears,” *New York Times*, April 6, 2011.
- ¹² Clive James, “Global status of Commercialized biotech/GM Crops,” *International Service for the Acquisition of Agri-biotech Applications (ISAAA)*, N 42, 2010.
- ¹³ Richard E. Just and Rulon Pope, “The agricultural producer: theory and statistical measurement,” *Handbook of Agricultural Economics*, Chapter 12, Volume 1, Part 1 (2001).
- ¹⁴ See, “Who Owns Nature?” *ETC Group Report*, November 12, 2008. Also, Bill Vorley, “Food, Inc. Corporate concentration from farm to consumer,” *U.K. Food Group*, 2003; and, “Corporate actors in the South American soy production chain,” *World Wide Fund for Nature*, Switzerland, November 2002.
- ¹⁵ See, “The soy supply chain policy: striking a CSR balance in financial decisions,” *Rabobank Food & Agribusiness Research and Advisory*, January 2008.
- ¹⁶ This waterway is used by Brazilian giant *Caramuru Alimentos*—through a joint venture with the company, Torque—to transport its soymeal and lecithin to the port of Santos by tugboats and barges (with a 6,000 ton capacity) to terminals in the city of Pederneiras or Anhembi (São Paulo). From there, they are transported by train to the port of Santos. According to company Vice President César Borges de Souza, the hydro–railway combination reduces logistic costs vis-à-vis the hydro–highway alternative of between 8 percent and 10 percent.
- ¹⁷ For the impact on land grabs, see, *Rising global interest in farmland: Can it yield sustainable and equitable benefits?* The World Bank, 2011.
- ¹⁸ Richard Snyder, “Does lootable wealth breed disorder? A political economy of extraction framework,” *Comparative Political Studies* 39, no. 8 (October 2006).
- ¹⁹ Figures cannot even estimate the total amount of *brasiguayos* in Paraguay. Institute of Rural Welfare (IBR) sources estimate 300–350,000, while the 2002 Census counts 108,000. Migrations officers say there are 118,000 legally inscribed as immigrants, while Brazilian consular figures show between 400 and 500,000 out of a total Paraguayan population of 6.3 million.
- ²⁰ John. S. Galbraith, “The ‘Turbulent Frontier’ as a Factor in British Expansion,” *Comparative Studies in Society and History* 2, (January 1960): 150–168.
- ²¹ Brazilian state-owned oil company Petrobras controls 10 percent of the oil fields in Bolivia, an equivalent to 606,490 hectares. Figures for 2008 show the company being responsible for 61.5 percent of Bolivia’s oil and natural gas production, up from 56.7 percent in 2004 and despite nationalization of the hydrocarbon sector on May 1, 2006.
- ²² China’s Ministry of Land and Resources warned in December 2010 the country was “edging dangerously close to its red line,” with just 1.826 million hectares available as of the end of 2009. It also reported China had lost 123 million hectares of arable land from 1997 to 2009.