VOLUME 20 NUMBER 2 AUGUST 2011

TRANSNATIONAL CORPORATIONS

United Nations
New York and Geneva, 2011
United Nations Conference on Trade and Development
Division on Investment and Enterprise

Editorial statement

Transnational Corporations (formerly *The CTC Reporter*) is a refereed journal published three times a year by UNCTAD. In the past, the Programme on Transnational Corporations was carried out by the United Nations Centre on Transnational Corporations (1975–1992) and by the Transnational Corporations and Management Division of the United Nations Department of Economic and Social Development (1992–1993). The basic objective of this journal is to publish articles and research notes that provide insights into the economic, legal, social and cultural impacts of transnational corporations in an increasingly global economy and the policy implications that arise therefrom. It focuses especially on political and economic issues related to transnational corporations. In addition, *Transnational Corporations* features book reviews. The journal welcomes contributions from the academic community, policymakers and staff members of research institutions and international organizations. Guidelines for contributors are given at the end of this issue.

Subscriptions

A subscription to *Transnational Corporations* for one year is US$45 (single issues are US$20). See p. 153 for details of how to subscribe, or contact any distributor of United Nations publications. United Nations, Sales Section, Room DC2-853, 2 UN Plaza, New York, NY 10017, United States – tel.: 1 212 963 3552; fax: 1 212 963 3062; e-mail: publications@un.org; or Palais des Nations, 1211 Geneva 10, Switzerland – tel.: 41 22 917 1234; fax: 41 22 917 0123; e-mail: unpubli@unog.ch.

Note

The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the United Nations. The term "country" as used in this journal also refers, as appropriate, to territories or areas; the designations employed and the presentation of the material do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. In addition, the designations of country groups are intended solely for statistical or analytical convenience and do not necessarily express a judgement about the stage of development reached by a particular country or area in the development process.

Unless stated otherwise, all references to dollars ($) are to United States dollars.

ISBN 978-92-1-112821-5
ISSN 1014-9562

Board of Advisers

CHAIR

Terutomo Ozawa, Professor of Economics, Colorado State University, Fort Collins, Colorado, United States

MEMBERS

V.N. Balasubramanyam, Professor of Development Economics, Lancaster University, United Kingdom

Edward K.Y. Chen, Former President, Lingnan University, Hong Kong, Special Administrative Region of China

Farok J. Contractor, Professor of Management and Global Business, Graduate School of Management, Rutgers University, Newark, New Jersey, United States

Arghyrios A. Fatouros, Professor of International Law, Faculty of Political Science, University of Athens, Greece

Xian Guoming, Professor of Economics and International Business, Director, Center for Transnational Corporation Studies, Dean, Teda College of Nankai University, Tianjin, China

Kamal Hossain, Senior Advocate, Supreme Court of Bangladesh, Bangladesh

Celso Lafer, Professor, University of São Paulo, Brazil

James R. Markusen**,** Professor of Economics, University of Colorado at Boulder, Colorado, United States

Theodore H. Moran, Karl F. Landegger Professor, and Director, Program in International Business Diplomacy, School of Foreign Service, Georgetown University, Washington, D.C., United States

Sylvia Ostry, Distinguished Research Fellow and China/WTO Project Chair , Centre for International Studies, University of Toronto, Toronto, Canada

Tagi Sagafi-nejad, Radcliffe Killam Distinguished Professor of International Business; Director, Center for the Study of Western Hemispheric Trade; Director, International Trade Institute and Editor, International Trade Journal, The A. R. Sanchez, Jr., School of Business, Texas A&M International University, Texas, United States

Mihály Simai, Professor Emeritus, Institute for World Economics, Budapest, Hungary

John M. Stopford, Professor Emeritus, London Business School, London, United Kingdom

Osvaldo Sunkel, Professor and Director, Center for Public Policy Analysis, University of Chile, Santiago, Chile

Marjan Svetlicic, Head, Centre of International Relations, Faculty of Social Sciences, University of Ljubljana, Slovenia

Daniel Van den Bulcke, Professor of International Management and Development, University of Antwerp, Belgium

Transnational Corporations
Volume 20, Number 2, August 2011

Contents

Home economy heterogeneity in the determinants of China's inward foreign direct investment

Ping Zheng and Hui Tan*

This study explores whether the determinants and motivations of China's inward foreign direct investment (FDI) are heterogeneous among the home economies. Categorizing the home economies into two sets of groups in terms of their economic development levels and geographic locations, this research found that China's inward FDI determinants and motivations are different between the groups. Chinese inward FDI from non-OECD developing economies is more likely to be both horizontal and vertical types for efficiency-seeking and market-seeking purposes, while FDI from OECD developed economies is more likely to be horizontal market-seeking. FDI from Europe is more likely to be driven by the large Chinese market, while FDI from North America is more likely to be stimulated by China's low input costs, and FDI from Asia is more likely to be attracted by both the large Chinese market and its low costs. These findings will be useful to the host government in devising better policies to enhance positive externalities created by the inflows of FDI.

Keywords: China, inward foreign direct investment (FDI), geographic location, determinants, home economy, heterogeneity

JEL classifications: C23, F21, F23, O53

1. Introduction

Having overtaken Japan in 2010, China now has the world's second largest economy. The rise of China has affected the global economy in many ways, through patterns of trade, economic growth, foreign investment, demand for natural resources, international migration and environmental quality. Following its entry into the World Trade Organization, China has emerged as a world economic superpower and super-location for inward

* Ping Zheng is at the Westminster Business School, University of Westminster in the United Kingdom. Contact: e-mail zhengp@wmin.ac.uk Hui Tan is at the School of Management, Royal Holloway, University of London in the United Kingdom. Contact: email hui.tan@rhul.ac.uk

foreign direct investment (FDI) (Buckley, 2004), justifying its position as a focus for both academic and policy interest.

As the largest emerging economy, China has been very successful in attracting inflows of FDI since 1984. FDI has flowed into China from over 150 economies and regions worldwide. Chinese inward FDI stock amounted to US$378.08 billion in 2008, its share of global FDI stock increasing from 0.2 per cent in 1980 to 2.5 per cent in 2008 (UNCTAD, 2009). China has maintained its position at the top of the FDI Confidence Index since 2002, ranking first among Asian investors as well as all developing economies and second among European and North American investors (Kearney, 2007, 2010; UNCTAD, 2008).

FDI in the Chinese context has been well documented during the last decade, and a number of previous empirical studies have analysed FDI determinants in China (Liu et al., 1997; Sethi et al., 2009; Shi, 2001; Wang and Swain, 1995; Wei and Liu, 2001; Zhang, 1994; Zhao, 2003; Zhou et al., 2002). These studies, however, do not distinguish the FDI determinants between the home economies. In other words, the home economies have been examined without differentiation. This raises the question of whether the identified determinants are equally applicable to different home economies. Behrman (1972) and Dunning (1993) suggest that, from the perspective of home economies, FDI determinants can be related to different motivations for investment. Nachum and Zaheer (2005) argue that investment motivations can only be analysed meaningfully with respect to a specific context because of the unique attributes of the market and firms from different economies. FDI motivation and determinants thus would vary by the nationality of transnational corporations (TNCs). Zheng (2009) points out that FDI determinants and motivations might be heterogeneous between different home economies, due to their different economic development levels and geographical locations. While the world is populated with economies of great contrast, both economically and politically, no research thus far has attempted to establish the validity of FDI determinants across the entire spectrum of home economies, or to decompose home economies according to their economic development or geographical location. This distinction is important for both policy and business purposes, because different kinds of inward FDI create different kinds of externalities through linkages and spillovers (Jordaan, 2005, 2008a and 2008b; Kugler, 2006; Liu, 2002), while not all

of them positive. It is therefore crucial for the host country government to understand the strategies and motivations of TNCs, and to develop policies that will enhance positive externalities.

Using a large panel dataset covering 28 home economies, this paper intends to fill this gap by examining the potential heterogeneity of inward FDI determinants and motivations in China from a home economy perspective, and to provide important recommendations for both policymakers and business practitioners. The home economies of Chinese inward FDI are categorized into two sets of groups according to economic development (OECD developed economies, and non-OECD developing economies) and by geographical location (Asian, European and North American economies) with the intention of achieving a clearer evaluation of, and presenting further insights on, the impact of home economy differences on FDI determinants in the host economy, China. From an economic development perspective, it is important for an FDI host economy to devise its policy framework and strategy in accordance with home economies' characteristics, from which more FDI may be attracted. China is a country with great regional disparities (Chen and Fleisher, 1996). As such, the findings from this research may provide a basis of discussion with which to design effective FDI policies specifically to attract those types of FDI with the greatest potential for positive externality generation from particular home economies, thus further promoting its remarkable economic growth across its many regions with contrasting economic characteristics.

The rest of the paper is organized as follows. Section II reviews country characteristics and attributes and further develops hypotheses. Section III discusses research methodology. Section IV presents the findings and discussions, and the last section summarizes the conclusions and policy implications.

2. Country characteristics, FDI determinants and hypotheses

Based on his OLI eclectic paradigm analysing FDI determinants, Dunning (1998) points out that the relative attractiveness of FDI locations is determined by investment motivations, which he classifies into four categories: resource-seeking, (horizontal) market-seeking, (vertical) efficiency-seeking and strategic asset-seeking. Makino et al.

(2002) distinguish FDI into two groups: asset-exploitation and asset-seeking. The former views FDI as the transfer of a firm's proprietary assets across borders and the latter regards FDI as a means to acquire strategic assets available in a host country. Nachum (2003) categorizes FDI in terms of different strategic investment motivations and input needs: home-exploiting investment and home-augmenting investment. The former exploits the firm-specific advantages that firms have developed initially in their home economy in foreign markets in order to expand their market share (similar to horizontal market-seeking FDI); while the latter is driven by the need of firms to tap into strategic resources in foreign markets in order to access low-cost inputs (vertical efficiency-seeking FDI), certain resources (resource-seeking) and assets (asset-seeking).

Previous studies have shown that TNCs from the same country tend to share many common attributes which distinguish them from TNCs from other economies (Culem, 1988; Mariotti and Piscitello, 1995; Grosse and Trevino, 1996; Zaheer and Zaheer, 1997; Thomas and Waring, 1999; McKendrick, 2001). It has been assumed that the influence of nationality is uniform, implying that all firms are affected by the conditions in their home country in the same manner and to the same degree (Nachum, 2003). In other words, the pattern of TNCs' motivations and strategies would be similar if they are from the same country, but dissimilar if they are from different economies in which significant characteristics differ. As noted above, FDI motivations and determinants would vary by the nationality of the TNCs as well as different host economies. Some markets (FDI host economies) possessing specific factors are more suitable for achieving certain motivations, and TNCs from particular (home) economies are more likely to be driven by specific motives (Nachum and Zaheer, 2005). In short, specific FDI motivations and determinants are affected and shaped by both FDI host and home economies' characteristics, including government policies (Gastanaga, Nugent and Pashamova, 1998).

As the host economy, China represents the largest emerging market in the world, with a population of more than 1.3 billion and the world's fastest economic growth, attracting horizontal market-seeking FDI. China's low cost labour force and resources also attract vertical efficiency seeking FDI. In general, China's inward FDI from the

world is motivated by the prospective benefits such as market access and expansion, cost-reduction and efficiency improvement. This study, therefore, will focus on the two motivations, i.e. market-seeking and efficiency-seeking.

As the characteristics of FDI home economies vary, TNCs from different economies invest in China with different motivations. Due to the differing nature of firm-specific competencies possessed by TNCs, the strategic motivations for FDI vary between economies (Nachum, 2003). TNCs from developing economies tends to be in search of home-exploiting (market-seeking) and home-augmenting (efficiency-seeking, resource-seeking and asset-seeking) investment opportunities, and often undertake outward FDI to maximize benefits from their competencies in ethnic networks, knowledge of foreign markets, product design and international distribution. Lecraw (1993) and Wells (1983) suggest that TNCs from developing economies tend to develop small-scale, labour-intensive and flexible processes and products which are suitable to developing markets in which input characteristics and market demand conditions are similar to those in their home economies. FDI in this case is used primarily to strengthen their price competitiveness by exploiting the low-cost labour force in the host economies (Makino et al., 2002). As these economies possess limited domestic markets, they tend to expand their market through investment into other large developing economies like China. It can be argued that asset-exploitation FDI from developing economies investing in China is of both a horizontal and a vertical nature, for efficiency-seeking as well as market-seeking purposes.

In contrast, TNCs from developed economies investing in developing economies, especially in those large emerging economies like China, are generally seeking to exploit their ownership advantages derived from their distinctive resources and capabilities (Dunning, 1993, 1998). These ownership advantages include advanced technology, product and process innovation, economies of scale and scope, risk-reduction capacity, management skills and internalization advantages. Petrou (2007) finds that transnational banks from developing economies are more likely to follow clients from home, while those from developed economies tend to enter developing economies for foreign market opportunities, due to market saturation and regulatory

constraints at home. We can, therefore, describe FDI from developed economies investing in large developing markets as horizontal home-exploiting investment for market-seeking purpose.

H1: The motivations and determinants of China's inward FDI from different economic development groups are likely to be different.

Kearney (2007) notes that Asian investors prefer the "near abroad" strategy for their investments and China is the top investment location for them. "Asian investor interested in China spans across manufacturing and service sectors, as the country expands its domestic market demand and deepens its know-how as an export platform" (Kearney, 2007, p.9). Asian economies (see Appendix 1) provided about 60 per cent of Chinese total inward FDI during 1992–2004. There are certain special factors favouring such investments, including close geographical proximity, pre-existing kinship, social network and cultural affinity with China. These special factors provide TNCs from Asian economies with certain advantages in exploiting China's low input costs and gaining access to the Chinese domestic market. Having faced challenges in their home economies, such as appreciation of the currencies, rising labour and land costs, and environmental constraints, since the mid-1980s, TNCs in these economies have experienced an erosion of their comparative advantage, forcing many firms to relocate their productive activities overseas. This is particularly serious for those in labour-intensive "sunset" industries such as textiles, garments, electrical goods, metal, plastics, and toys. In doing so, many Asian economies, in particular the NIEs, have become "upstream suppliers of intermediate inputs and market channels for China's labour-intensive products while China is becoming a downstream processing and assembling base for the Asian NIEs, enabling them as a whole to become a more competitive producer in the world manufacture goods market" (Siew-Yean, 2001, p.12). Therefore, as a result of rising costs – the push factors at home − and fast growth of the Chinese market and its low input costs – the pull factors in the host country − TNCs from the Asian economies have made large investment in China, providing over 60 per cent of China's inward FDI (see Appendix 1). Indeed, China has become the largest host economy for the outward FDI from this group of economies.

Given that European countries are at a greater geographic distance from China, and enjoy only limited growth in their home markets, TNCs from Europe may have different business strategies from those in Asia. Previous studies have argued that small FDI firms are more likely to be driven by low host country labour costs, while large firms are more driven by the host country's market, exploiting their technological advantage (Kinoshita, 1998, Shi, 2001). The average size of an investment from Europe was almost twice that from North America and Asia (Hsiao and Hsiao, 2004). TNCs from Europe, therefore, are more likely to be interested in the Chinese domestic market than its low input costs.

Unlike investors from Asia and Europe, who prefer the near abroad investment strategy, "North American investors tend to look outside the Western Hemisphere" (Kearney, 2007, p. 8). Canada and the United States account for a large portion of China's inward FDI (8.4 per cent is from the United States and 0.8 per cent from Canada) (see Appendix 1). While the United States has the largest domestic market in the world, wage levels there are 10 and even 20 times higher than in China, while productivity in the United States is five times as high as that in China (Burke, 2000). The share of Chinese exports produced by foreign invested enterprises (FIEs) operating in China was 50 per cent in 2001. According to Burke (2000), United States firms build export-oriented production bases in China in order to take advantage of China's low-wage labour force, to produce intermediate and final products for re-export back to the United States market. A 10 per cent increase in the level of United States direct investment in an industry in China is associated with a 7.3 per cent increase in volume of the United States imports from China and a 2.1 per cent decline in the United States exports to China, in that industry. He argues that increasing United States investment in China worsens the United States trade deficit with China.

H2: The motivations and determinants of China's inward FDI from different geographic regions are likely to be different.

3. Methodology

All major home economies of Chinese inward FDI (see Appendix 2 for the home economy list)[1] are included in the panel dataset for estimation. This large panel dataset, across 28 home economies over 19 years from 1984 to 2002,[2] could provide robust and generalized empirical analysis and conclusions. As noted earlier, China has attracted dramatically increased FDI since 1984, and reached its top position of the FDI Confidence Index by 2002. It will be interesting to explore the vibrancy of the FDI received during the time period. In order to investigate potential heterogeneity among the different country groups within the data, all the home economies are categorized into two sets of groups by economic development and geographical location. By economic development, the economies are classified into two groups: OECD developed economy group and non-OECD developing economy group. By geographical location, the economies are divided into three groups[3] – Asian, European and North American economies (see Appendix 2 for the home economy categories).

The dependent variable is China's inward (annual realized) FDI, from the 28 home economies. The independent variables are composed of predictor variables and control variables. The predictor variables include three market size related variables to capture FDI market-seeking motive, and a labour cost related variable to capture FDI efficiency-seeking motive, while the control variables include two bilateral trade variables, three financial variables, two political risk variables and two distant variables.

A. Predictor variables

Market-seeking variables: Relative Market Size – RGDPP is the ratio of Chinese to home economy GDP per capita; Market Growth – RGGDP is the ratio of Chinese to home economy GDP growth and Absolute Market Size – RGDP is the ratio of Chinese to home economy GDP. All three variables are expected to positively influence FDI flows

[1] Taiwan Province of China and Virgin Islands are not included, because of insufficient data.

[2] Annual data for FDI before 1984 is not available.

[3] The Australian group including Australia and New Zealand is not examined because the FDI from the region is not as significant as that for the other three regions.

from the home economies to China. Efficiency-seeking variable: Labour Cost – RWAGE is the ratio of Chinese to home economy wage level. This is predicted to influence China's inward FDI inversely.

B. Control variables

Bilateral trade variables: Import and Export – IM and EX are China's annual imports/exports from/to home economy. These variables will capture the influence of trade intensity between the host and home economy on FDI flows from the home to the host economy. The previous studies suggest that trade and FDI are complements rather than substitutes and foreign firms tend to invest in their trade partner markets where they are familiar (Zheng, 2009). Therefore, both variables are expected to positively influence FDI flows to China.

Financial variables: Borrowing Cost – RLEN is the ratio of China's lending interest rate to that of the home economy. On one hand, the variable is expected to have a positive influence on China's inward FDI, as FDI will be more competitive in terms of cost of lending, over local capital in China (Grosse and Trevino, 1996; Liu et al., 1997). A higher lending interest rate in China also makes it attractive to foreign investors through portfolio investments. However, on the other hand, a higher rate would increase the cost if the foreign firms needed to obtain local capital in China, which should have a negative impact on inward FDI. The relationship between relative borrowing cost and China's inward FDI, therefore, is ambiguous. Exchange Rate – RREER is the real effective exchange rate between China and home economy. It is expected to influence China's inward FDI positively. Inflation – INF is the home economy's inflation and will have a negative influence on China's inward FDI.

Political risk variables: Home Economy Political Risk – POLI is the home economy political risk rating on a 100-point scale, from Very Low Risk (80 to 100 points) to Very High Risk (zero to 49.5 points), comprising 12 components covering both political and social attributes, i.e., government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability and bureaucracy quality. It is expected to have a positive influence on China's inward FDI. China Political Risk – Time Dummy (TD), 1989–1992 (1989–92 = 1, otherwise = 0) capturing the influence of the

Tiananmen Square Incident, is expected to have a negative influence on China's inward FDI.

Distant variables: Cultural Distance (proximity) – Culture Dummy (CD) is presented by the percentage of ethnic Chinese population in the home economy's total population. The economies in which the share of Chinese population in the total is higher than 50 per cent, i.e., Hong Kong, Macao, and Singapore = 1, otherwise = 0. It is expected to have a positive influence on China's inward FDI. Geographic Distance – GD, measured between China (capital city Beijing) and home economy (capital city), is expected to have a negative influence on China's inward FDI.

Table 1 summarizes all variables and their proxies, the expected signs, theoretical justification and the data sources.

The following log-linear equation is employed and estimated by the Random Effects statistical model:

$$LFDI=\alpha+\beta_1 LRGDPP+\beta_2 LRGGDP+\beta_3 LRGDP+\beta_4 LRWAGE+\beta_5 LIM+\beta_6 LEX$$

$$+\beta_7 LRLEN+\beta_8 LINF+\beta_9 LRREER+\beta_{10} LPOLI+\beta_{11} TD+\beta_{12} CD+\beta_{13} LGD+\varepsilon_{it}$$

4. Findings and discussion

Appendix 3 presents the descriptive statistics and correlations for all variables used in the estimation. We also conduct the diagnostic statistic of variance inflation factor (VIF) for testing of multi-collinearity. The results of the VIF tests presented by Appendix 4 do not show any evidence of serious multi-collinearity (see O'Brien, 2007). The empirical results for the home economy groups are reported in table 2.

The empirical results for the economic development category are presented in Column (1) for the OECD developed economy group, and Column (2) for the non-OECD developing economy group. There are similarities and differences between the two groups. Interestingly, the market-seeking variable of LRGDPP is positively significant for both economy groups at the high levels (5 per cent for the OECD developed economies and 1 per cent for the non-OECD developing economies), with large coefficients of 1.22 and 2.01, respectively, which indicate FDI

Table 1. Determinants and motivations of Chinese inward FDI by home economy

Variable	Proxy	Sign	Theoretical justification	Predictor or Control Variable	Data source
FDI (dependent variable)	LFDI: Annual realised FDI				*Almanac of China's foreign Economic Relations and Trade*
Market size (I) – relative market size	LRGDPP: ratio of GDP per capita of China to home economy	+	Market seeking	Predictor	*World Development Indicators*
Market size (II) – market growth	LRGGDP: ratio of growth rate of China to home economy	+	Market seeking	Predictor	*World Development Indicators*
Market size (III) – absolute market size	LRGDP: ratio of GDP of China to home economy	+	Market seeking	Predictor	*World Development Indicators*
Labour cost	LRWAGE: ratio of wage level of China to home economy	-	Efficiency seeking	Predictor	*Yearbook of Labour Statistics*
Imports	LIM: China's imports from the home economy	+	Trade intensity	Control	*Almanac of China's Foreign Economic Relations and Trade*
Exports	LEX: China's exports to the home economy	+	Trade intensity	Control	*Almanac of China's Foreign Economic Relations and Trade*
Borrowing cost	LRLEN: ratio of lending interest rate of China to home economy	?	Financial factor	Control	*International Financial Statistics Yearbook*
Exchange rate	LRREER: Real effective exchange rate between China and home economy	+	Financial factor	Control	*International Financial Statistics Yearbook*
Inflation rate	LINF: Home economy annual inflation rate	-	Financial factor	Control	*International Financial Statistics Yearbook*
Home economy political risk	LPOLI: Home economy's political risk rating (higher rating indicates lower risk)	+	Institutional factor	Control	*International Country Risk Guide*
China Political risk	TD 89–92: Tiananmen Square Incident influence	-	Institutional factor	Control	1989–92 = 1, otherwise = 0
Cultural distance (proximity)	CD: = 1 when percentage of ethnic Chinese in home economy population is >50%	+	Transaction costs	Control	Hong Kong, Macao, and Singapore = 1, otherwise = 0
Geographic distance	LGD: Geographic distance between China and home economy (capital)	-	Transaction costs	Control	www.wcrl.ars.usda.gov/cec/java/capitals.htm

from the two economic development groups is both highly motivated and attracted by the huge Chinese domestic market. It can be argued that market-seeking is one of the important motives for China's inward FDI from both OECD developed economies and non-OECD developing economies.

However, the results for the efficiency-seeking variable LRWAGE are different between the two economic development groups. LRWAGE is highly significant at a 1 per cent level for the non-OECD group, with the high coefficient of -1.65. But LRWAGE is not statistically significant for the OECD group. This might indicate that efficiency-seeking is another important motivation for China's inwards FDI from non-OECD developing economies, while such is not the case for the FDI from OECD developed economies.

In general, it can be argued that the determinants and motivations for China's inward FDI from the two economic development groups are heterogeneous, which supports H1. FDI from OECD economies is more interested in the Chinese market for market-seeking purposes, while FDI from the non-OECD economies is interested in both the Chinese domestic market and its low labour cost, for market-seeking and efficiency-seeking purposes.

In comparison, it seems that FDI from the OECD economies is sensitive to exports, inflation, and particularly to host and home economy political risks, while the non-OECD economies are sensitive to bilateral trade with China, borrowing cost, exchange rate and both cultural and geographic distance.

The results of the two bilateral trade variables for the OECD group, LEX – China's exports to the home economies − appears to be one of the determinants for FDI from the OECD economies to China. The positive sign indicates that the greater the level of exports from China to the home economies, the more FDI flows will be attracted from the home economies to China. As argued above, FDI from OECD economies is more likely for market-seeking purposes to take advantage of the Chinese local market. It therefore could be further argued that exports from China to the OECD home economies are largely from Chinese indigenous firms, rather than TNCs operating in China re-exporting final goods back to their home economies. Regarding the variable import, China's imports from the home economies do not play a significant

Table 2. Determinants and motivations of China's inward FDI by home economy

	OECD (1) H1	Non-OECD (2) H1	Non-OECD excluding HK (2a)	Asia (3) H2	Asia excluding HK (3a)	Europe (4) H2	North America (5) H2
LRGDPP	1.22 (0.48)**	2.01 (0.33)***	1.35 (0.44)***	1.85 (0.30)***	1.82 (0.32)***	0.64 (0.20)**	1.40 (1.64)
LRGGDP	0.10 (0.07)	0.27 (0.15)*	0.49 (0.19)***	0.23 (0.12)*	0.31 (0.14)**	0.23 (0.09)**	0.05 (0.10)
LRGDP	-0.27 (0.17)	0.45 (0.18)**	0.23 (0.12)*	0.25 (0.14)*	0.26 (0.15)*	-0.25 (0.18)	-0.47 (0.62)
LRWAGE	-0.51 (0.37)	-1.65 (0.40)***	-2.15 (0.48)***	-1.34 (0.32)***	-1.28 (0.34)***	-0.08 (0.33)	-1.24 (0.68)*
LIM	0.09 (0.15)	0.70 (0.19)***	0.93 (0.22)***	0.62 (0.17)***	0.72 (0.19)***	0.03 (0.17)	-0.52 (0.47)
LEX	0.93 (0.14)***	0.96 (0.25)***	1.15 (0.28)***	1.01 (0.21)***	1.05 (0.25)***	1.00 (0.15)***	0.76 (0.46)*
LRLEN	0.08 (0.23)	1.78 (0.42)***	1.62 (0.53)***	1.26 (0.33)***	1.30 (0.37)***	0.44 (0.31)	0.92 (0.40)**
LRREER	-0.20 (0.28)	0.33 (0.13) **	0.22 (0.14)	0.44 (0.09)***	0.48 (0.10)***	0.50 (0.51)	0.99 (0.49)**
LINF	-0.27 (0.10)***	-0.04 (0.14)	0.08 (0.15)	0.10 (0.11)	0.16 (0.13)	-0.27 (0.14)*	-0.22 (0.20)
LPOLI	3.38 (1.59)**	0.62 (0.99)	-0.60 (1.11)	1.25 (0.80)	0.52 (0.97)	2.42 (2.00)	3.47 (2.39)
TD	-0.40 (0.18)**	-0.43 (0.26)	-0.37 (0.30)	-0.32 (0.24)	-0.17 (0.26)	-0.34 (0.27)	-0.10 (0.18)
CD	–	1.91 (0.77)**	0.43 (1.00)	2.24 (0.59)***	2.40 (0.64)***	–	–
LGD	-0.03 (0.26)	-1.66 (0.64)***	-3.61 (1.17)***	-1.02 (0.27)***	-0.98 (0.28)***	-2.59 (1.46)*	–
NT	293	104	90	123	109	209	33
Adj R^2	0.6302	0.7993	0.8289	0.7721	0.7737	0.5846	0.5621

Standard errors are in parentheses.
***, ** and * indicate that the coefficient is significant at the 1%, 5% and 10% levels, respectively.
– indicates that the variables are dropped due to collinearity.

role with regard to FDI flows for the OECD economies. In contrast, both imports and exports between China and non-OECD economies positively influence FDI from the non-OECD economies to China. The more bilateral trade takes place between the non-OECD economies and China, the more the flow of FDI from these non-OECD economies to China.

Of the three financial variables, LRLEN, LRREER and LINF, only the inflation variable is highly significant, while the borrowing cost and exchange rate variables are insignificant for the OECD economies, which might indicate that the home economy inflation level plays an important role in their investment decision-making process, while the borrowing cost and exchange rate between the host and home economies might not be a major concern for the OECD investors. In the case of non-OECD economies, the borrowing cost and exchange rate variables are significant, while the inflation variable is insignificant, which might indicate that the non-OECD investors are more concerned about the borrowing cost and exchange rate between the host and home economies, than their own economy's inflation.

The two political risk variables, both home and host economy political risks, are important to the OECD investors. The highest coefficient (3.38) on home economies' political risk indicates that home economy political stability will significantly encourage FDI flows from the OECD economies to China. On the other hand, high host economy political risk and instability will deter FDI flows into China. In contrast, for the case of the non-OECD economies, neither home economy stability nor host economy political risk is significant, indicating that economy political risk is not a major factor for investors from the non-OECD developing economies. These contrasting results between the OECD and non-OECD economies might reflect the fact that the investors from developing economies perceive and react towards the political risks in a radically different way from those from the OECD economies. The results might also be simply caused by the type of political risk measures we employed. As argued by Buckley et al. (2007), the measures of political risk might have shortcomings, because the indices are typically calculated from the point of view of firms from developed economies. They further suggest that the indices may need to be recalculated in order to better capture the perceptions of firms from the developing economies.

Interestingly, the two distance variables, cultural and geographic distance (with the large coefficients of 1.91 and -1.66, respectively) appear to be two very important determinants for the non-OECD economies: the closer the cultural and geographic distance of the home economies to China, the more FDI flows from the home economies to China, and vice versa. This result could explain why China's inward FDI from the developing economies comes mainly from those economies with cultural and locational proximity to China. It is also consistent with the fact that all the developing economies among the top 15 investor economies of inward FDI in China are Asian, except for the Virgin Islands (see Appendix 1). In contrast, geographic distance is not significant (while the cultural distance variable is dropped due to collinearity) in the case of the OECD countries, although the variable has the expected sign. The result might indicate that geographical distance is not an important issue for OECD investors to invest into China, which is also consistent with the fact showed in Appendix 1 – the OECD developed countries among the top 15 are from different continents worldwide, including the North America (Canada and the United States), Australia and Western Europe (France, Germany, the Netherlands and the United Kingdom).

Columns (3), (4) and (5) present interesting different results for the three geographic location groups, Asia, Europe and North America, respectively, which support H2. Similar to the non-OECD group, both market-seeking and efficiency-seeking predictors are significant for the Asian economy group, which indicate that FDI from Asian economies are both market- and efficiency-seeking types. In the case of the European economy group, two market-seeking variables are significant, but the efficiency-seeking variable is insignificant, which indicates that FDI from Europe is more likely to be market-seeking rather than efficiency-seeking. In contrast, the efficiency-seeking variable is significant, but all market-seeking variables are insignificant for the North American group, which might indicate that FDI from the North American countries is more likely to be efficiency-seeking rather than market-seeking.

All three market size variables are statistically significant for the Asian group, especially the LRGDPP variable, which is significant at the 1 per cent significance level with a large coefficient (1.82), so a 1 per cent increase in RGDPP would raise FDI inflows by 1.82 per cent. This result indicates that FDI from the Asian region is attracted by China's

large market. Interestingly, the efficiency-seeking variable is significant as well at the high level of 1 per cent with large coefficients -1.28. It could be argued that FDI from Asian economies is motivated not only by the large Chinese market for market-seeking purposes, but also by the low Chinese labour cost, for efficiency-seeking purposes.

Two market size variables are positively significant for the European economy group, which might indicate that FDI from European countries is motivated by the large Chinese domestic market and its rapid growth, because their domestic markets are saturated and market growth is limited in terms of their home economy's population and economic growth. However, the efficiency variable is insignificant. As the European countries are at a much greater geographic distance from China than the Asian economies, and have limited domestic markets, the large Chinese market might be more important and attractive than its cheap labour cost to the European investors. This result supports the finding from the previous studies that large foreign affiliates in China are more likely to have been established to serve China's large domestic market, as the average size of European affiliates in China is much larger compared with Asian and North American affiliates.

In contrast, the efficiency variable is statistically highly significant, but all market size variables are insignificant for the North American group. This result indicates that China's cheap labour cost is more important than its large market to the North American investors. FDI from North America is generally more likely for efficiency-seeking purposes, which again confirms the theory that small foreign affiliates in China are more likely to be driven by China's cheap labour cost, as the average size of America affiliates is generally small compared to that of European affiliates in China. This finding also supports the results obtained by previous studies in the area. For example, Hanson et al. (2001) note that vertical FDI from the United States is more common than horizontal FDI. Similarly, Nachum and Zaheer (2005) argue that the United States' outward FDI in less information-intensive industries is primarily driven by the search for efficiency and low-cost export platforms. Hejazi and Pauly (2003) find that taking advantage of relatively low labour costs is an important motivation for Canadian TNCs.

The Asian group seems sensitive to bilateral trade (both imports and exports) with China. The greater the bilateral trade between these economies and China, the higher FDI flows from these economies into China: hence FDI and trade are complementary. As is well known, China has a trade deficit with its Asian neighbours, but a trade surplus with Europe and North America. The Asian group is also sensitive to the relative borrowing cost and exchange rate (LRREER). This result, to some extent, could explain why some Asian economies had to devalue their currencies during the 1997–1998 Asian Financial Crisis after China had devalued its currency in 1994. Similarly to the non-OECD group, the Asian group are very sensitive to both cultural and geographic distance. As mentioned earlier, a large amount of China's FDI from the developing economies originates from those East and South-East Asian economies with cultural and locational proximity to China.

Like the OECD countries, of the two trade variables, only the export variable is significant, while the import variable is insignificant for both European and North American countries. This result indicates that exports and FDI complement one another, with more exports from China attracting more FDI inflows from the regions. The increased exports from China might also substitute these economies' domestic production. As a result, their trade deficit with China has become enlarged. Regarding the financial variables, home economy inflation is a factor of concern to investors from European countries, while the relative exchange rate variable is important to investors from North American countries.

The geographical distance variable is statistically significant, with the highest coefficient (-2.59) for the European countries, which indicates that the geographical distance is the most concern for FDI from the European countries to China. The result is consistent with the finding obtained earlier, that FDI from the European region is motivated by China's huge domestic market, for market-seeking purpose. Because of the geographic distance, TNCs from Europe are more likely to produce and sell their products locally in China, rather than re-export them back to their home countries.

While about 42 per cent of China's inward FDI came from Hong Kong (China) during the period studied, "round-tripping" has often been cited as a contributing factor (Buckley et al., 2008). this would tend to

over-represent the relevant groups i.e. non-OECD developing economy group and Asian group, which might cause potential bias. The two sub-groups, therefore, are re-estimated by excluding Hong Kong (China). Interestingly, the results obtained (Column 2a excluding Hong Kong) are similar to those including Hong Kong (Column 2) for the non-OECD group. The similarity is even higher comparing the results in Column 3 (with Hong Kong) and Column 3a (without Hong Kong) for the Asian group. This finding indicates that round-tripping FDI from Hong Kong, a serious issue in understanding the volume and pattern of China's inward FDI, does not influence the determinants and motivations of FDI from non-OECD or Asian economies.

5. Conclusions and implications

The empirical results suggest that the determinants and motivations of China's inward FDI are indeed heterogeneous between different home economy groups. From an economic development perspective, we found that both Chinese market size and its cheap input costs are important to investors from the developing economies, who are seeking both the Chinese domestic market (horizontal FDI) and efficiency (vertical FDI). In contrast, market size is more important for investors from the developed economies, who are more interested in the Chinese market than its cheap labour. In other words, horizontal FDI from the developed economies is more common than vertical FDI in China in general. From a geographic location perspective, investors from the Asian economies are both market-seeking and efficiency-seeking, interested in both the huge Chinese market and its low-cost labour. On the other hand, European investors are more interested in the Chinese market, while those from North America are more interested in cheap labour in China.

The benefit of differentiating FDI determinants across home economies is a clearer understanding of which factors are more important in attracting FDI from a particular home economy. This will enable the host economy to devise policies that can enhance positive externalities (Liu, 2002). An important contribution of this paper to literature is that determinants of FDI are contextual and economy-specific. Our argument is that maximizing positive externalities for the host economy can be achieved based on the understanding of the determinants that have attracted foreign firms in the first place.

However, the importance of those determinants can be assessed only when they are put in the specific economy context. Prior to this research, determinants of FDI were normally examined in general terms, without discriminating between the varied circumstances. This paper thus has furthered the academic discussion on this subject. For any host economy, FDI determinants can vary between developed and developing home economies from different continents. This conclusion demands the termination of generating universal list of FDI determinants. Instead, FDI flows from different home economies at different stages of market/economy maturation relative to the host economy can be decided by a different set of factors.

The policy implications from this research are that a host country government needs to depart from the traditional universal FDI policy framework. Instead, it should devise and pursue different packages of policies for different home economies of FDI, according to their individual attributes. This can be achieved by analysing the motivations of potential foreign investors in the context of their home economy characteristics, such as geographic location (Europe, Asia and America) and economic development (developing or developed), relative to the host economy. Equally important is an analysis of the characteristics of the host economy, which can vary from one region to the other. It is likely that by matching horizontal FDI to more developed regions of the host economy, or those seeking vertical FDI to less developed regions, where input cost such as labour is cheaper, will increase the success rate of FDI, and improve the externalities of the host region. By doing so, more FDI could be attracted from different home economies worldwide to the host economy. This will in turn provide more opportunities for economic development in the host society through production localization and technology spillover effect.

As an FDI hotspot, China has accumulated rich experience in dealing with inward FDI from different types of home economies. To improve its policy effectiveness, the Government of China could adjust its FDI strategies and policies to suit the requirements of different home economies. For example, the Government should endeavour to maintain China's remarkable rate of economic growth, and enlarge its domestic market to attract more horizontal market-seeking FDI, particularly from Asian and European economies. At the same time, it should also control its input costs by way of removing existing barriers to

the free flow of production factors such as labour and other resources, attracting more vertical efficiency-seeking FDI, particularly from the Asian NIEs and North American countries.

Similar principles will apply also to other emerging economies, such as India and Brazil, by which to develop more effective policies in order to attract larger volumes of FDI from different categories of home economies in terms of their level of economic development and geographic location. Host economies with low labour cost and a focus on manufacturing should seek to attract more FDI from North America, to benefit from the spillover effect of FDI motivated by cheap costs, while economies with higher labour cost should explore the possibilities of attracting more horizontal FDI from European countries on the basis of the size of their market. The implication for business practitioners and investors from a particular home economy is that they should examine and understand both host and home economies' characteristics, and the specific FDI determinants attached to the economies, and adjust their investment strategies and decisions accordingly.

This research has some embedded limitations which should be highlighted when examining its findings. For example, the grouping of economies is not balanced, as all the major source economies of China's inward FDI considered and classified in the non-OECD developing economy group happen to be located in Asia. In contrast, those categorized as the OECD developed economies are spread across Europe, North America and Asia. This has to be taken into consideration when applying the findings outside China.

Future research should investigate the potential heterogeneity of FDI determinants over different FDI development stages over a longer time period. This paper has looked at the overall determinants and motivations over 19 years, during which policy and economic factors evolved in both home and host economies. Breaking the considered time period into several phases could lead to a more accurate reflection of the heterogeneity of the determinants and motivations in different stages. Further, study should be conducted to relate motivations and entry strategies of foreign investors to the regional market characteristics and disparities within China (Chen and Fleisher, 1996; Démurger, 2001). Lastly, as each economy has its own specific industrial competitiveness, which can affect motivation and decisions of internationalization, it

would also be interesting to analyse the home industrial heterogeneity in relation to the determinants of China's inward FDI.

References

Behrman, J. N. (1972) *The Role of International Companies in Latin America: Autos and Petrochemicals*. Lexington, MA: Lexington Books.

Buckley, P. J. (2004) "The role of China in the global strategy of multinational enterprises", *Journal of Chinese Economic and Business Studies*, 2(1): 1–25.

Buckley, P. J., Clegg, L. J., Cross, A. R., Liu, X., Voss, H. and Zheng, P. (2007) "The determinants of Chinese outward foreign direct investment", *Journal of International Business Studies* 38(4): 499–518.

Buckley, P. J., Cross, A. R., Tan, H., Liu, X. and Voss, H. (2008) "Historic and emergent trends in Chinese outward direct investment", *Management International Review*, 48(6): 715–748.

Burke, J. (2000) "US investment in China worsens trade deficit". *Economic Policy Institute Briefing Paper*. http://epinet.org.

Chen, J. and Fleisher, B. E. (1996) "Regional income inequality and economic growth in China", *Journal of Comparative Economics*, 22(2): 141–164.

Culem, C. G. (1988) "The locational determinants of direct investments among industrialized countries", *European Economic Review* 32, 885–904.

Démurger, S. (2001) "Infrastructure development and economic growth: an explanation for regional disparities in China?", *Journal of Comparative Economics*, 29(1): 95–117.

Dunning, J. H. (1993) *Multinational, Enterprises and the Global Economy*. Wokingham: Addison-Wesley.

Dunning, J. H. (1998) "Location and the multinational enterprises: a neglected factor?", *Journal of International Business Studies* 29(1): 45–66.

Gastanaga, V. M., Nugent, J. B. and Pashamova, B. (1998) "Host country reforms and FDI inflows: How much difference do they make?", *World Development* 26(7): 1299–1314.

Grosse, R. and Trevino, L. J. (1996) "Foreign direct investment in the United States: an analysis by country of origin", *Journal of International Business Studies* 27, 139–155.

Han, C. M. (2002) "Korea's direct investments in China: technology, experience, and ownership factors in performance", *Asia Pacific Journal of Management*, 19: 109–126.

Hanson, G. H., Mataloni, R. J. and Slaughter, M. J. (2001) "Expansion strategies of US multinational firms". *BEA Working Paper*, WP2001-01.

Hejazi, W. and Pauly, P. (2003) "Motivations for FDI and domestic capital formation", *Journal of International Business Studies* 34(3): 282–289.

Hsiao, F. and Hsiao, M. (2004) "The chaotic attractor of foreign direct investment – why China? A panel data analysis", *Journal of Asian Economics* 15, 641–670

Jordaan, J. (2005) "Determinants of FDI-induced externalities: New empirical evidence for Mexican manufacturing industries", *World Development*, 33 (12): 2103–2118.

Jordaan, J. (2008a) "Intra- and inter-industry externalities from foreign direct investment in the Mexican manufacturing sector: new evidence from Mexican regions", *World Development*, 36(12): 2838–2854.

Jordaan, J. (2008b) "Regional foreign participation and externalities: new empirical evidence from Mexican regions", *Environment and Planning*, 40(12): 2948–2969.

Kearney, A. T. (2007) *New Concerns in an Uncertain World, FDI Confidence Index 2007*. Alexandria, VA: A. T. Kearney.

Kearney, A. T. (2010) *Investing in a Rebound, FDI Confidence Index 2010*. Alexandria, VA: A. T. Kearney.

Kinoshita, Y. (1998) "Firm size and determinants of foreign direct investment". *CERGE-EI Working Paper* No. 135.

Kugler, M. (2006) "Spillovers from foreign direct investment: within or between industries?", *Journal of Development Economics*, 80(2): 444–477.

Lecraw, D. (1993) "Outward direct investment by Indonesian firms: motivation and effects", *Journal of International Business Studies* 24(3): 589–600.

Liu, X., Song, H., Wei, Q. and Romilly, P. (1997) "Country characteristics and foreign direct investment in China: a panel data analysis", *Weltwirtschaftliches Archiv*, 133(2): 313–329.

Liu, Z. (2002) "Foreign direct investment and technology spillover: evidence from China", *Journal of Comparative Economics*, 30(3): 579–602.

Makino, S., Lau, C. M. and Yeh, R. S. (2002) "Asset-exploitation vs asset-seeking: implications for location choice of foreign direct investment from newly industrialised economies", *Journal of International Business Studies* 33(3): 403–421.

Mariotti, S. and Piscitello, L. (1995) "Information costs and location of FDI within the host country: empirical evidence from Italy", *Journal of International Business Studies* 26(4): 815–842.

McKendrick, D. G. (2001) "Global strategy and population-level learning: the case of hard disk drive", *Strategic Management Journal* 22, 307–334.

Nachum, L. (2003) "Does nationality of ownership make any difference and, if so, under what circumstances? Professional service MNEs in global competition", *Journal of International Management* 9(1): 1–32.

Nachum, L. and Zaheer, S. (2005) "The persistence of distance? The impact of technology on MNE motivations for foreign investment", *Strategic Management Journal* 26, 747–767.

O'Brien, R. M. (2007) "A caution regarding rules of thumb for variance inflation factors", *Quality and Quantity*, 41, 673–690.

Petrou, A. (2007) "Multinational banks from developing versus developed countries: competing in the same arena?" *Journal of International Management* 13, 376–397.

Sethi, D., Judge, W. Q. and Sun, Q. (2009) "FDI distribution within China: an integrative conceptual framework for analyzing intra-country FDI variations", *Asia Pacific Journal of Management*, online, DOI 10.1007/s10490-009-9144-5.

Shi, Y. (2001) "Technological capabilities and international production strategy of firms: the case of foreign direct investment in China", *Journal of World Business* 36, 184–204.

Siew-Yean, T. (2001) "Can Malaysian manufacturing compete with China in the WTO?", *Asia-Pacific Development Journal*, 8(2): 1–25.

Thomas, L. G. and Waring, G. (1999) "Competing capitalism: capital investment in American, German and Japanese firms", *Strategic Management Journal* 20, 729–748.

UNCTAD (2008) *World Investment Report 2008: Transnational Corporations, and the Infrastructure Challenge*. Geneva: United Nations.

UNCTAD. (2009) *World Investment Report 2009: Transnational Corporations, Agricultural and Production Development*. Geneva: United Nations.

Wang, Z. and Swain, N. (1995) "The determinants of foreign direct investment in transforming economies: empirical evidence from Hungary and China", *Weltwirtschaftliches Archiv* 131: 359–382.

Wei, Y. and Liu, X. (2001) *Foreign Direct Investment in China*. Cheltenham: Edward Elgar.

Wells, L. T. (1983) *Third World Multinationals: The Rise of Foreign Investment From Developing Countries*. Cambridge, MA: MIT Press.

Zaheers, S. and Zaheer, A. (1997) "Country effects on information seeking in global electronic network", *Journal of International Business Studies,* 28(1): 77–100.

Zhang, L. (1994) "Location-specific advantages and manufacturing direct foreign investment in South China", *World Development,* 22(1): 45–53.

Zhao, H. (2003) "Country factor differentials as determinants of FDI flow to China", *Thunderbird International Business Review* 45(2): 149–169.

Zheng, P. (2009) "A comparison of FDI determinants in China and India", *Thunderbird International Business Review*, 51(3): 263–279.

Zheng, P., Siler, P., and Giorgioni, G. (2004) "FDI and the export performance of Chinese indigenous firms: a regional approach", *Journal of Chinese Economic and Business Studies*, 2(1): 55–71.

Zhou, C., Delios, A. and Yang, J. (2002) "Locational determinants of Japanese foreign direct investment in China", *Asia Pacific Journal of Management*, 19: 63–86.

Appendix 1 . Top 15 source economies of inward FDI in China, 1992–2004

US$ billion

Economies	Rank	Amount	%
Hong Kong (China)	1	227.46	42.4
United States	2	45.33	8.4
Japan	3	43.56	8.1
Taiwan Province of China	4	38.76	7.2
Virgin Islands	5	36.75	6.8
Republic of Korea	6	25.94	4.8
Singapore	7	25.26	4.7
United Kingdom	8	11.89	2.2
Germany	9	9.51	1.8
France	10	6.39	1.2
Netherlands	11	5.81	1.1
Macao (China)	12	5.54	1.0
Canada	13	4.47	0.8
Malaysia	14	3.89	0.7
Australia	15	3.47	0.6
Total of the above 15	-	494.01	92.0
Total of the world	-	537.08	100.0

Source: China State Statistical Bureau, calculated by the authors

Appendix 2. Home economy list

Economy	Economic category	Geographic category
1. Australia	OECD	-
2. Austria	OECD	Europe
3. Belgium	OECD	Europe
4. Canada	OECD	North America
5. Hong Kong (China)	Non-OECD	Asia
6. Macao (China)	Non-OECD	Asia
7. Denmark	OECD	Europe
8. Finland	OECD	Europe
9. France	OECD	Europe
10. Germany	OECD	Europe
11. Indonesia	Non-OECD	Asia
12. Ireland	OECD	Europe
13. Italy	OECD	Europe
14. Japan	OECD	Asia
15. Republic of Korea	OECD	Asia
16. Kuwait	Non-OECD	Asia
17. Malaysia	Non-OECD	Asia
18. Netherlands	OECD	Europe
19. New Zealand	OECD	-
20. Norway	OECD	Europe
21. Philippines	Non-OECD	Asia
22. Singapore	Non-OECD	Asia
23. Spain	OECD	Europe
24. Sweden	OECD	Europe
25. Switzerland	OECD	Europe
26. Thailand	Non-OECD	Asia
27. United Kingdom	OECD	Europe
28. United States	OECD	North America

Appendix 3. Descriptive Statistics and Correlations

	Mean	S. D.	Min	Max	lfdi	lrgdpp	lrggdp	lrgdp	lrwage	lim	lex	lrlen	lrreer	linfl	lpoli	td	cd
lfdi	8.58	2.56	0.28	14.52													
lrgdpp	-3.26	1.07	-4.79	0.25	-0.02												
lrggdp	1.07	0.99	-1.96	5.94	0.01	-0.26											
lrgdp	0.8	1.56	-3.1	5.1	-0.23	0.40	-0.21										
lrwage	-3.35	0.89	-4.85	-0.91	0.09	0.87	-0.36	0.48									
lim	11.34	1.73	2.16	15.37	0.76	-0.05	0.01	-0.53	0.01								
lex	11.25	1.76	6.86	15.63	0.85	-0.00	-0.06	-0.38	0.12	0.87							
lrlen	-0.11	0.42	-1.61	1.33	0.29	-0.39	-0.03	-0.03	-0.31	0.14	0.22						
lrreer	0.14	1.46	-4.59	6.58	-0.03	-0.35	-0.01	0.15	-0.09	-0.24	-0.11	0.21					
linf	1.15	0.89	-3.09	4.32	-0.23	0.21	-0.16	0.17	0.26	-0.23	-0.19	-0.41	-0.03				
lpoli	4.34	0.17	3.52	4.57	0.12	-0.71	0.25	-0.26	-0.70	0.12	0.03	0.41	0.19	-0.42			
td	0.21	0.4	0	1	-0.23	-0.08	-0.13	-0.06	-0.06	-0.12	-0.14	-0.13	-0.01	0.22	-0.18		
cd	0.11	0.3	0	1	0.29	-0.12	-0.22	0.42	0.22	0.05	0.26	0.19	0.27	0.15	-0.15	0.06	
lgd	8.16	0.6	6.38	8.84	-0.25	-0.33	0.26	-0.33	-0.49	-0.13	-0.25	-0.04	-0.04	-0.23	0.44	-0.06	-0.49

Appendix 4. Results of VIF Tests

Variable	VIF	1/VIF
lrgdpp	16.54	0.060463
lrwage	10.74	0.093078
lex	6.45	0.155041
lim	6.36	0.157261
lrgdp	4.81	0.207940
cd	4.70	0.212716
lpoli	3.97	0.251589
lgd	1.95	0.513326
lrreer	1.91	0.523590
lrlen	1.73	0.576910
linf	1.55	0.646696
lrggdp	1.27	0.788288
td	1.25	0.800512
Mean VIF	4.86	

Foreign direct investment in renewable energy: trends, drivers and determinants

Michael Stephen Hanni, Thomas van Giffen, Ralf Krüger and Hafiz Mirza *

Technology and finance have emerged as critical factors in the transition to a low-carbon economy, and thereby in international climate change negotiations. A potential source of such resources, that is already having an impact in countries around the world through foreign direct investment (FDI), is transnational corporations (TNCs). The scale and scope of this phenomenon remains under research, including sector-specific drivers pushing firms to invest abroad and the determinants leading to investments in specific host economies. This paper seeks to shed light on these issues through an analysis of FDI in renewable electricity generation and the manufacture of related equipment. FDI in these areas has grown tremendously over the period 2003–2010. Using a framework developed in the *World Investment Report 2010*, the contribution of various drivers and determinants are discussed as they relate to the observed trends in FDI. The findings suggest that those governments seeking to target FDI as a source of external climate change finance must be mindful in particular of the motivations of the investors they are targeting, as well as the state of their domestic energy policies.

1. Introduction

Climate change has moved to centre stage in the international political arena, as became clear at the fifteenth Conference of the Parties (COP) to the UNFCCC held in late 2009 in Copenhagen. Even though significant progress was made at the sixteenth COP in Cancún, Mexico, key decisions have been postponed to COP17 in Durban, South Africa in late 2011. Nevertheless, awareness continues to grow and important policies are being implemented at the national level, even as research on climate change is providing new insights into the phenomenon and how it might be dealt with. What has become clear so far is the critical role of private sector investment in supplementing government mitigation efforts and the central role of the

* The authors would like to thank Anna Barnwell and Malte Schneider for their valuable comments and contributions to this paper.

energy sector, among others, in these efforts. The use of renewable energy technologies is already widely debated in the literature, including how the private sector may be incentivized and regulated to contribute to the move towards a low-carbon economy.

Among the most important players within the private sector are transnational corporations (TNCs) which often dominate in relevant technologies (including managerial and technical know-how) and have access to the necessary financial and other resources. The *World Investment Report 2010: Investing in a Low-Carbon Economy* (*WIR10*) took up this specific topic and laid out a conceptual framework for low-carbon foreign investment, including the main drivers and determinants of such investments, as well as assessing key policy issues in mobilizing low-carbon investment by TNCs (UNCTAD, 2010). However, for reasons of space and time, the report was not able to delve deeply into specific aspects, such as the specific dynamics of low-carbon investment in particular sectors, leaving such issues to ongoing work. This article is a part of this continuing effort. In particular, it builds on the conceptual framework established in *WIR10* and examines drivers and determinants for cross-border investment specifically in renewable energy.

The data to conduct this analysis is derived from announced foreign greenfield investment projects (2003–2010)[1] in electricity generation projects using solar, wind, hydroelectric, geothermal and biomass technologies and in manufacturing activities for solar and wind power equipment. The findings from this analysis provide useful insights for policymakers who seek to attract TNC activities into these areas. While the coverage of the dataset and the analysis is global, special attention is paid to the roles of developing countries. The following research questions are addressed: which countries do investors come from and what drives them to invest abroad? Which countries do they target and what factors determine their ultimate choice of location? What are the main implications for policymakers, particularly for those from developing countries?

Section 2 provides trends in the scale and scope of foreign investment in renewable energy projects[2]; based on the UNCTAD

[1] We concentrate on greenfield investments as M&A activity in this emerging area is still limited. The sample includes 776 generation and 378 manufacturing projects.

[2] One limitation this imposes on the analysis is that the data used are solely

framework for drivers in low-carbon foreign investment, section 3 analyses which factors drive companies to invest abroad; and section 4 looks at the factors determining where they invest. The concluding section highlights the main findings, indicates some implications for policymakers and points to areas for further research.

2. Trends in foreign renewable energy projects

2.1. Dynamics in the generation of renewable electricity

The scale and scope of renewable electricity generation investments has increased rapidly in recent years. Although much of this activity focuses on developed countries, developing and transition economies are increasingly targeted. In some cases, FDI projects make up all, or most, of developing countries' pipelines of renewable electricity projects in particular technologies.[3]

Investors (home regions)

TNCs from developed economies are the dominant actors in FDI in renewable electricity generation projects (figure 1; table 1); European TNCs are especially active having developed a firm technological base in their home economies at an early stage. Spain and Germany have been particularly active in promoting renewable energies at home, which explains why they account for the bulk of projects originating from Europe. However, while investors from both countries targeted other European destinations, Spanish outward investors are also very active in Latin America and North America.

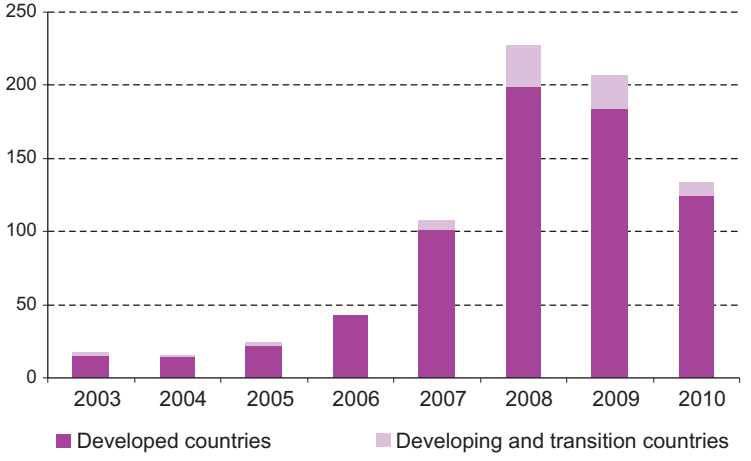
FDI in renewable electricity generation by TNCs from developing and transition economies remains relatively low, though it is increasing. Between 2007 and 2008, their share in all projects rose to roughly 12 per cent – despite the high peak of project originating from Europe in 2008, followed by a slight decline in 2009 and a fall to 7 per cent in

based on project announcements, without further information on their actual implementation. Further, the data are not comprehensive.

[3] For example, in Chile roughly 95 per cent of the installed wind capacity in 2010 was due to FDI based on data from the Global Wind Energy Council, see: http://www.gwec.net/index.php?id=171).

2010. South–South FDI made up the bulk of their activities, with more than 80 per cent of projects being in other developing and transition economies. The top five outward investing developing and transition economies, by order of number of projects, are China, Brazil, Malaysia, the Russian Federation and India.

Figure 1. Renewable electricity generation FDI projects, by year of announcement and source region
(Number of projects)



Source: Authors, based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

Note: Technologies covered are biomass, geothermal, hydroelectric, solar and wind.

Investors also differ in terms of the technologies that they target. TNCs from developed economies overwhelmingly – roughly three quarters – make use of wind and solar technologies in their FDI projects. This pattern holds even when considering the destination of their investments: these technologies account for more than 80 per cent of projects in developed countries and more than half in developed and transition economies. In contrast, 70 per cent of projects by Southern TNCs in other developing or transition economies make use of the more established biomass or hydroelectric technologies. Their investments in developed economies, however, are also in wind and solar projects.

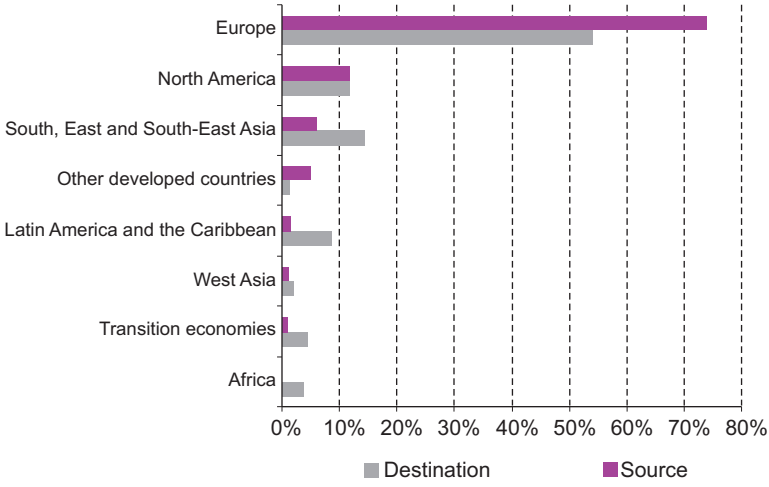
Recipients (host regions)

Developed economies remain the major destination for renewable electricity generation FDI, though developing and transition

economies are becoming more important hosts for these projects (figure 2). More than half of all FDI projects are in European countries (54 per cent or 419 projects). In large part, this reflects the early renewable energy policy commitments of European Union members. In comparison, while North America was host to fewer projects (12 per cent or 91 projects), the number of new projects fell only 4 per cent between 2008 and 2010, compared with a 47 per cent decline in Europe.

Figure 2. Renewable electricity generation FDI projects, by source and destination region, 2003–2010 cumulative

(Per cent of projects)



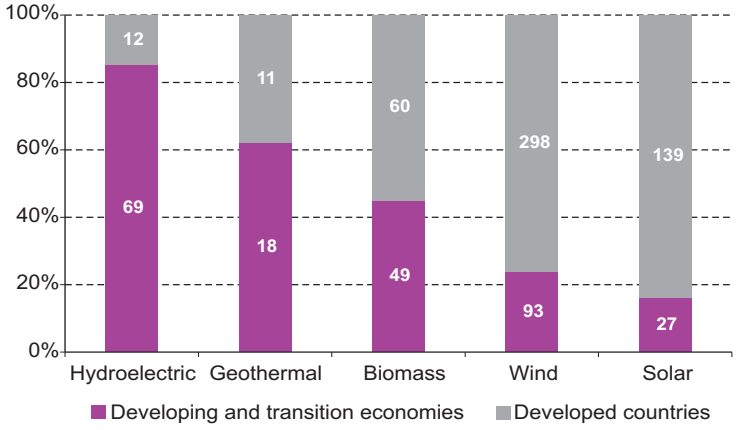
Source: Authors, based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

The dominance of developed economies as hosts should not overshadow the advances in developing and transition economies. These economies received one third of all projects (some 256) between 2003 and 2010. South, East and South-East Asia emerged as an early favourite destination for these investments, with 43 per cent of all projects in developing and transition economies (and 14 per cent of all projects worldwide). Latin America and the Caribbean is also increasingly an important destination, and in 2009 and 2010 the region accounted for more than 30 per cent of projects targeting developing and transition economies (and 9 per cent of all projects).

However, while the share of developing and transition economies in the number of projects received is significant, the types of renewable

electricity projects they receive largely make use of established technologies. More than half of the projects targeting these countries used biomass, hydroelectric or geothermal technologies – compared to only 16 per cent in developed economies. Among established renewable energy generation technologies, developing economies make up a significant share of projects: hydroelectric 85 per cent, geothermal 62 per cent and biomass 45 per cent (figure 3). Wind and solar FDI projects, in the most case, remain the preserve of developed countries.

Figure 3. Share of renewable electricity generation FDI projects, by technology and destination economic region
(Per cent and number of projects)



Source: Authors, based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

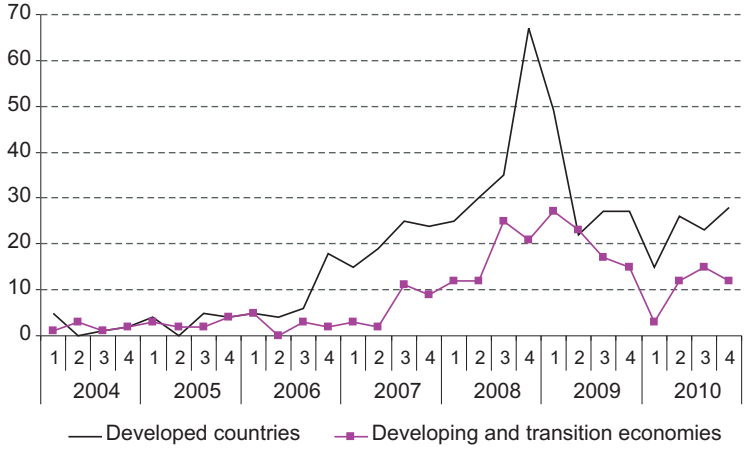
Developed country utilities are major international investors in generation projects. This is particularly the case in wind,[4] with EDF and GDF Suez from France (13 and 4 projects respectively out of 24 French projects), E.On and RWE from Germany (13 and 16 out of 69 projects), Enel from Italy (12 out of 18), Tokyo Electric Power Company (TEPCO) from Japan (4 out of 15), Energias de Portugal (EDP) from Portugal (12 out of 15), Iberdrola from Spain (34 out of 84), and AES Corporation

[4] With 391 the number of wind-based electricity generation projects is also larger than for all the other technologies combined (385, of which: solar 166, biomass 109, hydroelectric 81, and geothermal 29).

from the United States (5 out of 19), all topping the list of the largest investors from their respective home countries.

The combination of difficult credit conditions, fiscal retrenchment by governments and continuing uncertainty about international climate policy has served to significantly reduce FDI in renewable electricity generation projects. An analysis of announcements by quarter shows that the number of new projects have not returned to their pre-global financial and economic crisis levels (figure 4), albeit project announcements rebounded in the second quarter of 2010, after bottoming out in the previous quarter.

Figure 4. Renewable electricity generation FDI projects, by year and quarter of announcement and destination region
(Number of projects)

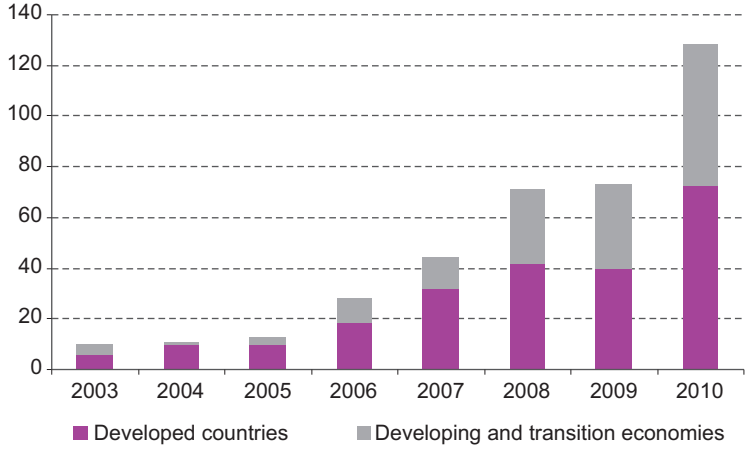


Source: Own elaboration based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

2.2. Dynamics in the manufacturing of renewable energy equipment

Foreign direct investment in renewable energy equipment manufacturing is a relatively recent phenomenon and, despite the impact of the global financial and economic crisis, FDI projects in this sector have continued to grow (figure 5). This suggests that TNCs in this industry remain confident of future growth prospects and are investing in areas where they expect demand to increase in the medium-term.

Figure 5. Renewable energy equipment manufacturing FDI projects, by year of announcement and destination economic region
(Number of projects)



Source: Own elaboration based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

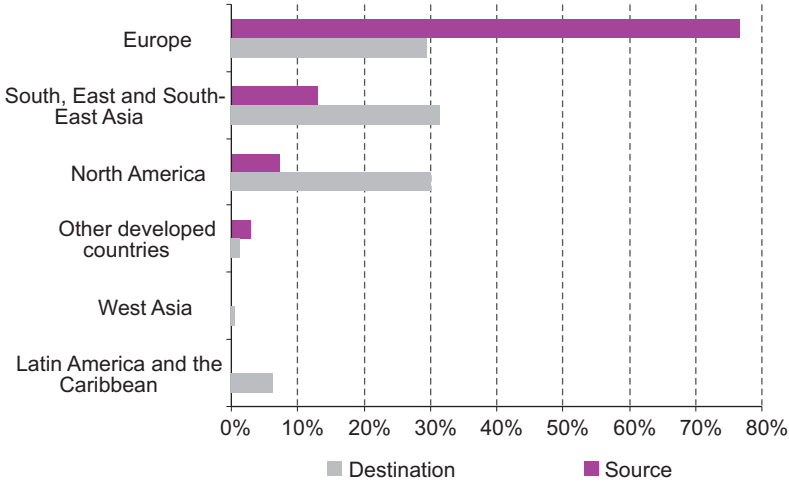
Investors (home regions)

TNCs from developed countries are the dominant investors in renewable energy equipment manufacturing. As with projects in renewable energy, European TNCs – mainly from Germany, Denmark and Spain – are most active investors, in terms of number of projects, accounting for nearly 60 per cent of wind and solar manufacturing FDI projects between 2003 and 2010. Their dominance in wind is especially pronounced; where they generated three quarters of all manufacturing FDI (figure 6). Investors from North America, mainly the United States, and other developed economies, mainly Japan, were more active in solar manufacturing, accounting for more than 40 per cent of these FDI projects (figure 7). In general, TNCs from the United States and Japan showed a higher propensity to invest in developing regions, with 54 per cent and 44 per cent respectively of their wind and solar projects in these economies. The equivalent share for European TNCs was only 33 per cent.

Manufacturers from developing and transition economies have only recently emerged as outward investors in renewable energy equipment manufacturing, their activity accounting for only 13 per cent of solar and wind projects between 2003 and 2010. By the end

of this period, however, their investments made up 18 per cent of all projects. South, East and South-East Asian TNCs, made up the majority of FDI projects from these economies, accounting for 13 per cent of global wind manufacturing FDI projects and 12 per cent for solar manufacturing (figures 6 and 7). Roughly 55 per cent of their investments have targeted developed markets. By technology, the preponderance of wind manufacturing projects of TNCs based in developing and transition economies are located in developed countries with established markets in these technologies. Solar manufacturing projects, on the other hand, are evenly split between developed and emerging markets.

Figure 6. Wind equipment manufacturing FDI projects, by source and destination region, 2003–2010 cumulative
(Per cent of projects)



Source: Own elaboration based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

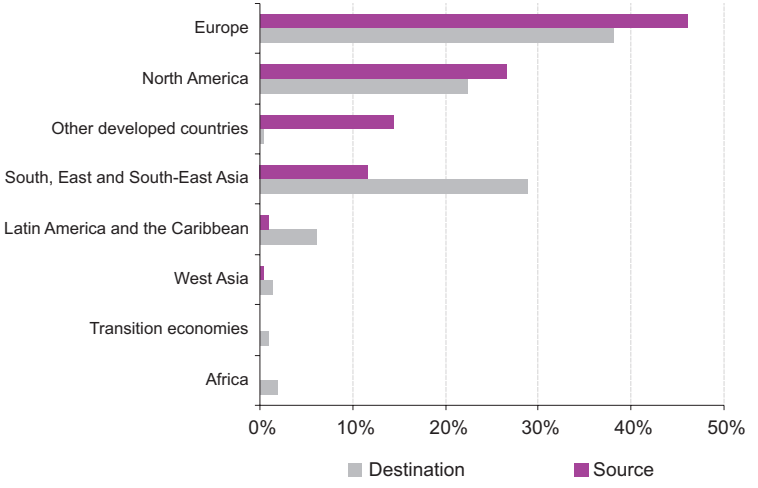
Recipients (host regions)

Renewable energy equipment manufacturing FDI projects largely targeted developed markets prior to 2008 (figure 5). In that year developing and transition economies, especially those in developing Asia, began to become important destinations, accounting for more than 40 per cent of projects on average between 2008 and 2010. South, East and South-East Asia alone – mainly China (67 projects), India (18) and Malaysia (11) – hosted roughly 30 per cent of all renewable

energy equipment manufacturing FDI projects over the 2003–2010 period. Mexico also was a major recipient with 14 projects. Developed economies received 61 per cent of projects over the period, mainly in the United States (73 projects), Spain (28 projects), Germany (24 projects), and Canada (24 projects).

Figure 7. Solar equipment manufacturing FDI projects, by source and destination region, 2003–2010 cumulative

(Per cent of projects)



Source: Own elaboration based on Financial Times *FDiIntelligence* database (fdiintelligence.com).

In terms of particular renewable energy technologies, over the period more than half of both solar and wind manufacturing FDI projects targeted developed economies (figures 6 and 7). This overall view, however, belies significant differences by individual regions and technologies. South, East and South-East Asia, for example, is the single largest recipient region for wind manufacturing FDI projects, with 31 per cent of projects (figure 6), and the second largest for solar manufacturing, with 29 per cent of projects (figure 7). Individual countries within the region rank among the top destinations for both technologies. For solar manufacturing the top five destinations were the United States, China, Germany, Spain and Canada (all with 15 or more projects). In wind manufacturing the top five destinations were the United States, China, Spain, India and the United Kingdom (all with 10 or more projects).

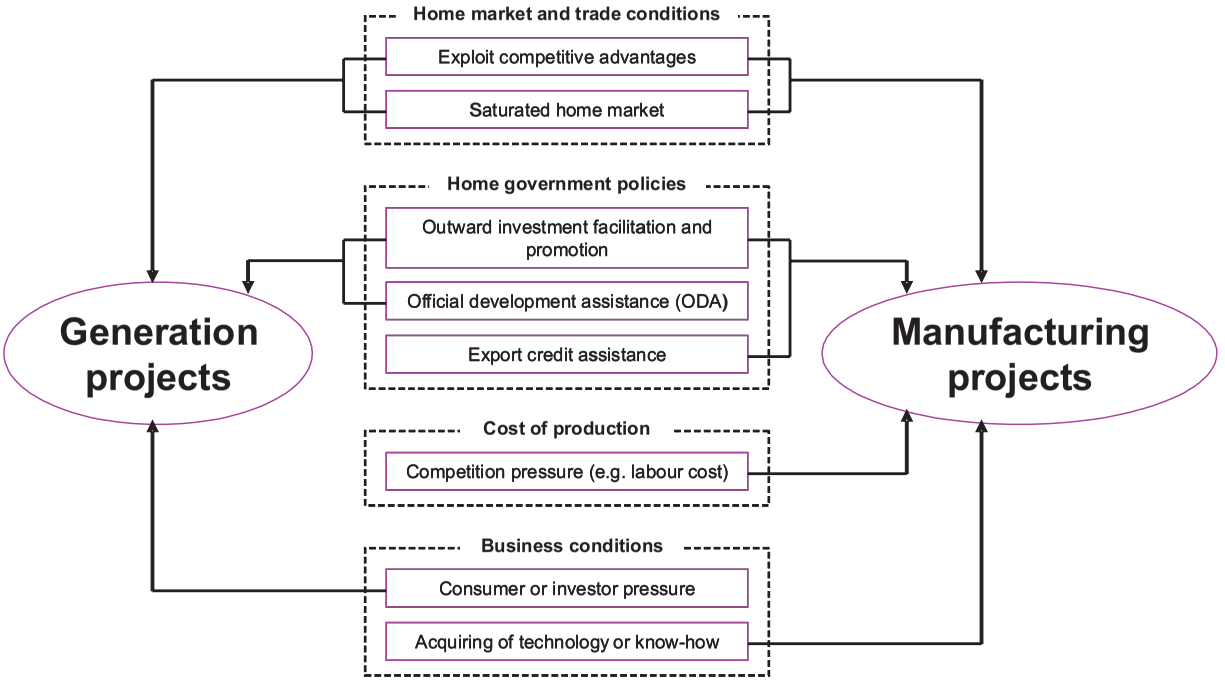
With respect to FDI into manufacturing activities in developing and transition economies, important differences appear when looking at source country and technology simultaneously. In solar manufacturing TNCs from the United States were more prone to invest in developing countries – with 59 per cent of their projects – compared to only 25 per cent for all of Europe. To some extent, this is also mirrored in the behaviour of large investor companies, where significant differences can be observed with respect to target region. The most important investor companies in the South in solar manufacturing are: Kyocera (Japan) with 6 projects, First Solar (United States) with 4 projects and Isofoton (Spain) with 3 projects. All three have the majority of their projects in developing countries, while some major global investors such as BP Solar (United Kingdom) and Carl-Zeiss-Stiftung (Germany) only invest in other developed countries. In wind manufacturing, while European companies dominate investments into the South with 48 out of a total of 64 projects, these projects only account for 38 per cent of their total manufacturing projects for this technology. Investors from the United States, while smaller in the number of projects, are slightly more prone to invest in the South (roughly half of their projects).

3. Drivers of foreign renewable energy projects

Drivers of FDI are factors that push a company to invest abroad (UNCTAD, 2006: 155-157; 2008: 116). Based on this earlier work, UNCTAD (2010: 116) developed a conceptual framework of FDI drivers for low-carbon foreign investments divided into four main categories, i.e. home market and business conditions, home government policies, costs of production and business conditions.[5] Figure 8 shows these categories and lists the most important categories of drivers for foreign greenfield investments in renewable electricity generation and related manufacturing activities.

[5] Most drivers are home-country factors, but some relate to host countries. Examples of the latter include targeted investment promotion efforts by potential host countries when offering a package of inducements to foreign companies as well as calls for tender issued by such countries, for an infrastructure project for instance. Such "host country drivers" that are simultaneously determinants are dealt with in the section on determinants below.

Figure 8. Drivers of Greenfield FDI into renewable electricity projects



Source: Authors, derived from UNCTAD (2010: 115–117), UNCTAD (2006: 155–157) and Ernst & Young (2009).

3.1. Home market and trade conditions

Primary drivers for FDI in renewable energy projects – in generation and manufacturing alike – are related to home market conditions. Actors in well developed home markets for renewable electricity benefit from the accumulated experience and know-how relating to planning, financing, operating and maintaining of renewable energy investments both regarding generation and manufacturing capabilities. This driver explains the major investor home countries for these investment projects (see above). Often these countries introduced renewable energy policies at an early stage and are well advanced in terms of installed renewable energy capacities.[6] In addition, home countries that invest in technology development programmes and establish R&D centres for renewable energy are more successful in building up a manufacturing base. This may be supported by a generally strong industrial base in relevant sectors such as strong engineering skills or knowledge of similar technologies (see determinants section).

Beyond competitive advantages from previously built-up capacities, saturated home markets in combination with emerging opportunities abroad form the basis for most companies to look for new investment opportunities abroad. For these reasons, wind and solar power equipment manufacturing industries in general are dominated by developed country TNCs' outward investment. In wind, out of the 163 investment projects, 142 were undertaken by Northern TNCs.[7] Similarly in solar, developed-country investors dominate cross-border projects: 187 out of 215 projects originated from the North, with early movers topping the list of largest investor home countries, i.e. the United States, Germany, Japan and Spain (table 1). Furthermore, in the wake of the economic crisis, major European wind turbine manufacturers (among the most technologically advanced in the world) were faced with a contraction of their already well-established markets (mainly

[6] Beck and Martinot (2004) provide an overview of early policy developments.

[7] In wind, European investors are dominant, accounting for 125 projects, with the top 3 countries being Denmark (44 projects), Germany (41) and Spain (15), followed by the United States (11) (table 1).

Lewis and Wiser (2007: 1844, 1853) also point out the roots most of the leading large wind turbine manufacturing companies in the market today have in R&D efforts that began in the late 1970s, e.g. in Denmark, the Netherlands, Germany and the United States. First mover advantages also played a key role, e.g. for Vestas.

Table 1. Top sources of renewable energy greenfield investments, manufacturing and generation, 2003–2010
(Number of projects)

Rank	Economy	Manufacturing		Generation					Total
		Solar	Wind	Biomass	Geo-thermal	Hydro-electric	Solar	Wind	
	Grand Total	215	163	109	29	81	166	391	1 154
1	Germany	36	41	20	2	6	35	74	214
2	Spain	18	15	3	..	13	30	88	167
3	United States	51	11	17	4	4	22	20	129
4	France	9	4	10	..	8	15	24	70
5	Denmark	2	44	..	..	..	1	15	62
6	Japan	27	5	2	1	..	9	15	59
7	United Kingdom	10	1	11	..	..	2	22	46
8	Italy	5	2	3	3	2	2	20	37
9	Canada	6	1	5	3	2	4	10	31
10	China	8	3	2	..	7	6	2	28
10	Ireland	1	..	1	..	..	3	23	28
12	Austria	3	..	8	..	3	5	8	27
13	Portugal	..	2	..	..	..	3	17	22
13	Netherlands	2	1	5	..	..	6	8	22
15	Switzerland	4	6	1	..	2	5	3	21
16	India	3	10	1	..	1	2	2	19
17	Norway	4	..	1	..	4	3	6	18
18	Belgium	..	4	2	..	..	3	5	14
19	Korea, Republic of	3	5	..	..	1	1	2	12
19	Finland	1	5	3	..	2	..	1	12
19	Iceland	..	..	..	12	..	..	..	12
22	Taiwan Province of China	9	..	..	..	..	1	..	10
22	Brazil	2	..	..	..	8	..	..	10

Source: Authors, based on Financial Times *FDiIntelligence* database (fdiintelligence.com).
Note: Countries are ranked by total number of generation and manufacturing projects combined.

in Spain, Germany and Denmark) which boosted their interest in fast growing markets such as China.[8]

In the case of renewable electricity generation, the proximity of natural resources may also drive outward investments. Using the host country as an export platform is a traditional determinant of FDI,

[8] "Developing Countries Embrace Wind Power", posted on 7 March 2011 on http://www.offshorewind.biz/2011/03/07/developing-countries-embrace-wind-power/. In the moves abroad by turbine manufacturers, it has been observed that suppliers follow in also establishing facilities in geographical proximity (Kirkegaard, Hanemann and Weischer, 2009: 15). With about 80 per cent of renewable energy in its electricity mix – mostly from wind –, Denmark is a good example of a country where the limited and saturated home market drove investors abroad (Lewis and Wiser, 2007: 1848; Perrot and Filippov, 2010: 13).

particularly in the context of regional integration schemes (Dunning and Lundan, 2008: 72). For instance, the DESERTEC renewable energy project[9] in Northern Africa is meant to serve the home market (Europe). Drivers of this project include the strong demand for renewable electricity in Europe combined with its disadvantage in available sun hours compared to Northern Africa, making FDI a favourable alternative to investing at home. Another example includes the Energia Sierra Juarez 1 wind farm project, to be located in Baja California (Mexico), which will service San Diego (United States) by making use of the strong wind resources of the area.[10]

With regard to trade conditions and in addition to the above-mentioned drivers, trade barriers are often used by potential host countries (as driver-cum-determinant) to further entice renewable energy investments in manufacturing into those countries, including emerging economies like India and Brazil (Kirkegaard, Hannemann and Weischer, 2009: 20). The relevance of these kinds of measures, however, depends on the underlying technology. Given the various motives for solar equipment manufacturing, for example, trade barriers may be less relevant (see section on manufacturing determinants below).

3.2. Home government policies

Home government policies can provide additional motivations for outward investments in renewable energy projects. Relevant policies include investment facilitation measures and development assistance, potentially complemented by incentives from international institutions. Being a "green" industry with a good image and lately also identified as important driver of economic growth (Hoffmann, 2010: 18–21), FDI in renewables is seeing considerable support. Government-backed export credit agencies and other public entities can reduce risks that would otherwise be perceived as barriers to investment. Examples of this kind of government support include OPIC in the United States or EKF in Denmark. Additional support may come from multilateral institutions, e.g. by the World Bank Group, regional development banks like the Asian Development Bank or the European Investment Bank (Hamilton, 2010: 9).

[9] See http://www.desertec.org/.

[10] See http://www.semprageneration.com/energy-solutions/wind-energia-sierra-juarez.html.

In a similar vein, multi- and bilateral official development assistance (ODA) can also drive some investment projects. The large climate finance portfolios of aid agencies and the large share of renewable energy projects in them highlight the potentially large role for ODA in creating attractive investment opportunities in developing countries for the private sector (Atteridge et al., 2009).[11] Special information provision programmes may also facilitate this, as in the case of Germany's export initiative for renewable energies.[12] Export credit assistance, subsidies, guarantees, concessional financing, tied development aid and equity investments are also employed by home countries in support of outward manufacturing projects. Countries using such measures for renewable energy projects include Denmark, Germany, Japan and the United States; according to table 1, all among the top five home countries of investors in renewable energy manufacturing activities (UNCTAD, 2010: 144; Lewis and Wiser, 2007: 1853; Richards, 2009).[13]

An additional incentive comes from international climate change policies that allow compensating for emission reduction obligations at home with the possibility to invest into renewable energy generation projects abroad to reduce their emissions. This global carbon market, currently mainly consisting of the EU ETS and the CDM, might also drive some investors abroad in the sense that it alerts them of additional (international) incentives offered by market opportunities abroad. The CDM, for instance, covers all developed countries, except for the United

[11] The large share of the energy sector of 47 per cent in the climate finance portfolios of a few bilateral aid agencies analyzed in a recent study (a good quarter of this in turn accounted for by renewable energy projects) and the overall size of the portfolios with more than $8 billion in 2008 highlights this potentially large role (Atteridge et al., 2009). Atteridge et al. (2009) analyze the climate-related portfolios of the bilateral agencies AFD, France; KfW, Germany and JICA, Japan; as well as of Europe's EIB and NEFCO from Scandinavia as multilateral institutions. The earlier four's climate finance in 2008 alone accounts for more than $8 billion, with roughly three quarters supporting mitigation outcomes.

[12] The German Ministry of Economy, for instance, is funding a programme facilitating German solar companies' access to respective developing country markets, e.g. with market studies on countries in East Africa (www.german-renewable-energy.com).

[13] The support from ODA for electricity generation projects may also lead to the further establishment of a manufacturing base with the help of TNCs, as exemplified by the Vestas, which was selected by DANIDA in 1987 to develop 6 wind energy projects in India; prompting Vestas to establish manufacturing facilities in India soon afterwards (Perrot and Filippov, 2010: 15).

States, and thus for most generation projects the CDM is an opportunity for additional revenues. In fact about half of the CDM projects so far have been in renewable energy (UNEP, 2011: 211). Nevertheless, a recent study based on expert interviews did not find the CDM to be considered as being very relevant (von Flotow and Friebe, 2011: 28).

Government encouragement to acquire foreign firms with relevant technology (M&A) or to participate in respective clusters abroad (M&A as well as greenfield) is hard to find, but examples exist, e.g. a Swedish-Chinese partnership agreement encouraging cooperation on energy conservation and environmental protection[14] or the EU-China Low Carbon Technology and Investment Demonstration Zones, aimed at overcoming barriers to innovation and market entry for companies from both partners.[15]

3.3. Cost of production and business conditions

Rising costs of production in the home country are a motivation for solar manufacturing companies from developed countries to locate in emerging economies. In solar manufacturing, 70 out of 187 projects from the North were directed to the South, with 24 targeting China and 10 in Mexico. For solar, the nature (i.e. cost structure) of the industry will be in favour of such a development in any case. In wind power equipment manufacturing, the cost composition of major turbine components this factor seems less influential and relevant FDI is (and most likely will be) market seeking, i.e. dominated by host country market-creation policies as pull factors (Kirkegaard, Hanemann and Weischer, 2009: 18).

Considerations of company reputation can be a motivation for large developed country utility companies to invest in renewable electricity generation abroad; a factor related to home-country conditions (see above).[16] Not only do their size and reach and the

[14] Sweden and China signed a formal Memorandum of Understanding to encourage bilateral cooperation on energy conservation and environmental protection (http://www.chinadaily.com.cn/business/2009-10/26/content_8846309.htm; accessed 1 December 2010); see also www.nbesweden.com.

[15] See www.E3G.org for more information.

[16] This argument is building on the finding by Delmas, Russo and Montes-Sancho (2007) that in states where consumers had a high environmental sensitivity utilities were likely to pursue a strategy of environmental differentiation, i.e. moving into "cleaner" electricity generation.

capabilities built-up in the home market enable them to easily invest abroad, investments into renewable electricity generation projects might actually serve the purpose of "appeasing" consumers in their home market or in several developed country markets. More generally, respective industry best practices would be relevant as far as they are referred to by consumers or investors or other stakeholders the utility needs to deal with. Potential pressure from (institutional) investors may be particularly important here (UNCTAD, 2010: 117; UNCTAD, 2011: 47). In fact in electricity generation, the largest investors from important home countries are the major utility companies (see above).

Individual developing country manufacturing TNC strategies are at the source of some investment decisions abroad. In the case of large emerging economies like China or India, most outward wind manufacturing projects are in developed countries (8 for India and 3 for China). These investments are potentially driven by the lack of relevant expertise/skills and the desire to acquire them. At the same time, these are prime strategic-asset-seeking motives for takeovers and/or the intention to benefit from relevant cluster effects in developed countries. For the case of China, this also manifests itself in a number of acquisitions of European companies by Chinese manufacturers (e.g. Goldwind)[17], which boosted Chinese technological capabilities (Dong, 2010). A fair number of European acquisitions also mark the path of India's Suzlon,[18] making its affiliate network a strong pillar of its technological development (Awate and Mudambi, 2010: 7–8; Lewis, 2007), which also accounts for 4 out of the 5 Indian projects mentioned.

4. Determinants of foreign renewable energy projects

This section looks at potential factors that influence a TNC's decision to establish operations in a specific host country (UNCTAD, 1998: 89–130; UNCTAD, 2010: 117–119). Following the general categorization of FDI determinants (UNCTAD, 1998: 89–96; UNCTAD, 2010: 117–119) determinants for foreign investment in renewable energy projects can be grouped into three categories: the general policy framework,

[17] One of the companies acquired by Goldwind (Vensys, Germany) in fact accounts also for one of the Chinese projects mentioned earlier.

[18] As acquisition transactions are not greenfield investments, but belong to the FDI category of mergers and acquisition, they are not covered in our data set.

economic determinants (i.e. market seeking, natural resource seeking, strategic asset seeking) and promotion and facilitation. The analysis below focuses on factors that are most likely to affect greenfield FDI in renewable energy, as opposed to general investment considerations aside. Further, as there are important differences between potential determinants for renewable energy generation and manufacturing, these are dealt with in two separate sections.

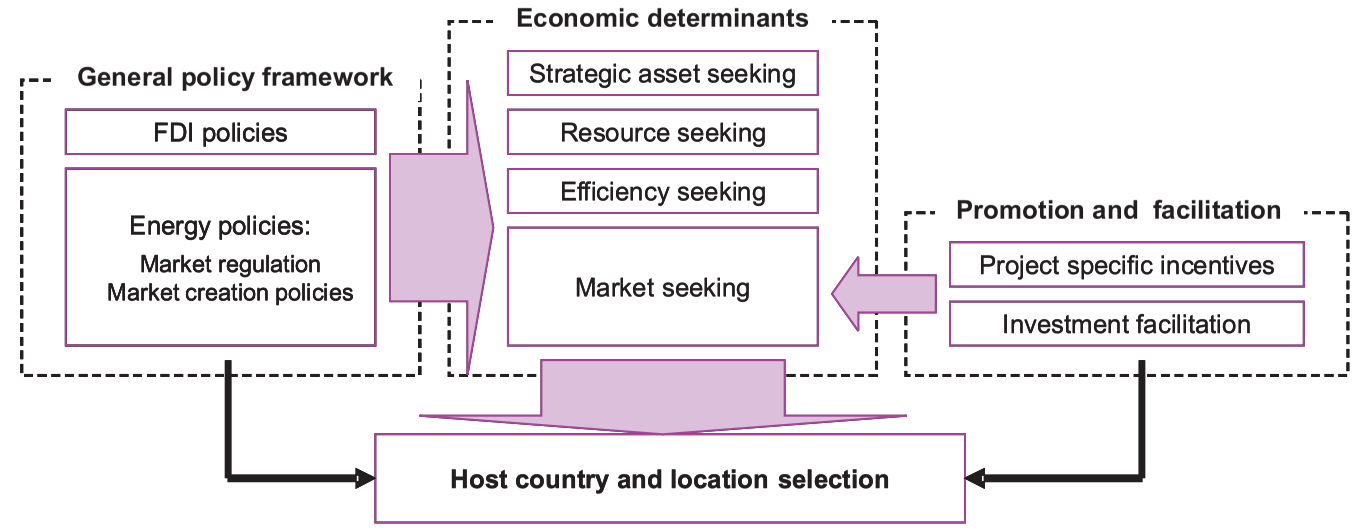
4.1. Determinants of FDI in renewable electricity generation

As for energy generation in general (UNCTAD, 2008), market-seeking motivations largely drive foreign investment in renewable energy. However, because this is still a relatively new market, with some technologies currently not cost-competitive, the (expected) market size depends to a large extent on the energy policy framework of a potential host state (figure 9). The most relevant policy areas include FDI entry requirements (e.g. full ownership, joint venture requirements), regulation of the electricity market (e.g. full competition, monopoly) and market creation policies (e.g. feed-in tariffs, renewable energy quotas). To a lesser extent, promotion and facilitation policies may also influence the decision-making process. Efficiency-seeking projects, to the extent that they exist or are planned, are also sensitive to these market-seeking determinants, though they seek to supply this market from a third country that may itself lack a domestic market for renewable electricity, this will be explored at the end of the section.

4.1.1. Energy and market-creation policies

Government policies establishing long-term goals for renewable electricity usage and incentivizing its generation are critical in attracting market-seeking foreign investors. Renewable energy sources are growing more competitive, but they are yet to become as competitive as conventional sources, making the existence of a stable market creation policy necessary for investment (UNEP, 2011: 226; Cosbey et al., 2011: 18; Global Climate Network, 2011: 25; Friebe and von Flotow, 2011: 23–26 (for wind); IEA, 2008: 17 (for wind)). Policies therefore play an important role in the promotion and establishment of the sector. These policies can operate at different levels. At the most basic level, adoption of clear renewable energy targets is an important signalling device for

Figure 9. FDI determinants for renewable energy



Source: Authors, based on UNCTAD (2010: 117–119; 1998: 89–96).

attracting investors in general, and foreign investors in particular, to a particular market. In terms of the top 20 destinations for renewable electricity generation, only one economy – the United States – does not have an overall national target. These targets also provide investors with a sense of certainty about the size of the market for renewable electricity in a given host economy as well as the time scales involved. Many of the top host economies for renewable electricity FDI have established targets that extend to 2020 and beyond (table 2).

Renewable electricity generation targets are often complemented with specific market-creation policies that serve to either generate demand directly or by incentivizing its production. These policies function through various mechanisms. The feed-in tariff is one of the most popular policies, which in 2010 had been implemented by 55 countries, with several countries currently exploring its use. The feed-in tariff combines market-based mechanisms with mandates, generally obliging utilities to enter into long-term contracts with renewable energy generators in which they pay a fixed (above-wholesale) price for each unit of energy generated. Another mechanism popular with governments is the renewable portfolio standard, which requires utilities to include a certain percentage of renewable energy within their overall generation portfolio by a designated time in the future. When comparing the effectiveness of these two policies, the feed-in tariff is considered somewhat more effective (Fischer and Preonas, 2010: 8–10; IEA, 2008: 17 (for wind)),[19] probably leading to its popularity with governments. In 2010, three quarters of the top 20 countries hosting renewable electricity generation FDI had implemented a feed-in tariff either at the national or sub-national level (table 2). In addition to the popular feed-in tariff and renewable portfolio standard, other relevant policies include tradable certificates, net metering and public bidding. The latter is particularly suited for countries wishing to enact a feed-in tariff, but without sufficient information about an appropriate level. Public bidding can allow those countries to discover the local renewable electricity cost curve. Brazil, Egypt and Uruguay have all made use of public bidding for wind energy projects.

[19] Flotow and Friebe (2011: 23) find the feed-in tariff to be the most attractive government support mechanism in wind energy generation from a project developer's perspective. Senior representatives from wind developers were asked about a list of important factors when having to take a decision on developing 30MW wind park in an emerging economy.

Table 2. Characteristics of the top 20 destinations for renewable electricity generation greenfield investments

Country	FDI projects	Market characteristics				Foreign equity cap	Structure of electricity market		Regulatory policies				Fiscal incentives				Public financing	
	Tot. Nr. Projects 2003–2010	% Renewable of tot. cap. (2008)	% Non-hydro renewable of tot. cap. (2008)	Target % renewable of tot. cap. (year)	Specific target(s)[b]	Greenfield investments in biomass, hydro, solar and wind	Transmission[c]	Renewable generation (proxied by the wind market)[c]	Feed-in tariff	RPS / Quota	Net metering	Tradable REC	Capital subsidies, grants, rebates	Investment or other tax credits	Sales tax, energy tax, excise tax, or VAT reduction	Energy production payments or tax credits	Public investment, loans, or financing	Public competitive bidding
United States[a]	70	11.6	3.9	..	..	100	U	U	○	○	○	●	●	●	●	●	●	●
United Kingdom	62	8	6.1	10 ('10/'11) 15 ('15/'16)	..	100	O	C	●	●	..	●	..	..	●	●	●	..
Spain	60	36	22	40 ('20)	●	100	M	C	●	..	..	..	○	●	●	..	●	..
France	52	21.9	4.2	..	●	100	M	C	●	..	..	●	●	●	●	..	●	●
Italy	49	22.7	8.8	26 ('20)	●	..	..	..	●	●	●	●	●	●	●	..	●	●
Bulgaria	42	23.2	1.2	..	..	100	M	C	●	..	..	..	●	..	●	..	●	..
China	27	23.4	1.9	3 ('20)	●	100	M	O	●	●	..	..	●	..	..	●	●	●
Poland	27	4.7	1.9	..	..	100	M	C	..	●	..	●	●	..	●	..	●	●
Chile	22	37.8	0.2	8 ('20)	..	100	O	C	..	●	..	..	●	..	●	..	●	..
India	22	29	6.8	10 ('12)	●	100	O	O	●	●	..	●	●	●	●	..	●	●
Canada	21	61.4	3.1	50 ('30)	●	100	M	C	○	○	●	..	●	●	●	..	●	●
Germany	18	27.1	24.6	65 ('40) 80 ('50)	..	..			●	..	..	..	●	●	●	..	●	..
Romania	18	29.3	0.1	35 ('15) 38 ('20)	..	100	M	C	..	●	..	●	..	..	●	..	●	..
Hungary	13	7	6.4	..	..	..			●	..	..	..	●	..	●	..	●	..
Sweden	13	60.3	12.1	..	●	..			..	●	..	●	●	●	●	●	..	..
Greece	12	25.2	7.8	..	..	100[d]	M	O	●	..	●	..	●	●	..	..	●	●
Brazil	11	82.4	7.1	16 ('20)	..	100	C	C	..	..	..	..	..	..	●	..	●	●
Portugal	11	46.6	21.1	55-60 ('20)	●	..			●	●	●	..	●	●	●	..	●	●
Philippines	10	33.7	12.7	40 ('20)	●	40	M	O	●	●	●	..	●	●	●	●	●	●
Turkey	10	34.3	1.3	30 ('23)	●	100	M	C	●	..	..	..	..	..	..	..	..	..

Source: Author's tabulation based on data from Financial Times FDiIntelligence database (number of projects), US Energy Information Agency (renewable of tot. cap. and non-hydro renewable of tot. cap.), World Bank Investing Across Borders database (foreign equity cap and market structure) and REN21 (2011) (all other).

Note: An ● in the columns for Regulatory policies, Fiscal incentives, and Public financing refers to policy measures at the national level. An ○ refers to the existence of only sub-national policies.

[a] Roughly 80% of renewable generation projects in the United States have targetted states with feed-in tariffs or RPS/Quotas.

[b] ***Spain***: Ocean: 10 MW by 2016; 100 MW by 2020, ***Wind***: 38 GW by 2020, including 35 GW on-shore and 3 GW off-shore, Solar PV: 10 GW by 2020; ***France***: Ocean: 800 MW of ocean power by 2020, Wind: 25 GW by 2020, including 6 GW offshore, Solar PV: 4.9 GW by 2020; ***Italy***: Solar PV: 23 GW by 2016; ***China***: Renewable capacity: 362 GW by 2020, including 300 GW hydro, 30 GW wind, 30 GW biomass, and 1.8 GW solar PV/CSP; ***India***: Renewable capacity: 78.7 GW renewable capacity to be added during the period from 2007–2012, Wind: 10.5 GW added 2007–2012, Small hydro (< 25 MW): 1,400 MW added 2007–2012, Biomass cogeneration: 1,700 MW added 2007–2012, Waste-to-energy: 0.4 GW added 2007–2012, Solar hot water: 15 million m2 (10.5 GWth) by 2017; 20 million m2 (14 GWth) by 2022, Solar PV: 12 GW by 2022, including 10 GW grid-connected and 2,000 MW off-grid, Rural lighting systems: 20 million by 2022; ***Canada***: Wind: 4,600 MW by 2020 (Ontario); 4,000 MW by 2016 (Quebec); 1,200 MW by 2015 (Maritime Provinces); 1,000 MW by 2016 (Manitoba); 400 MW by 2016 (New Brunswick); ***Sweden***: Renewable generation: Additional 25 TWh annually by 2020 compared to 2002; ***Portugal***: Hydro: 9,548 MW by 2020, Renewable capacity: 19.2 GW by 2020, Ocean: 250 MW by 2020, Wind: 6,875 MW by 2020, including 75 MW of offshore wind power, Solar: 1,500 MW by 2020, Biomass: 952 MW by 2020, Geothermal: 75 MW by 2020; ***Philippines***: Renewable capacity: 10.6 GW by 2030; 4.5 GW added during 2003–2013, Biomass power: 76 MW by 2010; 94 MW by 2015; 267 MW by 2030; ***Turkey***: Wind: 20 GW by 2023.

[c] C=competitive market; M=monopoly; O=oligopoly; U=unspecified.

[d] Only open for firms located in the European Union.

It is important to note that the existence of market-creation policies, while often necessary, is not sufficient on its own to generate flows of renewable electricity generation FDI to a country. Several countries that have policy present are not hosts to foreign direct investment in renewable generation. In other cases, market policy may have been in place for some time, but rather than encouraging FDI they served to develop the domestic market, such as in the case of Japan which does not host FDI projects, but is the source of 27 projects (the seventh largest). Some market policies may also be ineffective in generating investments because they do not sufficiently address the needs of investors. De Jager and Rathmann (2008: 119) find that the choice of policy environment can potentially decrease the cost of a renewable energy generation project by up to 30 per cent.

The presence of multiple market-creation policies can also, however, signal a lack of coherence. For example, in a number of countries – such as Canada, India and the United States – these policies are implemented purely at the sub-national level, such as by province or state, in lieu of a harmonized national framework. The presence of state-level policies instead of a national regulatory framework is considered less effective, although it is generally acknowledged that neither state nor national policy are sufficient on its own (IEA, 2008).

Finally, since renewable electricity generation projects – like all electricity projects – are long-term infrastructure investments, stability of respective government support mechanisms is a commonly cited major determinant (UNEP, 2011: 226; Friebe and von Flotow, 2011: 6 (for wind); de Jager and Rathmann, 2008: 119; IEA, 2008: 17 (for wind)). For TNCs, international investment agreements may play an important future role in protecting investors from policy fluctuations (Kuntze, 2011: 44-45). Through the risk reduction that comes with the existence of such agreements, potential investors might be more easily won to consider such projects (UNCTAD, 2010: 136–137; UNCTAD, 1998: 162; Cosbey et al., 2011: 41–49).

4.1.2. FDI policies and market regulations

The entrance of foreign renewable energy investors into a potential host country also depends on the country's FDI regulations and the state of its electricity market structure and infrastructure.

Traditionally the energy sector has been considered a sensitive sector when it comes to foreign involvement and full ownership is not allowed in all countries. Countries hosting renewable electricity FDI projects, in general, allow full foreign ownership. Among the major host economies for these projects, Greece stands out as an exception. The country only allows TNCs located in the European Union to invest in renewable electricity generation projects (table 2).

In many countries, the electricity market is dominated by national, often State-owned, electricity generators who controls both production and distribution (table 2). Renewable electricity projects, on the other hand, are often carried out by firms which operate as independent power producers (IPPs), selling their electricity to the dominant generator or grid-operator. Even if there is a competitive market for electricity generation, the existence of monopolies or oligopolies for distribution complicates the operations of independent generators. Indeed, the quality of electricity market and grid access are frequently noted as being one of the primary barriers for producers of renewable electricity thus increasing costs and making investments less likely (OECD and IEA, 2008; IEA, 2008: 23; de Jager and Rathmann, 2008: 120; Cosbey et al., 2011: 18–20).[20] Global Climate Network (2010: 25) lists poor infrastructure in general as a problem alongside market imperfections and a lack of competition. A connected concern is the ability of the country's grid to accommodate the relatively more variable output of renewable electricity projects, especially in a situation where the grid is controlled by an established monopoly. For example, in some developing economies this may be a particularly

[20] Incumbent utilities controlling access to the grid and with own vested interests may deny access or may charge high prices for transmission access (UNEP, 2011: 232; Beck and Martinot, 2004). Von Flotow and Friebe (2011: 31) also found grid access preference to be very important for renewable energy developers. This may be of particular importance as the natural resource dictating the project site (i.e. wind, solar or geothermal site) may be located far away from populated centers. Also problematic can be burdensome interconnection requirements by the utility, which increase transaction costs for the power producer (Beck and Martinot, 2004). Other key barriers to renewable energy investments listed by Cosbey et al. (2011: 20-22) are administrative barriers, subsidies and taxation in favor of conventional technologies, lax environmental regulation, knowledge and credibility gaps, fragmented and immature industry and market as well as lack of economies of scale and existence of supply chain bottlenecks. In addition, a recent study suggests that a high level of transparency and limited duration of permit procedures are very important for wind project developers (von Floto and Friebe, 2011: 29).

difficult barrier to overcome as traditionally State-owned utilities lack the technical capacity or financial resources to address this problem (UNEP, 2011: 233).

4.1.3. Promotion and facilitation measures

Although less important, promotion and facilitation policies can play a role in determining the location for renewable energy generation projects, in particular when used in combination with market creation policies**.** These include capital subsidies, grants or rebates; sales tax, energy tax, excise tax or VAT reduction; investment or other tax credits; energy production payments or tax credits; and public investment, loans or financing. Although it is difficult to determine the exact interaction of these policies with market creation policies,[21] data from the 20 largest host economies for renewable energy projects suggest that countries that implemented market creation policies complemented them with enacting one or more forms of promotion and facilitation policies (table 2). The presence of such policies is also highly correlated with renewable electricity generation greenfield investments, with 85 per cent of projects being located in countries with at least one business facilitation measure.

In some cases, business facilitation policies can by themselves make up for a lack of consistent market-creation policies. In the United States, which serves as host to the highest number of projects examined (table 2), investments in renewable energy generation projects have largely been promoted through production tax credits and investment tax credits, as no national market-creation policies have been enacted. Nevertheless, the country has witnessed repeated boom-bust cycles in wind power investment as this tax credit has repeatedly lapsed only to be renewed later. The uncertainty associated with its renewal, rather than the lack of the credit, has served to drive this cycle, hampering even economically viable projects from taking place (Barradale, 2010).

In developing economies, effective national CDM policies and institutions also serve to facilitate and incentivize FDI projects, though their future importance is in question. A number of identified greenfield

21 Fischer and Preonas (2010) therefore do not include the interactions with these policies into their review of interactions of different market-creation policies.

investments in renewable electricity projects in developing economies have noted that they intend to register as a CDM project.[22] The sale of certified emission reductions (CERs) from these projects can increase the economic viability of projects in these economies, though only if they are nearly viable without it.

Facilitation measures can also serve to inform potential investors rather than solely providing incentives, which may include: information on opportunities, matchmaking, one-stop-shops etc. The relevance of these measures to investors varies, with a recent survey of wind project developers finding that one-stop-shops were not particularly relevant (von Flotow and Friebe, 2011: 30). Nevertheless, the provision of information, especially through the release of national resource surveys, is an important element in generating interest in a particular host economy. In addition, recent evidence suggests that a high level of transparency and limited duration of permit procedures are very important for wind project developers (von Floto and Friebe, 2011: 29).

4.1.4. Motivations other than pure market-seeking

Some renewable energy investments are quite unique in that they lack any market-seeking element. These investments, for instance, seek to produce electricity in one location to take advantage of local advantages (for instance, natural endowments such as wind or solar energy) in order to export to another country or region. A classic example of such an investment is the DESERTEC initiative, which is building a large-scale renewable electricity generation facility in Northern Africa, with exports of the generated electricity destined for Europe. Another example is the large-scale development of wind farms in northern Mexico to service the electricity demands of the state of California in the United States.[23] These investments largely operate outside the realm of national market-creation policies and are viable due to possibility of cross-border energy trade.

22 For example, the Totoral wind farm in Chile, built by SN Power (Norway), applied for CDM status in the hopes of receiving carbon credits for their offset of 65,000 tons of CO_2 per year.

23 See http://www.signonsandiego.com/news/2011/apr/19/sdge-buying-power-from-mexican-wind-farm/.

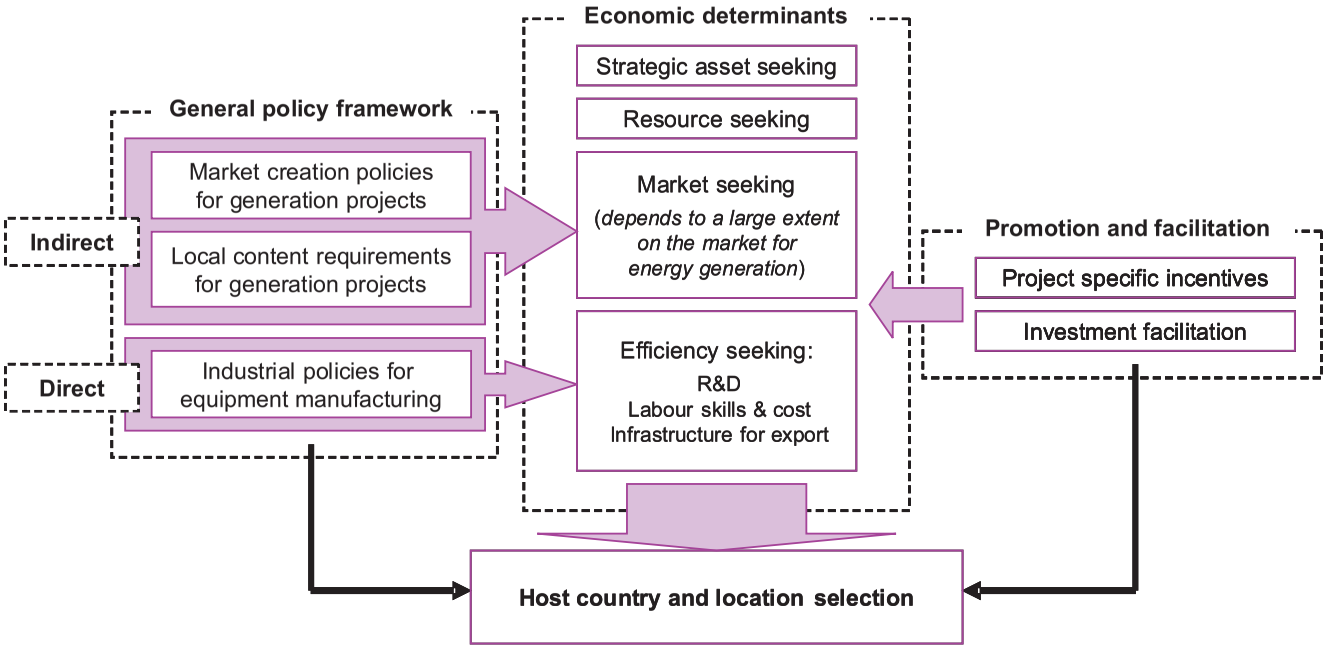
4.2. Determinants of FDI in manufacturing of renewable energy equipment

FDI in renewable energy equipment manufacturing projects, unlike generation projects, may be due to one or more of a number of motivations (figure 10). Market-seeking investors are largely influenced by the same determinants that are relevant for renewable energy generation projects, though the relevant policies largely target them only indirectly. Efficiency-seeking investors are further divided between those seeking to serve a large market for renewable electricity from a nearby cost-advantageous location and those for whom existing competencies in related industries, coupled with strong infrastructure, are more important. Due to such important difference in motivations, this section considers key location determinants separately.

4.2.1. Market-seeking specific determinants

Potential host economies' energy policy and renewable energy market-creation policies are important determinants for market-seeking renewable energy equipment manufacturing projects. This importance, however, manifests itself indirectly in that the investors targeted by these policies are investors in generation projects, rather than manufacturing investors (figure 10). Once a sizable market for renewable electricity is established, the market in turn creates a demand pull for equipment that is able to support local energy generation; initially this is through equipment imports, followed by production in the host country when conditions warrant it (Lewis and Wiser, 2007). This has been especially true over the last decade for wind components manufacturing, where weight and size and thereby high shipping costs means that it is cost-effective to produce components locally (Lewis and Weiser, 2007). In turn, this may also serve to induce suppliers of turbine manufacturers to follow the lead firm (Kirkegaard, Hanemann and Weischer, 2009: 15). This trend is strongly reflected in the data on greenfield investments in wind manufacturing, where the top seven host economies (United States, China, Spain, India, United Kingdom, Canada and Brazil) attracted 77 per cent of the projects (table 3). Each of these economies have large policy-created (using either market-creation policies or business facilitation measures) markets for wind power. Solar manufacturing projects also tended to target countries

Figure 10. FDI determinants for renewable energy equipment manufacturing



Source: Authors, derive from UNCTAD (2010: 117–119; 1998: 89–96).

Table 3. Characteristics of the top-20 destinations for renewable electricity manufacturing greenfield investments

Country	FDI projects			Market characteristics					Market creation and support policies (national or sub-national)		
	Tot. Nr. Projects 2003–2010	Nr. of Wind projects	Nr. of Solar projects	% Renewable of tot. cap. (2008)	% Non-hydro renewable of tot. cap. (2008)	Target % renewable of tot. cap. (year)	Specific wind target(s)[a]	Specific solar target(s)[b]	Regulatory policies	Fiscal incentives	Public financing
United States	73	40	33	11.6	3.9	..	..	..	●	●	●
China	67	35	32	23.4	1.9	3 ('20)	●	●	●	●	●
Spain	28	13	15	36.0	22.0	40 ('20)	●	●	●	●	●
Germany	24	4	20	27.1	24.6	50 ('30) 65 ('40) 80 ('50)	..	..	●	●	●
Canada	24	9	15	61.4	3.1	..	●	..	●	●	●
India	18	13	5	29.0	6.8	10 ('12)	●	●	●	●	●
United Kingdom	15	10	5	8.0	6.1	10 ('10/'11) 15 ('15/'16)	..	..	●	●	●
Mexico	14	4	10	22.6	2.7	..	●	..	●	●	●
Malaysia	11	1	10	9.2	0.0	..	..	●	●	..	●
France	11	3	8	21.9	4.2	..	●	●	●	●	●
Hungary	7	1	6	7.0	6.4	..	..	..	●	●	●
Portugal	7	2	5	46.6	21.1	55-60 ('20)	..	..	●	●	●
Viet Nam	6	2	4	39.7	0.0	5 ('20)	..	..	..	●	..
Poland	6	5	1	4.7	1.9	..	..	..	●	●	●
Czech Republic	5	..	5	10.1	4.2	16-17 ('30)	..	..	●	●	..
Belgium	5	2	3	7.8	7.2	..	..	..	●	●	..
Brazil	5	5	..	82.4	7.1	16 ('20)	..	..	..	●	●
Italy	4	..	4	22.7	8.8	26 ('20)	..	●	●	●	●
Singapore	4	..	4	0.0	0.0	..	..	..	..	..	●
Turkey	4	1	3	34.3	1.3	30 ('23)	●	..	●	..	..
Denmark	4	4	..	32.9	32.9	..	●	..	●	●	●

Source: Author's tabulation based on data from Financial Times FDiIntelligence database (number of projects), US Energy Information Agency (renewable of tot. cap. and non-hydro renewable of tot. cap.), and REN21 (2011) (all other).

Note: An ● in the columns for Regulatory policies, Fiscal incentives, and Public financing refers to the existence of one or more policy measures at the national or sub-national levels.

[a] *China*: 30 GW by 2020; *Spain*: 38 GW by 2020, including 35 GW on-shore and 3 GW off-shore; *Canada*: 4.6 GW by 2020 (Ontario); 4 GW by 2016 (Quebec); 1.2 GW by 2015 (Maritime Provinces); 1 GW by 2016 (Manitoba); 0.4 GW by 2016 (New Brunswick); *India*: 10.5 GW added 2007–2012; *Mexico*: 4.34% by 2012; *France*: 25 GW by 2020, including 6 GW offshore; Turkey: *Wind*: 20 GW by 2023; *Denmark*: Offshore wind: 1.02 GW by 2012.

[b] *China*: 1.8 GW solar PV/CSP by 2020; *Spain*: 10 GW by 2020; *India*: 12 GW by 2022, including 10 GW grid-connected and 2 GW off-grid; *Malaysia*: 1.25 GW by 2020; *France*: 4.9 GW by 2020; *Italy*: Solar PV: 23 GW by 2016.

with large markets for their products, with the top destinations for these investments including the United States, China, Germany, Spain and Canada. Nevertheless, due to the nature of the solar manufacturing value-chain, the scope for efficiency-seeking investments is still large (see below.)

To foster growth of a domestic manufacturing market and in turn create disincentives for TNCs to supply the local market with imports, governments have often turned to local content requirements. In the context of renewable energy investments, these are often embedded in renewable electricity generation concessions. They can also manifest themselves within feed-in tariffs, though in this case as an optional incentive rather than a requirement. For example, Malaysia's 2011 Renewable Energy Bill included a feed-in tariff regime that provides for bonuses on top of the basic feed-in rate for projects including local components.[24] The large number of FDI projects in China for wind equipment manufacturing stems in part from the stringent local content requirements used coupled with massive projects. In China, the industrial policy package also included a tax incentive and additional subsidies and direct financial support from R&D institutions (Dong, 2010). Other economies which have implemented local content requirements are Spain, Canada, Brazil,[25] India and to some extent the United States, where "political quid-pro-quo expectations work hand in hand" with explicit local content requirements to secure local investments and job creation in the renewable energy sector, particularly in wind (Kirkegaard, Hanemann and Weischer, 2009: 20–23). However, local content requirement and incentives tied to local manufacturing activities for generation projects might only have limited effects on the

[24] See http://www.parlimen.gov.my/files/billindex/pdf/2010/DR472010E.pdf.

[25] In the Brazilian wind power equipment industry historically only Wobben Windpower, a subsidiary of German company Enercon, was present. More recently other equipment suppliers entered the market, e.g. Argentina's Impsa, Suzlon and Vestas. Other new market entrants that sold turbines in 2009 and 2010 auctions include Alstom, Gamesa, GE Wind and Siemens. Based on their commitment to manufacture wind turbine generators in Brazil within a short time frame these foreign companies have become eligible for BNDES financing. With the initial aim of 60 per cent of local content, both GE and Alstom Wind are in the process of building plants in Brazil. Gamesa and Suzlon have also announced to establish local production, while Siemens already has a large manufacturing presence in Brazil, allowing it to produce and assemble wind turbines. Brazil is deemed to be well positioned for supplying the Latin American market and the United States with complete wind turbines or with turbine components (GWEC, 2011: 5).

locational choices of wind power equipment manufacturers; including the decision to move abroad. It is rather in the nature of the industry to locate where there is large and stable demand for equipment (Kirkegaard, Hanemann and Weischer, 2009).

The combination of industrial policy, market creation policy and business facilitation policies can encourage clusters of manufacturing projects. One such location where policy fostered a cluster of investment is in Ontario, Canada where a series of measures enacted in 2009 have resulted in the province attracting 79 per cent of Canada's total host investment in manufacturing projects (19 of 24 projects). The measures included market creation policy, such as a feed-in tariff, business facilitation measures and finally a measure mandating local content that requires developers to have a certain percentage of their projects' materials sourced from Ontario goods and labour at the time they reach commercial operation.[26] Another example of a manufacturing of renewable energy equipment cluster is the Tianjin Economic-Technological Development Area in China, which is one of three such clusters in China. Danish wind company Vestas, which established its first factory in the area in 2006, has build Tianjin into its largest integrated wind energy equipment base in the world.[27]

4.2.2. Efficiency-seeking specific determinants

Efficiency-seeking renewable energy equipment manufacturing investments are not quite as uniform in terms of their locational determinants as those for market-seeking investors. They can be classified largely into two groups, with the first seeking to establish operations in cost-advantageous countries located near to important markets for their products, and the second seeking to make use of existing competencies and avail themselves of various incentives. For the first of these two groups, the creation of large and stable markets for renewable electricity generation is also an important determinant, though in this case it is the proximity to such a market rather than being located within the market itself that is important. This occurs for both wind and solar manufacturing, though in the case of wind, the

[26] See http://news.ontario.ca/mei/en/2009/09/ontario-makes-it-easier-faster-to-grow-green-energy.html.

[27] See http://www.renewbl.com/2009/10/20/vestas-officially-opens-manufacturing-facility-in-tianjin.html.

potential customer markets must be very close and well connected by transportation infrastructure. For example, LM Glasfiber (Denmark) invested in a major production facility in Goleniów, Poland, largely due to the quick, flexible and cost-efficient transportation the location offered for moving blades by sea or by land to their customers in Northern, Central and Eastern parts of Europe.[28] In Mexico, the four wind manufacturing greenfield FDI projects have all been located along the border with the United States (2 projects in Ciudad Juárez, 1 in Monclova and 1 in Matamoros.) Of the 10 solar manufacturing projects in the country, all but one project were located in states bordering the United States. This is largely in line with previous work, which finds that for both solar PV and wind equipment manufactured in Mexico is largely exported to the United States (Barclay, 2008).

For the second group of efficiency-seeking investors, industrial policy that creates local capabilities or leverages existing ones serves as an important determinant. These policies often include a number of elements targeting the necessary upgrading of skills and infrastructure investments needed to lower start-up and operating costs. Malaysia has emerged as a solar manufacturing hub, with 10 greenfield projects between 2003 and 2010, building on its previous experience in producing semiconductors, its skilled labour force, and its capable infrastructure. First Solar (United States) operates a number of facilities in the country and has highlighted the importance of the qualified local workforce in its investment decisions.[29] Bosch (Germany), which plans to complete its announced facility in 2013, notes that Malaysia offers not only a qualified workforce in the fields of electronics and semiconductors but also a good local infrastructure. In particular, the country's reliable power supply was highlighted as being indispensable for the challenging and sensitive production processes in the field of photovoltaics.[30] Likewise, Taiwan Province of China (1 solar manufacturing greenfield project) is also emerging as a preferred location, due to its existing semiconductor and chip design industry, which has similar requirements as solar PV modules (Perrot and Filippov, 2010: 6).

28 See http://www.lmwindpower.com/News/Archive/View%20News.aspx?id={3BFB2C45-00BC-4650-A119-D938465EE42B}&y=2009.

29 See http://www.firstsolar.com/Downloads/pdf/FastFacts_KLM_NA.pdf.

30 See http://www.bosch-solarenergy.de/medienservice/presseinformationen/pressemitteilung/news/1308735031/?tx_ttnews%5BbackPid%5D=35&cHash=f48823d50e6603de4b16d4caebf0f6b5.

Investment incentives and other business facilitation measures can increase the attractiveness of host economies for all efficiency-seeking investors, but especially those in the second group. For example, First Solar (United States) received a 15-year income tax holiday as an incentive for its construction of a solar manufacturing facility in Kedah, Malaysia.[31] The Philippines (2 solar manufacturing greenfield projects) offers an income tax holiday of 4–6 years and a deduction of labour expenses from taxable incomes for renewable equipment manufacturing investments.[32] Business facilitation measures can also serve to lower the cost of operating in the country. In Thailand (1 solar manufacturing greenfield project), the Government offers an exemption of import duties on machinery in addition to an eight-year corporate income tax exemption for investors in solar cells and raw material for solar cells manufacturing facilities.[33]

5. Conclusions

Cross-border greenfield FDI projects in renewable energy generation and manufacturing have increased rapidly over the last few years. While the number of announced generation projects has markedly slowed after the recent crisis, manufacturing projects have continued to increase. So far developed countries have both been the main source and destination for generation and manufacturing projects, although developing countries and transition economies are becoming more significant. Key drivers for this FDI include first mover advantages, as well as saturated home markets in combination with emerging opportunities abroad.

With some exceptions, market seeking is the main motivation for most generation projects. However, as renewable energy technologies are not yet cost competitive with traditional types of electricity generation, market-creation policies are crucial for attracting investors, domestic and foreign. For manufacturing projects, the motivations of the investors and the determinants that are important to them depend largely on whether they simply want to be in a cost-advantageous

[31] See http://investor.firstsolar.com/releasedetail.cfm?ReleaseID=227063.
[32] See http://www.boi.gov.ph/pdf/IPP2011.pdf.
[33] See http://www.boi.go.th/index.php?page=eligible_activities.

location near their target market or make use of existing competencies and skills in a location further afield.

Although developing and transition economies seem to be catching up with their developed-country peers, there are some notable differences. First, while the overall share in the number of projects received is significant, most projects are concentrated in a few developing countries, many of which are large economies such as Brazil, China, India and Mexico. Second, projects into developing countries largely make use of mature technologies suggesting only limited technology transfer into these countries (although the narrowness of the gap may be conducive to transfer and effectiveness of these projects). These and other findings of this paper can help developing country policymakers when considering how to create a more attractive environment for investments into renewable energy.

Future research on the determinants of renewable energy FDI might use the framework in a number of ways. For instance, the framework can be tested empirically, e.g. with surveys of both foreign investors and local officials. It may also be used as an input into the assessments of individual countries' policy frameworks for investments into renewable energy. In addition, future research could look more in-depth at individual determinants and in particular how they play out for different technologies and host-country characteristics. Particularly with respect to poor countries, it may be important to shed more light on the link between (foreign) investments into renewable energy and external financing (official development assistance or multilateral climate financing), as financial constraints of poor countries will make external support a *conditio sine qua non* for such projects. Beyond this, the UNCTAD framework (UNCTAD, 2010) can be adapted for equivalent research in other areas of relevance to a low-carbon economy. From the perspective of policy coherence, it is important to know how FDI drivers and determinants play out in different areas, industries and contexts.

References

Atteridge, Aaron, Clarisse Kehler Siebert, Richard J.T. Klein, Carmen Butler and Patricia Tella (2009). Bilateral Finance Institutions and Climate Change: A Mapping of Climate Portfolios. Stockholm Environment Institute, Working Paper.

Awate, Snehal and Ram Mudambi (2010). Blowin' in the wind: Suzlon as an emerging economy multinational enterprise. The Richard J. Fox School of Business, Temple University, Philadelphia, PA.

Barclay, Eliza (2008). Baja positioning to be regional solar leader. Accessible here: http://www.treehugger.com/files/2008/07/baja_solar.php.

Barradale, Merrill Jones (2010). Impact of public policy uncertainty on renewable energy investment: Wind power and the production tax credit. *Energy Policy* 38: 7698–7709.

Beck, Fred and Eric Martinot (2004). Renewable Energy Policies and Barriers. Encyclopedia of Energy (Cutler J. Cleveland, ed.), Academic Press/Elsevier Science.

Cosbey, Aaron, Jennifer Ellis, Mahnaz Malik and Howard Mann (2008). Clean Energy Investment – Project Synthesis report. International Institute for Sustainable Development.

Dong Wu (2010). Powering the green leap forward: China's wind energy sector. Trade and Environment Review 2009/2010: Promoting poles of clean growth to foster the transition to a more sustainable economy. United Nations: New York and Geneva, pp.173–177.

Dunning, John and Sarianna Lundan (2008) Multinational Enterprises and the Global Economy: Second Edition. New York: Edward Elgar Publishing.

de Jager, David and Max Rathmann (2008). Policy instrument design to reduce financing costs in renewable energy technology projects. ECOFYS by order of the IEA Implementing Agreement on Renewable Energy Technology Deployment (RETD). ECOFYS International BV: Utrecht.

Delmas, M., M.V. Russo and M.J. Montes-Sancho (2007). Deregulation and environmental differentiation in the electric utility industry. *Strategic Management Journal* 28: 189–209.

Ellis, Karen, Bryn Baker and Alberto Lemma (2009). Policies for Low Carbon Growth. Overseas Development Institute: London.

Ernst & Young (2009). The Business Response to Climate Change: Choosing the Right Path. Ernst & Young. www.ey.com/GL/en/Services/Specialty-Services/Climate-Change-and-Sustainability-Services.

Fischer, Carolyn and Louis Preonas (2010). Combining policies for renewable Energy, is the Whole less than the sum of its parts? Discussion Paper. Resources for the future: 10–19. Washington, DC.

Global Climate Network (2010). Investing in Clean Energy – How can developed countries best help developing countries finance climate-friendly energy

investments? Global Climate Network discussion paper no.4. Available at: www.globalclimatenetwork.info.

Global Wind Energy Council (GWEC), (2011). Global Wind 2010 Report. Available at: http://www.gwec.net/fileadmin/documents/Publications/Global_Wind_2007_report/GWEC%20Global%20Wind%20Report%202010%20low%20res.pdf.

Hamilton, Kirsty (2010). Scaling up Renewable Energy in Developing Countries: finance and investment perspectives. Energy, Environment & Resource Governance Programme Paper 02/10. Chatham House, London, UK.

Hoffmann, Ulrich (2010). De-toxifying finance and de-carbonizing the economy: opportunities for clean and sustainable growth in developing countries. Trade and Environment Review 2009/2010 - Promoting poles of clean growth to foster the transition to a more sustainable economy. New York and Geneva: United Nations.

International Energy Agency (IEA) (2008). Deploying Renewables: Principles for Effective Policies. OECD Publishing. http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=2046.

International Labour Organization (ILO) (2011). Promoting Decent Work in a Green Economy. ILO Background Note to "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. UNEP, 2011", ILO.

Kirkegaard, Jacob Funk, Thilo Hanemann and Lutz Weischer (2009). It Should be a Breeze: Harnessing the Potential of Open Trade and Investment Flows in the Wind Energy Industry. Working Paper Series, WP 09-14, World Resource Institute, Peterson Institute for International Economics, Washington, D.C.

Kuntze, Jan-Christoph (2011). How does international law promote foreign investment into renewable electricity generation? Mimeo.

Lewis, Joanna I. (2007). Technological Acquisition and Innovation in the Developing World: Wind Turbine Development in China and India. *Studies in Comparative International Development*, Vol. 42, No. 3-4, pp. 208–232.

Lewis, Joanna I. and Ryan H. Wiser (2007). Fostering a renewable energy technology industry: An international comparison of wind indstry policy support mechanisms. *Energy Policy* 35: 1844–1857.

Perrot, Radikha and Sergey Filippov (2010). Localisation Strategies in Wind Energy Technology Development. UNU-MERIT Working Paper Series, No. 2010-047; www.merit.unu.edu.

Richards, R. Andrew (2009). Financing Green Product and Services Exports - Programs at the Export-Import Bank of the United States. *Journal of Green Building*, Vol. 4, No. 2, pp. 39–43.

United Nations Conference on Trade and Development (UNCTAD) (2011). Investment and Enterprise Responsibility Review. Analysis of investor and enterprise policies on corporate social responsibility. New York and Geneva: United Nations.

UNCTAD (2010). World Investment Report 2010: Investing in a Low-Carbon Economy. New York and Geneva: United Nations.

UNCTAD (2008). World Investment Report 2008: Transnational Corporations and the Infrastructure Challenge. New York and Geneva: United Nations.

UNCTAD (2006). World Investment Report 2006: FDI from Developing and Transition Economies – Implications for Development. New York and Geneva: United Nations.

UNCTAD (1998). World Investment Report 1998: Trends and Determinants. New York and Geneva: United Nations.

von Flotow, Paschen and Christian Friebe (2011). Politische Rahmenbedingungen für Windenergie in Schwellenländern - eine Abfrage der Präferenzen von Projektentwicklern. Abschlussbericht zur Studie. Sustainable Business Institute (SBI), Oestrich-Winkel.

Locational criteria of activities related to innovation: an econometric study of industry-level data for OECD countries*

Fabrice Hatem

Innovation-related activities have undergone steady internationalization in recent years. Host economies now need to offer a favourable environment to companies in which to develop their innovation-related activities. This paper presents an econometric study of the locational criteria of innovation-related activities. The results show the importance of market size, agglomeration effects, and, to a lesser extent, the quality of public governance, to the location of international activities in innovation-related activities. The overall degree of a country's openness to foreign direct investment also appears to be a significant locational determinant. The results give insights on the locational strategies of transnational corporations in various industries and across differing types of economy.

1. Introduction

This study sets out new evidence on the international locational criteria of innovation-related activities, derived econometrically using the OECD databases on foreign presence in the host economy at the industry level.[1]

Like most economic processes, innovation-related activities have become increasingly internationalized, due to increasing fragmentation of product value chains, and the desire of companies to locate closer to major markets and scarce resources.

For host economies, there has been a growing awareness of the need to offer a favourable environment to companies seeking to develop their innovation-related activities in the most attractive location. This concern is of special importance to developed countries relying heavily on innovation-

* This study was implemented under the auspices of the OECD's "Working Party on the globalization of industry". The author wishes to thank OECD for opening access to its databases in order to facilitate the completion of this work.

[1] At the time this study was completed in 2010, these data bases were known as "AFA" and "FATS". They are now undergoing a restructuring process, leading to the creation of the "AMNE" database.

related activities to make up for the decline of some of their traditional manufacturing industries. However, they are facing growing competition from emerging economies.

To meet this challenge, developed countries need to have a better understanding of investors' needs regarding their business environment. The knowledge corpus on locational criteria, however, remains sparse, and is focused on a limited set of specific issues. Systematic studies of specific locational criteria, allowing comparisons on a homogeneous basis, have seldom been implemented.

Another shortcoming of the existing literature is the scarcity of comparative analysis regarding the sensitivity of the results to the way explained variables are measured. There are obvious reasons to believe that the hierarchy of locational criteria may differ substantially, depending upon the nature of the activity carried out and the way it is measured.

Innovation-related activities are defined here using a two-dimensional approach (OECD, 2007): they include innovation-related industries, together with all business R&D activities regardless of industry.

According to OECD criteria, innovation-related manufacturing industries can be divided into two groups: high tech, and medium to high tech (table 1). Some service industries, considered as innovation-intensive, are also included in the study. Altogether, these activities account for not less than 34 per cent of value added, 26.1 per cent of employment, and 75.6 per cent of R&D expenditures, respectively, in the OECD economies.

Due to various limiting factors (especially the low availability of data in service industries), the present study will mainly focus on manufacturing industries.

Previous studies of locational criteria for innovation-related activities have been based on a very large array of methods and data: e.g. surveys of decision-makers, case studies and econometric studies (Hatem and Py, 2008). The existing literature also covers a wide range of geographical and industry scope.

Table 1. Innovation-related industries considered in this study

ISIC CODE	Definition	R&D status	Share in OECD countries' economies		
			Value added	Employ-ment	R&D expenditures
C24M2423	Chemicals exc. pharmaceuticals	Medium-high tech	1	0.5	4.9
C2423	Pharmaceuticals	High tech	0.6	0.2	11.6
C29	Machinery and equipment.	Medium-high tech	1.5	1.5	5.9
C30	Office and computing machinery	High tech	0.1	0.1	4.7
C31	Electrical machinery and apparatus	Medium-high tech	0.6	0.6	3
C32	Electronic equipment and components	High tech	0.7	0.6	13.8
C33	Precision and medical instruments	Medium-high tech	0.4	0.4	6.5
C34	Motor vehicles and trailers	Medium-high tech	1.3	1.1	11.8
C353	Aircrafts and spacecrafts	High tech	0.3	0.2	5.9
C64	Post and telecommu-nications	Medium-high tech	2.6	1.4	1.2
C65T67	Financial intermediation		6.7	3.4	1.1
C72	Computer-related activities		1.8	1.3	
C73	Research and development		0.3	0.4	5.2
C74	Other business activities		8.7	9.6	
Total	Innovation-related industries		34	26.1	75.6

Source: OECD, Stan database.

Note: Data for C73 refer only to companies and/or affiliates the main activity of which is R&D. It thus does not include all the R&D activities of the business sector.

For value added, data are for the year 2005 and for 19 countries.

For employment, data are for the year 2005 and for 20 countries.

For R&D, data are for the year 2005 for 19 countries. Data for C353 include all transport equipments (C3500). Data for C64 include transports (C60TC64). Data for C72 to C74 also include real estate (C70).

Very few – if any – studies so far have made a systematic comparison of locational criteria across a wide range of industries, with a broad international approach including a long list of host and home countries, and on the basis of long and detailed time series data providing aggregate information on the overall level of foreign-controlled activities by country and industry.

The OECD AFA and FATS databases (table 2) provide internationally comparable time series data on foreign presence in each of the OECD countries, by year (from 1985 onwards) and industry (up to level 2 of the ISIC rev. 3 classification). In addition, a large set of variables on foreign presence (value added, employment, R&D

expenditures, production, etc.) are available in these databases, which allows interesting comparisons on the relative importance of locational criteria depending on the kind of activity carried out abroad and/or the way it is defined.

Table 2. Databases used to analyse internationalization trends and locational criteria

Name	Developer/ owner	Contents
Databases specific to internationalization and international investment		
AFA	OECD	Aggregate data on foreign presence in OECD countries, by industries in the manufacturing and primary sectors (around 15 variables by industry, ISIC rev. 3, level 2).
FATS	OECD	Aggregate data on foreign presence in OECD countries, by industries in the services sector (around 15 variables by industry, ISIC code rev. 3 level 2).
Thomson One Banker	Thomson Reuters	Database on individual companies accounts worldwide, including foreign assets, sales, employment and affiliates.
Thomson Financial	Thomson Reuters	Database on individual M&A operations, including cross-border.
FDI markets	OCO Consulting/ Financial Times	Database in individual international greenfield investment projects worldwide (each projects being described by around 15 parameters (home and host country, date, number of jobs, industry, business function, etc.).
UNCTAD FDISTAT	UNCTAD	Aggregate data on FDI flows and stocks times series worldwide, by home and host country, and by industry.
General databases		
EU-Klems database	EU-Klems project	Database on measures of economic growth, productivity, employment creation, capital formation and technological change at the industry level for all European Union member states from 1970 onwards.
World Competitiveness Yearbook database	IMD	Database on national competitiveness criteria (around 200 criteria for 60 countries, with time series since 1989).
STAN	OECD	Structural aggregated data at the industry level for each OECD country (around 20 parameters by industry).

This study implements a panel econometric study aimed at identifying, for each of the major innovation-related industries, the

principal locational criteria of foreign activities. For each industry, this analysis covers a range of different indicators of foreign presence, in order to identify specific locational behaviour depending on the nature of the activity carried out abroad by transnational corporations (TNCs).

2. Locational criteria: a strategy to extend existing knowledge

2.1 Main findings of the existing literature

A significant amount of literature has analysed internationalization trends and locational determinants in activities related to innovation. Regarding the motives for R&D internationalization, two major driving forces have traditionally been identified. Firms invest abroad either to adapt their product and process to foreign consumers' requirements, or to augment their specific capabilities by tapping into foreign knowledge and techniques. However, the recent expansion of international R&D activities outside the Triad by TNCs, particularly in emerging Asian countries, suggests that cost and availability of large pools of scientific personnel are becoming additional important motives for R&D internationalization.

Regarding locational determinants in R&D activities, the most frequently mentioned general factors are market size, agglomeration forces, access to scientific and technical capabilities, and, increasingly, cost considerations; there is some uncertainty about intellectual property right regimes. Beyond these general determinants, locational behaviours differ, depending on the nature of the activity. Adaptive R&D facilities are more likely to be located close to the final market, while the location of innovative R&D is driven by proximity to poles of technical and scientific excellence.

High-tech industries as a whole are particularly sensitive to the availability of high- quality resources (skilled labour, scientific infrastructure, etc.), while factors relative to labour cost considerations appear to be less influential.

The author find that the use of the OECD's AFA and FATS databases to carry out additional studies on locational criteria at a detailed industry level would have the following five major advantages.

Table 3. Importance of locational factors, by industry, 2009-2011
(Per cent of companies' responses)

Sector/industry	Presence of suppliers and partners	Follow your competitors	Availability of skilled labour and talents	Cheap labour	Size of local market	Access to international/ regional market	Growth of market	Access to natural resources	Access to capital market (finance)	Government effectiveness	Incentives	Quality of infrastructure	Stable and business-friendly environment
Primary	**8.8**	**2.9**	**9.4**	**4.1**	**10.5**	**7.6**	**9.9**	**19.3**	**1.8**	**7.0**	**0.6**	**7.0**	**11.1**
Manufacturing	**10.1**	**5.0**	**8.1**	**6.5**	**17.5**	**10.0**	**15.8**	**3.4**	**2.4**	**4.0**	**2.9**	**6.1**	**8.1**
Chemicals and chemical products[a]	9.5	2.9	5.1	5.5	18.2	12.4	18.6	6.2	0.7	4.4	1.5	5.1	9.9
Electrical and electronic equipment	10.9	6.3	8.9	7.6	17.1	10.9	19.1	1.0	2.0	2.6	2.6	5.3	5.9
Food, beverages and tobacco	12.6	7.3	6.6	4.6	18.5	9.9	16.6	0.7	6.6	2.6	2.6	4.6	6.6
Motor vehicles and transportation equipment	9.8	7.0	6.0	7.4	17.7	8.8	12.6	2.8	2.8	3.7	6.5	7.4	7.4
Other heavy industry[b]	9.5	2.5	6.9	7.9	16.7	8.8	13.9	8.8	2.5	5.4	0.9	6.3	9.8
Other manufacturing	8.8	8.8	8.8	7.7	17.6	6.6	6.6	-	4.4	8.8	3.3	7.7	11.0
Pharmaceuticals	9.6	9.6	9.6	2.7	17.8	15.1	16.4	-	2.7	6.8	1.4	4.1	4.1
Professional equipment goods	10.2	3.3	13.5	5.8	17.5	8.8	16.8	1.1	0.7	2.2	4.4	7.7	8.0
Services	**9.5**	**3.7**	**8.6**	**3.7**	**17.5**	**9.2**	**17.5**	**1.5**	**5.1**	**5.8**	**1.8**	**6.8**	**9.2**
Business services	10.3	2.6	12.1	10.3	15.5	12.9	16.4	-	2.6	4.3	3.4	4.3	5.2
Electricity, gas and water	11.9	-	5.2	2.2	13.3	5.2	11.1	5.9	8.9	8.1	-	13.3	14.8
Other services	11.6	1.4	10.9	2.2	19.6	6.5	19.6	0.7	4.3	8.7	4.3	2.2	8.0
Trade	11.7	8.1	9.0	2.7	17.1	9.9	19.8	0.9	3.6	3.6	1.8	5.4	6.3
Telecommunications	5.4	2.7	6.8	2.7	25.7	10.8	27.0	-	6.8	4.1	-	2.7	5.4
Transportation	1.3	10.4	6.5	1.3	16.9	13.0	14.3	-	3.9	3.9	-	13.0	15.6
Total	**9.9**	**4.5**	**8.3**	**5.6**	**17.1**	**9.6**	**15.9**	**4.0**	**3.0**	**4.7**	**2.5**	**6.3**	**8.6**

Source: UNCTAD, 2009b.

[a] Excludes pharmaceuticals.

[b] Includes metal and metal products, non-metallic mineral products, and wood and wood products.

2.2 Presentation of the research methodology

i. The use of data on the level of foreign-controlled activities in host countries would give a more accurate view on the real magnitude of TNCs' presence abroad.

ii. The AFA and FATS databases provide homogeneous data for all OECD countries at a detailed industry level.

iii. These databases offer a long time series (1985 onwards), thus allowing the tracking of changes in locational patterns over time.

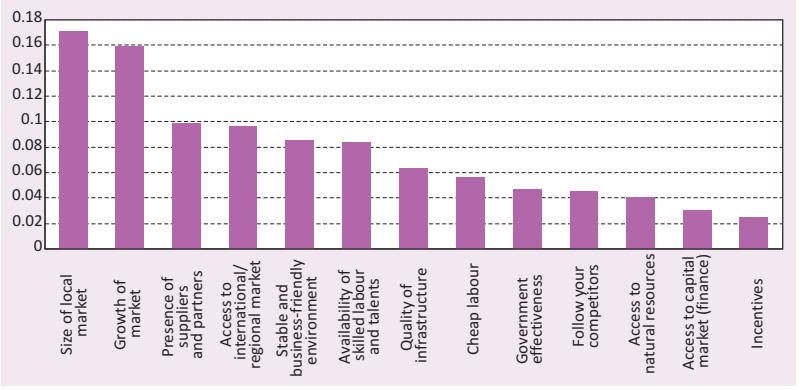
iv. The databases use standard nomenclatures and statistical concepts.

v. The databases provide indicators for a large range of foreign-controlled activities for each industry and each country: employment, value added, production, R&D expenditures, etc. This makes it possible to test the existence of specific locational criteria for each indicator.

The research methodology used in this study is empirical rather than theoretical. First, a standard explanatory model is designed on the basis of the finding of the existing literature. A database is then built in order to provide various proxies for the conceptual variable represented in the standard model. Various combinations of these proxies are then tested econometrically for each of the explained variables, respecting the structure of the standard model. The final explanatory variables are then chosen, and some components of the standard model are dropped, if none of the proxies for the component is considered significant.

The components of the standard model are taken directly from the findings of the existing literature (see UNCTAD, 2009a: 23, and figure 1). Three major motives for investing in a given country are generally identified: access to market (market-seeking, or MS), access to resources (resources-seeking, or RS) and access to low costs (efficiency-seeking, or ES). A large set of literature also insists on the existence of specific agglomeration effects (AG). The quality of the business environment (BE) and the openness of the country to foreign investment (OC) are further relevant factors for the location of investment.

Figure 1. Major location factor, all industries, by order of importance, 2009
(Share of companies' responses)



Source: UNCTAD, 2009b

The specific importance of various locational criteria is as follows:

i. **Market.** Proximity to the customer is an important locational determinant in innovation-related activities (figure 2). At the upstream stage, it meets the need for a strong interaction between supplier and customer for the development of the product. At a more downstream stage, the location of production facilities close to the final market also has many advantages (lower transport costs, more reliable supply chain, bypassing tariff and non-tariff barriers, better adaptation of the product to local regulations or customer requirements, etc.). However, in some industries the location of mass production facilities may be more sensitive to the availability of low-cost and efficient labour, than to proximity to market.

ii. **Human resources (quality).** This is an especially important locational criterion for the upstream part of the product development process (R&D, design, pilot production, etc.). This explains in particular why there has so far been only limited offshoring of upstream R&D activities, motivated purely by cost-related issues. This criterion is also important for other segments of the value chain, but to a lesser extent.

iii. **Human resources (costs).** In some innovation-related activities, manufacturing standard/mature components and assembled

products (notably microcomputers) can be very cost-sensitive and thus is prone to be located in countries where labour costs are lower. Similarly, some development and R&D support activities can also be sensitive to the existence of a large pool of qualified and cheap labour.

iv. **Co-location effects.** In some industries, development and application centres are frequently located close to production facilities. Production can also attract some last-phase development activities, such as production engineering, sustaining engineering, pilot production, testing, design review and prototype processes. But the dominant trend is one of fragmentation of the value chain, allowing a separate location of each of its components into different sites.

v. **Presence of suppliers and industrial agglomeration effects.** The overall quality of the industrial environment is an important locational criterion. This includes the existence of a large labour market, the presence of skills, activities and infrastructures necessary for the completion of the activity, and of a high-level technical environment (including the presence of suppliers, competitors, and potential partners). This leads to the existence of strong agglomeration and specialization effects.

vi. **Scientific infrastructure.** The intrinsic quality of public and academic research institutions, and also the potential for partnership that they may offer to companies, are important overall for the location of fundamental and upstream research.

vii. **Other infrastructure and public policies.** General infrastructure may also play a role, in particular for the location of high-tech production capabilities. Public policy regarding research, education, innovation, the development of large IT infrastructure (web, broadband, telecommunications) may play a role in stimulating innovation in the related industries.

viii. **Administrative and legal environment.** Being highly dependent on patents, intellectual property rights protection issues are important. Construction and planning regulations can also be a major issue.

ix. **Incentives and taxes.** While incentives are not a very important locational determinant in general, companies may be sensitive to the existence of favourable tax rules on R&D, and incentives

may play an important role in the final stages of the decision-making process for the location of international activities.

x. **Capital market.** The presence of an active capital market is not generally a major direct determinant of FDI in innovation-intensive industries.

On the basis of this general approach, various presentations of the explained variable could be considered. The most interesting one, at first sight, would be to explain a given country's share of the total foreign presence in the OECD ($FP_{ij}(t)/\sum FP_i(t)$) by its relative competitive advantages, compared to the OECD average. The basic structural formulation would then be:

(1) $FP_{ij}/\sum FP_i = F(MS_{ij}/\sum MS_i, RS_{ij}/M\_RS_i, ES_{ij}/M\_ES_i, BE_{ij}/M\_BE_i, OC_{ij}/M\_OC_i)$,

where :
FP is the level of foreign presence
MS the indicator of market size
RS the indicator of quality of resources
ES the indicator of costs level
BE the indicator of quality of business environment
OC the indicator of openness to international investment.[2]

This formulation accommodates the notion of "market share" related to the concept of attractiveness. However, this approach has three major weaknesses: 1) it does not explain either the overall growth or the actual level of the global foreign activities of TNCs in a given industry; 2) it is limited to OECD countries and does not explain (or even track) the overall loss of market share by this group of countries to the emerging economies; 3) it supposes that data on foreign presence are available for all OECD countries for all years. As this last condition is far from being true, it is impossible to measure a reliable $\sum FP_i(t)$ variable. The $FP_{ij}(t)/\sum FP_i(t)$ ratio (measuring the market share of country j in the total foreign presence in industry i for OECD countries) can thus not be measured.

[2] In this formulation, indices have to be read as follows: for each of the preceding variables, $X_{ij}(t)$ represents the value of the given variable X (resp. FP, MS, ES, OC, etc.) for industry i in country j, year t, $\sum X_i(t)$ represents the value of the given variable X (resp. FP, MS, ES, OC, etc.) for industry i for all OECD countries, year t, and $M\_X_i(t)$ represent the average value of the given variable X (resp. FP, MS, ES, OC, etc.) for industry i in all OECD countries, year t.

For these reasons, we prefer to try to explain the absolute value of the presence of foreign activities for each OECD in a given industry. The structural equation is then:

(2) $FP_{ij} = F(MS_{ij}, RS_{ij}, ES_{ij}, BE_{ij}, AG_{ij}, OC_{ij})$,

where the variables have the same meanings as in equation (1). For each of these variables, $X_{ij}(j)$ represents the value of the given variable X (resp. FP, MS, ES, OC, etc.) for industry i in country j, year t.

Using the log form usually adopted in the literature,[3] we find as a testable functional form:

(3) $\log(FP_{ij}) = \log(MS_{ij})+\log(RS_{ij})+\log(ES_{ij})+ \log(BE_{ij})+\log(AG_{ij})+\log(OC_{ij}) +C_j$,

where the variables have the same meanings as in equations (1) and (2). The constant term C takes different values, reflecting country specificities not taken into account in the generic formulation (2). This generic functional form will thus be the one tested in our study.

The tests were carried out for three different explained variables: 1) foreign-controlled value added; 2) foreign-controlled employment; and 3) foreign-controlled R&D expenditure.[4] Each of these three approaches is aimed at analysing locational determinants at different steps of the value chain or for different aspects of the companies' activities. In particular, the second series of test sheds light on specific locational determinants for the most labour-intensive activities, while the third will help explain better how companies locate their R&D activities abroad.

These tests were carried out separately for each industry, rather than implementing a two-dimension panel study by industry and country, to identify a specific set of values for the potential explanatory variables in each industry, and to allow cross-industry comparisons.

The tests were carried out only for the innovation-related industries listed in table 1, and thus not implemented for low and medium-low tech industries. This, however, does not allow the

[3] We drop in this empirical approach the theoretical and mathematical developments justifying this very common formulation. To get an idea of these standard developments, see Hatem and Py (2008b).

[4] Two additional series of tests were finally added for the two following explained variables: FDI stocks and the number of foreign affiliates.

identification of industry-specific locational criteria for innovation-related industries, as compared with other industries. To remedy this, tests were carried out systematically on the overall manufacturing sector, in order to offer global elements of comparison.

Another choice was not to introduce, at that step, lagged or moving average variables, notwithstanding the fact that the actual level of foreign activity in a country is the result of past locational decisions, made on the basis of past values of the explanatory variables. The absence of certain data from the time series used would have dramatically reduced the number of available observations, thus impacting negatively on the quality of the econometric tests.

Some of the explanatory variables (for instance those measuring agglomeration effects or market size) are described in the database as industry-specific, while others (for instance those relating to the business environment or the overall degree of openness of the economy to foreign investment) have the same value whatever the industry.

2.3 Building the model and the database

Three major explained variables were selected (table 4): foreign-controlled value added, foreign-controlled employment and foreign-controlled R&D expenditures.[5]

For the following indicators, the explanatory variables that were tested are as set out below:

i. **Market-seeking behaviour**: national GDP and the regional accessible market (measured by potential GDP[6]).

[5] Two additional series of tests were carried out on FDI stocks and the number of foreign affiliates.

[6] For a given country, the potential GDP is defined, using the Harris approach, as the sum of all markets in the world, weighted by their distance from the country concerned. The distance indicator used is CEPII's distw (distance between the major cities of the countries, weighted by their population). In the study, it was however decided to put a cap on the distance of the country to itself, in order to avoid unexpected effects, such as having the United States accounting for more than 50 per cent of Australia's potential GDP, or Austria's potential GDP equivalent to the United States one, as would be the case if the usual way of rating Harris's potential GDP had been followed. The cap chosen was the auto-distance of the smallest OECD country (e.g. Luxembourg) according to the Distw variable (Mayer, 2008). This allows more weight to be given to the country's

Table 4. Main variables used in the econometric study

Name	Contents	Source
$VAE_{i,j}(t)$	Foreign-controlled value added in industry I for country j, year t, current value in national currency	OECD (AFA and FAST databases)
$EMPE_{i,j}(t)$	Foreign-controlled employment in industry I for country j, year t, current value in national currency	OECD (AFA and FAST databases)
$RDE_{i,j}(t)$	Foreign-controlled R&D expenditures in industry i for country j, year t, current value in national currency	OECD (AFA and FAST databases)
$FDI_{i,j}(t)$	Foreign direct investment in industry i for country j, year t, current value in national currency	OECD (AFA and FAST databases)
$NUMBE_{i,j}(t)$	Foreign-controlled affiliates in industry i for country j, year t number of units	OECD (AFA and FAST databases)
$VA_{i,j}(t)$	Value added in industry i for country j, year t, current value in national currency	OECD (STAN database)
$EMP_{i,j}(t)$	Employment in industry i for country j, year t, current value in national currency	OECD (STAN database)
$RD_{i,j}(t)$	Total domestic R&D expenditures in industry I, country j, year t, current value in national currency	OECD (AFA and FAST database)
$GDP_j(t)$	GDP in country j, year t, current value in national currency	OECD
$FRAT_j(t)$	Total FDI inward stocks/GDP ratio, country j, year t	OECD,UNCTAD
$PIBPOT_j(t)$	Potential GDP, current US$ value, country j, year t (see calculation method in the main text)	Author's calculation, based on OECD and CEPII data
$TXCH_j(t)$	Exchange rate of the national currency against US$, country j, year t	
$BREV_j(t)$	Number of patents granted to residents in country j, year t	OECD (STAN database)
$RD_j(t)$	Total R&D expenditures in the business sector in country j, year t, current value in national currency	OECD (STAN database)
$NUMB_{i,j}(t)$	Total number of companies in industry i for country j, year t	OECD (STAN database)
$STOCK_{i,j}(t)$	Fixed capital stocks in industry i for country j, year t, current value in national currency	OECD (national accounts
$INDSSAL_j(t)$	Hourly wage compensation costs, current US$ value, country j, year t	United States Bureau of Labor Statistics
$HQ_j(t)$	Share of highly qualified workers in the total working population in the business sector, country j, year t	U-KLEMS database
$MQ_j(t)$	Share of medium qualified workers in the total working population in the business sector, country j, year t	U-KLEMS database
EDUCj(t)	Capability of the local workforce to meet the needs of the business sector, country j, year t (response to an opinion survey among local business executives)	IMD, Global competitiveness Yearbook database
ENVj(t)	Government efficiency ranking index , country j, year t (composite index of around 15 quantitative and qualitative variables). The higher the index, the lower government efficiency.	IMD, Global competitiveness Yearbook database

own GDP in the rating of its potential GDP than would be the case in the usual "Harris" approach, especially in the case of very large countries such as the United States or Australia.

ii. **Resource-seeking behaviour**: 1) total global R&D expenditure, both global and industry-level; 2) total number of patents filed by a country's residents; 3) share of highly and medium skilled worker in the total working population in the business sector; 4) judgement of the country's business executives on the capability of the local workforce to meet the needs of the business sector.

iii. **Efficiency-seeking behaviour**; hourly labour compensation costs for workers in the manufacturing sector, expressed in current US$ terms.

iv. **Business environment and openness to foreign presence**: the overall index of government efficiency, rated yearly by IMD, and the ratio of FDI inward stocks to GDP.

v. **Agglomeration effects and country's specific capabilities in the activities concerned**: various explanatory variables were chosen, depending on the explained variable.

All variables originally expressed in national currency were converted into current US dollars using the $TXCH_j(t)$ variable (table 4). In consequence, all variables used in the equation displayed below are expressed in current US dollar terms.

Tests were carried out using the e-views software. The validity of the panel specification – as compared to ordinary least squares – was systematically tested, with positive results in practically all cases. All the tests presented in this paper are thus based on the panel approach with fixed effects for the constant variables, using white period standard errors and covariance, with no d.f. correction.

3. The results: how companies optimize the geographical location of their value chain

The results of the econometric study suggest the existence of a standard locational determinants for TNCs to optimize the location of the various stages of their value chain. This conclusion seems to be supported by examination of other sources of data at the world level.

3.1 Specific locational criteria depending on the nature of activity

The standard model (3) was tested for three major explained variables (value added, employment and R&D expenditure), plus two additional ones in order to corroborate these findings (FDI stocks and number of foreign affiliates). The results show that, beyond some common determinants (notably access to market), the location of R&D expenditure is more sensitive to the overall R&D propensity of the host country, while the location of employment (in terms of headcount) is significantly influenced by labour costs.

Results differ widely between industries. However, the low number of observations weakens the reliability of the results obtained for some activities, especially aircraft, financial services and telecommunications.

Foreign-controlled value added

Various empirical tests led to the following formulation as the one giving the most satisfactory results (table 5):

$$\textbf{(4) } \log(VAE_{i,j}) = F(\log(PIBPOT_j), \log(FRAT_j), \log(VA_{i,j}/GDP_{i,j}), C) \textbf{ ,}$$

(F = linear equation, panel regression with fixed effects)[7]

All reference to production costs has been dropped, as wage levels were not identified as a significant locational criterion in any of the formulations tested. The "government efficiency index" variable appeared with the expected sign in most of the cases, but was not very significant, and thus also was dropped from our standard model. The "labour quality" variables were found to be quite significant in some formulations, but turned out to be insignificant each time the VA or VA/GDP variables were introduced, the latter probably capturing most of the explanatory power of the former.

One of the most reliable findings is the very strong explanatory power of the "access to market" variable, which turns out to be significant for a very large array of specifications. This is true whatever

[7] For the definition of the variables mentioned in equation (4), please refer to table 4.

the variable used to measure the market (national GDP8 or potential GDP).

Another important finding is the importance of "agglomeration" and/or "country specialization" effects. Investors in innovation-related industries are more likely to create value added in countries where there is already a high level of activity and/or which are very specialized in their industry. As for the previous explanatory variables, this result seems to be quite robust to the overall formulation of the econometric equation, as well as to the choice of the variable used to measure the agglomeration effect.9

The third quite significant explanatory variable is the overall openness of the country to foreign investors, measured in our equation by the ratio FRATj(t) (total inward FDI stocks/GDP): a country globally opened to FDI will attract more projects in a given industry than a more closed one.

Results by industry are satisfactory for most of the manufacturing activities, with the exception of C353 and C30. For C353, It should be noted that locational decisions in the aircraft and space industries are frequently subject to strong political influence. These might not be fully explained in straightforward economic terms. For C30, an analysis of country data shows the existence of many statistical breaks, due to either large M&As, or to a change in the industry classification of some foreign affiliates (see also detailed industry analysis below).

Foreign-controlled R&D expenditures

Various empirical tests have led to the following econometric formulation (equation (5) and table 6):

$$(5)\ \log(RDE_{i,j}) = F\ (\log(PIBPOT_j),\ \log(RD_{i,j}/VA_{i,j}),\ \log(VAE_{i,j}/VA_{i,j}),\ \log(VA_{i,j}/GDP_j),\ C)$$

(F = linear equation, panel regression with fixed effects)[10]

[8] Results are not shown for this explanatory variable.

[9] In the results presented here, an indicator of country specialization VA_{ij}/GDP_j was used, but the results remain quite good when using an indicator of industry activity in absolute levels, such as VA_{ij}

[10] For the definition of the variables mentioned in equation (5), please refer to table 4.

Table 5. Determinants of foreign-controlled value added location in OECD countries (standard model)

	VA_i/GDP	PIBPOT	FRAT	C	OBS.	LK FCT	ADJ R2
VAE_ C15T37	1.2 (0.5)**	1.6 (0.3)***	0.4 (0.1)***	- 29.0 (10.0)**	168	14.6	0.97
VAE_ C24-2423	1.8 (0.2)***	0.7 (0.5)	0.3 (0.1)***	- 21.6 (8.6)***	104	5.1	0.96
VAE_ 2423	1.9 (0.5)***	0.6 (0.6)	1.0 (0.4)**	- 20.3 (7.7)***	109	- 86.3	0.89
VAE_ C29T33	1.0 (0.4)**	1.3 (0.2)***	0.1 (0.1)	- 21.8 (8.1)***	73	32.2	0.98
VAE_C29	0.3 (0.3)*	1.9 (0.4)**	-0.2 (0.5)	-23.2 (4.8)***	119	-38.1	0.93
VAE_ C30T33	0.3 (0.2)*	0.9 (0.2)***	0.3 (0.2)*	-9.8 (4.4)**	85	12.1	0.96
VAE_ C30	- 0.3 (0.8)	- 0.2 (1.2)	- 0.5 (0.2)**	13.7 (21.6)	95	-138.2	0.64
VAE_ C31	0.2 (0.6)	0.9 (0.7)	0.4 (0.4)	- 9.4 (12.9)	135	- 96.9	0.83
VAE _C32	0.8 (0.3)***	1.1 (0.5)**	0.2 (0.3)	- 17.1 (9.2)*	126	- 73.7	0.90
VAE_ C33	0.7 (0.3)***	2.1 (0.3)***	0.3 (0.1)**	- 31.2 (5.6)***	131	- 8.7	0.97
VAE_ C34	0.5 (0.4)	0.6 (0.9)	1.6 (05)***	-11.6 (15.7)	116	- 100.4	0.89
VAE_ C353	0.4 (0.9)	1.6 (1.4)	0.8 (1.0)	- 23.4 (15.4)	32	- 36.1	0.84
VAE_ C64	- 0.2 (1.1)	1.8 (0.9)**	1.7 (1.0)*	- 27.5 (8.6)***	40	- 8.2	0.81
VAE_ C65C67	0.6 (0.0)***	2.5 (0.0)***	1.8 (0.0)***	- 34.6 (0.0)***	11	43.0	0.95
VAE_ C72	1.6 (0.2)***	1.6 (0.2)***	0.4 (0.2)	- 11.4 (2.7)***	87	- 47.4	0.92
VAE_ C73	0.5 (0.1)***	2.3 (1.1)**	0.9 (0.7)	- 30.5 (14.4)**	73	- 58.4	0.91
VAE_ C74	0.2 (0.2)	1.7 (0.3)***	0.7 (0.2)***	- 19.4 (5.4)***	88	- 60.0	0.87

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

This equation has been tested for manufacturing industries only. As in the case of value added, an indicator of market potential, the PIBPOT variable, has a very significant positive impact on the location of R&D expenditures in most of the innovation-related industries. This finding is resilient to the choice of the market indicator, as the national GDP also appeared very robust in alternative formulations.[11] This

[11] Results are not reproduced here.

confirms the importance of proximity to market for the location of R&D (especially downstream R&D: development and support).

The existence of co-location effects between R&D and production activities was tested by introducing the VA_i/GDP and VAE_i/VA variables. These two variables have a positive and quite significant impact in a majority of the industries for which the equation was tested. This means that the more a country is specialized in a certain industry in terms of value added or production, and the more the industry is foreign-controlled, the more it will also attract foreign-controlled R&D.

The RD_i/VA_i ratio was introduced in the equation in order to control the impact of the innovation-intensity of the industry on the results. This variable has a positive and significant impact on the overall level of foreign-controlled R&D: the absolute level of foreign-controlled R&D is higher when the industry is more technology-intensive.

Table 6. Determinants of foreign-controlled R&D expenditure location in OECD countries (standard model)

	RD_i/VA_i	VA_i/GDP	VAE_i/VAi	PIBPOT	C	OBS.	LK FCT	ADJ R2
RDE_ C15T37	0.7 (0.2)***	0.9 (0.3)***	1.2 (0.2)***	1.2 (0.1)***	10.1 (5.4)*	80	34.5	0.99
RDE_ C24-2423	0.5 (0.3)	0.6 (0.6)	1.2 (0.4)**	0.8 (0.5)*	13.0 (9.5)	61	- 7	0.96
RDE_ 2423	0.5 (0.3)*	0.6 (0.2)***	1.6 (0.05)***	1.7 (0.1)***	5.8 (3.4)*	61	- 19.2	0.98
RDE_ C29T33	-0.3 (0.4)	0.2 (0.5)	0.9 (0.5) *	1 (0.3) ***	- 3.2 (11.2)	57	- 9.0	0.95
RDE_C29	0.3 (0.3)	- 0.3 (0.2)	0.9 (0.1) ***	1.2 (0.3) ***	9.2 (6.2)	70	- 21.0	0.95
RDE_ C30T33	0.2 (0.3)	1.0 (0.4)**	0.9 (0.2)***	2.1 (0.4)***	-19.5 (6.7)***	50	1.2	0.94
RDE_ C30	0.5 (0.3)*	1.1 (0.7)	1.4 (0.3)***	1.4 (1.8)	1.4 (26.7)	48	-65.8	0.89
RDE_ C31	0.8 (0.5)	1.3 (0.9)	1.2 (0.1)***	1.6 (0.6)**	1.0 (14.3)	58	-49.5	0.91
RDE _C32	-0.3 (0.6)	0.8 (0.7)	1.4 (0.3)***	1.1 (0.8)	- 1.6 (11.4)	53	- 46.9	0.92
RDE_ C33	0.6 (0.2)***	1.9 (0.4)***	1.2 (0.5)***	1.7 (0.6)***	- 9.0 (9.5)	67	- 56.2	0.93
RDE_ C34	1.1 (0.4)***	1.1 (0.2)***	1.5 (0.1)***	1.9 (0.3)***	6.0 (4.8)	54	- 27.99	0.95
RDE_ C353	0.1 (0.2)	0.3 (0.3)	0.2 (0.0)***	1.0 (0.1)***	- 11.3 (1.1)***	14	24.6	1.0

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Other explanatory variables were not significant and thus were dropped from the final formulation: this was the case with labour costs, and also – perhaps surprisingly – with indicators of quality and/or qualification levels of the working population.[12]

Foreign-controlled employment

After various empirical tests, the following econometric formulation was selected as our standard model (equation 6 and table 7):

$$\textbf{(6) } \log(EMPE_{i,j}) = F(\log(VAE_{i,j}), \log(ENVT_j), \log(INDSSAL_j), C)$$

(F = linear equation, panel regression with fixed effects)[13]

For a given level of foreign-controlled value added in the country, the level of employment in foreign affiliates is negatively and significantly correlated to labour costs – companies locate the most labour-intensive segments of their value chain in countries with lower labour costs.

Another interesting finding is the positive and rather significant impact of government effectiveness in the location of foreign-controlled jobs.

The skills and qualifications variables (HQ and EDUC), however, give quite disappointing results. A positive impact, might have been expected. This is not the case, and in some industries, this variable even takes a negative sign. It thus unfortunately had to be dropped from the standard model.

[12] An empirical analysis of data shows that this last indicator is in fact not strongly correlated with the overall R&D intensity of the country, as illustrated by the case of Germany (high level of R&D expenditures, but quite limited share of highly educated workers in the total population).

[13] For the definition of the variables mentioned in equation (6), please refer to table 4.

Table 7. Determinants of foreign-controlled employment location in OECD countries (standard model)

	ENVT	INDSSAL	VAE_i	C	OBS.	LK FCT	ADJ R2
EE_ C15T37	- 0.1 (0.1)	- 0.3 (0.1) ***	0.6 (0.1) ***	6.0 (1.0) ***	132	145.7	0.99
EE_ C24-2423	- 0.1 (0.0) *	- 0,3 (0.1) **	0.2 (0.1) ***	8.4 (0.6) ***	82	89	0.995
EE_ 2423	0.0 (0.1)	- 0.7 (0.2) ***	0.5 (0.1) ***	5.2 (0.4) ***	82	69.7	0.995
EE_ C29T33	- 0.2 (0.1)*	-0.6 (0.1) ***	0.5 (0.1) ***	6.7 (0.7) ***	78	86.6	0.99
EE_ C29	0.0 (0.1)	- 1.1 (0.1) ***	0.8 (0.1) ***	3.7 (0.4) ***	122	108.0	0.99
EE_ C30T33	- 0.1 (0.0) **	- 1.0 (0.2) ***	0.6 (0.1) ***	5.8 (1.0)	89	78.8	0.99
EE_ C30	- 0.1 (0.2)	- 1.0 (0.5) **	0.7 (0.1) ***	3.9 (0.5) ***	76	- 17.8	0.94
EE_ C31	- 0.1 (0.1)	- 1.5 (0.3) ***	0.7 (0.0) ***	4.1 (0.2) ***	108	20.1	0.97
EE _C32	- 0.2 (0.1)	- 1.3 (0.2) ***	0.6 (0.1) ***	4.7 (0.4) ***	100	38.8	0.98
EE_ C33	- 0.1 (0.0) ***	0.0 (0.3)	0.5 (0.1) ***	6.0 (0.6) ***	98	57.8	0.98
EE_ C34	- 0.2 (0.1)	- 1.0 (0. 1) ***	0.8 (0.0) ***	4.0 (0.4) ***	94	40.6	0.99
EE_ C353	0.0 (0.2)	- 0.1 (0.2)	0.8 (0.0) ***	3.5 (0.3) ***	35	21.2	0.99
EE_ C64	- 0.2 (0.5)	- 1.5 (0.5) ***	1.0 (0.1) ***	1.7 (0.6) ***	38	10.3	0.91
EE_ C65T67	- 0.7 (0.1) ***	- 0.4 (0.4)	(0.7 (0.1) ***	4.4 (1.4) ***	19	2.53	0.95
EE_ C72	0.1 (0.1)	0.0 (0.3)	0.5 (0.1) ***	6.1 (0.6) ***	75	15.6	0.98
EE_ C73	- 0.6 (1.0)	- 0.7 (1,8)	1.2 (0.1) ***	1.4 (1.4)	62	- 91.3	0.81
EE_ C74	0.2 (0.2)	- 0.8 (0.4) **	0.7 (0.1) ***	5.5 (0.8) ***	80	- 0.33	0.99

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Two additional tests: FDI stocks and number of foreign affiliates

Two additional series of tests were carried out on the two following explained variables: FDI stocks (expressed in current dollars terms), and the number of foreign affiliates.

Taking the standard model used in the case of foreign-controlled value added, we introduced a supplementary explanatory variable, of the same nature as the explained variable: total capital stocks in the FDI equation, and number of total domestic firms in the foreign

affiliates equation. The former variable was eventually dropped from the standard model for FDI stocks, due to its low level of significance in most industries:

$$(7)\ \log (FDI_{i,j}) = F(\log(PIBPOT_j, \log(FRAT_j), \log(VA_{i,j}/GDP_{i,j}), C)$$

(F = linear equation, panel regression with fixed effects)[14]

$$(8)\ \log(NUMBE_{i,j}) = F(\log(PIBPOT_j), \log(FRAT_j), \log(ENVT_j), \log(NUMB_{i,j}), C)$$

(F = linear equation, panel regression with fixed effects)

Globally, these two equations provide a generally good explanatory power and a good level of significance for most of the parameters (tables 8 and 9), confirming some of the major findings of our standard model of "value added" location: positive and significant impact of the size of the potential market, of the overall openness of the country to FDI, and of "agglomeration" and/or "country specialization" effects. In particular, there is a significant and positive impact of total number of companies in industry i on the number of foreign affiliates in the same industry.

3.2 Analysis by industry

So far, we have not examined the existence of specificities by industry. There are strong reasons to believe that locational criteria may differ, sometimes significantly, depending on the activities. This intuition is supported by the results of our econometric regressions.

Pharmaceuticals

UNCTAD's WIPS survey (UNCTAD, 2009b, table 3) shows that locational decisions in pharmaceuticals are especially sensitive to the presence of skills and talents, to access to the regional market and to government effectiveness (pricing, licensing, IPR). Agglomeration effects also appear to be important. Locational criteria, however, differ significantly depending on the business function involved (R&D or production).

[14] For the definition of the variables mentioned in equations (7) and (8), please refer to table 5.

Table 8. Determinants of FDI location in OECD countries (standard model)

	VA$_i$/PIB	PIBPOT	FRAT	C	OBS.	LK FCT	ADJ R2
C15T37	0.3 (0.4)	1.1 (0.1) ***	0.8 (0.1) ***	- 12.2 (5.9) **	357	8.6	0.98
C24M2423	0.9 (0.2) ***	1.2 (0.2) ***	0.6 (0.2) ***	- 20.6 (3.3) ***	49	23.3	0.99
C2423	0.7 (0.7)	1.3 (0.3) ***	0.4 (0.0) ***	- 20.6 (9.0) **	53	7.3	0.99
C29t33	0.9 (0.5)*	0.4 (0.3)	0.8 (0.1)***	- 10.0 (3.1)***	56	27.9	0.99
C29	1,0 (1.0)	1.6 (0.4) ***	0.4 (0.4)	- 27.8 (11.8) **	249	- 316.5	0.88
C30t33	- 0.1 (0.4)	0.6 (0.3) *	0.8 (0.1) ***	- 2.0 (4.0)	56	7.1	0.98
C30	0.1 (0.3)	0.7 (1.2)	1.3 (0.4)***	- 10.3 (16.3)	109	- 133.4	0.91
C31	NA	NA	NA	NA	NA	NA	NA
C32	0.6 (0.3) *	0.2 (0.5)	0.8 (0.6)	- 4.3 (8.4)	154	- 216.0	0.81
C33	- 4.2 (1.2) ***	3.3 (1.1) ***	0.0 (0.2)	- 8.9 (13)	65	- 46.2	0.95
C34	0.4 (0.8)	2.3 (0.8)***	0.0 (0.6)	- 31.4 (11.3)	177	- 261.0	0.79
C352	0.5 (0.2) **	1.6 (1.0)	0.0 (0.4)	- 22.8 (13.1)*	24	8.0	0.995
C64	10.1 (3.6) **	20.2 (4.4) ***	- 1.8 (1.8)	- 251.1 (54.0)***	26	- 38	0.71
C65T67	0.1 (0.0)***	1.9 (0.2) ***	1.0 (0.1) ***	- 22.1 (3.3) ***	15	11.7	0.98
C72	0.0 (0.0)	2.7 (0.6) ***	1.4 (0.3) ***	- 38.3 (8.1) ***	36	- 22.2	0.95
C73	0.0 (0.1)	3.0 (2.0)	2.1 (0.6)***	- 47.8 (28.1)*	42	- 44.6	0.9
C74	0.0 (0.0)	1.7 (0.9)**	1.5 (0.2)***	- 20.5 (12.1)*	59	- 29.7	0.95

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Pharmaceuticals research activities are highly internationalized. The overall quality of national innovation systems (availability of skills and talents, quality of academic research and scientific infrastructure, existence of leading clusters, etc.) seems to be a major locational determinant for fundamental R&D.

For adaptation and support R&D, other factors, such as the existence of a production base, a favourable business environment (IPR regime, and drug price policy as well as the safety regulations and the licensing regime of new products), the size and growth of the market, can also be important. The final stages of the innovation process (excluding

clinical tests) may be located in the final market, to facilitate licensing procedures. The presence of a fiscal regime supportive of R&D may be a plus. Finally, R&D location is not very sensitive overall to labour costs, although limited cost-cutting offshoring has been observed in specific segments of the innovation chain (Cockburn, 2008).

Table 9. Determinants of foreign-controlled foreign affiliates location in OECD countries (standard model)

	PIBPOT	FRAT	ENVT	NE_i	C	OBS.	LK FCT	ADJ R2
C15T37	0.0 (0.3)	0.5 (0.2)***	- 0.1 (0.1)	0.0 (0.1)	5,4 (5.4)	147	- 16.0	0.92
C24 M2423	0.1 (0.1)	0.2 (0.1)**	- 0.1 (0.0)	0.2 (0.1)*	2.0 (1.9)	86	56.5	0.97
C2423	- 0.2 (0.2)	0.3 80.2)	0.0 (0.2)	0.7 (0.1)***	1.1 (2.1)	86	32.0	0.98
C29t33	0.8 (0.3)***	0.1 (0.1)*	- 0.1 (0.1)	0.1 (0.1)	- 7.6 (4.2)*	94	28.3	0.96
C29	0.4 (0.2)*	0.4 (0.1)***	- 0.1 (0.0)***	0.1 (0.1)	- 2.2 (2.7)	129	44.5	0.97
C30t33	1.1 (0.5)**	0.2 (0.1)**	- 0.1 (0.1)	0.1 (0.1)	- 12.2 (7.6)*	94	- 67.8	0.76
C30	0.1 (0.3)	0.1 (0.2)	0.2 (0.2)	0.0 (0.1)	1.5 (4.9)	102	- 11.8	0.93
C31	0.1 (0.3)	0.3 (0.1)***	0.0 (0.1)	0.2 (0.1)***	- 0.4 (3.7)	119	19.9	0.94
C32	0.4 (0.2)**	0.5 (0.2)***	- 0.1 (0.2)	0.1 (0.1)**	- 4.6 (3.5)	116	- 1.4	0.92
C33	0.8 (0.4)**	0.3 (0.1)***	- 0.2 (0.1) ***	0.1 (0.1)	- 9.6 (4.9)**	114	8.9	0.96
C34	0.6 (0.2)***	0.4 (0.2)**	0.2 (0.2)	0.2 (0.4)	- 8.1 (3.7)	108	0.3	0.95
C352	0.2 (0.4)	0.5 (0.2)***	0.1 (0.1)**	0.3 (0.1)***	- 4.4 (4.9)	71	12.6	0.97
C64 to C74	NA	NA	NA	NA	NA	NA	NA	NA

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Regarding production and value added, access to market is an important locational determinant, especially at a continental level. At the national level, the quality of business environment is important. At a more local level, pharmaceutical production is highly dependent on high-quality infrastructure, and very sensitive to cluster effects. Labour costs are not generally an important locational determinant, as manufacturing accounts for only a limited share of the total cost of the product (among R&D, marketing and distribution costs).

Most of the results of our econometric regression confirm these hypotheses (see annex). The location of value added is significantly influenced by the presence of a market, the overall openness of the economy to FDI and the specialization of the country in pharmaceuticals. The number of foreign affiliates in the country is positively and significantly correlated to the number of domestic companies. The quality of the local labour force also has a positive, although not very significant, impact on the location of foreign-controlled value added.

However, the quality of public governance, although positively correlated, does not appear to be very significant. This does not correspond with other sources, such as surveys among pharmaceutical company executives, who generally mention regulatory issues as key locational determinants in their business.

Another surprising finding is that labour costs seems to have a significantly negative impact on the location of jobs by TNCs in pharmaceuticals. This refutes our initial hypothesis.

For foreign-controlled R&D, the usual explanatory variables of our standard model, is significant with the expected sign.

Chemicals (others than pharmaceuticals)

The chemicals industry encompasses a broad scope of very specialized and interdependent activities, with complex value chains. Some chemical products (especially in intermediate goods) are difficult to transport. It is a very capital-intensive industry, employing a high share of medium to highly skilled people, but with a limited share of labour compensation in total production costs, compared to other manufacturing industries. It is thus expected that locational decisions will be influenced by proximity to markets, the existence of agglomeration effects, the quality of labour and of the industrial and administrative environment, but that labour cost will not appear as a significant factor.

Our econometric regressions confirm these hypotheses in broad terms. The location of foreign-controlled value added is positively and significantly influenced by the size of market (potential GDP), the level of specialization of the country in chemicals, the quality of government and the overall openness of the country to FDI.

Regarding employment, location is significantly influenced by the overall quality of the labour force, and the impact of labour costs is not very significant.

For foreign-controlled R&D, the usual explanatory variables of our standard model are significant, with the expected sign.

Electrical and electronics

In these industries, a global division of labour is taking shape, with upstream R&D being located mainly in proximity of major scientific clusters in developed countries, while the most labour-intensive mass production is relocating to low-wage countries, mainly in developing Asia.

Regarding upstream R&D, agglomeration effects around technological and scientific centres of excellence, the availability of skilled labour, and also proximity to market and customers, are major locational determinants.

Regarding downstream R&D activities and process innovation, there is also a co-location effect with production capacities. Some development and R&D support activities can also be cost-sensitive (availability of cheap and skilled labour).

Regarding production activities, the quality of the technical and legal environment, proximity to markets, but also in many cases the availability of large pools of labour with a good quality/cost ratio, are major locational determinants.

The results of the econometric regressions are in line with the above findings. The location of value added is found to be positively and significantly influenced by the presence of markets, the overall openness of the country to FDI and its specialization in these industries, as well as the overall quality of public governance. Foreign-controlled employment is negatively influenced by labour costs and positively (albeit not very significantly) by the quality of the labour force. All the explanatory variables of our standard R&D location model have the expected sign, even if their significance level is not very high. Each sector of the industry, however, displays specific characteristics, with a direct influence on locational criteria.

In the business machine sector, TNCs have implemented extensive globalization strategies. "Practically all the increase in computer hardware production since 1995 has taken place in developing Asia, which is now by far the leading region in the world for this activity" (Dedrick and Kraemer, 2008). However, most of the design jobs have so far remained located in the OECD area, especially in the United States.

Within the OECD, the locational pattern of foreign-controlled activities is very much influenced by the fact that many foreign investors in this activity are United States companies. This explains why the position of the United States as a host country in this industry is quite low, while most of the foreign-controlled activities – mostly affiliates of United States TNCs – take place in Western Europe, with Ireland in first position (OECD, 2007).

It might have been expected that our standard model would display a high explanatory power, with both market, agglomeration and cost effects being identified as significant location variables. However, our results have been rather disappointing, with most of the tested variables being not significant (annex). This may be due, among other causes, to the limited number of observations. In addition, the time series data show many breaks, probably due to major cross-border M&As, as this industry is characterized by a strong concentration of activities among a limited number of players.

Another possible explanation of these results might be that FDI and foreign-controlled activities might not be a good or complete enough approach to capture the internationalization of production and R&D. There is a growing trend in the PC industry to outsource development to original development manufacturers (ODMs), or to set up partnerships between PC seller and ODMs to develop products.

In the electrical industry, all the explanatory variables of our standard model appear with the expected sign, but are not in general very significant, either for value added or for R&D. Wage costs seem to have, as expected, a significant negative impact on the location of foreign-controlled jobs.

In the electronic equipment and components industry, there has been increasing vertical specialization at both company and

country level. The innovation value chain is thus rather segmented, favouring the development of international production networks, with a specialization of various countries depending on the nature of their locational advantages. In particular, a relocation trend in mass production activities has been observed from OECD countries to low-wage developing Asia. R&D activities remain far less internationalized than in other industries (Macher, 2008), and are also still largely carried out in developed countries.

These results raise high expectations regarding the capability of our standard model to provide evidence of various hierarchies of locational criteria, depending on the nature of the explained variable. The results of our econometric regression partially meet these expectations, but with some important limitations (annex). Most of the variables are significant, with the expected sign, for the location of FDI, number of affiliates, and employment. This indicates the importance of market access, agglomeration effects, and public governance, among others, for the location of these activities abroad. Employment is also sensitive, as expected, to labour costs. On the other hand, there is no evidence of the positive impact of the quality of labour force on the location of employment. The explanatory power of our standard model is quite limited in the cases of value added and R&D, with many variables appearing as not significant, although with the expected sign.

In the scientific instruments industry, most of the variables of our standard location model are significant with the expected sign, for value added as well as R&D and employment, with labour costs having a significant impact.

Machines and mechanical equipment

In this industry, it could be expected that the location of foreign-controlled activities will be especially sensitive to the existence of a favourable technical and industrial environment.

Our econometric estimates show a strong positive impact of a country's specialization in machines production on locational decisions in these activities. Proximity to market also appears to be a key locational determinant. The openness of the country to FDI and the quality of public governance also have a significant positive impact in many cases (annex). The quality of the workforce and labour cost

are also found to have a significant impact (with the expected sign) on locational decisions.

For foreign-controlled R&D, the usual explanatory variables of our standard model are significant with the expected sign.

Automotive industry

This industry has a very long product value chain (from components and equipment manufacturing to car assembly) and is also characterized by complex locational decision processes, taking into account a large number of sometimes conflicting criteria. For instance, labour costs play an important role in this very labour-intensive industry, but access to market (including to the downstream of automotive industry for equipment manufacturers) is also influential, as well as the existence of a good industrial and technical environment. It is thus expected that all the variables of our standard model will appear as significant in our regressions.

The results of our econometric regression fit these expectations quite well. The location of value added is extremely sensitive to both market size (as proxied by potential GDP) and variables related to agglomeration effects and country specialization in the automotive industry. Overall openness to FDI also appears significantly positive. Employment level is, as expected, extremely sensitive to labour costs.

For foreign-controlled R&D, the usual explanatory variables of our standard model are significant with the expected sign.

Aerospace industry

Locational decisions in the aerospace industry might seem to be somewhat difficult to analyse in strictly economic terms, due to the influence of political factors stemming from the industry's key role in national security, a factor which has also constrained internationalization of the industry in terms of FDI. An additional complication stems from the fact that the market of large segments of this industry is global in nature, and thus not clearly related to the size of the local market.

As expected, the low value of the R^2 test in our regressions show that our model has a quite limited explanatory power. However, many

of its explanatory variables have the expected sign, with a good level of significance. For instance, the location of foreign-controlled value added appears to be strongly influenced by the specialization of the domestic economy in aerospace activities, and the global openness of the country to FDI. As expected, the size of the local market (as measured by potential GDP) does not seem significant.

Regarding the location of employment, labour costs are less significant for the location of jobs abroad. Nevertheless, in recent years, some labour-intensive equipment and components manufacturers have located in cheap labour countries for cost-efficiency reasons.

It should be stressed that the number of observations available in this industry is small rendering our results less reliable.

Post and telecommunication

In this industry, location strategies are mainly focused on access to market, with relatively limited influence of local costs and access to resources. It should thus be expected that labour costs and agglomeration effects will be of less significance in our results than variables related to the size of market and openness of the country to foreign investment.

Our findings fit quite well with these expectations. For instance, the level of foreign-controlled value added is significantly influenced only by the market size and the overall level openness of the economy to FDI, and not by other variables of the standard model. There is also a negative influence of the level of wages and a positive influence of the overall education level in the country, but with a low level of significance.

Financial intermediation

The level of foreign presence in the country might be expected to be strongly influenced by three factors: the size of the local market for financial products (itself related to the size of the domestic economy); the relative specialization of the country in financial activities; and the openness of this activity to foreign investors. The level of wages is not expected to play a significant role in locational decisions.

Findings of our econometric study fit quite well with these expected results, with the level of foreign-controlled value added influenced significantly by the size of potential GDP, the specialization of the country in financial services and the overall openness of the country. There is no significant impact of labour costs on the location of jobs, but decisions regarding employment levels seem to be influenced by the share of high- and medium-qualified staff in the total working population.

R&D, computer-related activities and other business activities

It is expected that these activities, which are very intensive in skilled labour, will be especially sensitive to the level of qualifications/education level, and, for at least some of them (R&D in particular), criteria related to innovation capabilities and overall R&D efforts. Proximity to market is also supposed to play an important role. The role of labour cost may become increasingly significant in some activities.

Our econometric tests fit relatively well with these hypotheses, especially regarding the role of market access and the positive impact of the domestic economy's specialization. However, while the location of employment in computer-related and other business activities seem to be sensitive to labour costs, this does not seem to be the case for R&D activities, which have been found to be more sensitive to variables related to labour qualification.

4. An underlying generic location model

4.1 Shaping the model

The results of our five sets of econometric tests should not be considered in isolation, but as illustrating various aspects of a generic location strategy of the various components of a TNC company value chain. A stylized representation of this value chain might be as shown in figure 2.

A standard company value chain is composed of the following elements: 1) R&D (upstream/fundamental research, midstream/global product development, and downstream/product adaptation and support R&D activities); 2) production (upstream/intermediate

products and downstream/assembly of final product, each with two levels of technology intensity); and 3) distribution, sales and customer support services.

Results of the value added equations show that the location of this variable is very sensitive to the size of market, the openness of the country, and agglomeration effects. Such components of the value chain as distribution, customer support services, as well as R&D adaptation activities, might be located close to the final markets. In addition, much downstream production R&D could also be located close to the main markets and customers, with a special focus on countries offering an attractive environment due to the presence of a large industrial base and openness to international investment.

The results of the employment equations show, however, that the location of jobs is sensitive to labour costs. This might be particularly the case of the most labour-intensive components of the value chain, especially in mass production activities.

Finally, the results of the R&D expenditures equations show that the location of foreign R&D activities is very sensitive to the existence in the host country of a good scientific infrastructure and an efficient national innovation system.

On the basis of this analysis, it is possible to build a stylized representation of the optimal location of the various components of the value chain of a TNC operating in innovation-related industries, in the context of a totally globalized world economy, and with limited coordination, transaction and transportation costs (table 10).

4.2 Limitations of the model

This very simplified presentation has many limitations and shortcomings, due to five main factors considered below.

i. **High transaction and coordination costs** (e.g. tariff barriers, high transport cost for ponderous goods, loss of efficiency stemming from distance between various activities). TNCs may be reluctant to over-fragment the value chain, and/or to internationalize some of its components. Such limiting factors may restrict the explanatory power of our model, by underestimating the restraining forces to internationalization.

Figure 2. TNC product value chain: a stylized representation

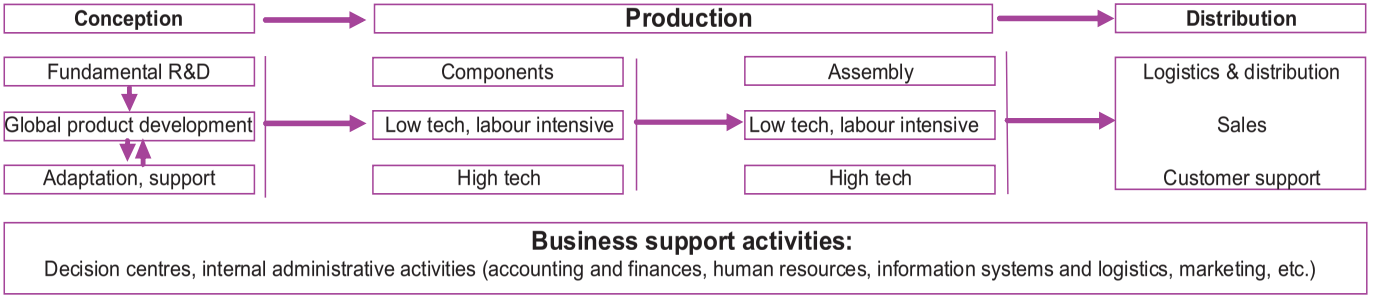


Table 10. Optimal location of the various components of the value chain

Component of the value chain		Optimal location
R&D	Upstream (fundamental R&D)	Close to scientific and industrial excellence centres (very developed countries, with availability of skills and talents)
	Midstream (global development)	Close to large industrial centres and final markets. Not indifferent to labour cost/quality ratio.
	Downstream (adaptation, support)	Close to large industrial centres and final markets.
Production	High tech	Close to final markets; in countries offering a good industrial and technical environment.
	Labour intensive, low tech	Mostly in countries offering low production costs, with a part close to large final markets.
Distribution, sales, customer support		Close to the large final markets

ii. **The non-global nature of some product value chains**. In some industries, especially in services, some products are not internationally tradable.[15] There is thus no scope for in-depth geographical fragmentation of the value chain. Complete or quasi-complete integrated value chains must thus be located, independently from each other, close to each major market.

iii. **The variable importance of certain factors in the production function**. In some innovation-related industries, labour cost plays only a limited role as a locational determinant. Access to market, the quality of business environment (both technical and regulatory), the co-location with R&D activities, play a much more important role (AFII, 2007: 20–21). Consequently there is less impetus for relocation of labour-intensive segments to low-cost countries.

iv. **The role of externalization and outsourcing**. In order to control costs and develop more resilience to market cycles, TNCs in many industries, including innovation-related industries, are implementing large-scale externalization strategies. Even R&D is now subcontracted. Our study is only focused on activities carried abroad in-house by TNCs: it cannot provide any evidence

[15] Or are subject to tariff or non-tariff barriers.

on the trade-off between internalization and externalization, which is in fact a major aspect of the underlying choice of internationalization strategies. However, the criteria behind the choice of a subcontractor might be quite similar to those influencing the locational decision of a fully owned affiliate.

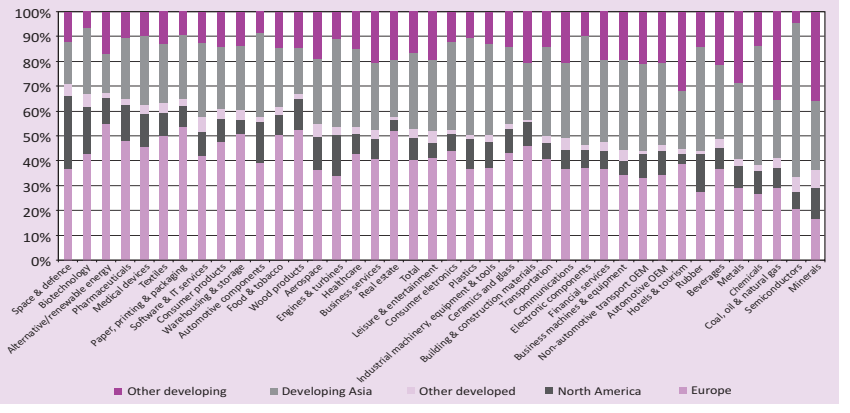
v. **The existence of business support functions not taken into account** in our location model. Some major components of a company's activities, such as decision centres, internal administration, logistics, etc. have not been explicitly analysed in our study.

4.3 Comparing our model with some empirical observations on greenfield projects

Despite its overall simplicity and the fact it has been based on tests across a limited geographical scope, the locational model described above fits quite well with some empirical observations, carried out at the world level on the basis of the FDi Markets database, regarding the location of greenfield projects.

First, OECD countries' market shares in innovation-related industries remain globally superior to those observed in some other industries, such as in light manufacturing production (figure 3). The more technologically advanced a country is, the more attractive it remains for innovation-related industries.

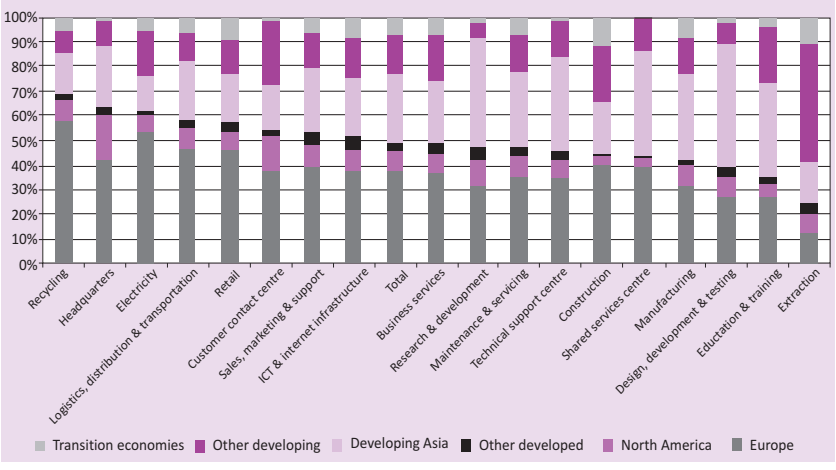
Figure 3. Greenfield projects by industry and host region, 2003-July 2009



Source: OCO Consulting, FDi Markets

Second, as regards business functions, developed countries remain more attractive for headquarters, business services and customer contact centres, than for manufacturing, extraction, and shared services centres (figure 4). Innovation-intensive and market-oriented functions are more attracted to OECD countries than are more cost-sensitive functions such as production.

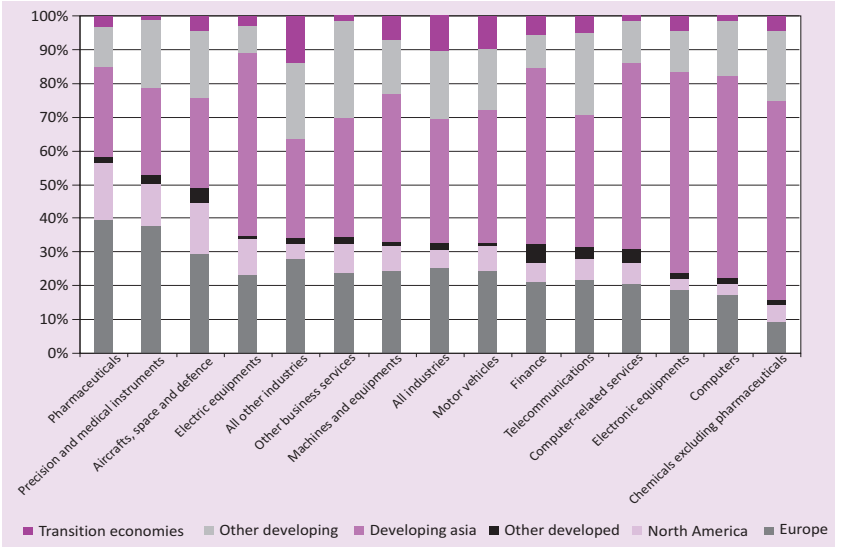
Figure 4. Greenfield projects in various business functions by host region, 2003-July 2009



Source: OCO Consulting, FDi Markets

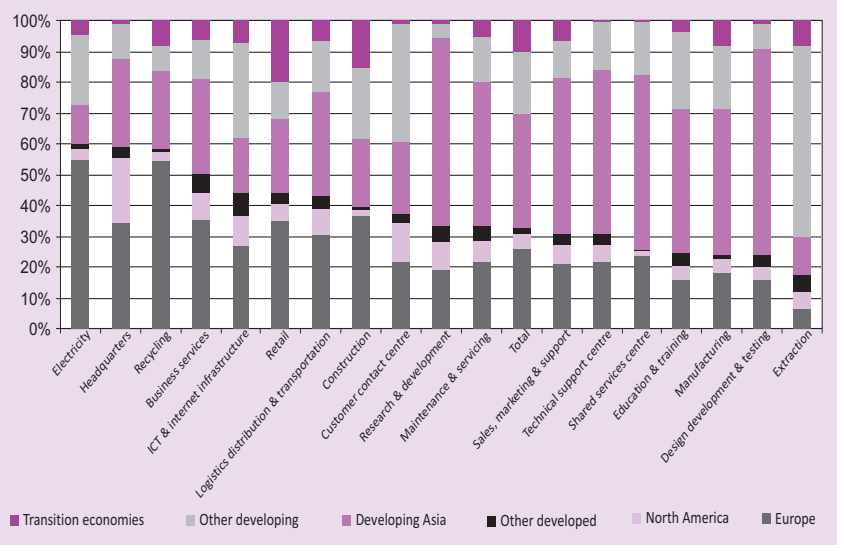
Third, in all functions and industries, the average size of projects in terms of jobs is larger in developing countries than in the OECD (figures 5 and 6).

Figure 5. Job creation related to international greenfield projects by host region according to industry, 2003-July 2009



Source: FDi Markets

Figure 6. Job creation related to international greenfield projects by home region in various business functions, 2003-July 2009



Source: FDi Markets

5. Conclusion

This study has highlighted the growing importance of TNCs' international locational decision-making for the local development of innovation-related activities, against the background of rapid internationalization of these activities. The attractiveness of the most advanced countries for innovation-related investment projects is increasingly being challenged by emerging countries, not only for cost reasons, but also due to the rapid growth of local markets and technological capabilities in those countries.

This study has identified size of markets, agglomeration effects, and openness of a country to FDI as the principal generic locational factors for international projects in innovation-related industries. The overall R&D and innovation-intensity of a country play a key role in its ability to attract R&D activities of TNCs, while labour costs impact significantly upon locational decisions for the most labour-intensive activities.

On the basis of these findings, five priorities can be identified for those countries wishing to enhance their attractiveness for international projects in innovation-related industries:

i. stimulate local markets for these activities;
ii. foster the overall quality of the national innovation system and of each of its major components (education, R&D financing and incentives, promotion of clusters, public–private partnerships, etc.) ;
iii. implement targeted promotion policies in innovation-related activities in order to attract new projects (and retain existing activities);
iv. address the question of costs (especially labour costs), in particular through fiscal reforms; and
v. improve the regulatory, administrative and technical business environment.

Annex: Some additional econometric results

Annex table 1. Determinants of foreign-controlled value added location in OECD countries (additional results)

	VA_i	VA_i/PIB	PIBPOT	FRAT	ENVT	HQ + MQ	EDUC	PIB	C	OBS.	LK FCT	ADJ R2
C15tT7		1.2 (0.5)**	1.6 (0.5)***	0.4 (0.1)***					-29.0 (10) ***	168	14.6	0.97
C24 M2423			1.1 (0.3) ***	0.2 (0.0) ***	-0.1 (0.0)**				-16.* (5.2)***	38:6	71	0.98
C2423		1 (0.4) ***	1.4 (0.3) ***	0.3 (0.2) *	-0.1 (0.1)		0.1 (0.4)		-22.5 (5.1) ***	74	18.7	0.98
C29t33		1.0 (0.4)**	1.3 (0.2)***	0.1 (0.1)					- 21.8 (8.1)***	73	32.2	0.98
C29		0.4 (0.2) **	1.7 (0.3) ***		-0.2 (0.1)				-22.2 (4.9) ***	119	-39.8	0.92
C30t33		0.3 (0.2)*	0.9 (0.2)***	0.3 (0.2)*					-9.8 (4.4)**	85	12.1	0.96
C30	0.3 (0.8)								-0.7 (17.5)	95	- 139.7	0.64
C31		0.2 (0.4)	0.5 (0.6)	1 (0.5)**	- 0.1 (0.2)				- 5.3 (9.6)	102	- 60.8	0.84
C32		0.7 (0.4) *	0.7 (0.6)	0.3 (0.5)	-0.2 (0.2)				- 11.2 (10.8)	95	- 51.4	0.89
C33		0.8 (0.3) ***	1.5 (0.2) ***	0.4 (0.1) ***	0.0 (0.1)				-24.7 (3.9) ***	91	7.2	0.97
C34		0.9 (0.4) ***	1 (0.4) **	1.4 (0.4) ***	0.0 (0.2)				- 19.2 (6.5) ***	88	- 54	0.91
C352		1.1 (0.2) ***		1.7 (0.9) *	- 0.2 (0.7)			2.6 (2.7)	- 45.0 (36.6)	28	- 17.2	0.94
C64			2.2 (0.6) ***	1.4 (0.6) **	- 0.8 (0.6)				- 30.4 (7.1) ***	41	- 7.2	0.82
C65T67		0.6 (0.0)***	2.5 (0.0)***	1.8 (0.0)***					- 34.6 (0.0)***	11	43.0	0.95
C72		1.4 (0.2) ***	1.2 (0.3) ***	0.4 (0.3)		33 (1.1) ***			- 20.3 (2.6) ***	75	- 42.5	0.92
C73		05 (0.1) ***	2.9 (1.0) ***	0.2 (0.5)	- 0.1 (0.5)				37.2 (13.5) ***	64	- 45.8	0.92
C74		0.2 (0.2)	1.7 (0.3)***	0.7 (0.2)***					- 19.4 (5.4)***	88	- 59.98	0.87

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Annex table 2. Determinants of foreign-controlled R&D expenditures location in OECD countries (additional results)

	VA_i	RD_i	RD_i/VA_i	VA_i/ PIB	VAE_i/ VA_i	PIBPOT	ENVT	PCT	RD/ PIB	C	OBS.	LK FCT	ADJ R2
C15T37			1.1 (0.3) ***	0.8 (0.4) **	1.1 (0.2) ***	1.0 (0.2) ***	0.0 (0.0)			17.7 (5.0) ***	54	28.0	0.99
C24 m2423			0.5 (0.3) *	0.8 (0.7)	1.0 (0.3) ***	0.6 (0.4)			1.0 (0.6) *	11.1 (9.5)	54	- 3.9	0.97
C2423			0.5 (0.3)*	0.6 (0.2)***	1.6 (0.05)***	1.7 (0.1)***				5.8 (3.4)*	61	- 19.2	0.98
C29t33				0.8 (0.4)*	0.7 (0.6)	1.2 (0.5)***			0.4 (0.8)	- 10.6 (17.1)	61	- 15.2	0.95
C29	1.0 (0.3) ***		0.5 (0.2) ***		1.0 (0.1) ***	0.3 (0.6)					70	- 19.2	0.96
C30t33			0.2 (0.3)	1.0 (0.4)**	0.9 (0.2)***	2.1 (0.4)***				-19.5 (6.7)***	50	1.2	0.94
C30			0.5 (0.3)*	1.1 (0.7)	1.4 (0.3)***	1.4 (1.8)				1.4 (26.7)	48	-65.8	0.89
C31			0.8 (0.5)	1.3 (0.9)	1.2 (0.1)***	1.6 (0.6)**				1.0 (14.3)	58	-49.5	0.91
C32		0.3 (0.4)	1.0 (0.3)***	1.3 (0.3) ***	0.4 (1.1)					7.4 (13.5)	53	- 46.9	0.92
C33			1.7 (0.5) ***	1.9 (0.6) ***	1.4 (0.5) ***	3.0 (1.2) **	- 0.1 (0.2)			- 7.4 (12.7)	41	36.2	0.92
C34			1.1 (0.4)***	1.1 (0.2)***	1.5 (0.1)***	1.9 (0.3)***				6.0 (4.8)	54	- 27.99	0.95
C352			0.1 (0.1)	0.1 (0.2)	0.1 (0.0) ***	1.0 (0.1) ***		0.2 (0.1)		- 13.1 3.4) ***	14	27.4	0.996
C64		NA	NA	NA	NA	NA	NA	NA	NA	NA			NA
C65T6		NA	NA	NA	NA	NA	NA	NA	NA	NA			NA
C72		NA	NA	NA	NA	NA	NA	NA	NA	NA			NA
C73		NA	NA	NA	NA	NA	NA	NA	NA	NA			NA
C74		NA	NA	NA	NA	NA	NA	NA	NA	NA			NA

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Annex table 3. Determinants of foreign-controlled employment location in OECD countries (additional results)

	FRAT	HQ+MQ	ENVT	INDSSAL	VAE_i	EDUC	C	OBS.	LK FCT	ADJ R2
C15T37				- 0.2 (0.1) **	0.5 (0.1) ***	0.0 (0.1)	6.7 (1.1) ***	151	142.9	0.99
C24 M2423			-0.1 (0.0)	- 0.3 (0.2)		0.1 (0.2)	8.3 (0.5 ***	82	89.2	0.995
C2423				- 0.8 (0.1) ***	0.7 (0.1) ***		3.5 (0.4) ***	109	43.7	0.99
C29t33			- 0.2 (0.1)*	-0.6 (0.1) ***	0.5 (0.1) ***		6.7 (0.7) ***	78	86.6	0.99
C29				- 0.7 (0.0)***	1.0 (0.0) ***	0.2 (0.1)	2.6 (0.2) ***	141	- 11.2	0.95
C30t33				- 0.9 (0.2) ***	0.6 (0.1) ***	0.0 (0.1)	5.7 (0.9) ***	101	85.3	0.99
C30				- 0.8 (0.3) ***	0.8 (0.1) ***		3.8 (0.4) ***	103	- 28.2	0.94
C31			- 0.1 (0.1)	- 1.5 (0.3) ***	0.7 (0.0) ***		4.1 (0.2) ***	108	20.1	0.97
C32			- 0.2 (0.1)	- 1.3 (0.2) ***	0.6 (0.1) ***		4.7 (0.4) ***	100	38.8	0.98
C33		0.1 (0.4)	- 0.2 (0.0) ***	0.0 (0.2)	0.4 (0.1) ***		6.0 (4.1) ***	85	60.0	0.99
C34			- 0.1 (0.1)	- 1.0 (0.1) ***	0.8 (0.0) ***	0.0 (0.1)	3.9 (0.4) ***	94	40.6	0.99
C352			0.0 (0.2)	- 0.1 (0.2)	0.8 (0.0) ***		3.5 (0.3) ***	35	21.2	0.99
C64				- 1.5 (0.6) ***	0.9 (0.1) ***	0.8 (0.3) **	0.4 (0.6)	38	12.1	0.91
C65T67	1.0 (0.4) **	8.7 (0.6) ***	- 0.8 (0.1) ***		0.3 (0.1) ***		- 34.0 (2.2)	17	9.2	0.98
C72				- 0.1 (0.3)	0.6 (0.1) ***	0.4 (0.2) **	5.1 (0.6) ***	80	9.4	0,97
C73				- 0.5 (1.7)	1.2 (0.2) ***	1.3 (2.0)	- 0.6 (2.9)	66	- 96.0	0.83
C74		0.1 (0.5)	- 1.0 (0.3) ***	0.7 (0.1) ***			4.6 (1.7)***	74	- 3.3	0.94

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Annex table 4. Determinants of FDI location in OECD countries (additional results)

	VA_i	VA_i/PIB	PIBPOT	FRAT	ENVT	$KSTO_i$	C	OBS.	LK FCT	ADJ R2
C15t37			0.4 (0.2)*	0.8 (0.1)***		0.6 (0.3)**	- 5.2 (1.6)***	163	79.7	0.99
C24 M2423		0.9 (0.2)***	1.2 (0.2)***	0.6 (0.0)***			- 20.6 (3.3)***	49	23.3	0.99
C2423		0.7 (0.7)	1.3 (0.3) ***	0.4 (0.0) ***			- 20.6 (9.0) **	53	7.3	0.99
C29t33		0.9 (0.5)*	0.4 (0.3)	0.8 (0.1)***			- 10.0 (3.1)***	56	27.9	0.99
C29			0.6 (1.2)***	0.7 (0.3)***	- 0.1 (0.1)	1.3 (0.5)***	- 16.2 (13.0)	48	- 16.2	0.88
C30t33	0.1 (0.4)		0.3 (0.8)	0.7 (0.1)***			- 2.7 (4.0)	56	7.2	0.98
C30	0.4 (0.3)		0.4 (1.4)	1.3 (0.4)***	- 0.1 (0.4)		- 13.4 (17.7)	109	- 132.6	0.91
C31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C32		0.9 (0.3)***	0.6 (0.4)	1.2 (0.2)***	- 0.4 (0.2)*		- 13.2 (5.7)**	113	- 73.8	0.95
C33			2.7 (1.0)***	0.1 (0.3)			- 34.7 (15)**	83	- 83.4	0.94
C34		0.4 (0.8)	2.3 (0.8)***	0.0 (0.6)			- 31.4 (11.3)	177	- 261.0	0.79
C352		0.2 (0.2)	3.2 (1.4)**	0.2 (0.7)	- 0.5 (0.2)		- 46.8 (18.3)**	23	10.8	0.995
C64		9.1 (3.4) **	18.7 (3.9)***				- 238.6 (50)**	26	- 38.2	0.73
C65T67			0.7 (0.3)***	1.4 (0.2)***	- 0.2 (0.0)***	0.3 (0.4)	- 8.0 (1.5)***	94	6.1	0.97
C72		0.2 (0.3)	2.7 (0.6)***	1.2 (0.2)***	0.3 (0.2)		36.6 (8.6)***	50	- 17.0	0.95
C73		0.2 (0.0)***	2.2 (1..2)*	1.2 (0.5)***	1.7 (0.6)***		- 30.8 (17.2)*	38	- 26.2	0.95
C74	0.1 (0.9)		2.0 (0.1)***				2.2 (0.9)**	59	- 36.9	0.93

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

Annex table 5. Determinants of foreign-controlled foreign affiliates location in OECD countries (additional results)

	PIBPOT	FRAT	ENVT	NE_i	C	OBS.	LK FCT	ADJ R2
C15T37		0.5 (0.1)***	- 0.1 (0.1)	0.0 (0.1)	5.1 (1.3)***	47	- 16.0	0.92
C24 M2423	0.1 (0.1)	0.2 (0.1)**	- 0.1 (0.0)	0.2 (0.1)*	2.0 (1.9)	86	56.5	0.97
C2423	- 0.2 (0.2)	0.3 80.2)	0.0 (0.2)	0.7 (0.1)***	1.1 (2.1)	86	32.0	0.98
C29t33	0.8 (0.3)***	0.1 (0.1)*	- 0.1 (0.1)	0.1 (0.1)	- 7.6 (4.2)*	94	28.3	0.96
C29	0.4 (0.2)*	0.4 (0.1)***	- 0.1 (0.0)***	0.1 (0.1)	- 2.2 (2.7)	129	44.5	0.97
C30t33	1.1 (0.5)**	0.2 (0.1)**	- 0.1 (0.1)	0.1 (0.1)	- 12.2 (7.6)*	94	- 67.8	0.76
C30	0.1 (0.3)			0.1 (0.1)	1.1 (4.0)	145	- 24.6	0.94
C31	0.2 (0.3)	0.2 (0.1)**		0.3 (0.1)**	- 1.5 (3.5)	163	- 8.0	0.92
C32	0.4 (0.2)**	0.5 (0.2)***	- 0.1 (0.2)	0.1 (0.1)**	- 4.6 (3.5)	116	- 1.4	0.92
C33	0.8 (0.4)**	0.3 (0.1)***	- 0.2 (0.1) ***	0.1 (0.1)	- 9.6 (4.9)**	114	8.9	0.96
C34	0.7 (0.2)***	0.3 (0.1)***		0.3 (0.3)	- 10.2 (3.3)***	152	- 4.7	0.96
C352	0.5 (0.3)*	0.3 (0.2)		0.2 (0.2)	- 8.0 (3.7)**	97	- 6.3	0.95
C64	NA	NA	NA	NA	NA	NA	NA	NA
C65T67	NA	NA	NA	NA	NA	NA	NA	NA
C72	NA	NA	NA	NA	NA	NA	NA	NA
C73	NA	NA	NA	NA	NA	NA	NA	NA
C74	NA	NA	NA	NA	NA	NA	NA	NA

Standard deviation between brackets. *: 10% significant. **: 5% significant. ***: 1% significant.

References

Abramowsky, L., R. Harrison and H. Simpson (2007) "University research and the location of business R&D", *The Economic Journal*, 117 (March) pp. 114–141.

AFII (2007) *2007 Report on Foreign Investment in France,* Paris, www.investinfrance.org/uploads/files-en/08–02–21_090219_AFII_bilan_UK_BD.pdf.

Arora, A. et al. (2008) "Software", in J.T. Macher and D.C Mowery (eds.), *Innovation in Global Industries, US Firms Competing in a New World*, Washington DC: The National Academic Press.

Barrios, S., M. Mas, E. Navajas and J. Quesada (2008) "Mapping the ICT in EU regions: location, employment, factors of attractiveness and economic impact", *JRC Scientific and Technical Reports* EU 23067 pp. 1–113.

Barry, F. and D. Curran (2004) "Enlargement and the European geography of the information technology sector", *The World Economy, 27(6): 901–922.*

Cockburn, I.M. (2008) "Pharmaceutical", in Macher J.T. and Mowery D.C. (eds.), *Innovation in Global Industries, US Firms Competing in a New World*, Washington DC: The National Academic Press.

Dedrick, J. and K.L. Kraemer (2008) "Personal computing" in Macher J.T. and Mowery D.C. (eds.), *Innovation in Global Industries, US Firms Competing in a New World*, Washington DC: The National Academic Press.

Florida, R. (1997) "The globalization of R&D: results of a survey of foreign-affiliated R&D laboratories in the USA", *Research Policy,* 26; 85–103.

Hart, J.A. (2008) "Flat panel display", in Macher J.T. and Mowery D.C. (eds.), *Innovation in Global Industries, US Firms Competing in a New World*, Washington DC: The National Academic Press.

Hatem, F. (2008) *Le Marketing Territorial : Principes, Méthodes et Pratiques*, Editions EMS.

Hatem, F. and L. Py (2008a) "Location factors in the activities related to innovation of multinationals: a literature review", *OECD Working Paper*, DSTI/IND/WPGI(2008)6, October.

Hatem, F. and L. Py (2008b) "Location of international investments projects in OECD", *OECD Working Paper*, DSTI/IND/WPGI(2008)4, Sept.

JBIC (2008) "Survey report on overseas business operations by Japanese manufacturing companies. Results of" JBIC FY2008 Survey, November, Tokyo.

Le Gall, S. (2007) "Les choix de localisation des projets d'investissement internationalement mobiles en France dans le secteur des technologies de l'information et de la communication", *Communication au colloque international de l'ASRDLF (Association de Science Régionale de Langue Française)* Chambéry-Grenoble, 13 juillet.

Macher, J.T. (2008) "Semiconductors", in Macher, J.T. and Mowery, D.C. (eds.), *Innovation in Global Industries, US Firms Competing in a New World*, Washington DC: The National Academic Press.

Macher, J.T. and D.C. Mowery (2008) *Innovation in Global Industries, US Firms Competing in a New World*, Washington DC: The National Academic Press.

Madhok, A. and T. Osegowitsch (2000) "The international biotechnology industry: a dynamic capabilities perspective", *Journal of International Business Studies*, 31 (2): 325–335.

Mayer, T. (2008) "Market potential and development", *CEPR Discussion Paper* 6798.

OCO (2009) *2008–2009 Review of Foreign Direct Investment*, Belfast.

OECD (2007) "The location of investment of multinationals linked to innovation", note by the secretariat, DSTI/IND/WPWI (2007) November.

Porter, M.E. (ed.) (1986) *Competition in Global Industries*. Boston, MA: Harvard Business School Press.

Sachwald, F. (2005) "*Localisation de la production en Europe: impact de l'élargissement et de la mondialisation*", in *L'industrie en France et la mondialisation*, SESSI, Ministère de l'économie, des finances et de l'industrie.

Sachwald, F. (2008) "Réseaux mondiaux d'innovation ouverte: pratique des entreprises et politiques publiques", draft report to OECD.

Serapio, M. and D. Dalton (1999) "Globalization of industrial R&D: an examination of foreign direct investments in R&D in the United States", *Research Policy*, 28: 303–316.

UNCTAD (2005*) World Investment Report 2005. Transnational Corporations and the Internationalization of R&D*. New York and Geneva: United Nations.

UNCTAD (2007) *World Investment Prospects Survey 2007–2009*, www.unctad.org/en/docs/wips2007_en.pdf.

UNCTAD (2008) *World Investment Prospects Survey 2008–2010*, www.unctad.org/en/docs/wips2007_en.pdf.

UNCTAD (2009a) *Assessing the Impact of the Current Financial and Economic Crisis on Global FDI Flows*, http://www.unctad.org/en/docs/diaeia20093_en.pdf.

UNCTAD (2009b) *World Investment Prospects Survey 2009–2011*, www.unctad.org/en/docs/wips2007_en.pdf.

UNCTAD (2009c) *World Investment Report 2009, TNCs and Agriculture*. New York and Geneva: United Nations.

UNCTAD, WTO, OECD (2009) *Report on G20 Trade and Investment Measures,* 14 Sept.

World Investment Report 2011: Non-Equity Modes of International Production and Development

KEY MESSAGES

FDI trends and prospects

Global foreign direct investment (FDI) flows rose moderately to $1.24 trillion in 2010, but were still 15 per cent below their pre-crisis average. This is in contrast to global industrial output and trade, which were back to pre-crisis levels. UNCTAD estimates that global FDI will recover to its pre-crisis level in 2011, increasing to $1.4–1.6 trillion, and approach its 2007 peak in 2013. This positive scenario holds, barring any unexpected global economic shocks that may arise from a number of risk factors still in play.

For the first time, developing and transition economies together attracted more than half of global FDI flows. Outward FDI from those economies also reached record highs, with most of their investment directed towards other countries in the South. In contrast, FDI inflows to developed countries continued to decline.

Some of the poorest regions continued to see declines in FDI flows. Flows to Africa, least developed countries, landlocked developing countries and small island developing States all fell, as did flows to South Asia. At the same time, major emerging regions, such as East and South-East Asia and Latin America experienced strong growth in FDI inflows.

International production is expanding, with foreign sales, employment and assets of transnational corporations (TNCs) all increasing. TNCs' production worldwide generated value-added of approximately $16 trillion in 2010, about a quarter of global GDP. Foreign affiliates of TNCs accounted for more than 10 per cent of global GDP and one-third of world exports.

State-owned TNCs are an important emerging source of FDI. There are at least 650 State-owned TNCs, with 8,500 foreign affiliates across the globe. While they represent less than 1 per cent of TNCs, their outward investment accounted for 11 per cent of global FDI in 2010. The ownership and governance of State-owned TNCs have raised concerns in some host countries regarding, among others, the level playing field and national security, with regulatory implications for the international expansion of these companies.

Investment policy trends

Investment liberalization and promotion remained the dominant element of recent investment policies. Nevertheless, the risk of investment protectionism has increased as restrictive investment measures and administrative procedures have accumulated over the past years.

The regime of international investment agreements (IIAs) is at the crossroads. With close to 6,100 treaties, many ongoing negotiations and multiple dispute-settlement mechanisms, it has come close to a point where it is too big and complex to handle for governments and investors alike, yet remains inadequate to cover all possible bilateral investment relationships (which would require a further 14,100 bilateral treaties). The policy discourse about the future orientation of the IIA regime and its development impact is intensifying.

FDI policies interact increasingly with industrial policies, nationally and internationally. The challenge is to manage this interaction so that the two policies work together for development. Striking a balance between building stronger domestic productive capacity on the one hand and avoiding investment and trade protectionism on the other is key, as is enhancing international coordination and cooperation.

The investment policy landscape is influenced more and more by a myriad of voluntary corporate social responsibility (CSR) standards. Governments can maximize development benefits deriving from these standards through appropriate policies, such as harmonizing corporate reporting regulations, providing capacity-building programmes, and integrating CSR standards into international investment regimes.

Non-equity modes of international production and development

In today's world, policies aimed at improving the integration of developing economies into global value chains must look beyond FDI and trade. Policymakers need to consider non-equity modes (NEMs) of international production, such as contract manufacturing, services outsourcing, contract farming, franchising, licensing, management contracts, and other types of contractual relationship through which TNCs coordinate the activities of host-country firms, without owning a stake in those firms.

Cross-border NEM activity worldwide is significant and particularly important in developing countries. It is estimated to have generated over $2 trillion of sales in 2009. Contract manufacturing and services outsourcing accounted for $1.1–1.3 trillion, franchising $330–350 billion, licensing $340–360 billion, and management contracts around $100 billion. In most cases, NEMs are growing more rapidly than the industries in which they operate.

NEMs can yield significant development benefits. They employ an estimated 14–16 million workers in developing countries. Their value added represents up to 15 per cent of GDP in some economies. Their exports account for 70–80 per cent of global exports in several industries. Overall, NEMs can support long-term industrial development by building productive capacity, including through technology dissemination and domestic enterprise development, and by helping developing countries gain access to global value chains.

NEMs also pose risks for developing countries. Employment in contract manufacturing can be highly cyclical and easily displaced. The value added contribution of NEMs can appear low if assessed in terms of the value captured out of the total global value chain. Concerns exist that TNCs may use NEMs to circumvent social and environmental standards. And to ensure success in long-term industrial development, developing countries need to mitigate the risk of remaining locked into low-value-added activities and becoming overly dependent on TNC-owned technologies and TNC-governed global value chains.

Policy matters. Maximizing development benefits from NEMs requires action in four areas. First, NEM policies need to be embedded in

overall national development strategies, aligned with trade, investment and technology policies and addressing dependency risks. Second, governments need to support efforts to build domestic productive capacity to ensure the availability of attractive business partners that can qualify as actors in global value chains. Third, promotion and facilitation of NEMs requires a strong enabling legal and institutional framework, as well as the involvement of investment promotion agencies in attracting TNC partners. Finally, policies need to address the negative consequences and risks posed by NEMs by strengthening the bargaining power of local NEM partners, safeguarding competition, protecting labour rights and the environment.

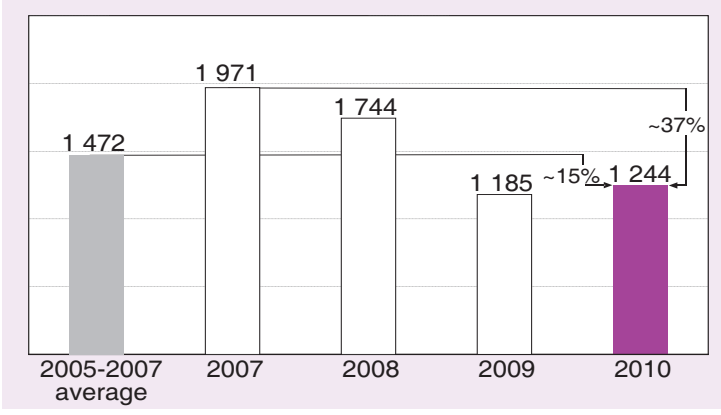
OVERVIEW

FDI TRENDS AND PROSPECTS

FDI recovery to gain momentum in 2011

Global foreign direct investment (FDI) inflows rose modestly by 5 per cent, to reach $1.24 trillion in 2010. While global industrial output and world trade are already back to their pre-crisis levels, FDI flows in 2010 remained some 15 per cent below their pre-crisis average, and nearly 37 per cent below their 2007 peak (figure 1).

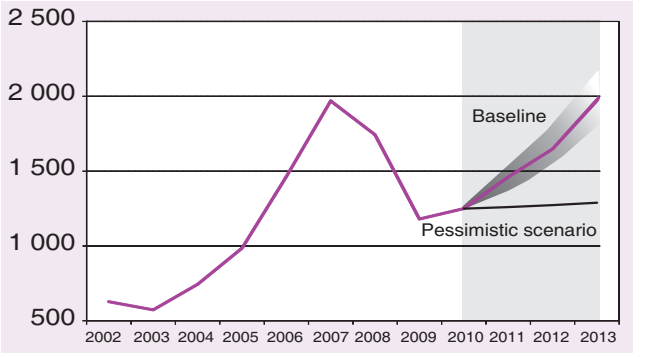
Figure 1. Global FDI inflows, average 2005–2007 and 2007 to 2010
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2011*.

UNCTAD predicts FDI flows will continue their recovery to reach $1.4–1.6 trillion, or the pre-crisis level, in 2011. They are expected to rise further to $1.7 trillion in 2012 and reach $1.9 trillion in 2013, the peak achieved in 2007 (figure 2). The record cash holdings of TNCs, ongoing corporate and industrial restructuring, rising stock market valuations and gradual exits by States from financial and non-financial firms' shareholdings, built up as supporting measures during the crisis, are creating new investment opportunities for companies across the globe.

Figure 2. Global FDI flows, 2002–2010, and projection for 2011–2013
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2011*.

However, the post-crisis business environment is still beset by uncertainties. Risk factors such as the unpredictability of global economic governance, a possible widespread sovereign debt crisis and fiscal and financial sector imbalances in some developed countries, as well as rising inflation and signs of overheating in major emerging market economies, may yet derail the FDI recovery.

Emerging economies are the new FDI powerhouses

Developing economies increased further in importance in 2010, both as recipients of FDI and as outward investors. As international production and, recently, international consumption shift to developing and transition economies, TNCs are increasingly investing in both efficiency- and market-seeking projects in those countries. For the first time, they absorbed more than half of global FDI inflows in 2010 (table 1). Half of the top-20 host economies for FDI in 2010 were developing or transition economies.

FDI outflows from developing and transition economies also increased strongly, by 21 per cent. They now account for 29 per cent of global FDI outflows. In 2010, six developing and transition economies were among the top-20 investors. The dynamism of emerging-market TNCs contrasts with the subdued pace of investment from developed-

Table 1. FDI flows, by region, 2008-2010
(Billions of dollars and per cent)

Region	FDI inflows			FDI outflows		
	2008	2009	2010	2008	2009	2010
World	1 744	1 185	1 244	1 911	1 171	1 323
Developed economies	965	603	602	1 541	851	935
Developing economies	658	511	574	309	271	328
Africa	73	60	55	10	6	7
Latin America and the Caribbean	207	141	159	81	46	76
West Asia	92	66	58	40	26	13
South, East and South-East Asia	284	242	300	178	193	232
South-East Europe and the CIS	121	72	68	60	49	61
Structurally weak, vulnerable and small economies	62.4	52.7	48.3	5.6	4.0	10.1
LDCs	33.0	26.5	26.4	3.0	0.4	1.8
LLDCs	25.4	26.2	23.0	1.7	3.8	8.4
SIDS	8.0	4.3	4.2	0.9	-	0.2
Memorandum: percentage share in world FDI flows						
Developed economies	55.3	50.9	48.4	80.7	72.7	70.7
Developing economies	37.7	43.1	46.1	16.2	23.1	24.8
Africa	4.2	5.1	4.4	0.5	0.5	0.5
Latin America and the Caribbean	11.9	11.9	12.8	4.2	3.9	5.8
West Asia	5.2	5.6	4.7	2.1	2.2	1.0
South, East and South-East Asia	16.3	20.4	24.1	9.3	16.5	17.5
South-East Europe and the CIS	6.9	6.0	5.5	3.2	4.2	4.6
Structurally weak, vulnerable and small economies	3.6	4.4	3.9	0.3	0.3	0.8
LDCs	1.9	2.2	2.1	0.2	0.0	0.1
LLDCs	1.5	2.2	1.9	0.1	0.3	0.6
SIDS	0.5	0.4	0.3	-	-	-

Source: UNCTAD, FDI/TNC database (www.unctad.org/fdistatistics).

country TNCs, especially those from Europe. Their outward investment was still only about half of their 2007 peak.

Services FDI subdued, cross-border M&As rebound

Sectoral patterns. The moderate recovery of FDI inflows in 2010 masks major sectoral differences. FDI in services, which accounted for the bulk of the decline in FDI flows due to the crisis, continued on its downward path in 2010. All the main service industries (business services, finance, transport and communications and utilities) fell, although at different speeds. FDI flows in the financial industry experienced one of the sharpest declines. The share of manufacturing rose to almost half of all FDI projects. Within manufacturing, however, investments fell in business-cycle-sensitive industries such as metal and electronics. The chemical industry (including pharmaceuticals) remained resilient through the crisis, while industries such as food, beverages and tobacco, textiles and garments, and automobiles, recovered in 2010. FDI in extractive industries (which did not suffer during the crisis) declined in 2010.

Modes of entry. The value of cross-border M&A deals increased by 36 per cent in 2010, but was still only around one-third of the previous peak in 2007. The value of cross-border M&As into developing economies doubled. Greenfield investments declined in 2010, but registered a significant rise in both value and number during the first five months of 2011.

Components of FDI. Improved economic performance in many parts of the world and increased profits of foreign affiliates lifted reinvested earnings to nearly double their 2009 level. The other two FDI components – equity investment flows and intra-company loans – fell in 2010.

Special funds. Private equity-sponsored FDI started to recover in 2010 and was directed increasingly towards developing and transition economies. However, it was still more than 70 per cent below the peak year of 2007. FDI by sovereign wealth funds (SWFs) dropped to $10 billion in 2010, down from $26.5 billion in 2009. A more benign global economic environment may lead to increased FDI from these special funds in 2011.

International production picks up

Indicators of international production, including foreign sales, employment and assets of TNCs, showed gains in 2010 as economic conditions improved (table 2). UNCTAD estimates that sales and value added of foreign affiliates in the world reached $33 trillion and $7 trillion, respectively. They also exported more than $6 trillion, about one-third of global exports. TNCs worldwide, in their operations both at home and abroad, generated value added of approximately $16 trillion in 2010 – about a quarter of total world GDP.

State-owned TNCs in the spotlight

State-owned TNCs are causing concerns in a number of host countries regarding national security, the level playing field for competing firms, and governance and transparency. From the perspective of home countries, there are concerns regarding the openness to investment from their State-owned TNCs. Discussions are underway in some international forums with a view to addressing these issues.

Table 2. Selected indicators of FDI and international production, 1990–2010

Item	Value at current prices (Billions of dollars)					Annual growth rate or change on return (Per cent)				
	1990	2005–2007 average	2008	2009	2010	1991–1995	1996–2000	2001–2005	2009	2010
FDI inflows	207	1 472	1 744	1 185	1 244	22.5	40.1	5.3	-32.1	4.9
FDI outflows	241	1 487	1 911	1 171	1 323	16.9	36.3	9.1	-38.7	13.1
FDI inward stock	2 081	14 407	15 295	17 950	19 141	9.4	18.8	13.4	17.4	6.6
FDI outward stock	2 094	15 705	15 988	19 197	20 408	11.9	18.3	14.7	20.1	6.3
Income on inward FDI	75	990	1 066	945	1 137	35.1	13.1	32.0	-11.3	20.3
Rate of return on inward FDI	6.6	5.9	7.3	7.0	7.3	-0.5	0.0	0.1	-0.3	0.3
Income on outward FDI	122	1 083	1 113	1 037	1 251	19.9	10.1	31.3	-6.8	20.6
Rate of return on outward FDI	7.3	6.2	7.0	6.9	7.2	-0.4	0.0	0.0	-0.2	0.3
Cross-border M&As	99	703	707	250	339	49.1	64.0	0.6	-64.7	35.7
Sales of foreign affiliates	5 105	21 293	33 300	30 213	32 960	8.2	7.1	14.9	-9.3	9.1
Value-added (product) of foreign affiliates	1 019	3 570	6 216	6 129	6 636	3.6	7.9	10.9	-1.4	8.3
Total assets of foreign affiliates	4 602	43 324	64 423	53 601	56 998	13.1	19.6	15.5	-16.8	6.3
Exports of foreign affiliates	1 498	5 003	6 599	5 262	6 239	8.6	3.6	14.7	-20.3	18.6
Employment by foreign affiliates (thousands)	21 470	55 001	64 484	66 688	68 218	2.9	11.8	4.1	3.4	2.3
GDP	22 206	50 338	61 147	57 920	62 909	6.0	1.4	9.9	-5.3	8.6
Gross fixed capital formation	5 109	11 208	13 999	12 735	13 940	5.1	1.3	10.7	-9.0	9.5
Royalties and licence fee receipts	29	155	191	187	191	14.6	10.0	13.6	-1.9	1.7
Exports of goods and non-factor services	4 382	15 008	19 794	15 783	18 713	8.1	3.7	14.7	-20.3	18.6

Source: UNCTAD, *Word Investment Report 2011*.

Today there are at least 650 State-owned TNCs, constituting an important emerging source of FDI (table 3). Their more than 8,500 foreign affiliates are spread across the globe, bringing them in contact with a large number of host economies. While relatively small in number (less than 1 per cent of all TNCs), their FDI is substantial, reaching roughly 11 per cent of global FDI flows in 2010. Reflecting this, State-owned TNCs made up 19 of the world's 100 largest TNCs.

Table 3. Distribution of State-owned TNCs by home region/economy, 2010

Region/economy	Number	Share
World	653	100
Developed countries	286	43.8
European Union	223	34.2
Denmark	36	5.5
Finland	21	3.2
France	32	4.9
Germany	18	2.8
Poland	17	2.6
Sweden	18	2.8
Others	81	12.4
Other European countries	41	6.3
Norway	27	4.1
Switzerland	11	1.7
Others	3	0.5
United States	3	0.5
Other developed countries	18	2.8
Japan	4	0.6
Others	14	2.1
Developing economies	345	52.8
Africa	82	12.6
South Africa	54	8.3
Others	28	4.3
Latin America and the Caribbean	28	4.3
Brazil	9	1.4
Others	19	2.9
Asia	235	36.0
West Asia	70	10.7
Kuwait	19	2.9
United Arab Emirates	21	3.2
Others	30	4.6
South, East and South-East Asia	165	25.3
China	50	7.7
India	20	3.1
Iran, Islamic Republic of	10	1.5
Malaysia	45	6.9
Singapore	9	1.4
Others	31	4.7
South-East Europe and the CIS	23	3.5
Russian Federation	14	2.1
Others	9	1.4

Source: UNCTAD, *Word Investment Report 2011*.

State-owned TNCs constitute a varied group. Developing and transition economies are home to more than half of these firms (56 per cent), though developed countries continue to maintain a significant number of State-owned TNCs. In contrast to the general view of State-owned TNCs as largely concentrated in the primary sector, they are diversified and have a strong presence in the services sector.

Uneven performance across regions

The rise of FDI to developing countries masks significant regional differences. Some of the poorest regions continued to see declines in FDI flows. Flows to Africa, least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing States (SIDS) continued to fall, as did those to South Asia. At the same time, major emerging regions, such as East and South-East Asia and Latin America, experienced strong growth in FDI inflows (table 1).

FDI flows to Africa fell by 9 per cent in 2010. At $55 billon, the share of Africa in total global FDI inflows was 4.4 per cent in 2010, down from 5.1 per cent in 2009 (table 1). FDI to the primary sector, especially in the oil industry, continued to dominate FDI flows to the continent. It accounted for the rise of Ghana as a major host country, as well as for the declines of inflows to Angola and Nigeria. Although the continuing pursuit of natural resources, in particular by Asian TNCs, is likely to sustain FDI flows to sub-Saharan Africa, political uncertainty in North Africa is likely to make 2011 another challenging year for the continent as a whole.

Although there is some evidence that intraregional FDI is beginning to emerge in non-natural resource related industries, intraregional FDI flows in Africa are still limited in terms of volume and industry diversity. Harmonization of Africa's regional trade agreements and inclusion of FDI regimes could help Africa achieve more of its intraregional FDI potential.

Inflows to East Asia, South-East Asia and South Asia as a whole rose by 24 per cent in 2010, reaching $300 billion. However, the three subregions experienced very different trends: inflows to ASEAN more than doubled; those to East Asia saw a 17 per cent rise; FDI to South Asia declined by one-fourth.

Inflows to China, the largest recipient of FDI in the developing world, climbed by 11 per cent, to $106 billion. With continuously rising wages and production costs, however, offshoring of labour-intensive manufacturing to the country has slowed down, and FDI inflows continue to shift towards high-tech industries and services. In contrast, some ASEAN member States, such as Indonesia and Viet Nam, have gained ground as low-cost production locations, especially for low-end manufacturing.

The decline of FDI to South Asia reflects a 31 per cent slide in inflows to India and a 14 per cent drop in Pakistan. In India, the setback in attracting FDI was partly due to macroeconomic concerns. At the same time, inflows to Bangladesh, an increasingly important low-cost production location in South Asia, jumped by 30 per cent to $913 million.

FDI outflows from South, East and South-East Asia grew by 20 per cent to about $232 billion in 2010. In recent years, rising FDI outflows from developing Asia demonstrate new and diversified industrial patterns. In extractive industries, new investors have emerged, including conglomerates such as CITIC (China) and Reliance Group (India), and sovereign wealth funds, such as China Investment Corporation and Temasek Holdings (Singapore). Metal companies in the region have been particularly active in ensuring access to overseas mineral assets, such as iron ore and copper. In manufacturing, Asian companies have been actively taking over large companies in the developed world, but face increasing political obstacles. FDI outflows in the services sector have declined, but M&As in such industries as telecommunications have been increasing.

FDI flows to West Asia in 2010 continued to be affected by the global economic crisis, falling by 12 per cent, but they are expected to bottom out in 2011. However, concerns about political instability in the region are likely to dampen the recovery.

FDI outflows from West Asia dropped by 51 per cent in 2010. Outward investment from West Asia is mainly driven by government-controlled entities, which have been redirecting some of their national oil surpluses to support their home economies. The economic diversification policies of these countries has been pursued through a dual strategy: investing in other Arab countries to bolster their small

domestic economies; and also investing in developed countries to seek strategic assets for the development and diversification of the industrial capabilities back at home. Increasingly this policy has been pursued with a view to creating productive capabilities that are missing at home, such as motor vehicles, alternative energies, electronics and aerospace. This approach differs from that of other countries, which have generally sought to develop a certain level of capacity at home, before engaging in outward direct investment.

FDI flows to *Latin America and the Caribbean* increased by 13 per cent in 2010. The strongest increase was registered in South America, where the growth rate was 56 per cent, with Brazil particularly buoyant. FDI outflows from Latin America and the Caribbean increased by 67 per cent in 2010, mostly due to large cross-border M&A purchases by Brazilian and Mexican TNCs.

Latin America and the Caribbean also witnessed a surge of investments by developing Asian TNCs particularly in resource-seeking projects. In 2010, acquisitions by Asian TNCs jumped to $20 billion, accounting for more than 60 per cent of total FDI to the region. This has raised concerns in some countries in the region about the trade patterns, with South America exporting mostly commodities and importing manufactured goods.

FDI flows to *transition economies* declined slightly in 2010. Flows to the Commonwealth of Independent States (CIS) rose marginally by 0.4 per cent. Foreign investors continue to be attracted to the fast-growing local consumer market, especially in the Russian Federation where flows rose by 13 per cent to $41 billion. In contrast, FDI flows to South-East Europe dropped sharply for the third consecutive year, due partly to sluggish investment from EU countries.

South–East interregional FDI is growing rapidly. TNCs based in transition economies and in developing economies have increasingly ventured into each other's markets. For example, the share of developing host countries in greenfield investment projects by TNCs from transition economies rose to 60 per cent in 2010 (up from only 28 per cent in 2004), while developing-country outward FDI in transition economies increased more than five times over the past decade. Kazakhstan and the Russian Federation are the most important targets

of developing-country investors, whereas China and Turkey are the most popular destinations for FDI from transition economies. Such South–East interregional FDI has benefited from outward FDI support from governments through, among others, regional cooperation (e.g. the Shanghai Cooperation Organization) and bilateral partnerships.

FDI flows to the poorest regions continue to fall

In contrast to the FDI boom in developing countries as a whole, FDI inflows to the 48 LDCs declined overall by a further 0.6 per cent in 2010 – a matter of grave concern. The distribution of FDI flows among LDCs also remains highly uneven, with over 80 per cent of LDC FDI flows going to resource-rich economies in Africa. However, this picture is distorted by the highly capital-intensive nature of resource projects. Some 40 per cent of investments, by number, were in the form of greenfield projects in the manufacturing sector and 16 per cent in services.

On the occasion of the 2011 Fourth United Nations Conference on the Least Developed Countries, UNCTAD proposed a plan of action for investment in LDCs. The emphasis is on an integrated policy approach to investment, technical capacity-building and enterprise development, with five areas of action: public-private infrastructure development; aid for productive capacity; building on LDC investment opportunities; local business development and access to finance; and regulatory and institutional reform.

Landlocked developing countries (LLDCs) saw their FDI inflows fall by 12 per cent to $23 billion in 2010. These countries are traditionally marginal FDI destinations, and they accounted for only 4 per cent of total FDI flows to the developing world. With intensified South–South economic cooperation and increasing capital flows from emerging markets, prospects for FDI flows to the group may improve.

FDI inflows to small island developing States (SIDS) as a whole declined slightly by 1 per cent in 2010, to $4.2 billion. As these countries are particularly vulnerable to the effects of climate change, SIDS are looking to attract investment from TNCs that can make a contribution to climate change adaptation, by mobilizing financial and technological resources, implementing adaptation initiatives, and enhancing local adaptive capacities.

FDI to developed countries remains well below pre-crisis levels

In 2010, FDI inflows in developed countries declined marginally. The pattern of FDI inflows was uneven among subregions. Europe suffered a sharp fall. Declining FDI flows were also registered in Japan. A gloomier economic outlook, austerity measures and possible sovereign debt crisis, as well as regulatory concerns, were among the factors hampering the recovery of FDI flows. Inflows to the United States, however, showed a strong turnaround, with an increase of more than 40 per cent.

In developed countries, the restructuring of the banking industry, driven by regulatory authorities, has resulted in a series of significant divestments of foreign assets. At the same time, it has also generated new FDI as assets changed hands among major players. The global efforts towards the reform of the financial system and the exit strategy of governments are likely to have a large bearing on FDI flows in the financial industry in coming years.

The downward trend in outward FDI from developed countries reversed, with a 10 per cent increase over 2009. However, this took it to only half the level of its 2007 peak. The reversal was largely due to higher M&A values, facilitated by stronger balance sheets of TNCs and historic low rates of debt financing.

INVESTMENT POLICY TRENDS

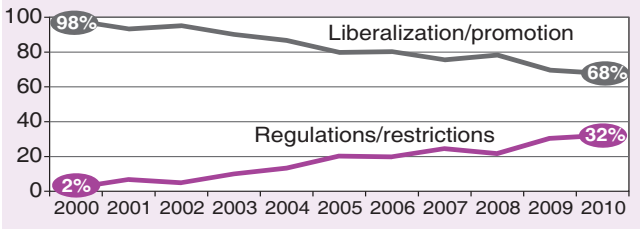
National policies: mixed messages

More than two-thirds of reported investment policy measures in 2010 were in the area of FDI liberalization and promotion. This was the case for Asia in particular, where a relatively high number of measures eased entry and establishment conditions for foreign investment. Most promotion and facilitation measures were adopted by governments in Africa and Asia. These measures included the streamlining of admission procedures and the opening of new, or the expansion of existing, special economic zones.

On the other hand, almost one-third of all new measures in 2010 fell into the category of investment-related regulation and restrictions, continuing its upward trend since 2003 (figure 3). The recent restrictive measures were mainly in a few industries, in particular natural resource-based industries and financial services. The accumulation of restrictive measures over the past years and their continued upward trend, as well as stricter review procedures for FDI entry, has increased the risk of investment protectionism.

Although numerous countries continue to implement emergency measures or hold considerable assets following bail-out operations, the unwinding of support schemes and liabilities resulting from emergency measures has started. The process advances relatively slowly. As of April 2011, governments are estimated to hold legacy assets and liabilities in financial and non-financial firms valued at over $2 trillion. By far the largest share relates to several hundred firms in the financial sector. All this indicates a potential wave of privatizations in the years to come.

Figure 3. National regulatory changes, 2000–2010
(Per cent)



Source: UNCTAD, *World Investment Report 2011*.

The international investment regime: too much and too little

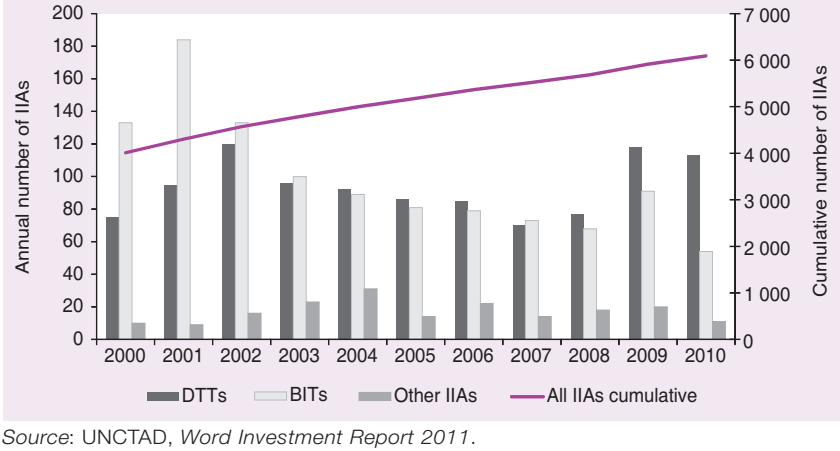
With a total of 178 new IIAs in 2010 – more than three new treaties per week – the IIA universe reached 6,092 agreements at the end of the year (figure 4). This trend of treaty expansion is expected to continue in 2011, the first five months of which saw 48 new IIAs, with more than 100 IIAs currently under negotiation. How the FDI-related competence shift from EU member States to the European level will affect the overall IIA regime is still unclear (EU member States currently have more than 1,300 BITs with non-EU countries). At least 25 new

treaty-based investor–State dispute settlement cases were initiated in 2010 and 47 decisions rendered, bringing the total of known cases to 390, and those closed to 197. The overwhelming majority of these cases were initiated by investors from developed countries, with developing countries most often on the receiving end. The 2010 awards further tilted the overall balance in favour of the State, with 78 cases won against 59 lost.

As countries continue concluding IIAs, sometimes with novel provisions aimed at rebalancing the rights and obligations between States and firms, and ensuring coherence between IIAs and other public policies, the policy discourse about the future orientation of the IIA regime and how to make IIAs better contribute to sustainable development is intensifying. Nationally, this manifests itself in a growing dialogue among a broad set of investment stakeholders, including civil society, business and parliamentarians. Internationally, inter-governmental debates in UNCTAD's 2010 World Investment Forum, UNCTAD's Investment Commission and the joint OECD-UNCTAD investment meetings serve as examples.

With thousands of treaties, many ongoing negotiations and multiple dispute-settlement mechanisms, today's IIA regime has come close to a point where it is too big and complex to handle for

Figure 4. Number of new BITs, DTTs and other IIAs, annual and cumulative, 2000–2010



Source: UNCTAD, *World Investment Report 2011*.

governments and investors alike. Yet it offers protection to only two-thirds of global FDI stock and covers only one-fifth of possible bilateral investment relationships. To provide full coverage a further 14,100 bilateral treaties would be required. This raises questions not only about the efforts needed to complete the global IIA network, but also about the impact of the IIA regime and its effectiveness for promoting and protecting investment, and about how to ensure that IIAs deliver on their development potential.

Intensifying interaction between FDI policies and industrial policies

FDI policies increasingly interact with industrial policies, nationally and internationally. At the national level, this interface manifests itself in specific national investment guidelines; the targeting of types of investment or specific categories of foreign investors for industrial development purposes; investment incentives related to certain industries, activities or regions; and investment facilitation in line with industrial development strategies. Countries also use selective FDI restrictions for industrial policy purposes connected to the protection of infant industries, national champions, strategic enterprises or ailing domestic industries in times of crisis.

At the international level, industrial policies are supported by FDI promotion through IIAs, in particular when the respective IIA has sector-specific elements. At the same time, IIA provisions can limit regulatory space for industrial policies. To avoid undue policy constraints, a number of flexibility mechanism have been developed in IIAs, such as exclusions and reservations for certain industries, general exceptions or national security exceptions. According to UNCTAD case studies of reservations in IIAs, countries are more inclined to preserve policy space for the services sector, compared to the primary and manufacturing sectors. Within the services sector, most reservations exist in transportation, finance and communication.

The overall challenge is to manage the interaction between FDI policies and industrial policies, so as to make the two policies work for development. There is a need to strike a balance between building stronger domestic productive capacity on the one hand and preventing investment and trade protectionism on the other. Better international

coordination can contribute to avoiding "beggar thy neighbour" policies and creating synergies for global cooperation.

CSR standards increasingly influence investment policies

Over the past years, corporate social responsibility (CSR) standards have emerged as a unique dimension of "soft law". These CSR standards typically focus on the operations of TNCs and, as such, are increasingly significant for international investment as efforts to rebalance the rights and obligations of the State and the investor intensify. TNCs in turn, through their foreign investments and global value chains, can influence the social and environmental practices of business worldwide. The current landscape of CSR standards is multilayered, multifaceted, and interconnected. The standards of the United Nations, the ILO and the OECD serve to define and provide guidance on fundamental CSR. In addition there are dozens of international multi-stakeholder initiatives (MSIs), hundreds of industry association initiatives and thousands of individual company codes providing standards for the social and environmental practices of firms at home and abroad.

CSR standards pose a number of systemic challenges. A fundamental challenge affecting most CSR standards is ensuring that companies actually comply with their content. Moreover, there are gaps, overlaps and inconsistencies between standards in terms of global reach, subjects covered, industry focus and uptake among companies. Voluntary CSR standards can complement government regulatory efforts, but they can also undermine, substitute or distract from these. Finally, corporate reporting on performance relative to CSR standards continues to lack standardization and comparability.

Governments can play an important role in creating a coherent policy and institutional framework to address the challenges and opportunities presented by the universe of CSR standards. Policy options for promoting CSR standards include supporting the development of new CSR standards; applying CSR standards to government procurement; building capacity in developing countries to adopt CSR standards; promoting the uptake of CSR reporting and responsible investment; adopting CSR standards as part of regulatory initiatives; strengthening the compliance promotion mechanisms of

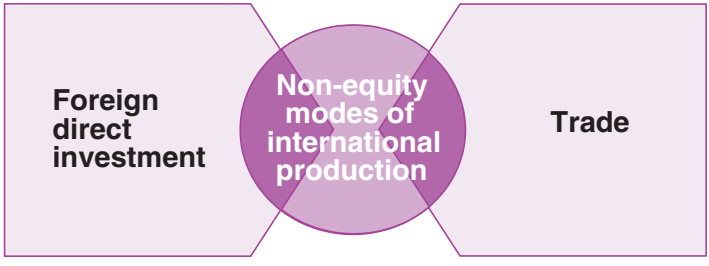
existing international standards; and factoring CSR standards into IIAs. The various approaches already underway increasingly mix regulatory and voluntary instruments to promote responsible business practices.

While CSR standards generally aim to promote sustainable development goals, in the context of international production care needs to be taken to avoid them becoming barriers to trade and investment. The objective of promoting investment can be rhymed with CSR standards. Discussions on responsible investment are ongoing in the international community. For example, in 2010, G-20 leaders encouraged countries and companies to uphold the Principles for Responsible Agricultural Investment (PRAI) that were developed by UNCTAD, the World Bank, IFAD and FAO, requesting these organizations to develop options for promoting responsible investment in agriculture.

NON-EQUITY MODES OF INTERNATIONAL PRODUCTION AND DEVELOPMENT

International production, today, is no longer exclusively about FDI on the one hand and trade on the other (figure 5). Non-equity modes (NEMs) of international production are of growing importance, generating over $2 trillion in sales in 2010, much of it in developing countries. NEMs include contract manufacturing, services outsourcing, contract farming, franchising, licensing, management contracts and other types of contractual relationships through which TNCs coordinate activities in their global value chains (GVCs) and influence

Figure 5. A "middle ground" between FDI and trade has evolved in international production, with significant development implications



Source: UNCTAD, *Word Investment Report 2011*.

the management of host-country firms without owning an equity stake in those firms.

From a development perspective, both NEM partnerships and foreign affiliates (i.e. FDI) can enable host countries to integrate into GVCs. A key advantage of NEMs is that they are flexible arrangements with local firms, with a built-in motive for TNCs to invest in the viability of their partners through dissemination of knowledge, technology and skills. This offers host economies considerable potential for long-term industrial capacity building through a number of key channels of development impact such as employment, value added, export generation and technology acquisition (table 4). On the other hand, by establishing a local affiliate through FDI, a TNC signals its long-term commitment to a host economy. Attracting FDI is also the better option for economies with limited existing productive capacity.

NEMs may be more appropriate than FDI in sensitive situations. In agriculture, for example, contract farming is more likely to address responsible investment issues – respect for local rights, livelihoods of farmers and sustainable use of resources – than large-scale land acquisition.

For developing country policymakers, the rise of NEMs not only creates new opportunities for productive capacity building and integration into GVCs, there are also new challenges, as each NEM mode comes with its own set of development impacts and policy implications.

The TNC "make or buy" decision and NEMs as the "middle-ground" option

Foremost among the core competencies of a TNC is its ability to coordinate activities within a global value chain. TNCs can decide to conduct such activities in-house (internalization) or they can entrust them to other firms (externalization) – a choice analogous to a "make or buy" decision. Internalization, where it has a cross-border dimension, results in FDI, whereby the international flows of goods, services, information and other assets are intra-firm and under full control of the TNC. Externalization results in either arm's-length trade, where the TNC exercises no control over other firms or, as an intermediate "middle-

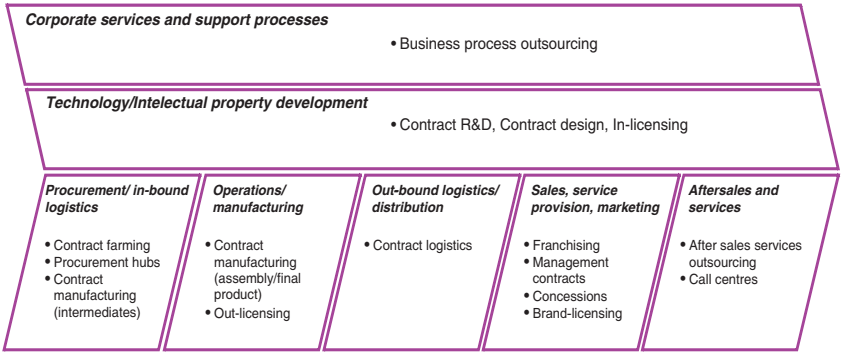
ground" option, in non-equity inter-firm arrangements in which contractual agreements and relative bargaining power condition the operations and behaviour of host-country firms. Such "conditioning" can have a material impact on the conduct of the business, requiring the host-country firm to, for example, invest in equipment, change processes, adopt new procedures, improve working conditions, or use specified suppliers.

The ultimate ownership and control configuration of a GVC is the outcome of a set of strategic choices by the TNC. In a typical value chain, a TNC oversees a sequence of activities from procurement of inputs, through manufacturing operations to distribution, sales and aftersales services (figure 6). In addition, firms undertake activities – such as IT functions or R&D – which support all parts of the value chain (upper parts of figure 6).

In a fully integrated company, activities in all these segments of the value chain are carried out in-house (internalized), resulting in FDI if the activity takes place overseas. However, in all segments of the value chain TNCs can opt to externalize activities through various NEM types. For example, instead of establishing a manufacturing affiliate (i.e. FDI) in a host country, a TNC can outsource production to a contract manufacturer or permit a local firm to produce under licence.

The TNC's ultimate choice between FDI and NEMs (or trade) in any segment of the value chain is based on its strategy, the relative costs and benefits, the associated risks, and the feasibility of available

Figure 6. Selected examples of NEM-types along the value chain



Source: UNCTAD, *Word Investment Report 2011*.

Table 4. Main development impacts of NEMs

Impact category	Highlights of findings
Employment generation and working conditions	• NEMs have significant job-creation potential: especially contract manufacturing, services outsourcing and franchising account for large shares of total employment in countries where they are prevalent • Working conditions have been a source of concern in the case of contract manufacturing based on low-cost labour in a number of countries with relatively weak regulatory environments • Stability of employment is a concern, principally in the case of contract manufacturing and outsourcing, as contract-based work is more susceptible to economic cycles
Local value added and linkages	• NEMs can generate significant direct value added, making an important contribution to GDP in developing countries where individual modes achieve scale • Concerns exist that contract manufacturing value added is often limited where contracted processes are only a small part of the overall value chain or end-product • NEMs could also generate additional value added through local sourcing, sometimes through "second-tier" non-equity relationships
Export generation	• NEMs imply access to TNCs' international networks for local NEM partners; in the case of those modes relying on foreign markets (e.g. contract manufacturing, outsourcing, management contracts in tourism) this leads to significant export generation and to more stable export sales • In the case of contract manufacturing this is partly counterbalanced by increased imports of goods for processing • In the case of market-seeking NEMs (e.g. franchising, brand-licensing, management contracts) NEMs can lead to increased imports
Technology and skills transfer	• NEM relationships are in essence a form of intellectual property transfer to a local NEM partner, protected by the contract • NEM forms such as franchising, licensing, management contracts, involve transfer of technology, business model and/or skills and are often accompanied by training of local staff and management • In contract manufacturing, local partners engaging in NEM relationships have been shown to gain in productivity, particularly in the electronics industry • NEM partners can evolve into important technology developers in their own right (e.g. in contract manufacturing and services outsourcing) • They can also remain locked into low-technology activities • NEMs, by their nature, foster local entrepreneurship; positive effects on entrepreneurship skills development are especially marked in franchising

Table 4. Main development impacts of NEMs (concluded)

Impact category	Highlights of findings
Social and environmental impacts	• NEMs can serve as a mechanism to transfer international best social and environmental practices • They equally raise concerns that they may serve as mechanisms for TNCs to circumvent such practices
Long-term industrial capacity building	• Through the sum of the above impacts, NEMs can support or accelerate the development of modern local productive capacities in developing countries • In particular, NEMs encourage domestic enterprise development and domestic investment in productive assets and integration of such domestic economic activity into global value chains • Concerns need to be addressed especially in issues such as long-term dependence on foreign sources of technology; over-reliance on TNC-governed GVCs for limited-value-added activities; and "footlooseness".

Source: UNCTAD, *Word Investment Report 2011*.

options. In some parts of the value chain NEMs can be substitutes for FDI, in others the two may be complementary.

NEMs are worth more than $2 trillion, mostly in developing countries

Cross-border NEM activity worldwide is estimated to have generated over $2 trillion of sales in 2010. Of this amount, contract manufacturing and services outsourcing accounted for $1.1–1.3 trillion, franchising for $330–350 billion, licensing for $340–360 billion, and management contracts for around $100 billion. Some of the industry breakdowns by mode are given in table 5.

These estimates are incomplete, including only the most important industries in which each NEM type is prevalent. The total also excludes other non-equity modes such as contract farming and concessions, which are significant in developing countries. For example, contract farming activities by TNCs are spread worldwide, covering over 110 developing and transition economies, spanning a wide range of agricultural commodities and accounting for a high share of output.

There are large variations in relative size. In the automotive industry, contract manufacturing accounts for 30 per cent of global exports of automotive components and a quarter of employment. In contrast, in electronics, contract manufacturing represents a significant

Table 5. Key figures of cross-border NEMs, selected industries, 2010
(Billions of dollars and millions of employees)

	Estimated NEM-related worldwide...			
	Sales	Value added	Employment	Employment in developing economies
Contract manufacturing - selected technology/capital intensive industries				
Electronics	230–240	20–25	1.4–1.7	1.3–1.5
Automotive components	200–220	60–70	1.1–1.4	0.3–0.4
Pharmaceuticals	20–30	5–10	0.1–0.2	0.05–0.1
Contract manufacturing - selected labour intensive industries				
Garments	200–205	40–45	6.5–7.0	6.0–6.5
Footwear	50–55	10–15	1.7–2.0	1.6–1.8
Toys	10–15	2–3	0.4–0.5	0.4–0.5
Services outsourcing				
IT services and business process outsourcing [a]	90–100	50–60	3.0–3.5	2.0–2.5
Franchising				
Retail, hotel, restaurant, and catering, business and other services	330–350	130–150	3.8–4.2	2.3–2.5
Management contracts - selected industry				
Hotels	15–20	5–10	0.3–0.4	0.1–0.15
	Estimated NEM-related worldwide...			
	Fees	Associated sales	Associated value added	
Licensing				
Cross-industry	17–18	340–360	90–110	

Source: UNCTAD, *Word Investment Report 2011*.

[a] For data reliability reasons this estimate only reflects pure cross-border sales and is therefore an underestimate of NEM activity in this industry.

share of trade and employment. In labour-intensive industries such as garments, footwear and toys, contract manufacturing is even more important.

Putting different modes of international production in perspective, cross-border activity related to selected NEMs of $2 trillion compares with exports of foreign affiliates of TNCs of some $6 trillion in 2010. However, NEMs are particularly important in developing countries. In many industries, developing countries account for almost all NEM-related employment and exports, compared with their share in global FDI stocks of 30 per cent and in world trade of less than 40 per cent.

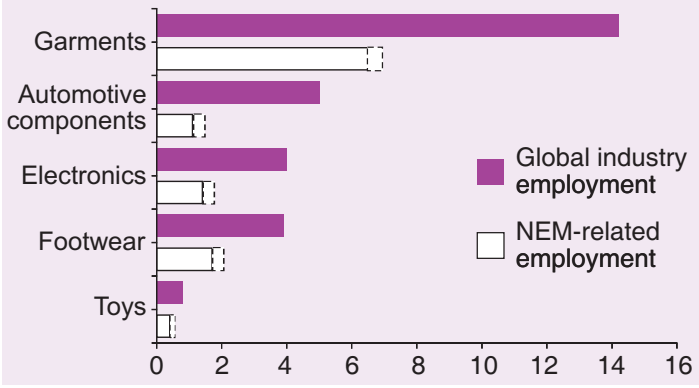
NEMs are also growing rapidly. In most cases, the growth of NEMs outpaces that of the industries in which they operate. This growth is driven by a number of key advantages of NEMs for TNCs: (1) the relatively low upfront capital expenditures required and the limited working capital needed for operation; (2) reduced risk exposure; (3) flexibility in adapting to changes in the business cycle and in demand; and (4) as a basis for externalizing non-core activities that can often be carried out at lower cost by other operators.

NEMs generate significant formal employment in developing countries

UNCTAD estimates that worldwide some 18–21 million workers are directly employed in firms operating under NEM arrangements, most of whom are in contract manufacturing, services outsourcing and franchising activities (figure 7). Around 80 per cent of NEM-generated employment is in developing and transition economies. Employment in contract manufacturing and, to a lesser extent, services outsourcing, is predominantly based in developing countries. The same applies in other NEMs, although global figures are not available; in Mozambique, for instance, contract farming has led to some 400,000 smallholders participating in global value chains.

Working conditions in NEMs based on low-cost labour are often a concern, and vary considerably depending on the mode and the legal, social and economic structures of the countries in which NEM firms

Figure 7. Estimated global employment in contract manufacturing, selected industries, 2010
(Millions of employees)



Source: UNCTAD, *Word Investment Report 2011*.

are operating. The factors that influence working conditions in non-equity modes are the role of governments in defining, communicating and enforcing labour standards and the sourcing practices of TNCs. The social responsibility of TNCs has extended beyond their own legal boundaries and has pushed many to increase their influence over the activities of value chain partners. It is increasingly common for TNCs, in order to manage risks and protect their brand and image, to influence their NEM partners through codes of conduct, to promote international labour standards and good management practices.

An additional concern relates to the relative "footlooseness" of NEMs. The seasonality of industries, fluctuating demand patterns of TNCs, and the ease with which they can shift NEM production to other locations can have a strong impact on working conditions in NEM firms and on stability of employment.

NEMs often make an important contribution to GDP

The impact of NEMs on local value added can be significant. It depends on how NEM arrangements fit into TNC-governed GVCs and, therefore, on how much value is retained in the host economy. It also depends on the potential for linkages with other firms and on their underlying capabilities.

In efficiency seeking NEMs, such as contract manufacturing or services outsourcing, it is possible for value capture in the host economy to be relatively small compared to the overall value creation in a GVC, when the scope for local sourcing is limited and goods are imported, processed and subsequently exported, as is often the case in the electronics industry, for example. Although value captured as a share of final-product sales price may be limited, it can nevertheless represent a significant contribution to the local economy, adding up to 10–15 per cent of GDP in some countries.

Local sourcing and the overall impact on host-country value added increases if the emergence of contract manufacturing leads to a concentration of production and export activities (e.g. in clusters or industrial parks). The greater the number of plants and the more numerous the linkages with TNCs, the greater will be the spillover effects and local value added. In addition, clustering can reduce the risk of TNCs shifting production to other locations by increasing switching costs.

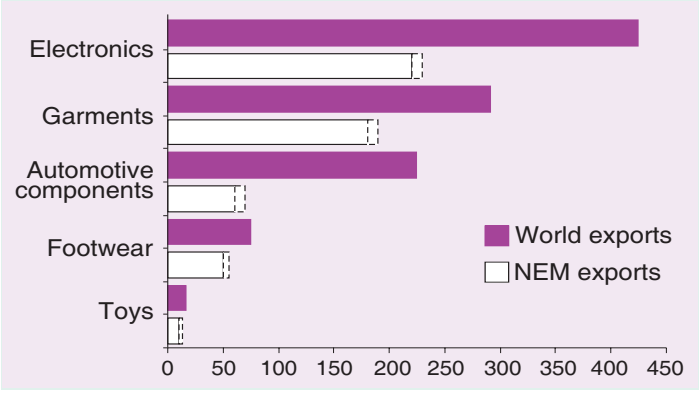
NEMs can generate export gains

NEMs are inextricably linked with international trade, shaping global patterns of trade in many industries. In toys, footwear, garments, and electronics, contract manufacturing represents more than 50 per cent of global trade (figure 8). NEMs can thus be an important "route-to-market" for countries aiming at export-led growth, and an important initial point of access to TNC governed global value chains, before gradually building independent exporting capabilities. Export gains can be partially offset by higher imports, reducing net export gains, where local value added is limited, especially in early stages of NEM development.

NEMs are an important avenue for technology and skills building

NEMs are in essence a transfer of intellectual property to a host-country firm under the protection of a contract. Licensing involves a TNC granting an NEM partner access to intellectual property, usually with contractual conditions attached, but often with some training or skills transfer. International franchising transfers a business model, and

Figure 8. World and NEM-related exports, selected industries, 2010
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2011*.

extensive training and support are normally offered to local partners in order to properly set up the new franchise with wide-ranging implications for technology dissemination.

In some East and South-East Asian economies in particular, but also in Eastern Europe, Latin America and South Asia, technology and skills acquisition and assimilation by NEM companies in electronics, garments, pharmaceuticals, IT-services and business process outsourcing (BPO) have led to their transformation into TNCs and technology leaders in their own right.

Although technology acquisition and assimilation through NEMs is a widespread phenomenon, this is not a foregone conclusion, especially at the level of second and third tier suppliers, where linkages may be insufficient or of low quality. A key factor is the absorptive capacity of local NEM partners, in the form of their existing skills base, the availability of workers that can be trained to learn new skills, and the basic prerequisites to turn acquired skills into new business ventures, including the regulatory framework, the business environment and access to finance. Another important factor is the relative bargaining power of TNCs and local NEM partners. Both factors can be influenced by appropriate policies.

Social and environmental pros and cons of NEMs

Concerns exist that cross-border NEMs in some industries may be a mechanism for TNCs to circumvent high social and environmental standards in their production network. Pressure from the international community has pushed TNCs to take greater responsibility for such standards throughout their global value chains. There is now a significant body of evidence to suggest that TNCs are likely to use more environmentally friendly practices than domestic companies in equivalent activities. The extent to which TNCs guide NEM operations on social and environmental practices depends, first, on their perception of and exposure to legal liability risks (e.g. reparations in the case of environmental damages) and business risks (e.g damage to their brand and lower sales); and, secondly, on the extent to which they can control NEMs. TNCs employ a number of mechanisms to influence NEM partners, including codes of conduct, factory inspections and audits, and third-party certification schemes.

NEMs can help countries integrate in GVCs and build productive capacity

The immediate contributions to employment, to GDP, to exports and to the local technology base that NEMs can bring help to provide the resources, skills and access to global value chains that are prerequisites for long-term industrial capacity building.

A major part of the contribution of NEMs to the build-up of local productive capacity and long-term prospects for industrial development is through the impact on enterprise development, as NEMs require local entrepreneurs and domestic investment. Such domestic investment, and access to local or international financing, is often facilitated by NEMs, either through explicit measures by TNCs providing support to local NEM partners, or through the implicit guarantees stemming from the partnership with a major TNC itself.

While the potential contributions of NEMs to long-term development are clear, concerns are often raised (especially with regard to contract manufacturing and licensing), that countries relying to a significant extent on NEMs for industrial development risk remaining locked-in to low-value-added segments of TNC-governed global value

chains and remaining technology dependent. In such cases, developing economies would run a further risk of becoming vulnerable to TNCs shifting productive activity to other locations, as NEMs are more "footloose" than equivalent FDI operations. The related risks of "dependency" and "footlooseness" must be addressed by embedding NEMs in the overall development strategies of countries.

The right policies can help maximize NEM development benefits

Policies are instrumental for countries to maximize development benefits and minimize the risks associated with the integration of domestic firms into NEM networks of TNCs (table 6). There are four key challenges for policymakers: first, how to integrate NEM policies into the overall context of national development strategies; second, how to support the building of domestic productive capacity to ensure the availability of attractive business partners that can qualify as actors in global value chains; third, how to promote and facilitate NEMs; and fourth, how to address negative effects of NEMs.

Table 6. Maximizing development benefits from NEMs

Policy areas	Key actions
Embedding NEM policies in overall development strategies	• Integrating NEM policies into industrial development strategies • Ensuring coherence with trade, investment, and technology policies • Mitigating dependency risks and supporting upgrading efforts
Building domestic productive capacity	• Developing entrepreneurship • Improving education • Providing access to finance • Enhancing technological capacities
Facilitating and promoting NEMs	• Setting up an enabling legal framework • Promoting NEMs through IPAs • Securing home-country support measures • Making international policies conducive to NEMs
Addressing negative effects	• Strengthening the bargaining power of domestic firms • Safeguarding competition • Protecting labour rights and the environment

Source: UNCTAD, *Word Investment Report 2011*.

NEM policies appropriately embedded in industrial development strategies will:

(a) ensure that efforts to attract NEMs through building domestic productive capacity and through facilitation and promotion initiatives are directed at the right industries, value chains and specific activities or segments within value chains;

(b) support industrial upgrading in line with a country's development stage, ensuring that firms move to higher value-added stages in the value chain, helping local NEM partners reduce their technology dependency, develop their own brands, or become NEM originators in their own right.

An important element of industrial development strategies that incorporate NEMs are measures to prevent and mitigate impacts deriving from the "footlooseness" of some NEM types, by balancing diversification and specialization. Diversification ensures that domestic companies are engaged in multiple NEM activities, both within and across different value chains, and are connected to a broad range of NEM partners. Specialization in particular value chains improves the competitive edge of local NEM partners within those chains and can facilitate, in the longer term, upgrading to segments with greater value capture. In general, measures should aim at maintaining and increasing the attractiveness of the host country for TNCs and improve the "stickiness" of NEMs by building up local mass, clusters of suppliers, and the local technology base. Continuous learning and skills upgrading of domestic entrepreneurs and employees are also important to ensure domestic firms can move to higher value-added activities should foreign companies move "low end" production processes to cheaper locations.

Improving the capacity of locals to engage in NEMs has several policy aspects. Pro-active entrepreneurship policies can strengthen the competitiveness of domestic NEM partners and range from fostering start-ups to promoting business networks. Embedding entrepreneurship knowledge into formal education systems, combined with vocational training and the development of specialized NEM-related skills is also important. A mix of national technology policies can improve local absorptive capacity and create technology clusters and partnerships. Access to finance for domestic NEM partners can be improved through

policies reducing borrowing costs and the risks associated with lending to SMEs, or by offering alternatives to traditional bank credits. Facilitation efforts can also include initiatives to support respect for core labour standards and CSR.

Promoting and facilitating NEM arrangements depends, first, on clear and stable rules governing the contractual relationships between NEM partners, including transparency and coherence. This is important, as NEM arrangements are often governed by multiple laws and regulations. Conducive NEM-specific laws (e.g. franchising laws, rules on contract farming) and appropriate intellectual property (IP) protection (particularly relevant for IP-intensive NEMs such as licensing, franchising and often contract manufacturing) can also help. While the current involvement of investment promotion agencies in NEM-specific promotion is still limited, they could expand their remit beyond FDI to promote awareness of NEM opportunities, engage in matchmaking services, and provide incentives to start-ups.

To address any negative impacts of NEMs, it is important to strengthen the bargaining power of local NEM partners vis-à-vis TNCs to ensure that contracts are based on a fair sharing of risks and benefits. The development of industry-specific NEM model contracts or negotiation guidelines can contribute to achieving this objective. If TNCs engaged in NEMs acquire dominant positions, they may be able to abuse their market power to the detriment of their competitors (domestic and foreign) and their own trading partners. Therefore, policies to promote NEMs need to go hand in hand with policies to safeguard competition. Other public interest criteria may require attention as well. Protection of indigenous capacities and traditional activities, that may be crowded out by a rapid increase in market shares of successful NEMs, is essential.

In the case of contract farming for instance, policies such as these would result in model contracts or guidelines supporting smallholders in negotiations with TNCs; training on sustainable farming methods; provision of appropriate technologies and government-led extension services to improve capacities of contract farmers; and infrastructure development for improving business opportunities for contract farmers in remote areas. If contract farming was given more pride of place in

government policies, direct investment in large-scale land acquisitions by TNCs would be less of an issue.

Finally, home-country initiatives and the international community can also play a positive role. Home-country policies that specifically promote overseas NEMs include the expansion of national export insurance schemes and political risk insurance to also cover some types of NEMs. Internationally, while there is no comprehensive legal and policy framework for fostering NEMs and their development contribution, supportive international policies range from relevant WTO agreements and – to a limited extent – IIAs, to soft-law initiatives contributing to harmonizing the rules governing the rules governing the relationship between private NEM parties or guiding them in the crafting of NEM contracts.

* * *

Foreign direct investment is a key component of the world's growth engine. However, the post-crisis recovery in FDI has been slow to take off and is unevenly spread, with especially the poorest countries still in "FDI recession". Many uncertainties still haunt investors in the global economy. National and international policy developments are sending mixed messages to the investment community. And investment policymaking is becoming more complex, with international production evolving and with blurring boundaries between FDI, non-equity modes and trade. The growth of NEMs poses new challenges but also creates new opportunities for the further integration of developing economies into the global economy. The World Investment Report 2011 aims to help developing-country policymakers and the international development community navigate those challenges and capitalize on the opportunities for their development gains.

GUIDELINES FOR CONTRIBUTORS

I. Manuscript preparation

Papers for publication must be in English.

Authors are requested to submit their manuscript by email to tncj@unctad.org. The manuscript should be prepared in Microsoft Word (or an application compatible with Word), and should be accompanied by a statement that the text (or parts thereof) has not been published or submitted for publication elsewhere.

If authors prefer to send their manuscripts by post, please send three copies to:

The Editor, *Transnational Corporations*
UNCTAD
Division on Investment and Enterprise
Palais des Nations
CH-1211 Geneva 10
Switzerland

Articles should not normally exceed 12,000 words (30 double-spaced pages). All articles should have an abstract not exceeding 150 words. Research notes should be between 4,000 and 6,000 words. Book reviews should be around 1,500 words, unless they are review essays, in which case they may be the length of an article. Footnotes should be placed at the bottom of the page they refer to. An alphabetical list of references should appear at the end of the manuscript. Appendices, tables and figures should be on separate sheets of paper and placed at the end of the manuscript.

Manuscripts should be double-spaced (including references) with wide margins. Pages should be numbered consecutively. The first page of the manuscript should contain: (a) the title; (b) the name(s) and institutional affiliation(s) of the author(s); and (c) the mailing address, e-mail address, telephone and facsimile numbers of the author (or primary author, if more than one).

Transnational Corporations has the copyright for all published articles. Authors may reuse published manuscripts with due acknowledgement.

II. Style guide

A. **Quotations** should be accompanied by the page number(s) from the original source.

B. **Footnotes** should be numbered consecutively throughout the text with Arabic-numeral superscripts. Important substantive comments should be integrated in the text itself rather than placed in footnotes.

C. **Figures** (charts, graphs, illustrations etc.) should have headers, subheaders, labels and full sources. Footnotes to figures should be preceded by lowercase letters and should appear after the sources. Figures should be numbered consecutively. The position of figures in the text should be indicated as follows:

Put figure 1 here

D. **Tables** should have headers, subheaders, column headers and full sources. Table headers should indicate the year(s) of the data, if applicable. The unavailability of data should be indicated by two dots (..). If data are zero or negligible, this should be indicated by a dash (–). Footnotes to tables should be preceded by lowercase letters and should appear after the sources. Tables should be numbered consecutively. The position of tables in the text should be indicated as follows:

Put table 1 here

E. **Abbreviations** should be avoided whenever possible, except for FDI (foreign direct investment) and TNCs (transnational corporations).

F. **Bibliographical references** in the text should appear as: "John Dunning (1979) reported that ...", or "This finding has been widely supported in the literature (Cantwell, 1991, p. 19)". The author(s) should ensure that there is a strict correspondence between names and years appearing in the text and those appearing in the list of references. All citations in the list of references should be complete. Names of journals should not be abbreviated. The following are examples for most citations:

Bhagwati, Jagdish (1988). *Protectionism* (Cambridge, MA: MIT Press).

Cantwell, John (1991). "A survey of theories of international production", in Christos N. Pitelis and Roger Sugden, eds., *The Nature of the Transnational Firm* (London: Routledge), pp. 16–63.

Dunning, John H. (1979). "Explaining changing patterns of international production: in defence of the eclectic theory", *Oxford Bulletin of Economics and Statistics*, 41 (November), pp. 269–295.

All manuscripts accepted for publication will be edited to ensure conformity with United Nations practice.

READERSHIP SURVEY

Dear Reader,

We believe that *Transnational Corporations,* already in its nineteenth year of publication, has established itself as an important channel for policy-oriented academic research on issues relating to transnational corporations (TNCs) and foreign direct investment (FDI). But we would like to know what **you** think of the journal. To this end, we are carrying out a readership survey. As a token of thanks, every respondent will receive an UNCTAD publication on TNCs! Please fill in the attached questionnaire and send it to:

Readership Survey: *Transnational Corporations*
The Editor
UNCTAD, Room E-9121
Palais des Nations
CH-1211 Geneva 10
Switzerland
Fax: (41) 22 907 0194
(E-mail: tncj@unctad.org)

Please do take the time to complete the questionnaire and return it to the above-mentioned address. Your comments are important to us and will help us to improve the quality of *Transnational Corporations*. We look forward to hearing from you.

Sincerely yours,

James Zhan
Editor
Transnational Corporations

TRANSNATIONAL CORPORATIONS

Questionnaire

1. Name and address of respondent (optional):

2. In which country are you based?

3. Which of the following best describes your area of work?

Government	☐	Public enterprise	☐
Private enterprise	☐	Academic or research	☐
Non-profit organization	☐	Library	☐
Media	☐	Other (specify)	☐

4. What is your overall assessment of the contents of *Transnational Corporations*?

Excellent	☐	Adequate	☐
Good	☐	Poor	☐

5. How useful is *Transnational Corporations* to your work?

Very useful ☐ Of some use ☐ Irrelevant ☐

6. Please indicate the three things you liked most about *Transnational Corporations*:

7. Please indicate the three things you liked least about *Transnational Corporations*:

_____

_____

_____

_____

_____

8. Please suggest areas for improvement:

_____

_____

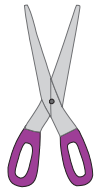
_____

_____

_____

9. Are you a subscriber? Yes ☐ No ☐

If not, would you like to become one ($45 per year)? Yes ☐ No ☐
Please use the subscription form on p. 153).



I wish to subscribe to *Transnational Corporations*

Name _____
Title _____
Organization _____
Address _____
_____
Country _____

Subscription rates for *Transnational Corporations* (3 issues per year)

☐ 1 year US$45 (single issue: US$20)
☐ Payment enclosed

Charge my ☐ Visa ☐ Master Card ☐ American Express

Account No. _____ Expiry Date _____

United Nations Publications

Sales Section
Room DC2-853
2 UN Plaza
New York, N.Y. 10017
United States
Tel: +1 212 963 8302
Fax: +1 212 963 3484
E-mail: publications@un.org

Sales Section
United Nations Office
Palais des Nations
CH-1211 Geneva 10
Switzerland
Tel: +41 22 917 2615
Fax: +41 22 917 0027
E-mail: unpubli@unog.ch

Is our mailing information correct?

Let us know of any changes that might affect your receipt of *Transnational Corporations*. Please fill in the new information.

Name _____
Title _____
Organization _____
Address _____
_____
Country _____

For further information on UNCTAD's work on investment, technology and enterprise development, please visit:

Division on Investment and Enterprise, DIAE
http://www.unctad.org/diae

Transnational Corporations Journal
www.unctad.org/tnc

FDI Statistics online
www.unctad.org/diae/FDIstats_files/FDIstats.htm

World Investment Report
www.unctad.org/wir

International Investment Agreements
www.unctad.org/iia

Investment Policy Reviews
www.unctad.org/ipr

United Nations Conference on Trade and Development, UNCTAD
www.unctad.org

Printed at United Nations, Geneva
GE.11- – December 2011 – 2,890

United Nations publication

ISBN 978-92-1-112811-6

UNCTAD/DIAE/IA/2011/ (Vol. 20, No. 2)

ISSN 1014-9562