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Investment strategies in the Latin American agri-business sub-sectors of agricultural commodities, biofuels and meat chains

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Abstract

Purpose – The purpose of this paper is to review and examine the recent investment trends of firms operating in the food, feed and biofuel production and processing sectors in Latin America. The inter-related nature of these three sub-sectors and the great expansion they have gone through in the last decade showcases a series of socioeconomic and environmental policy challenges thus making it relevant to identify their different business models through a typology.

Design/methodology/approach – The paper first presents an unprecedented literature review based on field observations and media coverage of agri-business strategies of the food, feed and biofuel production in the region. It then moves to an in-depth analysis of investment operations that serve to classify such firms into a business model typology considering degree of internationalization and integration. The typology is a useful mechanism to enhance public policy analysis and uncover market or government incentives behind business decisions.

Findings – By focusing on investment strategies, the paper illustrates how both market and government incentives shape and affect the performance and consolidation of different players in the food, feed and biofuel sub-sectors in Latin America. The resulting effects have strong economic as well as social and environmental implications because such economic activities have an impact on global food and energy security.

Research limitations/implications – Limitations include a reliance on largely qualitative evidence and research methods due to unavailability of consistent numerical data in these specific agri-business sub-sectors.

Originality/value – This paper is unique in its focus on business models in a particularly relevant set of agri-business sub-sectors in Latin America and its implications to promote investment and innovation in value chain development while considering regional-specific challenges.

Keywords Agriculture, Agricultural products, Food crops, Business development, Business analysis

Paper type Research paper

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1. Introduction

With world population projected to reach nine billion by 2050, food, feed and fuel production are also expected to expand to meet the increasing demand. This demographic trend is accompanied not only by rising family incomes but also by increasingly westernized diets

(based on higher consumption of animal protein and processed food). At the same time, the pursuit of energy security and the commitment to mitigate climate change have led governments of several countries to support the production and use of biofuels (Saravia-Matus *et al.*, 2012). Based on such events, the World Food Programme (2007) stated that the world has gone from a structural food surplus to a structural food deficit, ultimately providing increasing and attractive new business opportunities in the agro-energy and agro-processing sectors.

The literature suggests that there are strong linkages between biofuel and agricultural production. According to Ciaian and Kancs (2011), biofuels have a direct effect on the agricultural sector because both use biomass[1] as input, which together with the agricultural commodities are produced on a fixed area of agricultural land[2]. International organizations, such as the World Bank, the FAO and the OECD, argued that biofuels were an important factor leading to higher food prices in 2008 (Mitchell, 2008; FAO, 2008; OECD, 2009). In line with such predictions, empirical estimates of Ciaian and Kancs (2011) show that the transmission between the oil price and the agricultural commodity prices mainly occurs through the biofuel channel and that interdependencies between the energy and food markets are increasing over time. These results suggest that the biofuel channel is a more important driver of agricultural price changes rather than the input channel and that policies which stimulate biofuel production may indeed have an impact on food prices and such impact is stronger than that of higher energy costs in agriculture.

The objective of this paper is twofold. First, to uncover and analyze the behavior and strategies of firms involved in the production, processing and commercialization of agricultural commodities, biofuels and meat chains in Latin America[3]. These three sub-sectors are considered highly inter-connected and relevant for both food and energy security concerns at national and global level. For this purpose, a typology of firms for these three sub-sectors is defined and investment patterns analyzed. Second, the paper examines the respective market structure and ongoing transformations that emerge from the firms' different investment, innovation and technology outsourcing or development decisions in the Latin American region. The latter are discussed in the light of public policy environment and increasing challenges associated with climate change.

The paper is structured as follows: Section 2 focuses on the overall strategic value of agricultural and agro-industrial investment, discussing major trends and developments in the region. Section 3 contains an in-depth account of the major investment decisions by agri-business firms involved in agricultural commodities, biofuel and meat processing. This section seeks an understanding of the strategies followed by major transnational corporations in the region (including the trans-Latin[4] companies) and the dynamics of the supply chains to which they belong. Section 4 presents a typology of business. A typology is relevant because the agri-business sector (which is nowadays strongly connected to not only food and feed processing but also agro-energy generation activities) includes a great variety of players whose interactions become more complex considering oil price transmission effects and usage of common inputs. The typology allows not only identifying key players in the agri-business industry in Latin America, their investment strategies, but also their incentives (whether based purely on market or government sources) and how these have altered transaction costs and overall market structure and performance. Section 5 discusses potential policy implications at national and regional level considering the different types of firms identified in the selected agri-business sub-sectors. Section 6 presents concluding remarks with recommendations for future research which supports relevant policy formulation and discussion in Latin America.

2. Recent global patterns and regional investment trends in the Latin American agri-business sector[5]

The past few decades have seen the consolidation of a small set of large, global food companies like Nestlé (dairy; Switzerland), Kraft Foods, Inc. (food; USA) and Unilever (food;

the Netherlands). This phenomenon is part of a broader shift from the agro-industry stage to a new one that some authors have labeled "agro-tertiary" (Ayadi *et al.*, 2006). In this new phase, the influence of major agro-industrial processing and distribution transnationals is growing as they draw ever closer to the end consumer by managing globally recognized brands that go beyond food. In addition to the consolidation of food industry mega-transnationals, a new generation of transnationals is emerging. It includes new Asian commodities giants, Latin American vertically integrated agro-food transnationals companies[6], with an increasingly high global market profile, and much smaller, flexible and decentralized companies with high-quality (specialty) products.

The main investment strategy for this set of new players is via agro-industry mergers and acquisitions throughout different segments of the supply chain. The latter is favored by the tighter regulation – national and global – of food production and distribution (and, more recently, by policy incentives for producing biofuels) because setting up subsidiaries and joint ventures or acquiring local enterprises creates economies of scale that make it easier to comply with these regulations and create value while also accessing natural resources which can be off limit to foreign investors[7].

Between 1989-1991 and 2005-2007, global foreign direct investment (FDI) flows toward primary activities (agriculture, hunting, fishing and logging) and agro-industry operations (food, beverages and tobacco) quadrupled, driven by a number of factors including the liberalization of trade and capital flows, the consolidation of free trade agreements and the growth of emerging economies (UNCTAD, 2009). The share of FDI going to the agro-food industry (food, beverages and tobacco), primarily from developed countries, did not change significantly during this period and went from 98 to 95 percent. Meanwhile, the percentage of FDI toward the primary sector in developed countries plummeted from 91 to 52 percent because some developing countries began to generate important flows in this area (Rama and Martínez, 2013). The UNCTAD (2009) report on FDI in agriculture stresses that although in relative terms these flows are not particularly significant in Latin America (since they accounted for just 0.47 percent of the total between 2005 and 2007), these flows were important for some countries. For instance, they ranged between 6 and 10 percent of total FDI for Ecuador, Peru and Honduras and between 1 and 3 percent in Chile, Costa Rica and Brazil for the period in question. The study shows that in South America, investment was concentrated in grains and oilseeds, fruit and meat, while in Central America and the Caribbean it was concentrated in fruit and sugar cane. The main draws for such investments include the structure of the economy, the diversity of agricultural land and national public policies (UNCTAD, 2009). While the amounts of FDI flowing into the agricultural and agro-industry sector in Latin America and the Caribbean are not large compared with inward flows in other sectors, they (especially those funds targeting agriculture) have a strong weight on rural economies.

3. Investment strategies in the sub-sectors of agricultural commodities, biofuels and meat chains in Latin America

3.1 Agricultural commodities

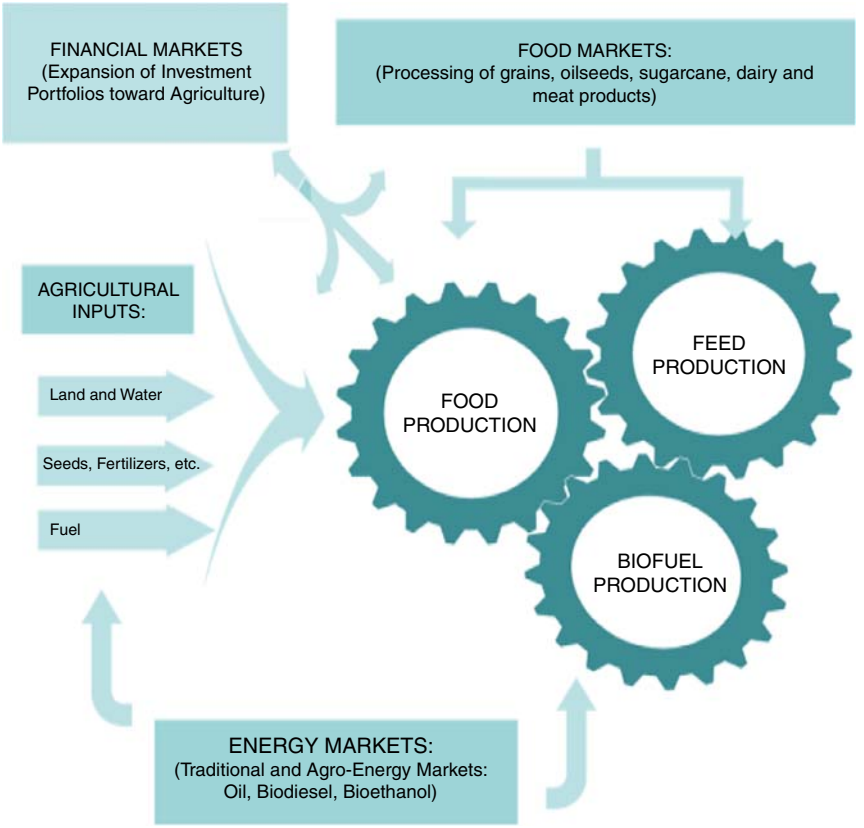
Agro-commodities are agricultural products that are traded in large volumes on a global scale; their properties are standardized in the market because they are usually used as raw material for other production processes (Gibbons, 2009). This section looks at a subgroup of agro-commodities which are termed "flex-crops" because they can be used for a variety of purposes: to make food, feed/fodder (that is the main input in animal protein production) or biofuels.

Flex-crops, regardless of whether they are intended for producing food, fodder or biofuel, compete for the same basic agricultural inputs (land, water, seeds, fertilizers and fuel). There is also a linkage between the biofuel market and the energy market, because the agro-energy business (like other alternative energies) will be profitable if fossil energy sources become less

competitive and/or government policy promotes the use of cleaner energies, creating a synergy between agricultural markets and energy markets. Likewise, the literature suggests that oil price transmissions to the agricultural sector occur through the biofuel channel (Ciaian and Kancs, 2011). Another connection that has always existed but has grown stronger in recent years is between the financial markets and agricultural activity, especially in the wake of the 2008 financial crisis when rising agricultural prices drove international portfolio investment to diversify into this sector (Saravia-Matus *et al.*, 2013). As will be seen, FDI in land, along with mergers and acquisitions in the flex-crop sector, is largely shaped by strategies in which the linkages illustrated in Figure 1 play a fundamental role.

The set of agricultural commodities and related investment plans discussed in this subsection includes soybeans, sugar cane, sorghum and maize which are among the most relevant flex-crops in the region. In 2010, the region accounted for a large part of the global output, producing more than 50 percent of the world total for fodder sorghum, sugar cane and soybeans (Figure 2). Surging demand of these crops (and others such as wheat and palm oil) in recent years is perhaps one of the major developments in global agriculture.

Soybeans. Soybeans are one of the most dynamic and flexible crops. They are the underpinning of emerging integrated agro-industries that can produce soybeans, raw oil, refined oil, flour, pellet feed and biodiesel. For this reason, soybeans have drawn the interest

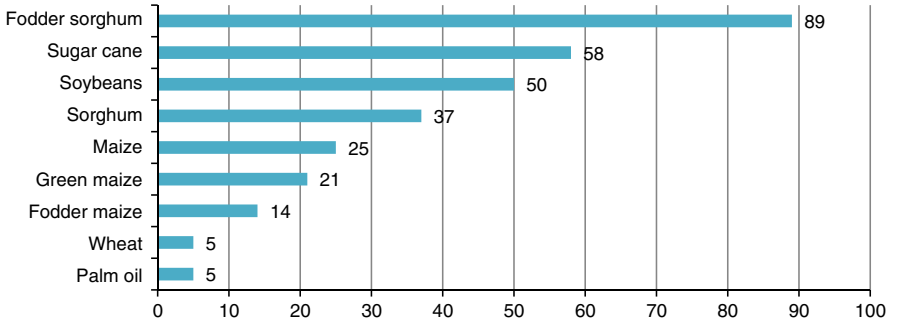


Source: Own elaboration

Figure 1.
Market linkages in flex crop production

of foreign and domestic investors in the region. They are part of a highly complementary crop rotation production system alongside wheat and maize, forming a production complex with a specific technical rationale.

Thanks to advanced crushing equipment, Argentina's soybean crushing plants are large and highly automated, which makes them very competitive compared with their peers in Brazil and the USA. Except for Argentina, most soybeans produced in the region are exported unprocessed. Argentina's soybean market has been changing quickly since the 1990s, with transnational corporations gaining more of a foothold. After Brazil's Ceval bought the local company Guipeba in 1995, the family enterprise Oleaginosa Moreno was bought by the Swiss multinational Glencore in 1997. During the 2000s, the largest crushing companies continued to invest and reached approximately US$450 million in 2005-2006 plus more than US$900 million in complementary investments in logistics and port infrastructure. Leading this expansion was the transnational Bunge (currently the largest processor in the country, whose new facility is expected to have a daily processing capacity of 30,000 metric tons), followed by Cargill, local groups AGD and Molinos Río de la Plata and the European transnational Louis Dreyfus Commodities LDC. By the late 2000s, 81 percent of crushing capacity was concentrated in five companies (Bunge, Cargill, Molinos Río de la Plata, Vicentin and LDC), four of which are foreign owned. This trend could steepen over the next few years, given the growing interest of Chinese enterprises in venturing into the sector. For example, in 2011 the state-owned giant Heilongjiang Beidahuang Nongken Group Company tried to break into the direct production of grain and other food by leasing 300,000 hectares of land. To this end it entered negotiations with the province of Río Negro for a planned investment of US$1.5 billion. This operation has been on hold because of political fallout from the deal. The strategy for attracting investments seems to have been changed recently in order to focus on investing in industrial facilities and infrastructure (Nelson, 2012). Planting pools are a unique feature of Argentina's soybean production model which has started to expand to the other Southern Cone countries except for Chile. This model has allowed the emergence of large producers that have expanded their operations in Argentina, Brazil, Paraguay, the Plurinational State of Bolivia and Uruguay. The ephemeral nature of planting pools (which consist of leasing land and machinery and recruiting technical personnel for short periods) makes it difficult to quantify the FDI mobilized, although the figures point to a sweeping trend that could change the face of agriculture in the region (CEPAL, 2013). Although the model could bring benefits in terms of profitability, professionalism and high technology, it could also favor an extractive, short-term approach that could have negative social and environmental impacts (e.g. approaching agriculture as mining).



Source: FAOSTAT (2013)

Figure 2.
Latin America and the Caribbean: main agro-commodities as a portion of global agricultural output, 2010 (in percent)

In Brazil there are 101 soybean processing plants with a crushing capacity of 143,515 tons per day. Five companies (Bunge, Cargill, Archer Daniels Midland (ADM), Coinbra (Louis Dreyfus) and the domestic group Maggi) own 47 percent of the crushing capacity. A number of foreign firms are long established in Brazil's soybean market. For example, the US multinational Bunge, which entered business in 1905, bought Cavalcanti & Cia in 1923 and then acquired other firms to expand throughout Brazil. The French multinational Louis Dreyfus has had interests in Brazil since the early twentieth century, and in 1942 bought Comércio e Industrias Brasileiras (Coinbra). More recently, between 1995 and 2002, ADM (USA) acquired the soybean operations of the local companies Sadia, Granja Rezende and J.B. Duarte; Bunge bought Covebras, Olvebasa, Incobrasa and Ceval Alimentos; and Louis Dreyfus (Coinbra) acquired Fabrica de Comove (Benetti, 2004). Similar patterns are observed in Bolivia, Paraguay and Uruguay where foreign firms ultimately dominate production, processing and marketing of agro-commodities.

Sugar cane. In Brazil, the main inducement for FDI in sugar cane production is the policy for promoting the use of ethanol that has been in place since the 1970s, although investments did not skyrocket until the mid-2000s. Since then, Brazilian companies have consolidated their position and restructured operations with the aim of capturing investment flows toward the sector. Their strategy included the sale of shares on the Brazilian Stock Exchange, which provided an opportunity for foreign investors to acquire majority and minority stakes. As a result, the foreign-owned sugar mills that were processing less than 1 percent of the sugar cane produced in Brazil were handling 12 percent by 2008. Including the sugar mills in which foreign shareholders have a minority holding brings the proportion up to 23 percent. At the national level, one-third of the industry is controlled by the groups Cosan, Crystalsev and Copersucar. Private investment funds have also come in, such as Radar Propiedades Agrícolas (managed by Cosa), Calyx (managed by Louis Dreyfus) and BrasilAgro (managed by Cresud) (GRAIN, 2009). Another important player is Monsanto, which in 2007 partnered with CanaVialis and Allelyx to develop varieties of sugar cane that are genetically engineered to be glyphosate-tolerant. In late 2008, Monsanto purchased the two companies for US$280 million and began to grow sugar cane directly. Another company that gained media attention was India's largest sugar refiner and alcohol distiller, Shree Renuka Sugars, which acquired 130,000 hectares in Brazil in 2010 (GRAIN, 2009).

Sorghum. Investments in sorghum are increasingly combined with investments in other crops, especially other grains. An example is the Argentine company El Tejar S.A., which manages 140,000 hectares in Uruguay planted with crops such as barley, wheat, soybeans, maize and sorghum and harvests approximately 650,000 tons of grains each year. Investment in sorghum is also combined with the construction of silos and fodder processing plants. Over the past few years as much as US$30 million in FDI flowed into Nicaragua from Cargill in order to build such type of facilities that service their poultry factories. Another case, which was reported in the press and recorded by Land Matrix (2012), is the Saudi conglomerate Al-Khorayef, which in 2011 signed an agreement with the government of Chaco province in Argentina for a US$400 million investment in growing sorghum and other crops on 200,000 hectares. Also in 2011, the Indo-Malaysian-owned Walbrook Group acquired 600,000 hectares in Argentina, under a sublease arrangement (Observatorio Iberoamericano de Asia-Pacífico, 2011). The purpose of the investment is to meet the demand for grain in countries such as India with scarce water resources and a large population.

Maize. In Mexico, Monsanto, DuPont and Dow requested government authorization to plant 2.5 million hectares of genetically modified maize in different parts of the country. These investment plans, however, are being reviewed due to the extension of the area in question and because a number of scientists have put forth arguments stressing the risks associated

with such cultivation plans, given that Mexico is a global repository of maize genetic diversity. In Argentina in 2012, Monsanto, also a key player, announced a US$329 million investment to set up two experimental genetically modified maize facilities in Cordoba and Tucumán with a capacity to produce enough seeds to plant 3.5 million hectares. Investment in five other facilities is scheduled in order to grow maize and make biofuel (ethanol). The nature of the investments reflects both the versatility of this crop and the growing demand for biofuel production. In Argentina, there were nearly 11 projects (currently being processed) that could sharply increase the production of maize for ethanol production in order to raise the ethanol content of gasoline from 4 to 10 percent. This increase would consume 7 percent of Argentina's maize output. One of the key players in this field is Bio4 (based in Córdoba), a company that produces 80,000 tons of maize ethanol. Maize and sorghum ethanol output is expected to rise to 1.3 million tons by 2015 (CEPAL, 2013).

3.2 Biofuels

Ongoing research, development and innovation efforts and policies encouraging biofuel consumption and production have turned this sub-sector into one of the most attractive and fast-growing agricultural endeavors with output totaling 90.2 billion liters in 2009. Ethanol from sugar-rich crops like sugar cane and maize makes up 82 percent of the total while the remaining 18 percent is biodiesel from oilseed crops like soybeans, canola (rapeseed) and palm oil. According to Organisation for Economic Cooperation and Development/Food and Agriculture Organization of the United Nations (2012) estimates, global production of bioethanol and biodiesel is expected to almost double by 2021 and will be largely concentrated in Brazil, the USA and the European Union. By 2021, biofuel production is estimated to be consuming a growing proportion of global sugar cane (34 percent), vegetable oil (16 percent) and coarse grain (14 percent). In the region, Brazil and Argentina are identified as the key biofuel producing countries.

Brazil has a long history of innovation-driven technological development combined with regulatory policies to encourage the use of ethanol in the automotive sector. A key part of this policy makes 25 percent of anhydrous ethanol obligatory in gasoline and requires the design of vehicles able to use hydrous ethanol, which is used in the pure state (flex-fuel vehicles). Many foreign companies took advantage of this to establish operations in Brazil by acquiring existing production (Table I). According to industry analysts, this process is likely to speed up considerably. Projections provided by representatives of the Brazilian Sugarcane Industry Association (UNICA, 2012) indicate that within the next five years, 40 percent of Brazilian production will be in foreign hands, with the major global petroleum companies accounting for more mergers and acquisitions than agricultural groups. Indeed, at the World Ethanol Conference held in Geneva in 2010, companies such as Shell, BP and Petrobras announced millions of dollars in investment in the sector, as they believe that biofuels are the "most realistic" option for complementing petroleum over the next 30 years. These investments could reach US$20 billion over the next few years. Petrobras announced that it would partner with foreign groups to invest US$3.5 billion in the ethanol sector in order to expand production by 193 percent and exports by 135 percent in the coming years. Petrobras has already signed an agreement with the French multinational Tereos to turn Guaraní, controlled by the latter, into a sector leader by investing US$2.4 billion before year-end 2013. Shell has plans to invest US$12 billion in a joint venture with Cosan to create the first multinational in the sector (Chade, 2010). This operation was authorized by Brazil's antitrust regulators in December 2012 and led to the creation of Raizen, which will produce and sell more than 2 billion liters per year of ethanol made from Brazilian sugar cane. In addition, Raizen will distribute more than 20 billion liters per year of other industrial and transport fuels through a network of some 4,500 Shell service stations and thus become the third largest fuel company in Brazil. The goal is to turn Raizen into a major ethanol exporter.

Foreign company	Brazilian factory	Share participation (%)	Production (Ton)
Abengoa (Spain)	São Luiz	100	2,996,198
	São João da Boa Vista	100	2,672,918
Adecoagro (USA/Argentina)	Monte Alegre	100	891,147
	Angélica	100	NA
Bunge (USA)	Santa Juliana	100	864,994
	Pedro Afonso	100	Greenfield
	Monteverde	60	Greenfield
Cargill (USA)	Cevasa	100	1,267,374
	Itapagipe	43.7	1,404,577
Infinity Bio (UK and others)	Usinavi	99	2,210,099
	DISA	97	1,053,309
	Cridasa	57	723,995
	Alcana	100	904,386
	Paraíso	100	NA
	Ibirálcool	100	Greenfield
	Laranjaí	100	Greenfield
Louis Dreyfus (France)	São Carlos	100	1,948,448
	Cresciumal	100	1,804,234
	Luciânia	100	1,311,110
	Santa Helena	100	1,906,447
	Maracajú	100	1,708,280
	Estivas	100	1,705,001
	Giasa	100	1,129,467
	Rio Brilhante	100	NA
Noble (Hong Kong)	Petribu Paulista	100	1,790,308
	Meridiano	100	Greenfield
Tereos (France)	Guarani	62.4	2,508,131
	Cruz Alta	62.4	4,168,067
	Guarani Tanabi	62.4	422,949
	Andrade	62.4	3,018,926
	Cia Energética São José	62.4	2,015,606
	Cardoso	62.4	Greenfield
Clean Energy (UK)	Usaciga	49	1,701,665
	Alcoolvale	33	1,477,579

Sources: SIAMIG (2009); CEPAL (2013)

Table I.
Foreign company participation in Brazilian ethanol and sugar production (2007/2008)

Along the same lines, the British oil company BP acquired 100 percent of Brazil's Tropical Bioenergia in 2011 and announced, in December 2012, its intention to invest US$350 million in expanding production capacity. In December 2010, Noble Group Limited, an energy and mining commodities company based in Hong Kong Special Administrative Region of China, announced the US$950 million purchase of two plants in São Paulo from Brazil's Cerradinho Açúcar, Etanol e Energia S.A. The purpose of the operation is to increase sugar cane processing volume (both ethanol and sugar) from 740,000 tons to 1.34 million tons. In another recent high-profile operation, Brazil's Copersucar and Eco-Energy of the USA were to merge their international ethanol trading operations to achieve a 12 percent share of the global market. See Table I for an overview of foreign company participation in Brazilian ethanol and sugar production in 2007/2008.

In Argentina, transnational corporations like Louis Dreyfus, Bunge and Cargill coexist with national enterprises such as AGD, Vicentin and Molinos Río de la Plata. In addition to these large companies, there are small and medium-sized enterprises initially started up by the Government of Argentina. The sector can therefore be split into three levels according to production capacity (MECON, 2011): high (more than 200,000 tons/year), comprising

22 percent of the companies (vegetable oil companies and large independents) and accounting for more than 60 percent of total biodiesel output; intermediate (between 50,000 tons/year and 200,000 tons/year) comprising 26 percent of the enterprises (large independents) and accounting for 26 percent of output; and low (less than 50,000 tons/year) made up of the remaining firms (small independents) and accounting for 13 percent of total output. Argentina has also begun to develop an ethanol industry based on maize and sorghum (Law 26.334), seeking to bring the ethanol content of petrol up from the current 4-10 percent by 2014 as new industrial plants are authorized over the next few years and the local automotive industry makes the requisite technical changes.

3.3 Meat chains

Meat chains (beef, pork and poultry) can generally be broken into four major phases: technical support and services for the primary producers; breeding, grow-out and finishing; processing; and trading. Large-scale industrial production of meat has significantly increased supply, with large intensive livestock operations (feedlots) using concentrate feeds (with soybeans and maize as the main raw material) and technological innovations, such as genetic improvements and balanced feed regimes. These innovations which involve all major supply chain phases increased beef production by approximately 15 percent in the last decade to nearly 65 million tons in 2011 (CEPAL-FAO-IICA, 2012). Growing population and changing consumption patterns in emerging countries, especially those where income has been on the rise, have contributed substantially to this growth.

Brazil became a major exporter of beef after the mad cow disease (bovine spongiform encephalopathy) crisis in Europe in the early 1990s. Brazil's meat market is now dominated by four agro-industry groups pursuing an aggressive strategy of internationalization (Capozoli, 2012): JBS-Friboi, Marfrig, Brazil Foods (BRF) and Minerva.

JBS-Friboi is the world's largest meat producer. With approximately 135,000 employees, it has production and distribution facilities in Argentina, Australia, Brazil, Mexico, Paraguay, the USA and Uruguay, in addition to trade offices across all continents. JBS-Friboi acquisitions since 2005 total US$3.7 billion. Along the way, US$80 million in financial support from Brazil's National Bank for Economic and Social Development (BNDES) was crucial to enabling JBS-Friboi to start globalizing its operations by buying Argentina's Swift Armour for US$200 million. In 2007, in JBS-Friboi's largest acquisition to date, US$1 billion of the US$1.4 billion purchase price of Swift Food Company of the USA proceeded from a BNDES loan and contributions from State-owned Brazilian pension funds like Petros (of the State-owned Petrobras) and FUNCEF (pension fund Fundação dos Economiários Federais). This enabled BNDES to acquire 31 percent of JBS-Fruboi through the former's investment management arm BNDESPAR.

Thanks to national and international acquisitions, Marfrig has become the world's fourth largest meatpacker (and third largest producer of beef) with 106 meatpacking units, 14 tanneries and 30 distribution centers and more than 90,000 employees across all continents. As with Grupo JBS, support from BNDES has been irreplaceable for transforming Marfrig into a world-class Brazilian transnational. To this end, BNDESPAR pledged to acquire a US $1.4 billion share offering, the proceeds of which would be used to fund the purchase of Keystone Foods and Ireland's O'Kane Poultry (BNDES, 2010). Currently, BNDESPAR has a 13.9 percent stake in Marfrig (Marfrig Group, 2010).

In May 2009, a partnership agreement between Perdigão and the food producer Sadia led to the birth of BRF. The merger made the group the tenth largest company in the region with a strong presence in Argentina. BRF has plans to invest in a processing plant in the United Arab Emirates and set up a joint venture with China's Dah Chong Hong Holdings Limited to market its products in China (BRF Foods, 2011). In 2008, Minerva Foods entered a joint venture with Ireland's Dawn Farms Foods that enabled the company to build the

Minerva Dawn Farms processing plant at a cost of US$44 million. The first cross-border operation took place in 2011, with the acquisition of Uruguay's Frigorífico PUL and Carnes Ana Paula (production capacity: 1,400 head per day). Again, public funds were pivotal to the internationalization strategies of these trans-Latin companies.

4. Typology of companies, business models, investment strategies in the Latin American agri-business sub-sectors of agricultural commodities, biofuels and meat chains

Vertical integration and globalization strategies aimed at gaining control over the entire production process and ensuring consistent quality supply for different geographical markets are frequent among agri-business firms, particularly in the three sub-sectors analyzed in this paper. In this respect, globalization trends and shared international regulations make the case for higher coordination and integration along the value chain. This particular setting makes it possible for agri-business to meet the requirements of the so-called new global food paradigm[8] while expanding their market shares (Barrera, 2010). In this business model, integrating the entire process from farm to final delivery to the consumer, combined with insourcing, helps yield high profits based on transforming food from a commodity into a service (which generates more value added), taking advantage of economies of scale (as markets expand and become integrated) and through consistent output quality increasing (as phyto-sanitary and environmental regulations become internationally standardized). It should be highlighted that the latter three aspects are highly specific to the agri-business activities.

However, the vertically integrated, internationalized business model is not within the reach of all agricultural or agro-industrial companies because not all are at the same level or have the same implementation and innovation capacity. The revision of the agro-commodities, biofuel and meat chain sub-sectors reflect that both market and policy environments affect the degree of vertical integration and transaction costs minimization that is ultimately achieved by firms. The major actors examined in this paper therefore fall into four general groups: transnational corporations with market positioning advantages; foreign companies with limited market presence; trans-Latins; and domestic enterprises (see Table II which contains a summary of identified types discussed below)[9].

4.1 Type 1: transnational corporations with market positioning advantages

There are four major grain sector transnationals which dominate much of the Latin American and global market: ADM, Bunge, Cargill and Louis Dreyfus (i.e. the ABCD traders). The ABCD companies are around 100 years old and their well-established positions allow them to be active in the creation and ownership of value creation along the chain and in influencing the operations of correlated business (Teece, 1986; Jacobides *et al.*, 2006). In other words, their financial position has been crucial to their prompt entry to emerging markets as well as adoption of innovations (mainly through mergers or alliances as evidenced in Section 3). The latter contributes to creating value as they build relationships of (one-way) dependence with customers and suppliers (Teece, 1986). Similarly, these companies have also enjoyed substantial negotiating power with governments in the region.

These companies' operations are increasingly global in scale, in response to geographic, strategic, geopolitical, financial and regulatory factors. Increasing international trade in food products requires diversifying sources of supply and working in different geographical markets. On the other hand, competition between companies calls for strategies that involve breaking up supply chains into a network of firms and industrial plants. The pattern across countries and agro-industry chains is to

Type	Definition	Sub-sector	Vertical integration	Internationalization
Transnationals with market positioning advantages	Large multinational companies with a long history in the industry. This enables them to influence the organizational structure of the sector and have an impact on the strategies of competing companies. They benefit from a dominant position in the chain	Agro-commodities, especially grains (wheat, soybeans and others) and ethanol	Agricultural commodities: High (backward and forward). In addition to large industrial facilities for processing raw materials, companies control ports, infrastructure and distribution channels	High. Present in multiple markets, with operations on a global scale
Foreign companies with limited market presence	Businesses with technology and innovation capacity, but with limited influence in their chain	Biofuels	Mixed (vertical integration can be stepped up as larger, international companies come in)	Medium. Present in just a few markets
Trans-Latins	Latin American enterprises investing in countries in the region	Meat chains	High especially forward, because they possess distribution channels and trademarks. Pork and poultry chains are integrated backwards, on the basis of contract farming	High. Operations on a global scale
Domestic enterprises	Growers of all sizes, and agri-businesses that operate only in the domestic market	Production of agro-commodities. Local slaughterhouses, small biofuel enterprises, sugar mills	Low	Low

Source: Own elaboration

Table II.
Typology of companies in the Latin American agri-business sector

acquire domestic enterprises (via mergers and acquisitions) and, to a lesser extent, enter into joint ventures with local companies and set up subsidiaries. This trend is a reflection of the longstanding presence of the major transnationals in the region, which has made them familiar with local markets. These mergers and acquisitions are driven by an interest in expanding operations or quickly gaining a foothold in the local market without having to go through all of the stages involved in creating a new company and starting from scratch. In addition to providing ownership of a business that already has a market share, this decreases the number of competitors. In these cases, the foreign firm determines the most efficient mechanism for absorbing local knowledge so that the staff recruited can use that know-how in keeping with the company's strategic objectives. When this knowledge cannot be hired directly because it is too costly, shared ownership can be a more efficient solution than setting up an affiliate. Such is the case with some transnational corporations with a longer track record in the region that have opted for partnering with local groups to expand their organizational boundaries, gain access to local knowledge and thus reduce their exposure.

However, their FDI flows have not necessarily transformed into the generation of innovative business or scientific practices. As Rama and Martínez (2013) illustrate (using data

for the major 59 European food and beverage multinationals and their 8,432 subsidiaries worldwide) firms tend to locate their R&D activities in the home country, particularly when it relates to inventions related to core businesses; while less core-business inventions tend to be produced in extra-regional locations. In the case of Latin America, the ABCD traders tend to only transfer R&D achievements from high-income country headquarters to low-income countries subsidiaries. The latter is also usually combined with local acquisitions of potential competitors engaged in R&D and integration of key suppliers through contract farming. In other words, the ABCDs are not only very vertically integrated (toward the consumer) but also have substantial horizontal influence in that they control a significant portion of the markets correlated with grains and agriculture. With the passage of time, these companies have consolidated their position of market power on the strength of their high degree of integration and globalization. This gives them considerable influence over all their transactions, such as contracts with direct and indirect suppliers (growers and shippers) and buyers (distributors and end consumers). Their position allows them to innovate and create more value as they build relationships of dependence with customers and suppliers. In the medium to long term, the major petroleum companies (such as Shell and BP) are expected to surge into the biofuels sector. While they have not followed the same path as the ABCD traders or major agrochemical corporations, their size and resources could put them in a strong position. Nevertheless, for the time being the smaller foreign companies (type 2) are the ones that are gaining ground in the region's ethanol and biodiesel markets.

In summary, transnational companies specializing in the production of agricultural commodities (for food or biofuel processing) map their strategies to integrate all of their operations along the value chain and optimize global raw materials exports. This requires meshing agricultural production, logistics, the maritime freight business and industrial processing to reduce costs and produce competitively at a global level. In the case of biofuel processing, it may also include acquisition of local technology or research on specific crop developments. One of the main challenges for such companies is the fierce competition emerging from its peers and the overall tendency to further consolidate firms through mergers and acquisitions.

4.2 Type 2: foreign companies with limited market presence

Together with the major transnationals, other foreign companies with smaller market shares operate in the region's agro-industry sector. These firms often stand out for their know-how or innovativeness, particularly if they are involved in biofuel generation. Examples include firms such as: Clean Energy, Abengoa, Sojitz Corporation, Tereos or Explora, who develop their R&D in their home countries and transfer equipment to the host economy. The latter may be expected to have potential spillovers as labor is hired and trained or when these firms start liaising with local partners. Foreign companies with limited market presence may also be present in the production of agro-commodities, such as Noble Group Limited with an investment in sugar and ethanol in Brazil.

These foreign companies do not enjoy the advantages of type 1 firms that can influence the organizational structure of their sector, affect competitor's strategies or leverage their position, but may be more likely to depend on their adaptation of technology and innovation to survive in the market. In the case of Brazil, where biofuel technology has been largely supported by the National Government, it is also frequent that foreign companies opt to buy domestic enterprise to adopt local know-how and faster adapt to the Brazilian market. In summary, foreign firms are able to compete based on their technological know-how and/or effective organizational strategies that place them usually ahead of domestic enterprises. Among their challenges is the need to adapt and understand changing national contexts while seeking to grow at national and international level.

4.3 Type 3: Trans-Latin firms

These are the result of mergers between two or more regional firms, or firms with headquarters in a Latin American country with cross-border operations. Brazilian trans-Latin firms exemplify successful strategies for vertical integration and insourcing which have largely been supported by financial programs devised by the National Development Bank of Brazil BNDES. In the case of meat processing, the support provided by BNDES has been critical in the international positioning of the four major Brazilian meat processing firms (JBS-Friboi, BRF, Marfrig and Minerva). Similarly, BNDES has also played a key role in the development of the Brazilian biofuel processing industry. The latter has implied substantial transformations in the domestic market, where small and medium enterprises have either been bought, disappeared or have been absorbed within the large supply chains established by these four major trans-Latins or the foreign companies entering the domestic market.

Trans-Latin companies have partnered with firms based in other countries for distributing their products and have even set up production facilities there. The expansion of these firms has been guided by offensive strategies based on achieving economies of scale, exploiting regional market knowledge and accessing new distribution channels. Similarly, defensive strategies have also been present such as: occupying key positions before competitors and/or avoiding being absorbed by transnational corporations. There is also some sectoral specialization based on existing comparative and competitive advantages. Examples are the Argentine grain millers expanding into Brazil, and Brazilian meatpackers investing in Argentina, Uruguay and elsewhere in the region. Agro-food trans-Latins follow expansion strategies that range from specializing in regional and niche markets to buying and selling shares to become part of transnational corporate global networks. The greatest agro-food sector success story is the Brazilian trans-Latins in the meat industry chain. They have become global leaders, as can be seen in their acquisitions in Southern Cone countries and in the USA and Australia. In addition to the inherent advantages of these chains over their competitors, their push to globalize is supported by BNDES national development policy that, among other instruments, provides loans for stock purchases and funding that enables Brazilian companies to buy competing ones abroad, acquire local companies with subsidiaries abroad or establish joint ventures with competing firms. One of the main challenges for trans-Latins is to sustain their competitive edge and international presence while reducing public support, particular for the Brazilian firms.

4.4 Type 4: domestic enterprises

Because of the cultural nature of food products, small and medium-sized domestic enterprises subsist alongside major international and trans-Latin firms as well as foreign companies operating in the national market. They exist because their broad knowledge of the domestic market enables them to meet those markets' specific needs. Agricultural producers (except planting pools) tend to operate in local markets, as do slaughterhouses, meatpackers, wheat flour mills and small or medium biodiesel plants. These companies, which are always smaller and not internationalized, are being forced to innovate and comply with new quality standards to continue operating internally. They also need to absorb the emerging transaction costs associated with functioning in markets that are becoming increasingly monopolized. In this respect, the main challenges these firms are facing is the need to maintain their local-specific know-how while aiming to enhance overall efficiency to ensure adequate cost management and survival.

5. The role of public policies in attracting investment and enhancing innovation in Latin American agri-business

FDI has the potential to impact economic growth endogenously if it generates production returns through externalities and technological and organizational spillovers. The public

policy regime and the institutional framework in general play a decisive role in promoting FDI, absorbing its positive domestic economic impact and building the knowledge base that economies need in order to achieve this end (Cimoli *et al.*, 2009; Mello, 1997). The information set out herein indicates that biofuel and meat industry FDI is driven not only by emerging market trends but also by the government incentives and regulations that have shaped foreign investor and trans-Latin company decision making. The factors that influence transnational firms are generally well known: advantageous location, defense of a strategic position, access to strategic local resources and a dynamic market that makes it possible to produce at the lowest cost and sell on a large scale. This means that foreign investors weigh the income level of the target country's population, the degree of urbanization, trade agreements, comparative advantages, economic incentives and the quality of institutions. The factors that discourage investment include fragile public institutions, an uncertain legal framework and the concomitant political risks, as well as small market size and export constraints. For those tasked with designing policies to attract and regulate FDI, the question is how to encourage investments that are not only profitable but also have an endogenous impact on socioeconomic growth in their countries while strictly conforming to health and environmental regulations.

As in other economic sectors, appropriate macroeconomic policies (inflation, exchange rate, interest rate and labor legislation, among others) and trade agreements (such as economic complementarity and free trade agreements) or tax regimes are factors that play a critical role in the dynamics of FDI in the agricultural and agro-industry sector in Latin America and the Caribbean. These general factors run along with others that are directly associated with the energy and food sector. Biofuel legislation has greatly influenced the development of this industry in Argentina, Brazil and Colombia. The meat industry depends directly on health regulations and the existence of health and trade agreements with other countries and blocs, which are essential for exporting. Domestic price policies can encourage or discourage FDI. Development and technological support programs are essential for making improvements in the early stages of production. Investment banks that help identify new FDI opportunities are also useful in a sector that is complex, heterogeneous and geographically dispersed.

The impact of FDI in the agricultural and agro-industry sector in terms of innovation is another area for consideration. Transnational corporations have tended to keep their research and development operations in their home countries (or in other developed countries where there are centers of excellence and research), with their foreign affiliates limited to planning for innovation adoption (Rama and Martínez, 2013; Martínez and Rama, 2012). The case of ethanol in Brazil is an exception: the entire technological development effort is entrusted to teams of Brazilian scientists. The recent arrival of transnationals in this sector could have a positive impact on the development of second-generation (biomass) ethanol because the technology is not available and research is being conducted through partnerships between domestic and foreign firms. Often, merely setting up new industrial plants in a country can have a potential spillover effect. FDI has three types of spillovers for domestic enterprise productivity and innovativeness: horizontal, backward and forward (the latter two are usually referred to as vertical spillover).

Horizontal spillover shows up in three ways (Havranke and Irsova, 2011). First, there is a competition effect when domestic firms respond to FDI flows by improving their procedures and end products for the consumer. This entails boosting production. The competition effect can also have negative consequences if the entry of foreign investors makes it harder to take advantage of economies of scale or if severe restrictions are imposed on the mobility of know-how and skilled labor (see demonstration effect and labor market effect). Second, there is a demonstration effect when new foreign actors introduce new technology or new applications that drive the domestic actors to imitate them and improve their own

production processes. Third, there is a labor market effect when foreign firms need to train workers in the receiving economy and this starts a learning process that can, over time, radiate out to the rest of the domestic economy.

Backward spillover (one of the best documented in the academic literature) depends on the relationship between the foreign investor and its local suppliers, which must meet new standards in order to adapt to investor requirements. The idea is that domestic suppliers can thereby improve their quality standards, and this spreads out to the benefit of other clients and associated activities. There are fewer empirical studies on forward spillover, but the idea is the same as for backward spillover: the components of the foreign investor's supply chain gain in productivity and innovativeness. Such is the case with the vegetable oil and biodiesel industry, which operates on the basis of benchmarks and whose technological innovation leaped forward (horizontal spillover effect) when Glencore set up a 250,000-ton capacity plant in Argentina, using European technology and opening a new phase that changed the scale of production. The same thing happened with the meat industry in all of the Southern Cone countries, whose export-oriented facilities are technologically far superior to slaughter facilities oriented toward the domestic market. In addition to technology dissemination at the industry level, export-oriented facilities have a systemic effect because they operate under stringent health and safety regulations that impact the production process along the entire chain, including the primary link (vertical spillover). The development of meat industry trans-Latins had a demonstration effect, because operating in more developed markets (such as the USA and others) has provided these companies with new technologies (like spray chilling, also known as Clor-Chil, in the North American market) that have subsequently been taken back to Brazil and have even resulted in changes to local standards and regulations. But innovation in production does not just come from stiffer market competition and the need to meet higher standards. Innovation is also driven by public policies, as is the case of ethanol in Brazil: both research and the implementation of new technologies for making biofuels have been fueled by public resources.

The level of innovation depends on the nature of each factor because production needs vary between, for example, processing biodiesel and exporting raw materials (soybean meal). Even so, and despite the constraints, research and development and organizational innovation that encompass national producers can be spurred by public policies aimed at reducing transaction costs for small and medium-sized enterprises. This can be achieved by supporting growers and manufacturers associations, investing in capacity building and in research and extension services, improving rural infrastructure and expanding access to information and communication technologies in remote or isolated areas, among other measures.

6. Concluding remarks

In this paper three highly inter-related agri-business sub-sectors sharing common inputs (agro-commodities, biofuels and meat chains) were selected to assess the most frequently implemented investment strategies in Latin America. The analysis of these three sub-sectors revealed how firms are adapting to the requirements of the new global food-feed-fuel paradigm and responding to emerging market and policy settings. The discussion of four different firm types, i.e., transnational with market advantage, foreign firms, trans-Latins and domestic enterprises, indicated that each one follows a different rationale when it comes to innovations and scale of production and the latter has repercussions for local, national and global markets.

Vertical integration (guided by transaction cost minimization strategies) and internationalization of activities appear to be the most common approaches to secure access to natural resources, gain control of the entire production processes, absorb know-how, create value and ensure consistent quality along the supply chain. As documented in this paper, type 1 or transnational corporations with market positioning advantages have usually

adopted such innovation and investment strategies. In this respect, global market players are integrating the entire process from farm to final delivery to the consumer yielding high profits mainly through transforming agricultural commodities into value-added products and reducing transaction costs related to the uncertainty in the acquisition of primary goods and control of natural resources, as well as organizing inter-dependent production stages and transport infrastructure. Foreign and trans-Latin firms (types 2 and 3) are also aware of the advantages of highly vertically integrated models but have pursued their internationalization to a lower degree than type 1 companies (mainly within the regional markets). In any case, these firms also aim toward constant innovation to adapt in a cost-effective approach to the emerging phyto-sanitary and/or environmental regulations as well as the technological improvements related to the generation of biofuels or meat processing. It can be argued that type 4 firms or domestic enterprises usually have more modest investment strategies since they have no international presence yet there is room for them to innovate particularly if they wish to maintain their national or local market niches.

The three agri-business sub-sectors discussed in this paper also reflect how policy programs and incentives have affected firm innovation and technology development or outsourcing decisions. In countries like Brazil, the National Development Bank has fostered the internationalization of the top meat processors of the region who are among the top firms of the sector at the world level. Similarly, government support and regulation has been crucial in the region for the development of the biofuel generation industry and associated technology which has usually come from foreign companies (except for Brazil). There are also spillover effects to consider which do not affect all players in the same way and which ultimately translate into changing transaction costs and market structure transformations. In other words, public regulations can ensure that foreign players have a more decisive effect on domestic producers by fostering national labor hiring schemes and training. The latter should go hand in hand with a transparent and stable macroeconomic and political setting.

The evolution of the so-called flex-crops whether they are used for food, feed or biofuel production will thus be influenced not only by the possibility of adopting sustainable yield increasing technology that may enhance overall supply but also by incentives coming from national policy formulations and any oil price transmissions effects. In this respect, future research is required to better evaluate the national-level impact of biofuel policies in Latin American countries while considering more targeted interventions in the private sectors. This paper has highlighted the need for firm-specific policy support and regulation considering the nature of each type of company's business model and capacity to invest and/or innovate. The policy analysis of the agri-business sub-sectors with respect to other sectors of the economy relies mainly on its local, national and global effects on food and energy security and thus further detailed assessments are required in such areas. To conclude, it is expected that the promotion of sustainable production practices, climate change adaptation, biodiversity protection, innovation spillovers and responsible investments are crucial aspects that affect consumers and producers today and in the future.

Notes

1. Biomass covers a wide range of plant sources such as the crops that are processed into biofuels (corn, soy, sugar cane, sugar beet, rapeseed, wheat, etc.) and fuelwood (Ciaian and Kancs, 2011).
2. The positive price effect of bioenergy expansion may be reduced by two factors: first, new technological development may improve yields and lead to an offsetting effect in supply of agricultural commodities; second, with the rising agricultural profitability, unused fallow land may be brought into cultivation. However, because technological improvement is costly, and the fallow land brought into cultivation usually is less productive, these factors cannot fully offset the positive price effect of bioenergy (Ciaian and Kancs, 2011).

3. All countries from Latin America and the Caribbean are considered although relevant information was not found for all of them.
4. Trans-Latin companies are the result of mergers between two or more regional firms, or of cross-border operations by firms headquartered in one Latin American country (CEPAL, 2013).
5. The definition of Agri-Business Sector is adopted from UNCTAD (2009) which includes agricultural activities and agro-industrial processing.
6. The list of the 500 largest companies in Latin America and the Caribbean (América Economía, 2012) includes 51 agro-food companies (or agro-industry firms whose products target the food market). Some of them are, on the basis of volume of sales, in a class with the major global transnationals in the sector. Of these 51 companies, 23 are from Brazil, 15 from Mexico, 4 from Argentina, 4 from Peru, 3 from Chile and 2 from Colombia. Of the 51 Latin American and Caribbean agro-food companies on the América Economía list, at least 21 are trans-Latin whose growth is based on successful mergers and acquisitions strategies not only in countries of the region but also in Canada, Europe and the USA.
7. For instance, in Argentina, Law 26 737 limits land ownership rights of foreigners or companies that are majority-owned by foreigners to 15 percent of rural areas. In Brazil, Law 5.709 regulates land purchases by foreigners and has been amended several times in the past few years. This issue is regulated, particularly, by ruling GQ-181 AGU of December 17, 1998, which is currently under review in response to the recent land rush, much of it illegal and on which there is little information (Hackbart, 2008). Other countries, such as Colombia, the Plurinational State of Bolivia and Uruguay, are also discussing similar bills aimed at curbing foreign ownership of agricultural land.
8. According to Barrera (2010), a new phase or paradigm is in place at global level for food production and processing. The latter requires that firms get closer to the end consumer by managing globally recognized brands that go beyond food.
9. These are the types of business which emerged based on the field studies and reviewed literature. Although the typology may not be comprehensive at global level, it covers the main players for the case of Latin America.

References

América Economía (2012), "Ranking de las 500 Mayores Empresas en América Latina", Mexico City, Diciembre 2011.

Ayadi, N., Rastoin, J.L. and Tozanli, S. (2006), "Les opérations de restructuration des firmes agroalimentaires multinationales entre 1987 et 2003", Working Paper No. 8, UMR MOISA, Montpellier.

Barrera, A. (2010), "El contexto mundial de la nueva revolución alimentaria", in Barrera, A. and Sotomayor, Y.O. (Eds), Chapter 1 in La agricultura chilena en la nueva revolución alimentaria, Editorial Universitaria, Santiago de Chile, 343pp.

Benetti, M.D. (2004), "A internacionalização real do agronegócio brasileiro. 1990-03", *Indicadores Econômicos FEE*, Vol. 32 No. 2, Agosto, Porto Alegre.

BNDES (2010), "Annual report 2010, banco nacional de desarrollo económico", BNDES, Rio de Janeiro.

BRF Foods (2011), "Informe anual 2011", São Paulo.

Capozoli, R. (2012), "O avanço das multinacionais brasileiras", Valor Setorial Carne Bovina, mayo.

CEPAL (2013), "Foreign direct investment 2012", Santiago.

CEPAL-FAO-IICA (2012), "Perspectiva de la agricultura y del desarrollo rural en las Américas: Una mirada hacia América Latina y el Caribe 2012-2013", San José.

Chade, J. (2010), "Grupos Estrangeiros Terão 40% da Produção Brasileira de Etanol até 2015", Economia e Negócios, São Paulo.

Ciaian, P. and Kancs, D.A. (2011), "Food, energy and environment: is bioenergy the missing link?", Discussion Paper No. 292/2011, LICOS discussion paper series, Seville.

Cimoli, M., Dosi, G. and Stiglitz, J. (2009), *Industrial Policy and Development, The Political Economy of Capabilities Accumulation. The Initiative for Policy Dialogue Series*, Oxford University Press, Oxford.

FAO (2008), "Growing demand on agriculture and rising prices of commodities; an opportunity for smallholders in low-income, agricultural-based countries?", *Proceeding of the Thirty-first Session of IFAD's Governing Council, Rome, February 14*.

FAOSTAT (FAO Statistical Database) (2013), "Production Data", available at: http://faostat.fao.org/ (accessed December 2013).

Gibbons, P. (2009), "Agro-commodity chains: an introduction", *IDS Bulletin*, Vol. 32 No. 3, pp. 60-68.

GRAIN (2009), "The new farm owners", available at: www.grain.org/article/entries/194-the-new-farm-owners GRAIN (accessed October 20, 2009).

Hackbart, R. (2008), "Aquisição de Imóveis Rurais por Estrangeiros, presentation", unpublished.

Havranke, T. and Irsova, Z. (2011), "Estimating vertical spillovers from FDI: why results vary and what the true effect is", *Journal of International Economics*, Vol. 85 No. 2, pp. 234-244, doi: 10.1016/j.jinteco.2011.07.004

Jacobides, M.G., Knudsen, T. and Augier, M. (2006), "Benefiting from innovation: value creation, value appropriation and the role of industry architectures", *Research Policy*, Vol. 35 No. 8, pp. 1200-1221.

Land Matrix (2012), "Land matrix portal", available at: http://landportal.info/landmatrix (accessed December 2011).

Marfrig Group (2010), "Relatório anual 2010", São Paulo

Martínez, C. and Rama, R. (2012), "Home or next door? Patenting by European food and beverage multinationals", *Technology Analysis and Strategic Management*, Vol. 24 No. 7, pp. 647-661.

MECON (Ministerio de Economía y Finanzas Públicas de la Argentina) (2011), "Complejo azucarero", Serie Producción Regional por Complejos Productivos, Buenos Aires, octubre.

Mello, L.R. (1997), "Foreign direct investment in developing countries and growth: a selective survey", *Journal of Development Studies*, Vol. 34 No. 1, pp. 1-34.

Mitchell, D. (2008), "A note on rising food prices", Policy Research Working Paper No. 4682, The World Bank, Washington, DC.

Nelson, D. (2012), "Situation and outlook, grain industry, presentation for the national oilseed processors associations", Washington, DC, February 6.

Observatorio Iberoamericano de Asia-Pacífico (2011), "China e India buscan tierras y alimentos en Latam", Boletín Electrónico, No. 29, available at: www.iberoasia.org/pdf/boletin_29_print.pdf

OECD (2009), "OECD-FAO agricultural outlook 2009-2018", FAO-OECD, Paris.

Organisation for Economic Cooperation and Development/Food and Agriculture Organization of the United Nations (2012), "Perspectivas agrícolas 2012-2021", available at: www.oecd.org/site/oecdfaoagriculturaloutlook/SpanishsummaryOCDEFAOPerspectivasgr%C3%ADcolas2012.pdf (accessed December 2011).

Rama, R. and Martínez, C. (2013), "The changing structure of the global agribusiness sector", in Chapters, Handbook of Industry Studies and Economic Geography, Chapter 12, Edward Elgar Publishing, pp. 305-340.

Saravia-Matus, S., Delincé, J. and Gomez y Paloma, S. (2013), "Overview of Large Scale Land Transactions (LSLT's) in the context of food security", European Commission JRC Technical Report, Seville, May.

Saravia-Matus, S., Gomez y Paloma, S. and Mary, S. (2012), "Economics of food security", *Selected Issues Bio-Based and Applied Economics*, Vol. 1 No. 1, pp. 65-80.

SIAMIG (2009), "Associação das Indústrias Sucroenergéticas de Minas Gerais (SIAMIG) Capital Estrangeiro No Setor Sucroalcooleiro Brasileiro", Relatório Econômico, No. 007, Belo Horizonte.

Teece, D.J. (1986), "Profiting from technological innovation: implications for integration, collaboration, licensing, and public policy", *Research Policy*, Vol. 15, pp. 285-305.

UNCTAD (2009), "Informe sobre Inversiones en el Mundo. Conferencia de Naciones Unidas sobre Comercio y Desarrollo", UNCTAD, Geneva.

UNICA (Brazilian Sugar Cane Industry Association) (2012), "Statistics. União da Indústria de Cana-de-Açúcar", available at: www.unica.com.br/ (accessed December 2011).

World Food Programme (2007), "WFP strategic plan (2008-2011)", WFP Tools and Approaches to Hunger, Rome.

Further reading

Sotomayor, O., Rodríguez, A. and Rodrigues, M. (2011), "Competitividad, sostenibilidad e inclusión social en la agricultura: nuevas direcciones en el diseño de políticas en América Latina y el Caribe", Libros de la CEPAL No. 113, Santiago.

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