The changing structure of the global agribusiness sector

Ruth Rama and Catalina Martínez

1. Introduction

Following their review of the International Business (IB) literature published in 1996-2006, Griffith *et al.* (2008) argue that one of the most important themes to emerge from such analyses concerns international corporate processes and the differences apparent among various industrial sectors in this respect. Using data from the United Nations Conference on Trade and Development (UNCTAD), Senauer and Venturini (2005) show that the distribution of foreign direct investment (FDI)¹ is geographically uneven and varies by industry. Thus, the geography of multinational enterprises (MNEs) apparently requires studies which take sectoral specificities into consideration.

This chapter analyses the changing structure of the global agribusiness sector and some of the theories surrounding it, in an attempt to understand the evolution of its geographic patterns. The agribusiness sector comprises segments such as agriculture, food and beverage processing, R&D, retailing and restaurants. We examine the entire sector, with the exception of retailing and restaurants, although these are also mentioned briefly.

Agriculture accounted for 31% of total world employment (40% in developing economies) in 2002-2006, and the food and beverage processing industry (hereafter, the F&B industry) for 23 million jobs worldwide and 15% of industrial value added (UNCTAD, 2009). According to data for 2002 provided by

¹ According to UNCTAD, "FDI refers to an investment made to acquire lasting interest in enterprises operating outside of the economy of the investor. Further, in cases of FDI, the investor's purpose is to gain an effective voice in the management of the enterprise. The most important characteristic of FDI, which distinguishes it from foreign portfolio investment, is that it is undertaken with the intention of exercising control over an enterprise". <http://www.unctad.org/>

the United Nations Industrial Development Organisation (UNIDO) and CIAA², the European Union (EU) was responsible for 24% of world F&B production, the United States for 21% and Japan for 10%; other important producer countries are China (4%), Brazil (2%) and Canada (2%) (Ayadi *et al.*, 2006).

MNEs play an important role in these substantial industries. All over the world, the F&B industry is dominated by small and medium-sized enterprises (SMEs), although the 100 largest MNEs in this industry accounted for approximately 27% of world production of processed foods and beverages and 14% of employment in 2002. Furthermore, they also influenced agricultural production worldwide through FDI, contract farming and purchases in arm's length markets (Ayadi *et al.*, 2006; Echánove and Steffen, 2005; Oman *et al.*, 1989; UNCTAD, 2009). Such companies accounted for 41% of food and beverage production and 26% of sectoral employment in the 10 most important producer countries, which are in the majority their home countries (Ayadi *et al.*, 2006). F&B MNEs are also key players in the worldwide technological development of the food chain, including technology employed in agriculture, food and beverage processing and auxiliary industries (e.g. food packaging) (Christensen *et al.*, 1996; von Tunzelmann, 1998). The world's 100 largest food and drink MNEs (hereafter the Top 100) supply approximately 50% of the patentable inventions usable in this sector and in auxiliary industries worldwide (Alfranca *et al.*, 2002; Patel and Pavitt, 1991). In 2007, the share of foreign affiliates in R&D into food, beverages and tobacco was over 40% of the national total in the industries of countries such as Germany, Portugal, Sweden, the United Kingdom and, especially, several Eastern European countries which had recently joined the EU³.

As stated above, our intention is to analyse changes in the geographic patterns of the agribusiness sector in the light of some of the theories aimed at explaining the location of F&B MNEs, their foreign affiliates and their R&D activities. We employ case studies, econometric analyses, patent statistics and other statistical data, and review theories from a variety of disciplines, such as

² <http://www.ciaa.be/asp/index.asp> (Confédération des Industries Agro-alimentaires)

³ OECD statistics on globalisation: Inward activity of multinationals - share in national total, from <http://stats.oecd.org/index.aspx>, as of February 2010.

international business (IB), international management (IM), the economics of technological change and economic geography.

Section 2 provides an overview of FDI in the agribusiness sector and discusses the information sources employed in the present chapter. Section 3 attempts to identify new patterns in the geographic origin of capital in the agribusiness sector⁴. Section 4 is concerned with the spatial patterns of the agribusiness sector. Section 5 focuses on the internationalisation of the R&D activities of F&B MNEs. Each section provides a review of the literature and empirical evidence. To end the study, section 6 offers our conclusions.

2. Overview of FDI in the agribusiness sector

2.1. Recent evolution

Between 1989-1991 and 2005-2007, outward FDI flows doubled in agriculture, hunting, forestry and fishing and quadrupled in food, beverage and tobacco manufacturing (Table 1), due to a range of new circumstances and policy measures such as the liberalisation of capital and trade, the formation or enlargement of trading blocs (e.g. the EU), the adoption of the market system in erstwhile state-managed economies (or in some of their regions, as in China) and increasing *per capita* gross domestic product (GDP) in the emerging economies. The F&B industry is considered to be a non-cyclical sector, a “refuge” industry in times of crisis, attracting institutional investors (e.g. pension funds), especially in the USA and, to a lesser extent, in Europe. This new configuration of shareholders has apparently been accompanied by demands for relentless rhythms of growth and the achievement of global goals by F&B companies, which have often contributed to weakening their embeddedness in specific regions of the world by promoting their worldwide expansion instead (Caswell, 1987; Palpacuer and Tozanli, 2008) (Muller and Van Tulder, 2005). We now turn to the sources of information available for the study of the global geography of the agribusiness sector.

⁴ Agri-food firms include both agricultural companies (e.g. plantations) and food and beverage processors. Firms classified as F&B companies because their main business is food and drink processing may nevertheless have some business lines related to primary production (e.g. agriculture and aquaculture).

2.2. Data sources

At sector level, data regarding FDI and MNE activity is frequently patchy; this paucity has often restricted attempts to map MNE activity by sector. While there are some exceptions (see, for instance, Gabel and Bruner, 2003), these contain little information regarding agri-food MNEs.

We combine several data sources in order to understand the geographical patterns of such companies. We employ data on FDI investment⁵ flows and stock, although as no comprehensive international statistics are available at the sectoral level, this information needs to be complemented by other sources.

Thus, to specifically analyse the geography of F&B MNEs, we use an upstream measure i.e. data concerning the location of the affiliates⁶ of the world's 100 largest F&B MNEs. The distribution of affiliates is one of the proxies proposed by the OECD (2004) to construct MNE-related globalisation indicators. While a minor rebalancing of a company's sales portfolio or mere currency appreciation/depreciation may erroneously suggest substantial changes in its geographic patterns (Osegowitsch and Sammartino, 2008), the analysis of affiliate location provides a measurement less subject to short-term changes.

To analyse the location of affiliates we use the AGRODATA database, which despite having been underexploited in studies published in English, contains the most comprehensive information available on the activities and location of the affiliates of the world's 100 largest F&B MNEs (Annex I). F&B MNEs included in the database must have at least one food processing plant outside the home country and agri-food sales of at least US\$1 billion per year. The database includes world-renowned firms (e.g. Nestlé, Unilever and Ajinomoto) from the five continents. The companies selected are active in a variety of industries, such as meat processing, dairy products, canned

⁵ Flow data record the value of investments undertaken in a specific year, while stock data represent the net accumulated value resulting, at a point in time, from past flows Letto-Gillies, G. (2005). *Transnational corporations and international production. Concepts, theories and effects*. Cheltenham, UK and Northampton US Edward Elgar.

⁶ An affiliate is an incorporated or unincorporated enterprise in which an investor owns a stake that permits a degree of control of the management of that enterprise (Ibid.)

specialties, spirits, etc. While all are food or beverage processors, a number of them also engage in agricultural production and production of non-food items.

Admittedly, data on the distribution of affiliates may also have certain drawbacks, as the control of the parent company over its affiliates may vary in such an international industry. However, the nature of affiliates is relatively homogeneous in AGRODATA, in which each parent company controls, on average, 70% or more of the share capital in 90% of its affiliates. Nevertheless, the identification of the *loci* selected by F&B MNEs to perform their innovative activities poses specific methodological difficulties, which are tackled in Section 5.

3. Source countries for agri-food FDI

3.1. Agri-food companies and their home countries

The eclectic paradigm of international production provides a framework for explaining the foreign production of firms (for an extended version of the eclectic paradigm, see Dunning, 1993). The eclectic (or **OLI**) paradigm maintains that firms may have competitive advantages related to three crucial variables: Ownership, Location and Internalisation. These competitive advantages, in turn, explain the extent of foreign affiliates and other assets owned and controlled by companies.

Ownership (**O**) advantages of enterprises of one nationality over those of another include property rights, innovatory capacity, marketing systems, human capital, etc. New knowledge is an important competitive tool for companies in general and for MNEs more specifically (Frankho, 1989). The internalisation of knowledge production is, in IB theory, a method firms use to minimise the risks of involuntary spillovers of knowledge. Such risks may be quite real when new products are relatively easy to imitate, as is the case with new foodstuffs (Gallo, 1995). Internalisation (**I**) advantages consist of the internalisation of markets within the company, a strategy adopted to protect the firm from market failure or to exploit it. As described below, in this process of knowledge internalisation, firms may invest abroad in various forms of R&D (we analyse in detail this question in Section 5).

In the IB literature, new products, new processes and new skills are ownership (O) advantages of the MNE, often difficult to copy by rivals. Although the F&B industry is traditionally considered to be low-tech, some empirical studies suggest that F&B MNEs possessing such O advantages are more likely to expand internationally. Analysing more than 800 international food companies, an econometric study finds that capital intensive firms with high levels of intangible assets (e.g. brand names), profitability and knowledge capital were more likely to internationalise (Wendt and Pedersen 2006). Another econometric study shows that the fastest-growing F&B MNEs are highly internationalised, capital intensive companies which have diversified into food-related technological activities (e.g. biotechnology) (Anastassopoulos and Rama, 2005). Analysing the Top 100, Tozanli (2005) confirms the importance of other O advantages, such as global brand names, in the expansion of firms.

As stated above, internalisation (I) advantages consist of the internalisation of markets within the company, a strategy adopted to protect the firm from market failure or to exploit such failure. Analysing the Top 100, Tozanli (2005) argues that I advantages are losing importance for these very large companies. By contrast, explanations for the emergence of successful agri-food MNEs based in developing countries often underline their allegedly superior capacity to internalise markets i.e. their I advantages. According to Burtch and Goss (2005), large F&B MNEs based in Southeast Asia have been able to avoid the conflicts that have characterised, in Western countries, the relationships between F&B companies and retailers in recent years. In their view, companies such as CP (Thailand) and the Salim Group (Indonesia) have achieved vertical integration along the entire commodity chain in a way no Western agri-food MNE has been able to, and this strategy has been the foundation of their successful international expansion. Vertical integration along the food chain towards food processing, packaging and retailing has also been implemented by some Asian MNEs operating in the consumer goods sector and by Brazilian F&B processors who have recently internationalised (Azevedo *et al.*, 2004; Sim, 2007) (Pozzobon, 2008). In the case of Asian conglomerates, another I advantage may be their capacity to internalise financial markets (Buckley *et al.*, 2007). According to these authors, Asian conglomerates may operate an inefficient internal capital market which can subsidise FDI. Market

imperfections, they argue, may become ownership (**O**) advantages for firms based in emerging markets.

What factors explain the predominance of some countries as home locations for MNEs? Location (**L**) advantages, which may help to determine the home or host countries of MNEs, include resource endowment, international transport and communication costs, investment incentives and disincentives, barriers to trade, R&D, the institutional framework, etc. We now briefly discuss three potential **L** advantages of F&B MNEs: their technological environment, institutional environment and natural resource endowment.

Theories dealing with national systems of innovation emphasise the importance of space in learning processes, claiming that companies are more likely to seek new technology in the home country. The user and producer theory (Andersen and Lundvall, 1988; Lundvall, 1988) was developed in Denmark, an important exporter of agri-food goods and, as will be seen below, of agri-food equity capital. Language, common culture and geographical proximity, this theory claims, facilitate links between companies, industries and universities, thereby positively affecting R&D cooperation and product upgrading. Andersen and Lundvall (1988) argue that the longstanding competitiveness of Danish food firms in international markets is associated to strong Danish positions in related technological areas, such as food processing machinery. In other small industrialised countries besides Denmark, they claim, the specialisation of the engineering sector also reflects the national history of agriculture and food processing. Another study tested whether F&B MNEs performing well internationally (as measured by global margins and the Return on Capital Employed, ROCE) come from home countries which enjoy support from innovative food and food-related industries (e.g. food processing machinery), as measured by patent counts (Rama, 1999). It found that successful newcomer and smaller F&B MNEs were likely to originate from such innovative national backgrounds. However, an R&D-intensive national environment is apparently less important to large F&B MNEs and incumbents (the capacity of large F&B MNEs to obtain technology worldwide is analysed in Section 5). Thus, the **O** advantages of some companies with regard to new technology may be combined with the **L** advantages of home countries which have R&D-intensive sectoral systems of innovation.

As indicated earlier, the institutions of the home country may also feature among the **L** advantages influencing the emergence and development of native MNEs. Sim (2007) argues that while the so-called Western theories of the MNE have neglected the role played by the state, some Asian governments have actually promoted the internationalisation of native firms and sometimes even influenced its direction. Two empirical studies analyse the role played by governments in the internationalisation of agribusiness in New Zealand and Southeast Asia (Burch and Goss, 2005; Pritchard, 2005). Government stimuli may have contributed to the expansion of agribusiness companies, especially those based in developing countries which lack sufficient natural resources (e.g. China) (Buckley *et al.*, 2007; UNCTAD, 2009). However, the Japanese government has also encouraged (for instance, through insurance guarantee schemes) outward FDI to developing Asian countries, in order to ensure the supply of raw materials for Japanese industry (Dunning, 1993). The previous discussion suggests that government support (an **L** advantage) may have played some role in the current resurgence of resource-seeking investment in this sector.

By contrast, the role played by structural reform and its effects upon the availability of cheap agricultural products is still a matter of debate. One study claims that such reform has helped Latin American economies to incubate native MNEs, including the largest F&B MNEs based in the region (Cuervo-Cazurra, 2008). Seven out of twenty very large *multilatinas* (MNEs based in Latin America) analysed by this author operate in the food chain: two examples are Bimbo (Mexico) and Sadia (Brazil). All but one went international after 1979, and the author argues that this has been no coincidence since by that year the previous import-substitution model had come to an end and structural reforms were implemented by Latin American governments; under pressure from the collapse of the previous model and the debt crisis of 1982, the *multilatinas* (including agri-food MNEs) restructured their finances, developed new technology and seriously faced the challenge to diversify geographically in order to reduce risk.

However, in their study of Thailand, Burch and Goss (2005) show that CP, the most important native agri-food MNE, internationalised a decade ahead of liberalisation policies. Pritchard (2005) questions, moreover, the possibilities

for the successful internationalisation of agri-food firms based in small, open economies. Since the 1980s, he claims, some have viewed the pioneering liberalisation of agri-food trade in Australia and New Zealand as the first step towards the emergence of powerful F&B MNEs based in the two countries; in his opinion, however, the agri-food export competitiveness of these companies can make them the target of takeovers from foreign firms, as an alternative to internationalisation through FDI. Other studies would appear to confirm that the availability of natural resources may both attract foreign F&B MNEs (Makki *et al.*, 2004) and promote, in the later stages of development of well-endowed countries, the emergence of native F&B MNEs (Gutman *et al.*, 2006) (Azevedo *et al.*, 2004; CEPAL, 1982; Farina and Viegas, 2005; Schvarzer, 1989).

Paradoxically, good soil and climate conditions in the home country may restrict the international expansion of native F&B companies through FDI and encourage exports of agri-food products instead. Studies in economic geography underline the importance of a “geography of quality” with regard to certain foods and beverages (Mansfield, 2003). Consumers often associate the high quality of particular products to specific sites in the world. The *country of origin effect* (so called in literature on management) may limit the internationalisation of F&B firms, especially wine producers; for example, there is only one Champagne region in the world and this name is protected by EU regulation (Filippaios and Rama, 2008). Producers of some high quality products tend to serve foreign markets through exports rather than through FDI. This may be one explanation for the limited expansion through FDI of F&B firms based in certain European countries, such as Portugal (da Silva Lopes, 2005).

One of the issues still hotly debated in the International Business (IB) literature is why firms based in certain countries internationalise while firms based in others do not. As this subsection shows, L advantages provide some of the answers, although an integrated theory has also been proposed; this maintains that there is an investment development path (IDP) by which some countries gradually reach a stage of development which allows their companies to go international (Dunning and Narula, 1996). However, Burtch and Goss (2005) argue that the “stages of development” proposed by the model imply a degree of uniformity which is not apparent, at least in the food and fibre sector. In developing countries, they claim, a highly sophisticated and productive food

processing sector may be established on the basis of very different ownership and organisational forms: peasant farming, plantations, cooperatives, collective ownership and so on.

We turn now to empirical evidence for source countries in the global agribusiness sector.

3.2. Changes in the origin of capital

Most FDI originates in developed countries and the agribusiness sector is no exception. In clear confirmation of this, Table 1 shows outward FDI flows between 1989-1991 and 2005-2007 for both developed and developing countries.

We maintain, however, that the composition of outward FDI in this sector changed substantially between the two periods. Since no comprehensive data on the geographic origin of agri-food capital is available, we employ complementary sources to analyse this question.

Table 1

Firstly, the share of developed countries in such outward FDI flows fell between 1989-1991 and 2005-2007. The reduction in their share was moderate (from 98% to 95% of the total) in the food, beverage and tobacco industry, but was substantial (from 91% of the total to only 52%) in agriculture, hunting, forestry and fishing (hereafter, agriculture and related industries), owing to the dynamic expansion of FDI flows originating in developing countries.

In 2007, 12 of the world's 25 largest agriculture-based and plantation MNEs were based in developing countries (UNCTAD, 2009), coinciding with the divestment from land of many Triad-based MNEs since the early 1980s, due to the nationalisation of plantations and the migration of such companies to more rewarding business lines (e.g. agricultural technology and food processing)⁷ (Oman *et al.*, 1989). Other Triad-based agri-food MNEs have preferred to outsource production to local networks of suppliers of agricultural products (e.g. milk, fruit and vegetables), and thus their geographic links in foreign countries are difficult to trace and measure, although they have been illustrated by case

⁷ Traditionally, the Triad comprises Western Europe, the USA and Japan.

studies since the 1970s (Echánove and Steffen, 2005; UNCTAD, 2009). Some authors describe such arrangements as new forms of international investment (rather than of FDI), since MNEs which outsource agricultural production are often involved in financial, organisational and technological aspects of local agricultural production, but not in land ownership (Oman *et al.*, 1989). To summarise, as UNCTAD (2009) makes clear, after a long period of little FDI involvement in agriculture, a recovery may be underway, but coming today from developing rather than from developed source countries. As stated earlier, government support (L advantages) may have played some role in the current resurgence of resource-seeking investment in this sector.

Secondly, changes have also occurred in the geography of source countries within the F&B processing subsector. As Tozanli (2005, p.22) states, the world ranking of the Top 100 “*shows the supremacy of the Triad, even though the composition within the Triad has changed*”. During 1978-2000, according to her study, 88% of the Top 100 companies were Triad-based, and this figure remained stable throughout. As she notes, however, changes within the Triad are apparent, and especially the emergence of very large Japanese companies, which increased their share from only 9 to 20% of the Top 100 during the 1978-2000 period. According to Tozanli (2005), in the 1970s and 1980s such companies internationalised partly in reaction to changes in international trade regulations, such as the 1974 Law of the Sea; a good example, she claims, are the new Japanese fishing affiliates located in Latin America (as will be seen below, other reasons may also exist).

Showing the outward FDI position of several OECD countries in 1988, 1998 and 2008, Figure 1 corroborates and extends the information provided by analysis of the Top 100. Denmark and Japan, which displayed relatively low rates in 1988, quickly increased their FDI positions in F&B in the following twenty years. The United Kingdom became the most important source country for FDI in this industry, overtaking the USA. Within the Triad, the growth rates of outward FDI in this industry differed according to the origin of capital. In 1988-2008, the outward FDI position (stock) of the US multiplied by 6, that of the UK and Italy by 8 each and that of the Netherlands (the most dynamic source country) by 12%, while the position of Canada, for instance, increased

by only 1.5, despite it having been a traditional exporter of F&B equity capital (hereafter, F&B capital)⁸ (Rugman, 1987).

Another cause of changes within the Triad was the emergence of new exporters of F&B capital: Spain (US\$ 4.8 billion); Austria (US\$2.3 billion); Finland (US\$2.3 billion), and Norway (US\$2.3 billion) are some examples (2008 data for outward FDI positions in the F&B industry)⁹. F&B MNEs such as Grupo Ebro and SOS (both Spaniard), Fazer (Finnish) and Orkla (Norwegian) are now members of the Top 100¹⁰. Even nations such as Iceland and some Eastern European countries (the Slovak Republic, the Czech Republic and, especially, Poland), which had never been reported as exporters of F&B capital, currently display some small outward F&B FDI. All in all, the IDP theory appears to be supported by the recent evolution of FDI in the agribusiness sector.

Figure 1

○ advantages may partly explain why the share of countries such as Japan and some small European countries in outward F&B FDI has risen so quickly. Japanese F&B companies are now important producers of new technology in fields such as food inputs and ingredients (additives, vitamins, etc.), and biotechnology (von Tunzelmann, 1998), and their R&D affiliates form a larger part of their total affiliates than any other F&B MNEs (Filippaios et al 2009). Some Dutch and Danish agri-food companies (e.g. Numico, Danisco) have successfully penetrated new fast growth industries such as nutraceuticals, aquaculture and fish feed, a strategy some authors link to their dynamic international expansion (Tozanli, 2005). Finally, there are four Dutch companies (including Anglo-Dutch Unilever) among the 15 most innovative European F&B MNEs, as measured by patent counts (Martínez and Rama, 2010). As Section 5 will show, major European F&B MNEs have selected countries such as Denmark, Germany, France, the Netherlands, the UK and the USA as *loci* for their innovative activities; these are some of the most important and dynamic source countries for agri-food FDI. As summarised by Tozanli (2005, p. 26), within the Top 100 group, *“the most dynamic and innovative MNEs won over those that placed their competitive advantages merely on raw material*

⁸ When a company launches a foreign affiliate, the MNE is actually exporting equity capital to the foreign nation Caves, R.E. (1996). *Multinational enterprise and economic analysis*: Cambridge University Press.

⁹ OECD statistics on globalisation, <http://stats.oecd.org/index.aspx>, as of February 2010.

¹⁰ AGRODATA, 2005.

procurement". According to the previous discussion, therefore, the **O** advantages of firms and the **L** advantages of some home countries regarding the presence of centres of agri-food technological excellence may be possible explanations for the emergence of several new source countries for FDI in this sector or the outstanding dynamism of others.

As we have underlined, data sources must often be complemented. For 1988-2008, the OECD provides no information on the outward F&B FDI positions of Australia and New Zealand, although some analyses emphasise the activities of very large F&B MNEs based in these countries during this period (Pritchard, 2005; Tozanli, 2005). For example, Fonterra, a large New Zealand producer of dairy products, is now one of the Top 100; the availability of cheap agricultural products and government support (i.e. **L** advantages offered by the home-country) appear to have positively influenced its internationalisation (Pritchard, 2005).

In addition to the emergence of new source countries in Europe and Oceania, developing nations in Africa, Asia and Latin America have also become home to their own F&B MNEs. As Table 1 shows, the share of developing countries in outward FDI flows in food, beverage and tobacco manufacturing rose from 2% to 5% of the total between 1989-1991 and 2005-2007. Empirical studies report the presence of F&B MNEs based in emerging economies, such as Brazil, Indonesia, Mexico, Thailand, etc. (Burch and Goss, 2005; ECLAC, 2005). Some examples are the Charoen Pokphand Group (CP) (Thailand), or the so-called *multilatinas* operating in various beverage markets of The Americas, which have received little attention from academics. As Burch and Goss (2005) note, most current literature characterises the model of globalisation as a process instigated by the dynamism of large corporations based in the Triad, a view which fails to consider MNEs based in less developed countries. Even less research, they claim, has been devoted to the role of agri-food MNEs based in developing countries, in spite of their significant regional and even global activity (as defined below). As the discussion above suggests, **L** advantages (related to the availability of natural resources and the institutional background of the respective home country) and **I** advantages (sometimes related to the exploitation of market failure) may have contributed to

the internationalisation and dynamism of agri-food MNEs based in developing countries.

To summarise, changes in the geographic origin of agri-food FDI have been evident from the late 1970s to the present decade. In agriculture, there has been a resurgence of FDI outflows, driven principally by companies based in developing countries. In the F&B industry, important changes have taken place within the Triad, although Triad-based MNEs are still dominant. Outside the Triad, new source countries for capital have emerged both in the developed and the developing world.

4. Geographic patterns of agri-food companies

4.1. The location of F&B MNEs

We now examine the theories which attempt to explain the location of agri-food firms and their route to international expansion, and begin by reviewing studies which explore the determinants of FDI in F&B processing. According to the literature, such firms prefer countries with a large internal market, a high GDP *per capita*, a large urban population, high levels of protection for food and beverages and easy availability of cheap inputs and raw materials, while membership of a trade bloc is a plus (Ayadi *et al.*, 2006; Gopinath *et al.*, 1999; Pick and Worth, 2005; Rama and Wilkinson, 2008). An econometric study finds that US MNEs in the processed food sector are not especially interested in countries with low wage rates (Makki *et al.*, 2004).

Analysing the Top 100, another study also observes that large F&B firms are chiefly attracted by high income countries with a strong demand for high value-added foods and drinks, rather than by countries which can provide cheap labour (Ayadi *et al.*, 2006). Using data from the World Bank for 2002, these authors note that 73% of the nearly 8,000 affiliates of the Top 100 were located in countries with an average GDP *per capita* of over US\$9,075. However, they observe, some affluent countries (such as Bahrain, Kuwait or Saudi Arabia) have not attracted such companies because of their low levels of industrialisation and, especially, their small populations. By contrast, they argue, less affluent countries such as Brazil, China, South Africa, Turkey or Egypt, have become poles of attraction for such firms as a result of their large urban

populations. Their study suggests that in emerging economies urban dwellers now tend to follow international patterns of food consumption. Various studies have predicted that the agribusiness sector would expand to developing countries in order to take advantage of the natural resources available, low salaries and cheap agricultural goods (Constance and Heffernan, 1993). Dunning (1993) argues, in opposition, that natural resources such as land has become less important for MNEs. In general, the studies reviewed here provide only some general indications regarding the geography of agri-food MNEs.

Several theories have attempted to explain the path companies take to internationalisation and, subsequently, the location of MNEs. We briefly examine two such theories and various empirical studies which have tested them, using data for specifically agri-food companies. The Uppsala school of thought maintains that the sequence of penetration of different foreign markets proceeds according to their cultural similarity with the home country of the MNE (Johansson and Vahlne 1977; Shenkar 2001). According to theories of international production, the more dissimilar the home and the host country are in terms of tastes, values, ethics, etc., the more difficult it will be for MNEs to operate and to respond to local demand (Goerzen and Beamish, 2003).

Cultural factors may be especially important with regard to food and drink consumption (Selvanathan and Selvanathan, 2006). Ning and Reed (1995), who investigate location determinants of US FDI in food and related products from 1983 to 1989, find that US firms tend to invest in either English-speaking or European countries, due to their cultural similarities. In 1999, the sales of US F&B MNE affiliates in the UK, Germany and The Netherlands accounted for more than half their sales in Europe, which may reflect the effects of these countries' cultural similarities with the USA (Pick and Worth, 2005).

Cultural questions may have also facilitated the recent internationalisation of some F&B firms based in developing countries, such as the small F&B MNEs located in North Africa which have expanded into regional markets (Bachta and Gherzi, 2004) and the small Taiwanese and Korean F&B MNEs which now cater to the demands of Asian minorities in Latin America. Similarly, some producers of typical Mexican foods have been able to penetrate the US market and tap into the demands of Mexican immigrants (ECLAC, 2005). These examples suggest the potential importance of subnational ethnic

markets in the development of some F&B MNEs. This aspect has been underexplored by the Uppsala school of thought, which has focused on the country level, but may well be important today, given the current dimension of migration flows.

Is the expansion of F&B MNEs regional or global? Recent research supports the contention that most MNEs actually operate on a regional basis within the Triad (Kozul-Wright and Rowthorn, 1998; Rugman, 2005a; Rugman and Verbeke, 2002; Rugman and Verbeke, 2004). A study testing Rugman and Verbeke's (2004) regionalisation theory with empirical data for the international food industry finds that although F&B MNEs seem at first sight good candidates to become global companies¹¹, only a few pursue a truly global strategy (Filippaios and Rama, 2008). MNEs operating in this sector prefer regional to global strategies. The main reason for this, the authors argue, is that food consumption is still largely culturally bound, and therefore companies find it difficult to employ their firm-specific assets across regions and cultures.

Using a database comprising approximately 7,000 affiliates, the abovementioned study analyses the geographic pattern of the world's largest F&B MNEs in the period 1996-2000; the macroregions analysed are Africa, Asia, the EU, Latin America, North America, the Rest of Europe and the Rest of the World. The authors find only nine global firms, with 20% or more of their affiliates in at least three regions each but under 50% in any of these regions; 23 companies followed a bi-regional strategy, with at least 20% of their affiliates in each of two regions, but under 50% in either of them; and 49 firms followed a home region strategy, with the home region hosting at least 50% of their affiliates. F&B MNEs which adopt a global strategy are likely to be very large, and thus F&B MNEs smaller than those analysed in the study are likely to pursue a home region or bi-regional strategy.

The study also finds a significantly higher proportion of global firms among the F&B MNEs based in non-EU Western European countries than in

¹¹ The Top 100 spread, on average, to 20 foreign countries in 2000- 2002 (AGRODATA). To put these figures into perspective, note that the average MNE spread to only 13.6 countries in 2000 Ietto-Gillies, G. (2002a). *Transnational Corporations. Fragmentation amidst Integration*. London and N.Y.: Routledge.. Country spread indicates the number of countries where a company is active through FDI. Another indicator confirms that F&B MNEs are highly internationalised: According to information provided by AGRODATA, the share of foreign affiliates to the total number of affiliates rose, in the Top 100, from 52% in 1980-1989, to 53% in 1990-1995 and to 55% in 1996-2000.

the total sample, a result attributable to the presence in this group of Nestlé and Novartis, two very large companies based in a small country (Switzerland). F&B MNEs based in the EU follow either a bi-regional or a home region strategy (the EU and North America or the EU and Latin America) but there are no global firms among them. The study shows a significantly higher proportion of home region oriented firms among F&B MNEs based in Japan than in the total sample (we return to this question below). Nevertheless, it concludes that while global strategy at the company level is likely to be a myth (Rugman, 2005b), globalisation at the industry level is not. Most of the regionally oriented F&B MNEs locate a part, however small, of their affiliates in extra-regional locations. Another empirical study gives similar results for retailing, another important segment of the food chain; large MNEs in this subsector also prefer regional to global strategies (Rugman and Girod, 2003).

Tozanli (2005) argues that, in the F&B European industry, large plants with a continental structure currently supply different national markets simultaneously while remaining in constant touch with retailers' demands. The study also shows that, between 1987 and 2002, 78% of plant closures related to the Top 100 took place in Western Europe. In our opinion, the current centralisation of production may stimulate European firms to choose home-region strategies because this new form of organisation provides them with scale economies. As noted by McCann and Mudambi (2004), the internal organisation of companies is likely to be associated to specific geographic patterns.

Finally, a further study argues that the geographic orientation (global or regional) of F&B MNEs is associated to the shareholder configuration and the product mix of the company. Examining selected European food chains (milk, sugar, cereals and meat) from a Global Value Chain (GVC) perspective, Palpacuer and Tozanli (2008) investigate the international scope of 22 leading firms' activities, distinguishing two major strategies. Global strategies, they argue, are characterised by homogeneous market approaches (i.e. firms sell the same portfolio of products in their macroregion and elsewhere) and by the search for economies of scale across the world's macroregions (e.g. Africa, North America, Western Europe). By contrast, a second group of leading firms concentrate their operations within the home region.

The above authors find that all the global firms with homogeneous business activities in their home regions and elsewhere operate in the downstream segment of food chains and use agri-food processed products (e.g. sugar) to manufacture their own products for the end market; a downstream chain position, large size, a strong presence of institutional shareholders and US origin are key characteristics of the global segment of European food chains. By contrast, they also find that smaller size, family or farmer ownership (cooperatives), capital of European origin and different chain positions (i.e. upstream or downstream) are statistically associated with regional strategies. In our view, this result is coherent with Muller and Van Tulder (2005), who maintain that firms tend to be more nationally or regionally embedded when stakeholders such as cooperatives and local suppliers, rather than institutional investors, have a large say in company governance. Palpacuer and Tozanli (2008) appear to confirm, for the food industry, that company organisation and its geographic pattern are likely to be associated (McCann and Mudambi, 2004).

Palpacuer and Tozanli (2008) conclude that although global corporations have become dominant among European GVCs, locally-embedded firms focusing on country-specific production are still of great importance. Nevertheless, they argue, the reform of the Common Agricultural Policy (CAP) which took place at the start of the 2000s is likely to stimulate global sourcing, especially for non-perishable items (e.g. milk powder). EU liberalisation policies are likely to contribute, in their opinion, to a dislocation of upstream production from European nations to other countries (e.g. Brazil, New Zealand and Australia) and to a downstream-driven globalisation of European food chains. We turn now to empirical evidence of changes in the geography of the global agribusiness sector.

4.2. Host countries

Table 2 displays the changes in inward stock FDI by sector in 1990 and 2007. Throughout this period, developing economies were the most important areas for investment in agriculture and related industries, accounting for 57% of total stock in this sector. However, after China (by far the most important host

country), the largest shares of such investment went to two developed nations, the USA and Canada (Table 3). Moreover, in 2007, various socialist and transition countries (in descending order of importance, China, Vietnam¹², the Russian Federation, Ukraine and some Eastern European countries) accounted for more than one third of inward FDI stock in agriculture and related industries; their increasing importance as recipients of inward stock, particularly after 1989 (Chobanova, 2009), has certainly involved a major transformation of the geographic pattern of FDI in agriculture and related industries.

Table 2

Table 3

Table 4 evidences this predominance of developing countries, which accounted for 90% of inward FDI flows in agriculture and related industries in 2005-2007. Although comprehensive statistical information on the geographic distribution of investment by home country is not available, a review of the literature (e.g. Rama and Wilkinson 2008, UNCTAD 2009) and the comparison of Tables 1 and 4 suggest that currently a large share of total FDI in agriculture and related industries is South-South investment.

Table 4

Information on the distribution of agricultural¹³ affiliates of the Top 100 by macroregion completes the information provided in Tables 3 and 4. All such affiliates are F&B processors but, as described earlier, some also engage in the activities indicated in footnote 13. In 1981, according to AGRODATA, the most important locations for these affiliates were, in descending order, North America (USA and Canada) (35% of the total number of agricultural affiliates), the EU (at that time the EEC) (25%) and Africa (20%). By 2000, the geography of these specialised affiliates had changed dramatically. While it is true that most were still located in North America (33%) and the EU (31%), the share of Africa had fallen to only 1% of the total and that of

¹² 2002 data.

¹³ Including agriculture, horticulture, animal husbandry, viticulture, pisciculture, aviculture, silviculture and fisheries (source: AGRODATA).

Asia had increased from 4% to 16%; moreover, a number of these affiliates (3%) were located in non-EU nations in Central and Eastern Europe for the first time¹⁴. In African agriculture and related primary industries, the Top 100 may have been replaced by investors based in developing countries (such as Saudi Arabia or China i.e. from nations which lack agricultural resources) and by European retailers who operate through contract farming rather than FDI (UNCTAD, 2009).

The empirical evidence suggests that the prediction of Dunning (1993), namely that natural resources such as land would become less important for MNEs, may have been accurate for Triad-based agri-food MNEs but not for other agri-food MNEs. The thesis of an expansion of agricultural FDI towards developing countries (Constance and Heffernan, 1993) appears to be supported by the data, with two important caveats. Firstly, a substantial proportion of the growing FDI in agriculture and related primary industries is currently channelled to socialist and transition countries. Secondly, some of the principal foreign investors appear at present to be MNEs based in developing countries (rather than Triad-based companies, as expected). Both these circumstances were obviously difficult to foresee at the beginning of the 1990s.

The food, beverages and tobacco industry, by contrast, displays a clear predominance of developed countries, which received 87% of inward FDI stock for these sectors in both 1990 and 2007 (Table 2). Furthermore, the evolution of FDI flows from 1989-1991 to 2005-2007 shows that developed countries became increasingly important (from 67 to 84% of the total), despite the fact that inward FDI flows received by developing economies and by Southeast Europe¹⁵ and the CIS¹⁶ also grew during this period (Table 4).

In what follows we study various countries as both exporters and importers of capital. In 2008, the most important countries (as measured by the volume of their outward FDI stocks) in the food, beverages and tobacco industry were, in descending order, the UK, the US, the Netherlands, Japan

¹⁴ The shares of Latin America and Oceania remained relatively stable (11-10% and 4-5%, respectively).

¹⁵ Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia and the FYR of Macedonia.

¹⁶ Commonwealth of Independent States: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

and Denmark (Figure 1). Comparison with Figure 2 shows that certain of these nations (i.e. the US, the UK and the Netherlands) are both the most important source countries and the most important recipients for FDI in this industry. For the food industry in 2008, Figure 3 shows the US position (stock of FDI) in Europe and the European position in the USA: there is a high level of reciprocity between the two areas, although the US stock of FDI in Europe is greater. This phenomenon is not new, as shown also by sales data. By the mid-1990s, European firms were responsible for a majority (73%) of foreign affiliates output in the US food and kindred products industry and, similarly, the majority (50%) of foreign affiliate sales of US firms took place in Europe ¹⁷ (Pick and Worth, 2005).

Figure 2

Figure 3

For FDI in the food industry, the empirical evidence appears to support the hypothesis that foreign investors cluster in the same countries and, therefore, that rival firms in the same industry have a similar geographic distribution of their sales or assets (Knickerbocker, 1973). Recent developments of Knickerbocker's oligopolistic rivalry theory have been used to explain the so-called "transatlantic reversal" i.e. European FDI investment in the US (Ietto-Gillies, 2005), a clear trend in this industry. However, as described above, cultural and geographic proximity to home countries may have also contributed to these spatial patterns of food FDI.

This is suggested by the analysis of Japanese outward FDI in food, which evidences a search for new markets (instead of a tendency to cluster in the same European countries and in the USA). Figure 4 shows that in 1989-1994 most Japanese FDI in this industry went to North America, Oceania and Europe; by 2000-2004, however, the share of these saturated markets had declined, while those of Latin America and (especially) Asia had clearly risen. FDI data, therefore, confirm the importance of the home region strategies of Japanese F&B MNEs, discussed in Subsection 3.2 .

¹⁷ Data from the Survey of Current Business.

Figure 4

5. The geography of corporate R&D

5.1. Introduction

Multinational enterprises undertake R&D and innovative activities both in their home countries and in host countries. The internationalisation of R&D activities by firms (hereafter, the internationalisation of R&D) has become increasingly common (OECD, 2008; UNCTAD, 2005). Firms innovate abroad for many different reasons: to adapt their products to host country tastes, to absorb new knowledge from world centres of excellence, to benefit from low cost, good quality local R&D, etc. (Blanc and Sierra, 1999; Cantwell and Iammarino, 2000; OECD, 2005). Although such strategies are contributing to a new geography of corporate R&D, the empirical evidence available regarding this internationalisation is still insufficient (Dunning and Narula 1996; Dunning 1994; Serapio, Takabumi and Dalton 2004), especially for mature industries such as food and beverages.

However, sectoral factors appear to strongly influence MNEs' choice of geographic location for their R&D activities (Cantwell and Janne 2000; Patel and Pavitt 1991), for two principal reasons. Firstly, MNEs internationalise R&D to support international production, and geographic patterns of FDI (foreign direct investment) differ by sector (Blanc and Sierra, 1999; Ietto-Gillies, 2002b). Secondly, they also internationalise R&D to absorb new knowledge which may be not available at home; world centres of scientific and technological excellence, however, are not located in the same countries for all industries (Cantwell and Piscitello, 1999).

Apparently, F&B MNEs are especially likely to undertake their R&D activities abroad (Alfranca, Rama and von Tunzelmann 2005; Cantwell and Hodson 1991; Patel 1995), probably because it is essential for them to adapt their products to different national tastes and food safety regulations. Despite trends toward the homogenisation of food and drink consumption in Western countries (Connor, 1994), differences in local tastes are significant and persistent.

5.2. Literature review

Some authors, described by Archibugi and Iammarino (1999) as the “sceptics of globalisation”, maintained in the 1990s that many MNEs have little interest in internationalising their R&D activities because they prefer to invent in their home countries (Patel and Pavitt 1991; Patel and Vega 1999; Patel and Pavitt 1995; Patel and Pavitt 1997). A recent review of the literature suggests that MNEs continue to perform much of their innovative activity at home (Dunning and Lundan 2009). However, various authors are currently calling attention to a new phenomenon, namely the alleged preference of Triad-based companies for offshoring R&D to the emerging economies (Bardhan and Jaffee, 2004; Edler, 2008).

In our view, there are several explanations for this lack of consensus. Firstly, authors may use different types of samples for analysis. Their results concerning the geographic patterns of R&D internationalisation may be influenced not only by the abovementioned sector-specific factors but also by country-specific questions. European, US and Japanese companies have approached the internationalisation of R&D differently (von Zedtwitz and Gassmann, 2002), while geographic and cultural proximity appear to influence the choice of corporate R&D location (OECD 2008). According to some authors, the internationalisation of R&D may be largely a regional process, principally involving European MNEs innovating in other European countries (Archibugi and Michie, 1995). In addition, different types of R&D projects may display different patterns of internationalisation (Sachwald, 2008). Despite the specificity of results, conclusions are sometimes generalised for all types of MNEs or for all types of R&D projects.

Secondly, agreement has not yet been achieved among academics concerning important methodological issues which may affect research results, and thus these issues require further examination. Data regarding the internationalisation of R&D are not fully comparable and research methods vary between studies (OECD 2005), restricting the possibility of comparing different authors' results and requiring internationalisation to be approached from various angles and a variety of indicators to be employed. Firms rarely provide information on their R&D expenditure broken down by geographic location. Empirical studies often measure the innovative performance of firms using

patent data, and although there are drawbacks associated with such information, the advantages of its availability and richness are widely recognised (Griliches 1990).

A patent is a title, granted by a patent office, which gives the holder the right to exclude others from making, using, selling or distributing an invention without his/her consent (e.g. through a licensing agreement). Such a right is legally enforceable in case of infringement, and patents can be granted for inventions on products and processes. They are generally only valid for a maximum of 20 years from the date of filing and are restricted to the geographic area under the jurisdiction of the patent office where protection is sought. For instance, while patents assigned by the European Patent Office (EPO) may protect the intellectual property rights of patentees in up to 36 European countries¹⁸, patents assigned by the United States Patent Office (USPTO) protect these rights in the USA. As will be seen below, the type of patent information employed may affect research results.

Several studies have tested whether F&B MNEs internationalise their R&D using patent data. Cantwell and Hodson (1991) and Patel (1995) found that between 24 and 31% of the patents granted in the United States to the world's largest food and drink companies in the mid-1980s and early 1990s were attributable to research performed outside companies' home countries. However, studies of European F&B MNEs have found higher levels of R&D internationalisation. The largest such companies apparently produce abroad 83% of their total patentable inventions (hereafter, inventions), while the equivalent figure for the largest US F&B MNEs is only 10% (Alfranca, Rama and von Tunzelmann 2005; Cantwell and Janne 2000). Criscuolo and Patel (2003) find that large EU MNEs in the food and drink industry undertake over 50% of their innovative activities outside their home countries.

It must be remembered, however, that most such analyses have been based on the count of patents granted by the USPTO to companies. By contrast, a study which also investigates location indicators for all the inventors

¹⁸ The European Patent Organisation comprised 36 member countries in 2009, including EU countries, but also non-EU members such as Switzerland, Norway and Turkey. Once a patent is granted by the EPO, it must be validated in the member countries chosen by the patentee, which usually requires the payment of a fee and the translation of the patent document into the national language. For a complete list, see <http://www.epo.org/about-us/epo/member-states.html>

listed in patent documents, but employs both USPTO and EPO data (instead of a single source), suggests that research work which only analyse USPTO information may overstate the relative dimension of corporate R&D internationalisation (Martínez and Rama, 2010). This study establishes that, according to USPTO information, major European F&B MNEs produced 66% of their inventions abroad in 1978-2001, a result in line with previous analyses. However, the examination of EPO applications for a similar time period provides more nuanced conclusions; figures using this information source indicate that such firms produced abroad only 42% of their inventions. The predominance of the home country as a “locus” for R&D activities is corroborated by the analysis of patent families applied for by these companies. Patent families may provide information concerning inventions protected in markets other than Europe and the USA (e.g. Japan)¹⁹, and research based only on USPTO data may therefore overestimate the patenting of European F&B MNEs abroad. In this section, consequently, we use both EPO applications and USPTO data as complementary sources of information, and we also analyse the location of specialised R&D affiliates which may perform patentable and non-patentable R&D (e.g. basic research). Specialised R&D affiliates are defined below.

The studies reviewed in this subsection have, however, rarely analysed in what parts of the world F&B MNEs choose to locate their international R&D activities, and we turn to this question below.

5.3. Coordination and management of global R&D

As stated above, different types of corporate R&D may have different patterns of geographic distribution (Sachwald, 2008). The present subsection examines the location of the specialised R&D affiliates of the world's 100 largest F&B MNEs; as shown by a previous study using a similar sample, these affiliates control and manage innovation within the multinational network (Filippaios *et al.*, 2009). MNEs today divide their innovative activities among a large number of dispersed localities (we shall return to this question below). Consequently, they may risk losing technological coherence (Blanc and Sierra

¹⁹ The OECD Patent Statistics Manual (2009) defines patent families as “the set of patents (or applications) filed in several countries which are related to each other by one or several common priority filings”.

1999), and to avoid doing so may establish affiliates specialising in research-related activities and responsible for coordinating and directing innovation within the multinational network (Gassmann and von Zedtwitz 1998; Gerybadze and Reger 1999; von Zedtwitz, Gassmann and Boutellier 2004). This type of R&D organisation appears to have been originally implemented by MNEs operating in high-tech sectors, but is currently being adopted by F&B MNEs, especially when these are highly internationalised or innovative (Filippaios et al. 2009). While these specialised affiliates are not necessarily located in the home country, according to Cohen et al (2009) traditional centres of research located in the country of the parent company enjoy accumulated expertise and reputation, while foreign R&D-related affiliates have a long learning curve. The present subsection investigates where the world's 100 largest F&B MNEs choose to locate their R&D-related affiliates (hereafter R&D affiliates).

We define R&D affiliates as those which, according to the AGRODATA database (2000-2002), specialise in seed production, proteins, biotechnology, engineering, industrial research laboratories, research centres and medical and veterinary services (Rama, 1996)²⁰. As shown by a previous study (Filippaios *et al.*, 2009), these affiliates encompass both adaptation and “home-base augmenting” types of R&D (Kuemmerle, 1999). The sampled companies own 368 such affiliates which, it should be emphasised, enjoy independent status and are not merely laboratories attached to MNE production facilities. Some examples of these specialised affiliates are Nestlé Product Technology Center, Danapak R&D Center A/S (Arla Foods), Tate & Lyle Process Technology and Nutreco Aquaculture Research Center.

As shown by Figure 5, the world's 100 largest F&B MNEs own R&D affiliates in the five continents. They have been attracted by the emerging economies, such as Brazil or China, but also (although to a lesser extent), by less developed nations, such as the Ivory Coast. Nevertheless, in 2000-2002, major F&B MNEs preferred to locate most such affiliates in Europe, Japan and the USA.

²⁰ These activities correspond to the UN-ISI codes 111024, 312180, 832000 (excluding real estate, marketing and investment counselling services), 832030, 832020, 832021, 932000 and 933000 in the AGRODATA database, plus those affiliates which, included under code 832010 (management and IT services), have the term “research” in the description of their activities.

Comparison with a previous study based on similar data (Rama, 1996) suggests, however, that the 100 largest F&B MNEs decentralised the control and management of R&D to a certain degree during the period 1988 to 2000-2002. The proportion of R&D affiliates located within the EU (the EEC, in 1988) fell from 50% to 43% of the total number. Furthermore, within Europe, companies may have redistributed these affiliates. The proportion of R&D affiliates positioned in France, the United Kingdom and the Netherlands fell, respectively, from 16% to 8%, from 14% to 6% and from 7% to 5% of the world total during the period examined. At the same time the share of those located in the Czech Republic, Poland, Romania and Slovakia (i.e. in new member states of the EU-27) rose from 0% to 13%, underlining the importance of intra-European R&D investment in this industry, as most of these new R&D affiliates belong to Western European F&B MNEs. The share of R&D affiliates located in the USA rose slightly, from 20% to 21% of the total, while that of those operating in other developed countries²¹ increased from 17% to 20%, probably as a consequence of the emergence of new source countries, such as Norway, for FDI in this industry (see Section 3). Finally, the proportion of R&D affiliates located in developing countries rose from 13% to 15% of the total in this period. Overall, the share of some traditional locations (e.g. the USA, the UK, France and the Netherlands) increased only insignificantly or even fell, while that of new locations (other developed countries, Eastern Europe and some developing countries) rose.

To summarise, F&B MNEs are likely to retain within the Triad those tasks which involve the coordination and management of global R&D, although a trend towards some degree of geographic decentralisation is noticeable when we compare 1988 with 2000-2002.

F&B MNEs may produce their inventions both in the R&D affiliates analysed in this subsection and in laboratories attached to production centres. Such companies' inventions may also be the result of research performed outside the MNE, through R&D collaboration or subcontracting agreements with other public or private institutions. We analyse below the spatial pattern of the

²¹ Australia, Canada, Japan, New Zealand, Norway, South Korea and Switzerland,

generation of inventions in the largest European F&B MNEs, as reported in patent documents.

Figure 5

5.4. The geography of patented invention

Large European MNEs play a substantial role with regard to innovations employed worldwide by the food and drink sector and auxiliary industries (Christensen, Rama and von Tunzelmann 1996; von Tunzelmann 1998). As early as the 1970s there was a noticeable trend towards the international sourcing of technology by such firms (OECD, 1979). The present subsection examines, from the late 1970s to the present decade, the changing geography of the innovative activities²² of 59 major European F&B MNEs whose parent companies are based in 11 EU countries and Switzerland and which have a total of 8,432 affiliates (Annex II).

We analyse the 8,626 EPO applications filed by the sampled firms and their affiliates in 1978-2005 and the 3,650 USPTO granted patents they applied for in 1978-2001. As Europe and the USA are the two major markets for European F&B MNEs (Filippaios and Rama, 2008), these two types of patents are likely to protect the most important inventions produced by such companies, and we therefore employ USPTO and EPO data as complementary sources of information. We observe a relatively long time period, to ensure we capture as many innovations as possible in the mature and conservative food and beverage industry, where consumer tastes tend to change slowly (Galizzi and Venturini 2008).

According to the OECD (2005), the country where the inventor is located provides an indication of where the technology has been produced. Contained in patent documents, information on the inventor's country of residence enables us to analyse important changes in the geography of corporate R&D. In what follows, therefore, we study the locations preferred by the sampled companies

²² We refer here to the innovative activities of the MNEs or their R&D activities, as measured by their patentable inventions. It should be borne in mind, however, that these companies may also perform R&D which in principle, is not patentable, such as basic research. For an overview of differences among jurisdictions on patentable subject matter see Martínez and Guellec (2004).

for their innovative activities, as proxied by the stated location of inventors²³, to calculate the share of each country in the total innovative activities of the MNEs in the sample.

Firstly, we focus on EPO applications; between 1978-1989 and 1990-2005 the sampled companies increased their aggregate number of EPO applications from 1,848 to 6,776 and the number of countries involved in the production of their patentable inventions from 25 to 51 (home countries included). Figure 6 shows in darker tones the most popular countries for the production of inventions in 1978-1989. According to EPO data, 41% were generated in the UK. Other common locations were, in descending order of importance, the Netherlands, the USA, Switzerland, Germany and France. There are two possible explanations for such preferences. Firstly, corporate R&D tends to follow, with a time lag, foreign direct investment (FDI) (Blanc and Sierra 1999). In the F&B industry, because a substantial proportion of innovation consists of small improvements and it is crucial to adapt foodstuffs to national tastes (Galizzi and Venturini 2008), companies need to locate their laboratories close to their manufacturing facilities. The UK, which hosts 20% of the F&B MNEs' foreign affiliates in our sample, the USA (7.5%), Germany (6.7%), France (6.1%) and the Netherlands (3.8%) are also the most important foreign locations for the production facilities of the sampled firms (as measured by the number of their affiliates). If we consider both domestic and foreign affiliates, the share of the UK increases to 28% of the total, and that of France, Germany and The Netherlands to 8%, 7% and 6%, respectively. These are important markets indeed for major European F&B MNEs, which strongly encourages companies to select them as "loci" for their innovative activities.

Another explanation for the preference for these countries is probably the quality of their environment with regard to food and food-related technology (Christensen *et al.*, 1996). In 1969-1994, according to the USPTO information analysed by these authors, the US accounted for 67% of the world's patents in food, 62% in food equipment, 71% in agricultural machinery and 59% in

²³ Following the OECD (2009) advice for analyses of the internationalisation of R&D, we use the whole count of patents (as opposed to fractional counts, which assign a part of the patent to each country of residence). 82% of all EPO applications and 87% of all US patents in our sample are produced by inventors located in a single country. Therefore, in our database, the number of patents which protect inventions achieved by the collaboration of inventors located in different countries is quite small.

biotechnology²⁴, while Western Europe generated 19%, 23%, 18% and 20%, respectively²⁵. These figures suggest that in choosing a suitable location to perform R&D, the European F&B MNEs in our sample may also have taken into account the specialised technological achievements of the USA and Western Europe and the possibilities they offer for knowledge acquisition.

Figure 7 maps, in turn, the countries in which the sampled companies produced their inventions (measured once more by EPO applications) in 1990-2005. Comparison with Figure 6 evidences some important changes in the geography of corporate R&D between the periods 1978-1989 and 1990-2005. Firstly, as stated earlier, top European F&B MNEs currently perform R&D in more countries than previously. In Latin America, for instance, in 1978-1989 only Brazil and Argentina were selected to perform local innovative activities but, in 1990-2005, such activities were extended to Chile, Ecuador, El Salvador and, especially, Mexico. In 1990-2005, for the first time, the sampled companies engaged in innovative activities in Eastern European nations (Hungary, Poland and the Czech Republic), which became EU member states by the end of the period. A few large European food and beverage MNEs had already become involved in certain business undertakings (e.g. licences) in these countries prior to 1989 (Chobanova, 2009) but not, according to our patent data, in innovative activities.

Furthermore, major European F&B MNEs increased the proportion of R&D activities performed in emerging countries, such as (in descending order) Brazil, Thailand, Argentina, Singapore and South Africa, although the share of such nations remained comparatively small throughout the 1990-2005 period. According to the empirical evidence, the F&B industry does not clearly display a shift of corporate R&D toward emerging countries, as is the case of other industries, such as electronics (Bruche, 2009; Reddy, 2000). In our sample, India, now of similar importance to Sweden as a location for the sampled companies' R&D (1.2% of the inventions for which they seek patent protection

²⁴ These data may, however, overestimate the level of innovativeness of US inventors, since USPTO patents are actually, for them, domestic patents. Domestic patents are usually cheaper and easier to obtain than international patents.

²⁵ These figures include the US patents granted to all types of inventors: MNEs, one-nation firms, institutions (e.g. universities) and individuals.

in Europe), is currently the most important destination for R&D outside the Triad.

Two possible explanations can be provided for such changes. Firstly, the internationalisation of R&D may be following the internationalisation of production, as suggested by the rapid expansion of the sampled companies in developing and transition countries (see Section 4). Secondly, the current wave of R&D internationalisation may be aimed at reducing costs by recruiting highly qualified scientists from developing nations, where salaries are lower than in the Triad (Reddy, 2000). Finally, in 1990-2005, the group of top locations (i.e. those in which the majority of inventions are concentrated) displays some degree of spatial decentralisation. The share of inventions produced in the UK fell from 41% to 30% of the total, in contrast to the increase in the relative share of other European countries, such as (in descending order) France, Germany, Italy, Sweden, Spain and Austria. Moreover, the US became the second preference for innovative activities, after the UK, replacing the Netherlands, another European country. Consequently, the share of inventions produced in the USA increased, in 1978-1989 and 1990-2005, from 13% to 25% of the total.

Figure 6

Figure 7

As Figures 8 and 9 show, USPTO data corroborate these findings, confirming the attractiveness of the USA for major European F&B MNEs. According to this source, the USA became their most important location for R&D activities; from 1978-1989 to 1990-2001, its share grew from 26% to 43% of the total number of such companies' inventions (as measured by their USPTO patents). These results are not surprising; as stated earlier, the USA is an important market for European F&B MNEs and the most important centre worldwide for food and food-related technology (Christensen *et al.*, 1996). Logically enough, the European companies in our sample are likely to use USPTO patents chiefly to protect the inventions they produce in the USA. However, the comparison of Figures 6-7, on the one hand, and Figures 8-9, on the other, suggests that research based exclusively on USPTO information may overestimate the innovative activities of European F&B MNEs in the USA. This

corroborates research into European MNEs in other sectors (Criscuolo 2002), indicating that European MNEs in general prefer to generate their inventions in Europe.

To summarise, the R&D activities of European F&B MNEs have become geographically more dispersed in recent years. However, in 1990-2005, such companies still preferred to spatially concentrate these activities in a handful of Western European countries and in the USA. More specifically, the empirical evidence does not indicate, at least for the F&B industry, that the EU is becoming less attractive for domestic corporate R&D, as various authors argue (Bijman *et al.*, 1997; Erken and Gilsing, 2005; Sachwald, 2008) .

Figure 8

Figure 9

6. Conclusions

This chapter has analysed the changing structure of the global agribusiness sector in order to better understand its geographic patterns.

FDI in the global agribusiness sector has increased swiftly from the end of the 1980s to the present and, as in other sectors, most such investment has come from companies based in developed countries. Although Triad-based investors are still prominent, the configuration of the source countries for equity capital has changed substantially in this sector. The share of developed countries has fallen noticeably with regard to outward FDI flows in agriculture, hunting, forestry and fishing. This trend may be the result of a variety of causes, such as divestment of land by Triad-based MNEs; their choosing of new forms of investment (other than FDI), such as outsourcing of local agricultural production; and, most particularly, the outstanding dynamism of FDI flows originating in developing countries. Much of the outward FDI of developing countries in agriculture and related primary industries appears to consist of South-South investment i.e. FDI channelled to other developing countries.

Location **(L)** advantages, such as government support, are apparently instrumental to explaining the expansion of resource-seeking MNEs based

in either developing or developed countries. Secondly, the share of developed countries in food and beverages has fallen only moderately, although changes in the composition of source countries are observable, both inside and outside the Triad. The emergence of several new source countries or the special dynamism displayed by others appear to be associated to: the ownership **(O)** advantages of indigenous companies (technology); internalisation **(I)** advantages, such as vertical integration of the food-chain, which is especially important for agribusiness based in developing countries; and certain location **(L)** advantages home countries are able to offer native companies, such as R&D-intensive sectoral systems of innovation or easy access to finance. By contrast, location **(L)** advantages related to the availability of cheap natural resources or outstanding soil and climate conditions in the home country have no clear effects on the internationalisation of native agribusiness, although these benefits may have played a positive role in some specific cases. The fact that successive waves of source countries have emerged in the agribusiness sector indicates support for the Investment Development Path theory, namely that nations appear to reach threshold levels of development which enable their agribusiness to go international.

FDI in agriculture and primary related industries goes chiefly to developing countries. However, the USA and Canada are the most important host countries after China, and formerly socialist and transition countries also play a substantial role. While the search for land may have become less important for Triad-based MNEs, as predicted by Dunning (1993), it remains a crucial strategy for MNEs based in developing countries, especially those lacking sufficient natural resources.

By contrast, FDI in food and beverages goes primarily to developed countries, whose importance appears to have increased in recent years, despite the flows received by developing countries also having grown. Some reciprocity of investment is apparent, at least between the USA and Europe. Moreover, some of the most important home countries are at the same time the most important host countries for FDI in this industry. Knickerbocker's oligopolistic rivalry theory and cultural proximity are probable explanations of the majority of these developments. By contrast, Japan appears to have

reduced its involvement in other developed countries, tending instead to channel its FDI to Latin America and, especially, the rest of Asia. Increasing income levels in certain of these countries and, in some cases, cultural proximity to the home country may help to explain these trends.

The world's 100 largest F&B prefer to locate their specialised R&D units within the Triad, although certain developing nations and Eastern European countries are increasingly regarded as new "loci" for such activities. According to patent analysis, major European F&B MNEs tend to locate their innovative activities in an increasing number of countries; since, however, most of these new locations are European nations, this trend seems to support the view that the internationalisation of R&D is, for European firms, chiefly a European rather than a global phenomenon (Archibugi and Michie, 1995). The USA, nevertheless, is also a very important location for the innovative activities of European food and beverage MNEs, while emerging economies, especially India, today host a part of these innovative activities. Companies are apparently attracted by those countries which host large shares of their production facilities, probably because this arrangement enables them to better adapt their products to local tastes. Asset-seeking behaviour and the search for world centres of excellence for food and food-related technology are also apparent.

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Annex I

The sources of AGRODATA, a database compiled by the Institut Agronomique Méditerranéen de Montpellier (France), are Moody's industrial Manual, the Fortune Directory of the 500 largest corporations, the "Dossier 5.000" of the largest European corporations, Dun & Bradstreet, the annual reports of the enterprises, etc. The Top 100 are not continuing firms since some companies have dropped out of this group for a variety of reasons (e.g. acquisitions by another firm) and "new" groups have become large enough to be part of it. In English, Tozanli (2005) provide tables containing some of the data on the Top 100. In this chapter, however, we also use unpublished information. Information on the IAMM and AGRODATA (in French) is available in the following web page: <http://www.iamm.fr/default.htm>

Annex II

The companies analysed in this subsection are European-based multinationals included in the worldwide ranking of agro-food multinationals in the AGRODATA database (see Annex I). We combined information from this source and from other databases on corporate information and patents to obtain a global picture of their R&D facilities and patenting activities.

Firstly, we identified all the affiliates of the selected F&B MNEs and extracted information regarding their names, locations and principal industrial sectors of activity from the Bureau van Dijk (BvD) AMADEUS database, version March 2008. Secondly, we matched patent counts to the company names corresponding to the F&B MNEs selected. We are aware that mergers and acquisitions and the closure of affiliates prior to the compilation of the information on affiliates may alter patent counts but, like Criscuolo et al (2002), we feel this methodology is acceptable for our purposes, since most multinationals apply for the majority of their patents using variations of their corporate name. We extracted information from the September 2008 EPO Worldwide Patent Statistics Database (PATSTAT) on USPTO patent grants and EPO applications filed by the F&B MNEs sampled; we obtained from Amadeus the names of all their affiliates and corresponding host countries and matched them with the names and countries of residence of EPO applicants and USPTO assignees.

Table 1. Estimated worldwide outward FDI flows, by sector and industry, 1989–1991 and 2005–2007 (in millions of dollars)

Sector/industry	1989-1991			2005-2007			
	Developed countries	Developing economies	World	Developed countries	Developing economies	South-East Europe and CIS	World
Total	217 637	6 142	223 779	1 332 782	140 901	270	1 473 953
Primary	9 869	291	10 160	133 672	12 392	879	146 943
Agriculture, hunting, forestry and fishing	467	45	512	599	495	49	1 143
Manufacturing	80 050	3 494	83 543	335 135	24 414	98	359 647
Food, beverages and tobacco	12 233	253	12 486	45 723	2 617	- 12	48 327
Services	110 661	2 021	112 682	755 164	98 438	- 618	852 985
Private buying and selling of property	497	-	497	3 370	-	-	3 370
Unspecified	16 561	336	16 897	105 441	5 657	- 89	111 008

Source: UNCTAD.

* A considerable share of investment in business activities is in Hong Kong (China), which accounted for 87% of developing economies and 12% of the world total during 2005–2007. Hong Kong (China) data include investment holding companies.

Note: The world total was extrapolated on the basis of data covering 27 countries in 1989–1991 and 50 countries in 2005–2007, or the latest three-year period average available. They account for over 90% of world outward FDI flows in the periods 1989–1991 and 2005–2007. Only countries for which data for the three main sectors were available were included. The distribution share of each industry of these countries was applied to estimate the world total in each sector and industry. As a result, the sum of the sectors for each group of economies is different from the totals shown in annex table B.1. Approval data was used for Taiwan Province of China. In the case of Japan, the actual data was estimated by applying the implementation ratio of realized FDI to approved FDI to the latter : 75% in 1989–1991. The world total in 1989–1991 includes the countries of South-East Europe and the CIS, although data by sector and industry are not available for that region.

Table 2. Estimated worldwide inward FDI stock, by sector and industry, 1990 and 2007 (in millions of US dollars)

Sector/industry	1990			2007			
	Developed countries	Developing economies	World	Developed countries	Developing economies	South-East Europe and CIS	World
Total	1 579 483	362 632	1 942 116	11 583 162	3 816 510	297 204	15 696 876
Primary	151 505	30 349	181 854	863 657	240 791	67 988	1 172 436
Agriculture, hunting, forestry and fishing	3 466	4 571	8 036	11 830	17 997	2 182	32 010
Manufacturing	640 572	158 026	798 598	3 251 613	916 814	77 407	4 245 834
Food, beverages and tobacco	69 940	10 401	80 341	390 734	46 919	12 378	450 030
Services	778 457	169 243	947 701	7 300 508	2 586 293	133 682	10 020 483
Private buying and selling of property	-	-	-	6 043	-	-	6 043
Unspecified	8 949	5 014	13 963	161 341	72 612	18 126	252 079

Source: UNCTAD.

* A considerable share of investment in business activities is in Hong Kong (China), which accounted for 88% of developing economies and 40% of the world total in 2007. Hong Kong (China) data include investment holding companies.

Note: The world total was extrapolated on the basis of data covering 54 countries in 1990 and 92 countries in 2007, or latest year available. They account for over four-fifths of world inward FDI stock in 1990 and 2007. Only countries for which data for the three main sectors were available were included. The distribution share of each industry of these countries was applied to estimate the world total in each sector and industry. As a result, the sum of the sectors for each group of economies is different from the totals shown in annex table B.2. In the case of some countries where only approval data were available, the actual data was estimated by applying the implementation ratio of realized FDI to approved FDI to the latter (56% in 1994 for Japan, 10% in 1990 and 7% in 1999 for Lao People's Democratic Republic, 84% in 2007 for Malaysia, 44% in 2002 for Mongolia, 39% in 1990 and 35% in 2007 for Myanmar, 41% in 1990 and 35% in 1999 for Nepal, 62% in 1995 for Sri Lanka, 73% in 1990 and 52% in 2007 for Taiwan Province of China). The world total in 1990 includes the countries of South-East Europe and the CIS, although data by sector and industry are not available for that region.

Table 3. Inward FDI stock/flows in agriculture, forestry and fishing, various years
(in millions of US dollars and percentages)

Host region/economy	Millions of dollars				Percentage share in total			
	Flows		Stock		Flows		Stock	
	2002–2004	2005–2007	2002 ^a	2007 ^c	2002–2004	2005–2007	2002 ^a	2007 ^c
World	2 286.9	3 327.8	18 969.5	32 010.0	0.4	0.2	0.3	0.2
Developed economies	156.5	38.9	6 694.7	11 830.3	0.0	0.0	0.1	0.1
Europe								
Czech Republic	27.8	29.0	20.3	196.5	0.5	0.3	0.1	0.2
France	25.4	61.5	351.3	616.4	0.1	0.1	0.1	0.1
Germany	5.6	- 6.7	194.0	225.2	0.0	- 0.0	0.1	0.0
Hungary	26.6	13.6	387.3	493.9	0.8	0.2	1.1	0.5
Italy	83.0	28.6	264.3	624.3	0.5	0.1	0.2	0.2
Netherlands	21.2	..	349.2	..	0.1	..	0.1	..
Poland	43.6	73.9	185.7	446.3	0.6	0.4	0.4	0.4
Romania	16.8	67.7	108.2	412.8	0.3	0.7	0.9	0.7
United Kingdom	- 2.0	84.7	243.4	490.8	- 0.0	0.0	0.0	0.0
Other developed countries								
Australia	54.4	- 74.7	642.6	624.2	0.3	- 0.8	0.5	0.2
Canada	..	..	662.2	1 497.8	..	..	0.3	0.3
United States	- 195.7	31.0	1 997.0	2 561.0	- 0.2	0.0	0.2	0.1
Developing economies	2 040.8	2 980.0	11 978.2	17 997.1	1.1	0.8	0.8	0.5
Africa								
United Republic of Tanzania	40.5	40.5	210.7	252.4	9.4	9.4	6.2	6.7
Latin America and the Caribbean								
Brazil	153.3	420.9	392.0	383.6	0.9	1.6	0.6	0.4
Chile	4.8	49.5	789.6	949.7	0.2	2.3	1.5	1.5
Peru	1.5	51.0	51.1	208.6	0.5	8.7	0.4	1.3
Asia and Oceania								
China	1 047.7	747.0	4 120.3 ^d	6 156.2 ^d	1.9	1.0	1.9	1.9
Korea, Republic of	- 4.9	1.3	400.6	400.5	- 0.1	0.0	0.9	0.6
Viet Nam	61.9	51.4	1 753.1	..	4.4	3.0	6.7	..
South-East Europe and the CIS	89.5	308.9	296.5	2 182.5	0.4	0.7	0.4	0.7
Russian Federation	7.3	187.7	87.0	953.0	0.1	1.0	0.4	0.9
Ukraine	..	57.3	113.6	557.6	..	4.0	2.1	1.9

Source: Annex A.I.4 and A.I.6 and UNCTAD, FDI/TNC database.

^a Including the hunting industry.

^b Or closest year available.

^c Or latest year available.

^d Based on approval data.

Note: The world totals, as well as totals for developed economies, developing economies and South-East Europe and CIS, were extrapolated from the data for countries for which detailed statistics on FDI in agriculture were available. The coverage of data available was as follows: about 100 countries for inward flows, accounting for over 90% of world inward FDI flows and around 90 countries for inward stock, accounting for over 85% of world FDI inward stock.

Table 4. Estimated worldwide inward FDI flows, by sector and industry, 1989–1991 and 2005–2007
(in millions of US dollars)

Sector/industry	1989–1991			2005–2007			
	Developed countries	Developing economies	World	Developed countries	Developing economies	South-East Europe and CIS	World
Total	151 998	34 551	186 549	1 060 084	367 294	43 886	1 471 264
Primary	8 998	3 860	12 858	124 046	33 639	13 205	170 891
Agriculture, hunting, forestry and fishing	- 6	628	623	39	2 980	309	3 328
Manufacturing	47 769	16 081	63 849	232 141	113 850	7 192	353 183
Food, beverages and tobacco	4 790	2 361	7 151	34 051	5 079	1 415	40 545
Services	83 477	10 634	94 111	636 238	208 180	22 931	867 349
Private buying and selling of property	113	-	113	9 766	-	1	9 767
Unspecified	11 642	3 977	15 619	57 892	11 624	557	70 073

Source: UNCTAD.

^a A considerable share of investment in business activities is in Hong Kong (China), which accounted for 44% of developing economies and 11% of the world total during 2005–2007. Hong Kong (China) data include investment holding companies.

Note: The world total was extrapolated on the basis of data covering 70 countries in 1989–1991 and 104 countries in 2005–2007, or the latest three-year period average available. They account for 88 and 95% of world inward FDI flows respectively in the periods 1989–1991 and 2005–2007. Only countries for which data for the three main sectors were available were included. The distribution share of each industry of these countries was applied to estimate the world total in each sector and industry. As a result, the sum of the sectors for each group of economies is different from the totals shown in annex table B.1. Approval data was used for Israel (1994 instead of 1989–1991), Mongolia (1991–1993 instead of 1989–1991) and Mozambique (2003–2005). In the case of some countries, the actual data was estimated by applying the implementation ratio of realized FDI to approved FDI to the latter: Bangladesh (2% in 1989–1991), Cambodia (9% in 1994–1995), China (47% in 1989–1991), Indonesia (15% in 1989–1991), the Islamic Republic of Iran (69% in 1993–1995 and 22% in 2001–2003), Japan (20% in 1989–1991), Jordan (74% in 2001–2003), Kenya (7% in 1992–1994), the Lao People's Democratic Republic (1% in 1989–1991), Malaysia (52% in 1989–1991), Mauritius (72% in 1995), Mexico (93% in 1988–1990), Mongolia (62% in 2005–2007), Myanmar (70% in 1989–1991), Nepal (30% in 1989–1991 and 53% in 1996–1998), Papua New Guinea (20% in 1993–1995 and 36% in 1996–1998), Solomon Islands (1% in 1994–1995 and 3% in 1996), Sri Lanka (47% in 1995 and 91% in 2005–2007), Taiwan Province of China (65% in 1989–1991 and 50% in 2005–2007), Turkey (40% in 1989–1991) and Zimbabwe (23% in 1993–1995). The world total in 1989–1991 includes the countries of South-East Europe and the CIS, although data by sector and industry are not available for that region.

Figure 1. Outward FDI positions in the food, beverage and tobacco industry, 1988-2008
(in millions of US dollars)

Source: Authors' elaboration, based on OECD statistics on globalization
<http://stats.oecd.org/index.aspx>, as of February 2010

Figure 2. Inward FDI positions in the food, beverage and tobacco industry, 1988-2008
(in millions of US dollars)

Source: Authors' elaboration, based on OECD statistics on globalization
<http://stats.oecd.org/index.aspx>, as of February 2010

Figure 3. Direct investment position of the USA in Europe and direct investment position of Europe in the USA for food manufacturing, 2008
(in millions of US dollars)

Source: Authors' elaboration, based on the Survey of Current Business.

Notes: Europe includes Russia. Historical cost basis.

Figure 4. Japanese outward FDI in the food industry (by region)

A.

B.

Source: Authors' elaboration, based on data from the Japanese Ministry of Finance.
<http://www.mof.go.jp/english/>

Figure 5. R&D affiliates of the world's 100 largest food and beverage MNEs (2000-2002)

Source: Own elaboration based on AGRODATA. Map prepared by the authors using the programme Cartes&Données (www.articque.com).

Note: Includes domestic and foreign affiliates.

Figure 6

Figure 7

Source: Own elaboration, based on patent data from PATSTAT September 2008 and information on affiliates from BvD Amadeus 2008 for a selection of Top Food European MNEs, taken from Agrodatab 2005.

Figure 8

Figure 9

Source: Own elaboration, based on patent data from PATSTAT September 2008 and information on affiliates from BvD Amadeus 2008 for a selection of Top Food European MNEs, taken from Agrodatab 2005.

References

- Alfranica, O., R. Rama, and N. von Tunzelmann. (2002). "A patent analysis of global food and beverage firms: the persistence of innovation." *Agribusiness. An International Journal* 18.
- Alfranica, O., R. Rama, and N. von Tunzelmann. (2005). 'Innovation in food and beverage multinationals'. in, R. Rama (ed). *Multinational agribusinesses*. New York and London: Haworth Press Inc.
- Anastassopoulos, G., and R. Rama. (2005). "The Performance of Multinational Agribusinesses: Effects of Product and Geographical Diversification." Pp. 73-113 in *Multinational agribusinesses*, edited by R. Rama. New York and London: Haworth Press Inc.
- Andersen, E.S., and B.-A. Lundvall. (1988). "Small national systems of innovation facing technological revolutions: an analytical framework." in *Small Countries Facing the Technological Revolution*, edited by Freeman C. and B.-A. Lundvall. London and New York: Pinter Publishers.
- Archibugi, A., and S. Iammarino. (1999). 'The policy implications of the globalisation of innovation'. *Research Policy* (28),317-336.
- Archibugi, D. , and J. Michie. (1995). 'The globalisation of technology: a new taxonomy'. *Cambridge Journal of Economics* (19),121-140.
- Ayadi, N., J-L. Rastoin, and S. Tozanli. 2006. "Les Operations de Restructuration des Firmes Agroalimentaires Multinationales entre 1987 et 2003." Pp. 1-64, <http://ideas.repec.org/p/umr/wpaper/200608.html> in *Working Paper No 8* Montpellier (France): Unité Mixte de Recherche MOISA.
- Azevedo, P.F., F.R. Chaddad, and M.M.Q. Farina. 2004. "The food industry in Brazil and the United States: The effects of the FTAA on trade and investment" in *SITI-07* Buenos Aires: Inter-American Development Bank.
- Bachta, M.S., and G. Gherzi. (2004). "Restructuration des filières et stratégies de croissance des entreprises agroalimentaires dans les pays du Sud et de l'Est du bassin méditerranéen." Pp. 111-138 in *Agriculture et alimentation en Méditerranée*, edited by M.S. Bachta and G. Gherzi. France: CIHEAM, IRESA, KARTHALA.
- Bardhan, A.D., and D. Jaffee. 2004. "On intra-firm and multinationals: foreign outsourcing and offshoring in manufacturing." Pp. 1-23, http://www.brookings.edu/pge/offshoring_Bardhan.pdf: Haas School of Business.
- Bijman, W..B., R. van Tulder, and M. van Vliet. (1997). 'Internationalisation of Dutch Agribusiness and the Organisation of R&D.' Pp. 10 in Seminar on Globalization of the Food Industry:, University of Reading, Reading.
- Blanc, H., and C. Sierra. (1999). 'The internationalisation of R&D by multinationals: a trade-off between external and internal proximity'. *Cambridge Journal of Economics* (23),187-206.
- Bruche, B. (2009). "The emergence of China and India as new competitors in MNCs' innovation networks " *Competition & Change* 13:269-290.
- Buckley, P.J., J. Clegg, A.R. Cross, X. Liu, H. Voss, and P. Zheng. (2007). "The determinants of Chinese outward foreign direct investment." *Journal of International Business Studies* 38:499-518.

- Burch, D., and J. Goss. (2005). "Regionalization, globalization, and multinational agribusiness: a comparative perspective from Southeast Asia." Pp. 253-282 in *Multinational Agribusinesses*, edited by R. Rama. N.Y. and London Haworth Press Inc.
- Cantwell, J. , and C. Hodson. (1991). 'Global R&D and UK competitiveness'. Pp. 133-183 in, Mark Casson (ed). *Global Research Strategy and International Competitiveness*. Oxford and Cambridge: Basil Blackwell.
- Cantwell, J., and S. Iammarino. (2000). 'Multinational corporations and the location of technological innovation in the UK regions'. *Regional Studies* (34),317-332.
- Cantwell, J., and O. Janne. (2000). 'Globalization of innovatory capacity: the structure of competence accumulation in European home and host countries'. Pp. 121-177 in, F. Chesnais, G. Ietto-Gillies, and R. Simonetti (ed). *European integration and global corporate strategies*. London-NY: Routledge.
- Cantwell, J., and L. Piscitello. (1999). 'The emergence of Corporate International Networks for the accumulation of dispersed technological competences'. *MIR* 123-147.
- Caswell, J.A. (1987). "Dominant Forms of Corporate Control in the US Agribusiness Sector." *American Journal of Agricultural Economics* 69:11-21.
- Caves, R.E. (1996). *Multinational enterprise and economic analysis*: Cambridge University Press.
- CEPAL. 1982. "Sugar cane, alcohol production and the interests of transnational corporations in Brazil." E/CEPAL/R 324.
- Chobanova, Y. 2009. "Strategies of multinationals in Central and Eastern Europe Innovation Systems and Embeddedness." Palgrave, Pp. 1-305.
- Christensen, J. L., R. Rama, and N. von Tunzelmann. (1996). 'Study on innovation in the European Food Products and Beverages Industry.' Pp. 145. EIMS/SPRINT Brussels: The European Commission.
- Cohen, S.S., A. Di Minin, Y. Motoyama, and C. Palmberg. (2009). 'The persistence of home bias for important R&D in wireless telecom and automobiles'. *Review of Policy Research* (26),55-77.
- Connor, J. M. (1994). "North America as a precursor of changes in Western European food-purchasing patterns." *European Review of Agricultural Economics* 21:1-173.
- Constance, D.E., and W.D. Heffernan. (1993). "Transnational corporations and the globalization of the food system." *Sociology of Agriculture and Food*.
- Criscuolo, P. and P. Patel (2003), "Large firms and internationalization of R&D: 'Hollowing out' of national technology capacity", paper presented at SETI workshop, Rome.
- Criscuolo, P., Narula, R. and B. Verspagen (2002), "The relative importance of home and host innovation systems in the internationalisation of MNE R&D: a patent citation analysis", Eindhoven Centre for Innovation Studies, The Netherlands, Working Paper 02.20.
- Cuervo-Cazurra, A. (2008). "The multinationalization of developing country MNEs: The case of multilatinas." *Journal of International Management* 14:138-154.
- Da Silva Lopes, T. (2005). "Competing with multinationals: Strategies of the Portuguese alcohol industry." *Business History* 79:559-585.

- Dunning, J. H. (1993). *The globalisation of business*. London-NY: Routledge.
- Dunning, J.H. (1994). 'Multinational enterprises and the globalization of innovatory capacity'. *Research Policy* (23),67-68.
- Dunning, J., and R. Narula. (1996). 'The investment development path revisited: some emerging issues'. in, J. Dunning and R. Narula (ed). *Foreign Direct Investment and governments. Catalysts for economic restructuring*. London and N.Y.: Routledge.
- Dunning, J.H., and S.M. Lundan. (2009). 'The internationalization of corporate R&D: A review of the evidence and some policy implications for home countries'. *Review of Policy Research* (26),13-34.
- ECLAC (Ed.). 2005. *Trans-latins in the food and beverages industry*. Santiago de Chile: ECLAC (UN).
- Echánove, F., and C. Steffen. (2005). "Agribusiness and farmers in Mexico: the importance of contractual relations." *The Geographical Journal* 171:166-176.
- Edler, J. (2008). "Creative internationalization: widening the perspectives on analysis and policy regarding international R&D activities." *Journal of Technology Transfer* 33:337-352.
- Erken, H., and V. Gilsing. (2005). "Relocation of R&D - a Dutch perspective." *Technovation* 25:1079-1092.
- Farina, E, and A. Viegas. (2005). "Multinational Firms in the Brazilian Food Industry." in *Multinational agribusinesses*, edited by R. Rama. New York and London: Haworth Press.
- Filippaios, F, and R.. Rama. (2008). "Globalisation or regionalism? The strategies of the world's largest food and beverages MNEs." *European Management Journal* 26:59-72.
- Filippaios, F., R. Pearce, M. Papanastassiou, and R. Rama. (2009). 'New forms of organisation and R&D internationalisation among the world's 100 largest food and beverages multinationals'. *Research Policy* (38),1032-1043.
- Frankho, L.G. (1989). "Global corporate competition: Who's winning, who's losing, and the R&D factor as one reason why." *Strategic Management Journal* 10:449-474.
- Gabel, M., and H. Bruner. (2003). *Global Inc. An atlas of the multinational corporation*. New York: Ther New Press.
- Galizzi, G., and L. Venturini. (2008). 'Nature and determinants of product innovation in a competitive environment of changing vertical relationships'. in, Ruth Rama (ed). *Handbook of innovation in the food and drink industry*. New York and London: Taylor & Francis Group.
- Gallo, A.E. (1995). "Are there too many new product introductions in US food marketing?" *Journal of Food Distribution Research* 26:9-13.
- Gassmann, O., and M. von Zedtwitz. (1998). 'Organization of industrial R&D on a global scale'. *R&D Management* (28),147-161.
- Gerybadze, A., and G. Reger. (1999). 'Globalization of R&D: recent changes in the management of innovation in transnational corporations'. *Research Policy* (28),251-274.
- Goerzen, A., and P.W. Beamish. (2003). "Geographic scope and multinational enterprise performance." *Strategic Management Journal* 24:1289-1306.
- Gopinath, M., D. Pick, and U. Vasavada. (1999). "The economics of foreign direct investment and trade with an application to the U.S. food

- processing industry." *American Journal of Agricultural Economics* 81:442-452.
- Griffith, D.A., S.T. Cavusgil, and S. Xu. (2008). "Emerging themes in international business research." *Journal of International Business Studies* 39:1229-1235
- Griliches, Z. (1990), "Patent statistics as economic indicators: a survey", *Journal of Economic Literature*, 28 (4), 1661-1707.
- Gutman, G., R. Bisang, P. Lavarello, M. Campi, and V. Robert. (2006). "Les mutations agricoles et agroalimentaires argentines des années 90: libéralisation, changement technologique, firmes multinationales." *Région et Développement* 23.
- Ietto-Gillies, G. (2002). *Transnational Corporations. Fragmentation amidst integration*. New York: Routledge.
- Ietto-Gillies, G. (2005). *Transnational corporations and international production. Concepts, theories and effects*. Cheltenham, UK and Northampton US Edward Elgar.
- Johanson, J. y Vahlne, J.-E. (1977): « The Internationalization Process of the Firm - A Model of Knowledge Development and Increasing Foreign Markets Commitments », *Journal of International Business Studies*, Vol. 8, No.1, pp. 23-32.
- Kozul-Wright, R., and R. Rowthorn. (1998). "Spoilt for choice? Multinational corporations and the geography of international production." *Oxford Review of Economic Policy* 14:74-92.
- Kuemmerle, W. 1999. Foreign direct investment in industrial research in the pharmaceutical and electronics industries-Results from a survey of multinational firms. *Research Policy*, 28:179–93.
- Lundvall, B.A. (1988). "Innovation as an Interactive Process: from User-producer Interaction to the National System of Innovation." Pp. 349-369 in *Technical Change and Economic Theory*, edited by G. Dosi, C. Freeman, R. Nelson, G. Silverberg, and L. Soete. London. NY: Pinter Publishers.
- Makki, S.S., A. Somwaru, and C. Bolling. 2004. "Determinants of foreign direct investment in the food-processing industry: a comparative analysis of developed and developing economies." Pp. 1-8, <http://ageconsearch.umn.edu/bitstream/123456789/7946/1/35030060.pdf>, edited by US Department of Agriculture Economic Research Service, USA. Washington DC: The Market and Trade Economics Division of ERS.
- Mansfield, B. (2003). "Spatializing globalization: A 'geography of quality' in the seafood industry." *Economic Geography* 79:1-16.
- Martínez, C. and D. Guellec (2004), "Overview of recent changes and comparison of patent regimes in the United States, Japan and Europe", Chapter 7 in *Patents, Innovation and Economic Performance. OECD Conference Proceedings*, pp.127-162, OECD, Paris.
- Martinez, C., and R. Rama. 2010. "Home or abroad? R&D and patenting among European food and beverage multinationals." Pp. 31 in *2nd conference on corporate R&D (CONCORD 2010), Corporate R&D: An engine for growth, a challenge for European policy*. Seville, Spain.

- McCann, P., and R. Mudambi. (2004). "The location behaviour of the multinational enterprise: some analytical issues." *Growth and Change* 35:491-524.
- Muller, A., and R. Van Tulder. (2005). "Exploring Patterns of Upstream Internationalization: The Role of Home-region 'Stickiness'." ERS-2005-084-ORGERIM Report Series Research in Management.
- Ning, Y., and M.R. Reed. (1995). "Locational determinants of the US Direct Foreign Investment in Food and Kindred products." *Agribusiness. An International Journal* 11:77-85.
- OECD. (1979). Impact of Multinational Enterprises on National Scientific and Technical Capacities. Paris: OECD.
- . (2004). "Handbook on economic globalisation indicators." Pp. 1-241. Paris: OECD.
- . (2005). 'Background report. Internationalisation of R&D: Trends, issues and implications for S&T policies. A review of the literature.' Pp. 1-67. Brussels: OECD Forum on the Internationalisation of R&D.
- . (2008). *The internationalization of business R&D*. Paris: OECD.
- . (2009). *Patent Statistics Manual*. OECD, Paris.
- Oman, C., F. Chesnais, J. Pelzman, and R. Rama. (1989). *New forms of investment in developing country industries: mining, petrochemicals, automobiles, textiles, food*. Paris: OECD.
- Osegowitsch, T., and A. Sammartino. (2008). "Reassessing (home-regionalisation)." *Journal of International Business Studies* 39:184-196.
- Palpacuer, F., and S. Tozanli. (2008). "Changing governance patterns in European food chains: the rise of a new divide between global players and regional producers." *Transnational Corporations* 17:69-100.
- Patel, P. (1995). 'Localised production of technology for global markets'. *Cambridge Journal of Economics* (19),141-153.
- Patel, P. and K. Pavitt. (1991). 'Large firms in the production of the world's technology: an important case of 'non-globalisation'. *Journal of International Business Studies* (22),1-21.
- . (1995). 'Patterns of technological activity: their measurement and interpretation'. in, P. Stoneman (ed). *Handbook of the Economics of Innovation and Technological Change*. Blackwell.
- . (1997). 'The technological competencies of the world's largest firms: complex and path-dependent, but not much variety'. *Research Policy* 141-156.
- Patel, P. and M. Vega. (1999). 'Patterns of internationalisation of corporate technology: location vs. home country advantages'. *Research Policy* (28),145-155.
- Pick, D., and T. Worth. (2005). "Foreign direct investment in the U.S. food and kindred products." Pp. 149-164 in *Multinational Agribusinesses*, edited by R. Rama. N.Y.-London: Haworth Press Inc.
- Pozzobon, D.M.. 2008. "Explorando solucoes internacionais: O caso dos frigorificos brasileiros." in *XXXI Encontro da ANPAD*, edited by EnANPAD. Rio de Janeiro (Brazil).
- Pritchard, B. (2005). "The internationalization paths of Australiand and New Zealand Food MNEs." Pp. 219-252 in *Multinational Agribusinesses*, edited by R. Rama. N.Y. and London: Haworth Press, Inc.

- Rama, R. (1996). 'Les multinationales et l'innovation. Localisation des activités technologiques de l'agro-alimentaire'. *Economie Rurale. Paris* (231),62-68.
- . (1999). "Innovation and profitability of global food firms. Testing for differences in the influence of the home base." *Environment and Planning A* 31:735-751.
- Rama, R., and J. Wilkinson. (2008). "Foreign direct investment and agri-food value-chains in developing countries: a review of the main issues " *Commodity Markets Review* 2007-2008:51-66.
- Reddy, P. (2000). *Globalization of R&D. Implications for innovation systems in host countries*. London & New York: Routledge.
- Rugman, A. (2005a). *The regional multinationals. MNEs and "global" strategic management*. Cambridge: Cambridge University Press.
- Rugman, A., and S. Girod. (2003). "Retail multinationals and globalization: the evidence is regional." *European Management Journal* 21:24-37.
- Rugman, A., and A. Verbeke. 2002. "The regional multinationals: The location-bound drivers of global strategy." in *Templeton Research Paper 2002, University of Oxford*. Oxford.
- . (2004). "A perspective on regional and global strategies of multinational enterprises." *Journal of International Business Studies* 35:3-18.
- Rugman, A.E. (1987). "The firm specific advantages of Canadian multinationals." *Journal of International Economic Studies* 2:1-14.
- Rugman, A.M. (2005b). "A further comment on the myth of globalization." *Journal of International Management* 11:441-445.
- Sachwald, F. (2008). "Location choices within global innovation networks: the case of Europe." *Journal of Technology Transfer* 33:364-378.
- Schvarzer, J. (1989). *Bunge & Born: Crecimiento y diversificación de un grupo económico*. Buenos Aires: CISEA.
- Selvanathan, S., and E.A. Selvanathan. (2006). "Consumption patterns of food, tobacco and beverages: a cross-country analysis." *Applied Economics* 38:1567-1584.
- Senauer, B., and L. Venturini. 2005. "The globalization of food systems: a conceptual framework and empirical patterns." Pp. 1-40. Minnesota: The Food Industry Center, University of Minnesota
- Serapio, M.G., H. Takabumi, and D. Dalton. (2004). 'Internationalization of Research and Development: Empirical trends and theoretical perspectives'. in, M.G. Serapio and H. Takabumi (ed). *Internationalization of Research and Development and the emergence of global R&D networks*. Amsterdam: Elsevier.
- Sim, A.B. 2007. "Emerging Southeast Asian and Taiwanese Multinational Firms and their Internationalization Strategies." Pp. 31 in *Oxford Business & Economics Conference*. United Kingdom.
- Shenkar, O. (2001). "Cultural distance revisited: towards a more rigorous conceptualization and measurement of cultural differences." *Journal of International Business Studies* 32:519-535.
- Tozanli, S. (2005). "The rise of global enterprises in the world's food chain." in *Multinational Agribusinesses*, edited by R. Rama. N.Y.: Haworth Press Inc.

- UNCTAD. 2005. "World Investment Report 2005. Transnational corporations and the internationalization of R&D." Pp. 331. New York and Geneva: United Nations.
- . 2009. "World Investment Report 2009. Transnational corporations, agricultural production and development." Geneva: United Nations.
- von Tunzelmann, G.N. (1998). 'Localized technological search and multi-technology companies'. *Economics of Innovation and New Technology* (6),231-255.
- von Zedtwitz, M., and O. Gassmann. (2002). "Market versus technology drive in R&D internationalization: four different patterns of managing research and development." *Research Policy* 31:569-588.
- von Zedtwitz, M., O. Gassmann, and R. Boutellier. (2004). 'Organizing global R&D, challenges and dilemmas'. *Journal of International Management* (10),21-49.
- Wendt, M., and G. Pedersen. 2006. "Foreign direct investment in the food manufacturing industry." Pp. 28, edited by University of Minnesota The Food Industry Center. St Paul, MN: The Food Industry Center, University of Minnesota.