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Working Party on Globalisation of Industry

ATTRACTIVENESS FOR INNOVATION
LOCATION FACTORS FOR INTERNATIONAL INVESTMENT

This paper will be discussed under item 8 of the agenda of the WPGI meeting to be held on 23-24 September 2010. It synthesises the work that has been done on attractiveness for innovation within the WPGI. The document has been prepared in close cooperation with Fabrice Hatem who acted as consultant.

Delegates are invited to discuss and comment on the document. The paper will be presented at the CIIE meeting of 28-29 October for declassification.

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ATTRACTIVENESS FOR INNOVATION - LOCATION FACTORS FOR INTERNATIONAL INVESTMENT

FOREWORD

Virtually all governments are keen to attract international investments by multinational enterprises (MNEs) as these promote growth and employment by creating new jobs, realising new investments and bringing in new technologies. Policy makers are interested in the direct and indirect value that new investments by MNEs can bring to their country. By encouraging multinationals to establish local affiliates host countries hope to generate technology transfer to local firms since foreign direct investment (FDI) is one of the most important channels through which technology is transferred across countries.

Attractiveness for investment in innovation is high on the policy agenda in many countries as innovation has become a key factor of growth and competitiveness in OECD countries. Further on, MNEs are central actors in the (global) innovation process and consequently, 'national' innovation activities in host countries are to a large extent affected by international location decisions taken by MNEs. Consequently, there is a growing interest among OECD member countries to formulate policies aimed at fostering territorial attractiveness for particularly high-tech, R&D and innovation activities.

While every country and region has some policy measures in place that are aimed at increasing attractiveness (for innovation), it is less clear if these policies are effective. Evidence for some countries suggests that a coherent and structured strategy to attract investment is not always in place and negotiations with international investors are often tackled on an *ad hoc* basis. At the same time, a growing policy competition between countries is gaining momentum in attracting international investment.

OECD countries are confronted with an increasing competition from emerging countries for international investments, not only in more labour intensive activities but increasingly also in innovative activities. This has raised concerns in (some) developed countries about their long term economic future: after the relocation of major production and distribution investments by MNEs (including their own indigenous MNEs), do they now risk to lose also higher value added activities like R&D and innovation related activities to emerging economies?

This reports analyses the current trends in international investments in innovation (Chapter 1) and discusses the attractiveness of countries for international investments in innovation (Chapter 2). Because innovation is a broad and complex concept encompassing a range of inputs and outputs within and across the activities of firms, locations factors are discussed based on both an industry and a business functions approach. The industry approach focuses on high-technology industries, defined by the OECD as those where the R&D effort is the highest. The business function approach focuses on the most innovative activities in companies' global value chains: R&D corporate functions and headquarters which both are supposed to play a determining role in the innovation strategy of multinational enterprises.

The report discusses attractiveness policies for innovation that countries have implemented (Chapter 3) which are often based on the more traditional instruments for attracting international investments in general. The evidence presented raises some policy issues and questions on existing policies for attracting international investments particularly in innovation: the need for a broad versus targeted policy approach, the links with other (innovation) policies, etc. Based on this discussion, a number of policy principles are formulated intended to guide policy makers in formulating more effective attractiveness policies for innovation. In addition, this report notes the negative effects of the increasing policy competition between (OECD) countries in attracting international investments, including bidding wars between countries to attract individual investors through direct financial and fiscal incentives.

This report is based on the work that has been undertaken by the Working Party on Globalisation of Industry (WPGI) during the past two years: a literature review and desk research; statistical and econometric analyses; policy surveys and questionnaires. The different activities have directly contributed to the OECD Innovation Strategy and the results are presented in this thematic report. The report has been prepared by Koen De Backer of the OECD Secretariat and Fabrice Hatem who acted as consultant.

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EXECUTIVE SUMMARY

1. International investment has been an important driver of globalisation and has grown quickly over the last decades because of the rapid emergence of global value chains. Production processes have become increasingly fragmented as goods are produced sequentially in stages across different countries following the strong decline in communication and co-ordination costs. Firms seek to optimise the production process by locating their various production stages across different sites according to the most optimal location factors across countries. While distribution, sales and production activities were the first to lead the way, R&D and decision-making activities have also become increasingly (re-)located internationally.

2. MNEs have become important economic actors in the global economy because of their large international investments and numerous affiliates abroad, enabling them to shift activities within their multinational network according to changing demand and cost conditions. MNEs also play a major role in the internationalisation of R&D and innovation with their growing investments in R&D abroad. While the majority of the R&D investments is still concentrated in home countries often close to the MNEs' headquarters, foreign affiliates of MNEs play an important role within the multinational network when organising their R&D and innovation activities on a global scale.

3. Emerging economies have become increasingly attractive for international investments, including investments in innovative activities. Changes in the investment behaviour of MNEs reflect the changing landscape of innovation and the increasingly global supply of science and technology (S&T) resources and capabilities. China and India for example have taken their place as important players with a growing capacity for research and innovation. Consequently, industrialised countries are confronted with a growing competition from emerging economies not only at the low-end, low-technology end of the value chain, but also increasingly in the more technology and knowledge-intensive components.

4. The recent economic crisis has significantly impacted international investments (in innovation) with major drops in investments abroad; several companies have put new investments projects on hold. Cost savings and consolidation have become priority especially for investments in developed countries at the expense of market entry which still seems to be important however in large emerging countries.

5. Almost all governments nowadays target international investments in high technology industries (reflecting an innovation industry approach) and in innovation and R&D (reflecting an innovation business functions approach) as these investments are generally believed to bring large(r) benefits to host countries. While differences exist between countries, common industries 'targeted' are especially electronics-telecommunications, equipment, pharmaceuticals, aerospace, automobile (manufacturing) and business services and telecommunications (services). Countries increasingly take into account the growing international fragmentation of companies' value chain and also implement a more functional approach by prioritising R&D laboratories, headquarters and other decision centres.

6. The attractiveness of a country for international investment is directly determined by the advantageous character of its location factors. The literature on attractiveness and location factors is large and diverse and has not resulted in (many) clear-cut policy implications. There is not a single theory of MNEs but a variety of models that all try to explain (partially) the location decisions of MNEs. Likewise, a

variety of empirical models have discussed several and heterogeneous location factors in explaining the pattern of MNEs across countries. But studies often differ in scope and methodology; discuss different countries, industries and firms and hence report (often) contradicting results.

7. International investors carefully study the underlying location determinants (strong and weak) of the alternative locations they consider and typically look for a package of attractive location factors which are based on sound economic fundamentals. There is however a large diversity among international investments and location determinants typically differ between industries, functional activities, entry modes, internationalisation motives, etc., which explains the need for a more differentiated analysis. Location decisions are in many cases the result of a lengthy and thorough decision process by MNEs because of the typically long-term character and the large investments involved in setting up an affiliate abroad, explaining the need for a stable policy and regulatory framework.

8. Location determinants in high-technology industries (industry approach of innovation) are the size of the market, the availability of high quality resources like scientific infrastructure and the supply of skilled labour, (potential) agglomeration effects arising from the proximate location of other companies and public knowledge centres. Cost considerations, including labour costs, appear more secondary than in other industries; instead, the quality of the location factors in the host country is much more important.

9. Looking at specific activities like R&D and headquarters (business functions approach) offers complementary insights. Location decisions for more adaptive R&D facilities D are primarily demand-oriented and hence related to market proximity as it is important to be close to 'lead users' and to adapt products and processes to local conditions. Location factors for more innovative R&D investments are more supply-driven consistent with the motivation of technology/knowledge sourcing: the host country's technological infrastructure, the presence of other firms and institutions that may create benefits which investing firms can absorb, access to trained personnel, established links with universities or government institutions, the existence of appropriate infrastructure for specific kinds of research, etc. The importance of labour costs for R&D personnel remains ambiguous; while being of limited importance until some years ago, there is some evidence pointing to a growing importance particularly in emerging economies.

10. Location determinants for headquarter services are the quality and diversity of business services and infrastructure, headquarter agglomeration effects, and levels of corporate taxes and wages. Agglomeration effects are observed to play a very important role, as MNEs prefer to locate their headquarters close to other firms/headquarters, preferably active in the same industry.

11. While falling transport and communication costs have resulted in lower coordination costs between activities within MNEs and hence in a lower need of activities to locate close to each other, co-location effects are nevertheless important for specific business functions. Vertical linkages and complementarities motivate MNEs to locate corporate activities together; especially production activities are drivers of functional co-location along the value chain, by attracting particularly distribution/logistics and R&D.

12. Attractiveness for international investments is a policy priority in most countries: developed countries hope that these new investments compensate for their decreasing comparative advantage in more labour intensive activities, while emerging countries consider these activities as an important leverage for their economic development. The implementation of active attractiveness policies of countries for a rather limited supply of investments projects has resulted in an increasing policy competition between countries. Policy makers should remain vigilant for the negative effects of such policy competition (*e.g.* bidding wars) and refrain from market distorting behaviour.

13. Governments look for a coherent and efficient strategy based on the right mix of policies (reflecting the simultaneous importance of several location factors) and in direct relation to the characteristics of the host country. As such, there is no 'one size fits all' set of policies for all countries/regions as the optimal policy mix will depend on the industrial structure of countries, their innovation performance, their size and institutional organisation, the presence of MNEs, etc.

14. To attract international investments in innovation, governments need to implement a broad, horizontal strategy that is an explicit part of the broader economic/industrial policy of countries. The horizontal character of attractiveness policies for innovation is directly related to the broad and pervasive character of innovation; a successful innovation strategy needs to act upon several policy domains, including specific measures to attract international investments in innovation. A major challenge for governments is to design policy instruments that are maximally open to MNEs but at the same time optimise the benefits to the local economy.

15. Attractiveness for innovation requires a close coordination/integration of innovation policy and inward investment promotion policy. Innovation policy aims to foster the innovation performance and outcomes of host countries, while investment promotion attempts to create a positive image of the country as location for international investments. An attractive marketing of the host country that is not based on strong economic fundamentals will however be rapidly perceived as non-credible by potential investors. By targeting specific types of investors, formulating marketing and information instruments and providing tailored services, investment promotion can result in better investment outcomes. Investment Promotion Agencies (IPA), typically in charge of these policies, should work closely together with other government ministries and agencies in charge of science, technology and innovation, industrial, trade, education and labour policy, etc.

16. As a result of the increasing policy competition, countries are sometimes willing to offer direct incentive packages (e.g. subsidies and taxes including R&D tax credits) to individual investors. There is some evidence suggesting that incentives may divert investments from one country to the other country within a geographic region. Nevertheless, countries should be very cautious in granting incentives to investors since spillovers from MNEs do not occur automatically and may trigger rent-seeking behaviour of investors. Complementary measures are often necessary to increase the absorptive capacity of domestic firms for the advanced technology of MNEs. Furthermore, while there is no systematic evidence of a 'race to the bottom', policy makers should remain vigilant for the negative effects of such policy competition.

CHAPTER 1 INTERNATIONAL INVESTMENTS IN INNOVATION

1.1. A steady growth in international investments and MNEs activities

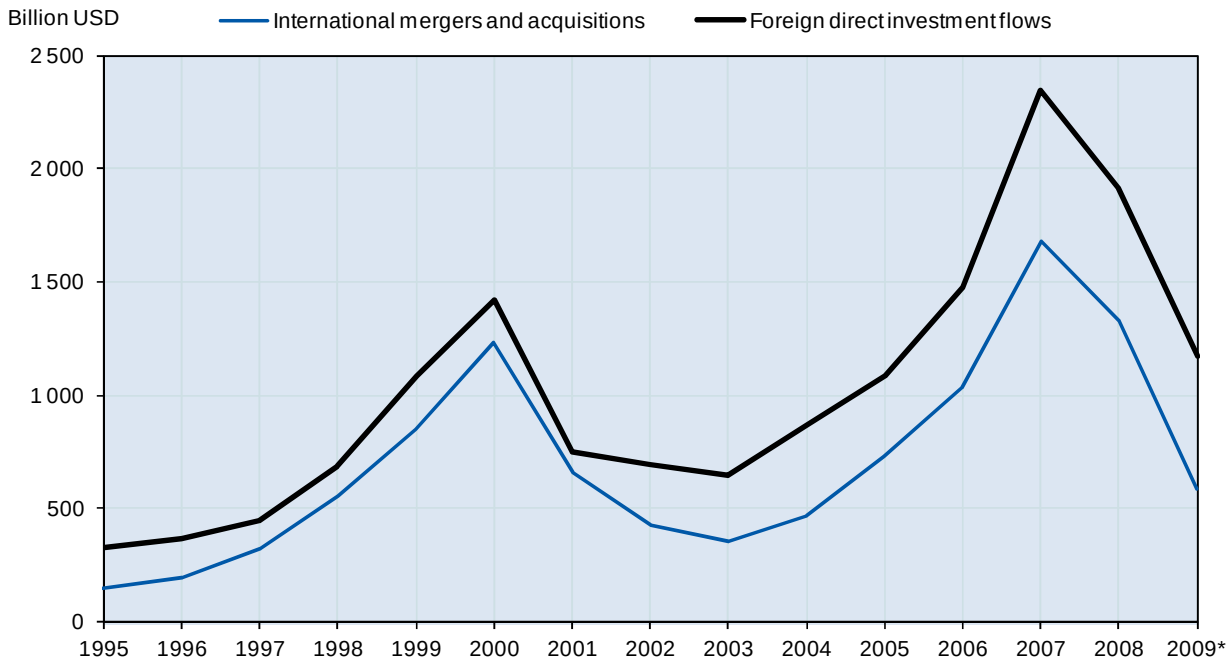
17. International trade and investment have been the primary drivers of globalisation over the last decades showing a growth rate significantly above world GDP growth. International investments, both direct and portfolio investments have grown more strongly than international trade but are the same time highly volatile. Within international trade, services trade has grown strongly in recent years although it still counts for only a fraction of trade in goods. Multinational companies (MNEs) play a key role in these growing international flows of trade and investment due to their subsidiaries and affiliates abroad which increasingly export intermediate and final goods/services among them.

18. Globalisation has benefitted from the gradual lowering of tariff and non-tariff barriers for goods and services trade and from the liberalisation of capital movements through the elimination of restrictions for foreign direct investment (FDI). In addition, drastically reduced transport and communication costs induced by technological progress have also made the integration of markets across borders easier. The decline in these costs has helped reduce economic distances and smoothed economic interaction among countries. Moreover, advances in computing power and the emergence of the Internet have sharply cut the costs of processing and transmitting information thereby further facilitating international investments and trade (OECD, 2007a).

19. The rising flows and stocks of FDI reflect the increasing internationalisation of (multinational) companies and have resulted in an increasing interdependence between countries. Particularly mergers and acquisitions largely aimed to restructure firms' activities have contributed to the strong surge in international investment flows. The upswing in FDI at the end of 1990s *e.g.* was largely due to an exceptional wave of mergers and acquisitions. After a decline in early 2000s, FDI took up again until the recent economic crisis has resulted in a drastic drop of FDI flows, including mergers and acquisitions (OECD, 2010a; Figure 1).

20. These growing international flows of trade and investments are increasingly taking place within global value chains and international production networks. Production processes have become increasingly fragmented as goods are produced sequentially in stages across different countries. Until recently, production generally took place in one location, in line with countries' comparative advantages, but the strong decline in communication and co-ordination costs has facilitated the spatial distribution of production (Grossman and Rossi-Hansberg, 2006; Baldwin, 2006). Firms seek to optimise the production process by locating their various production stages across different sites according to the most optimal location factors across countries. As a result, companies have increasingly been restructuring their operations internationally *e.g.* through the outsourcing and offshoring of activities (OECD, 2007a).

Figure 1. FDI flows and mergers and acquisitions

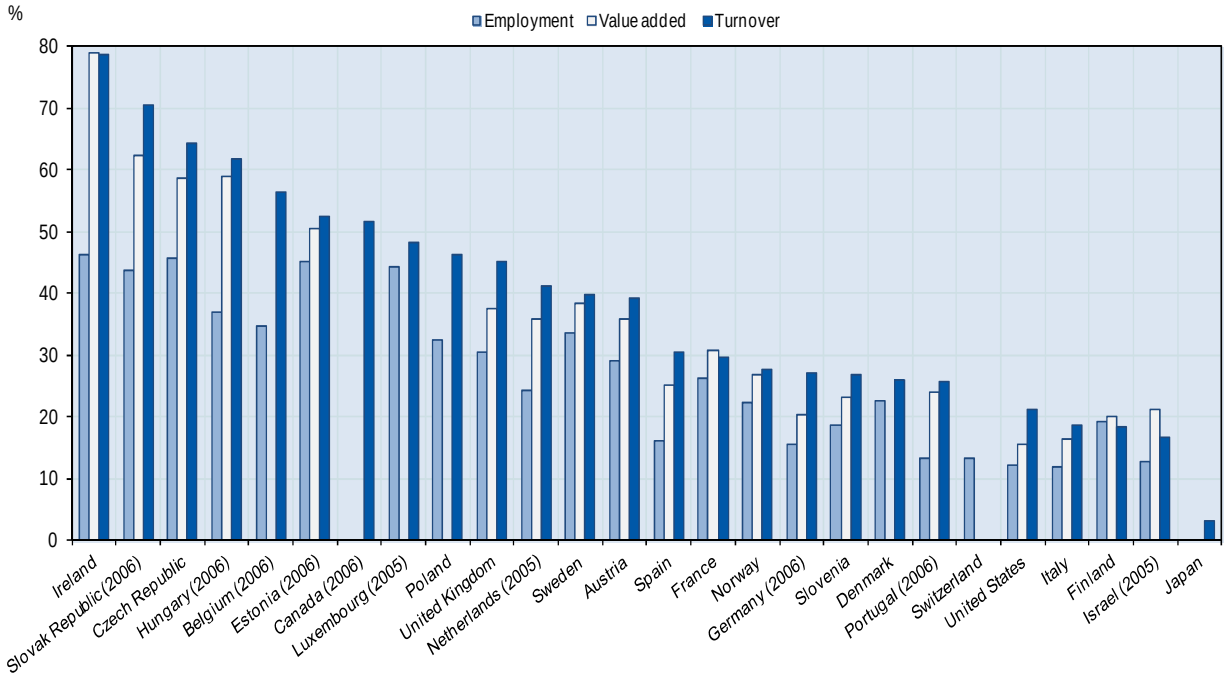


Note: * estimates.
Source: OECD (2010a), IMF and Dealogic.

21. MNEs have become important economic actors in the global economy because of their large international investments and numerous affiliates abroad, enabling them to shift activities within their multinational network according to changing demand and cost conditions. These affiliates not only serve local markets in the host country but often also serve other neighbouring markets and in addition, produce inputs for other affiliates within MNEs global value chains. This intra-firm trade, *i.e.* cross border trade between MNEs and their affiliates accounts for an increasing share of international trade (OECD, 2010a).

22. MNEs are responsible for a large share of employment, turnover and value added in host countries, especially in high technology industries in manufacturing. In 2007, the share of foreign-controlled affiliates in OECD manufacturing turnover ranged from nearly 80% in Ireland to 3% in Japan, with especially smaller countries like Ireland, Czech republic, Slovak Republic, Hungary and Belgium characterised by a large foreign presence. Figures of the foreign-owned share of employment and value added follow the same pattern, but are on average a bit smaller (Figure 2). These figures indicate that strategic decisions taken at the international level by MNEs may generate major impacts on the economic structure of host countries.

Figure 2. Importance of MNEs in manufacturing, 2007



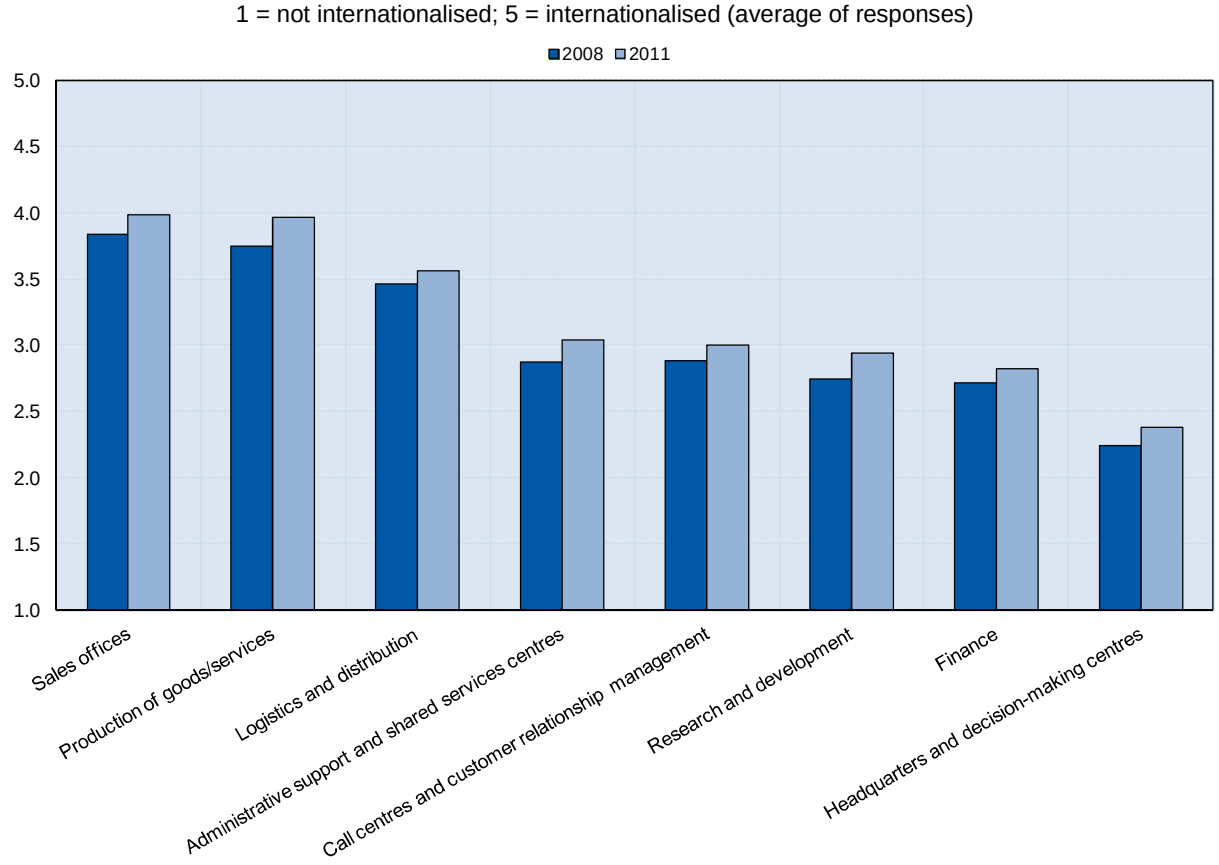
Note: The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: OECD (2010a)

1.2. International investments in innovation on the rise

23. The past decades have witnessed an increasing internationalization of the different company activities including innovation related activities. The increasing vertical specialisation within global value chains has resulted in the geographical dispersion of economic activities across many countries (OECD, 2007a). While distribution, sales and production activities were the first to lead the way, nowadays also R&D and decision-making activities are increasingly (re-)located internationally (OECD, 2008). The World Investment Prospects Survey of UNCTAD (2009) showed that R&D and headquarters services have become more internationalized, though they are still less internationalized than sales, distribution and production activities (Figure 3). In particular, technical advances in ICT and the growing availability of knowledge infrastructure seem to have enabled and spurred the internationalization of knowledge intensive activities including R&D.

Figure 3. Share of corporate functions undertaken abroad



Source: World Investment Prospects Survey 2008-2011, UNCTAD (2009).

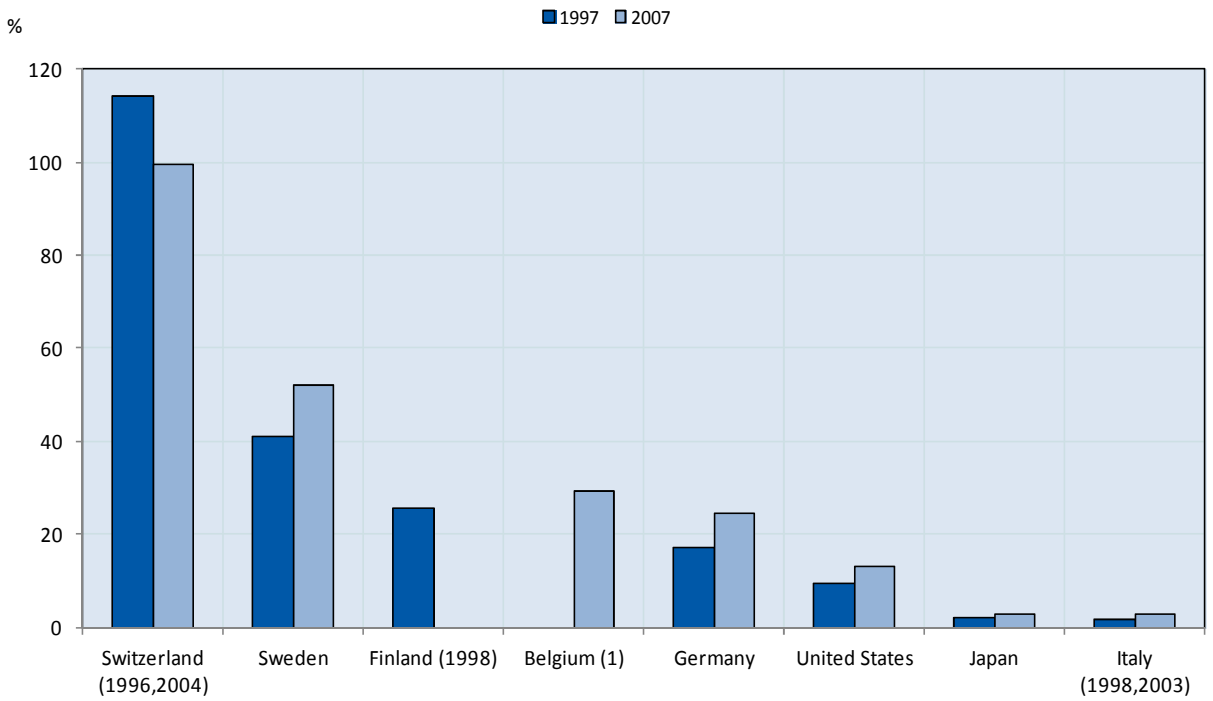
24. Successful innovation increasingly requires more complex and interactive processes, forcing companies to partner internationally to share costs, find complementary expertise, gain access to different technologies and knowledge rapidly and collaborate as part of an innovation network (OECD, 2009c). The playing field for innovation has become truly international, illustrated by the growing international cooperation in science, technology and innovation along different dimensions: international patents, international co-authorship of scientific publications, R&D funding from abroad, international cooperation arrangements (OECD, 2010a). Flows of human capital also contribute to the internationalisation of innovation through increased international mobility and rising numbers of foreign scholars in countries.

25. MNEs play a major role in the internationalisation of R&D and innovation with their growing investments in R&D (abroad): the largest R&D spending MNEs position themselves among the Top 10 countries investing in R&D in 2008 and the aggregate spending of the world's 8 largest MNEs in 2008 was larger than the R&D investments of all individual countries, except for the United States and Japan (OECD, 2010). While the majority of the R&D investments is still concentrated in home countries close to the MNEs' headquarters, foreign affiliates of MNEs play an important role within the multinational network when organising their R&D and innovation activities on a global scale. R&D investments by foreign affiliates in the OECD area more than doubled between 1997 and 2007 (reaching USD 89.3 billion). The United States, Germany and the United Kingdom attracted the largest investment projects in R&D, although their relative importance decreased over the period considered.

26. While different internationalization modes are available for companies, FDI through equity investments often remains the preferred alternative, especially when core competencies are at play. Non-equity investments (*e.g.* outsourcing, licensing and strategic alliances) are increasingly used for the production of non-strategic parts and components or for the support of specific business functions like logistics, customer support services and administrative activities (such as payrolls, billing and accountancy). Corporate activities like innovation often embed the use and development of proprietary knowledge, hence companies might prefer to keep these activities at close hand (*i.e.* in-house) by setting up new firms (greenfield investments) or by acquiring existing firms (mergers and acquisitions) in foreign countries.

27. OECD data on outward R&D investment by MNEs showed that the R&D performed abroad has increased since 1995 relative to R&D performed at home (Figure 4). The only exception is Switzerland which has seen a slight decline, but Swiss affiliates abroad do as much research as all firms inside Switzerland. The share of R&D investments abroad is smaller in other countries but still over 20% in Germany, Finland and Sweden.

Figure 4. Business sector R&D expenditure by affiliates abroad as a percentage of domestic R&D expenditure in selected R&D countries

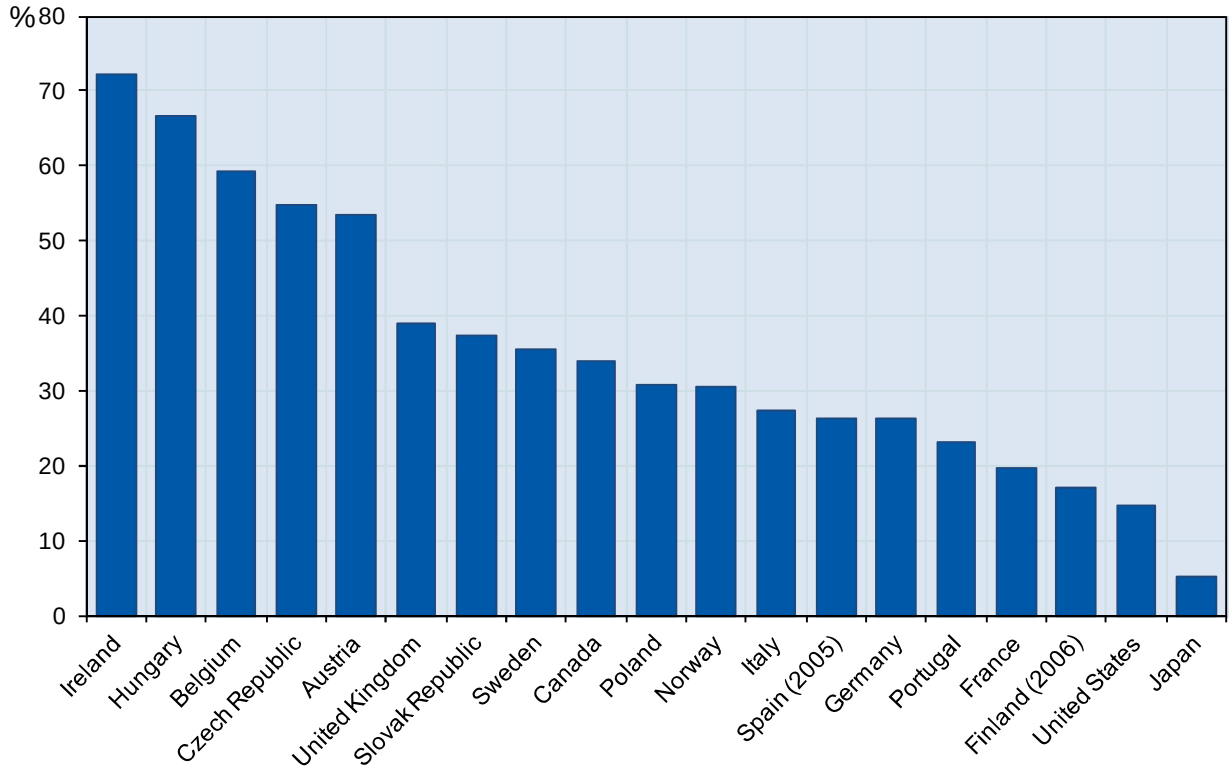


Note: 1 = manufacturing sector.
Source: OECD (2010).

28. The result of this increasing R&D internationalisation is the growing share of foreign affiliates in total R&D investments in host countries: in some (smaller) countries, foreign affiliates account for the majority of R&D investments (Figure 5, OECD, 2010a). Overall business R&D in countries is observed to be increasingly funded from abroad, with especially funding from internal corporate transfers (from the parent company to its affiliates abroad) being important. Finance from abroad represented more than 10% of total business R&D in 2007 in several countries and this foreign funding concerns primarily intra-company financing (OECD, 2009b). Concerns have been raised in some countries about the

dependency and vulnerability of the local R&D base, since MNEs have become more mobile and increasingly shift activities, including R&D, across borders within their global value chains in reaction to differences in countries' location factors

Figure 5. Share of foreign-controlled affiliates in total business R&D expenditures, 2007

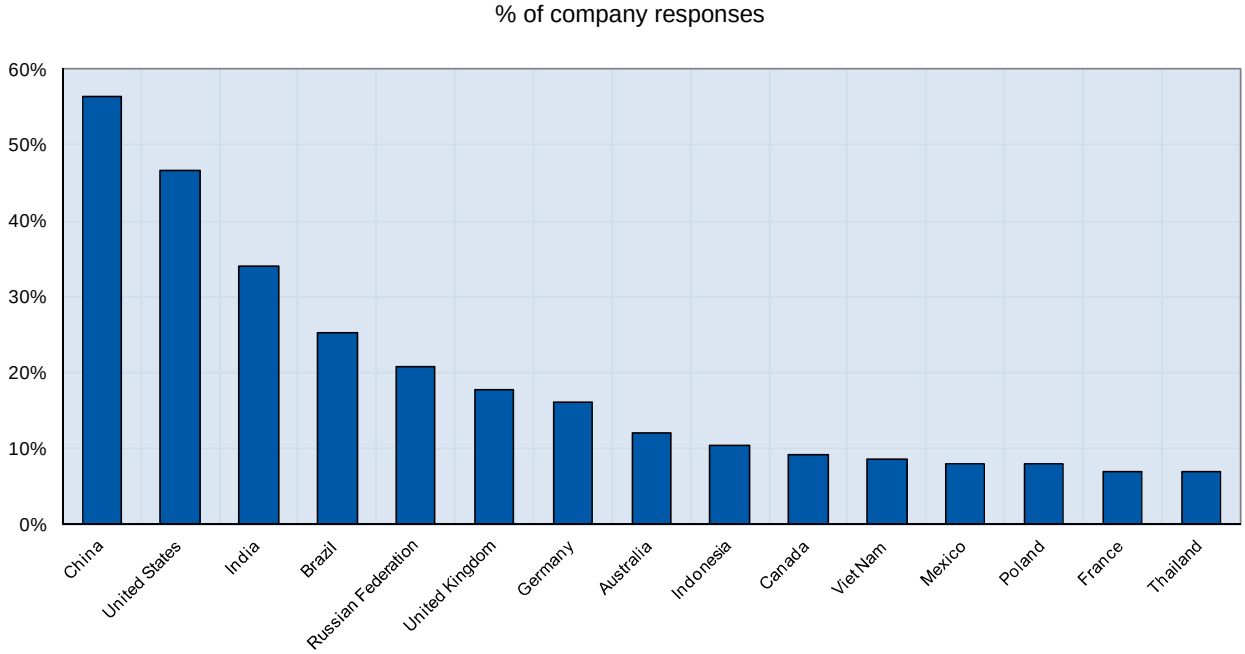


Source: Economic Globalisation Indicators, OECD (2010, forthcoming).

1.3. A growing market share of international investments for emerging countries

29. Emerging countries have become increasingly attractive for international investments. The availability of low cost resources and the emergence of fast growing markets have led many MNEs to locate large-scale manufacturing activities in these emerging countries rather than in traditional industrialized countries. Results of the World Investment Prospects Survey indicate, for example, that several of these countries are considered to be among the 15 most attractive locations for international investment (Figure 6). UNCTAD (2010) reports that developing and transition economies now host the majority of foreign affiliates' labour force. While there is a stronger attraction for particularly labour intensive industries, new investment projects in emerging countries are not limited to more traditional, lower technology industries. As companies increasingly slice up of their value chains in sequential production stages, they are able to move the most labour intensive activities (*e.g.* assembly) even in higher technology intensive industries.

Figure 6. Top -15 most attractive countries for the location of FDI, 2009

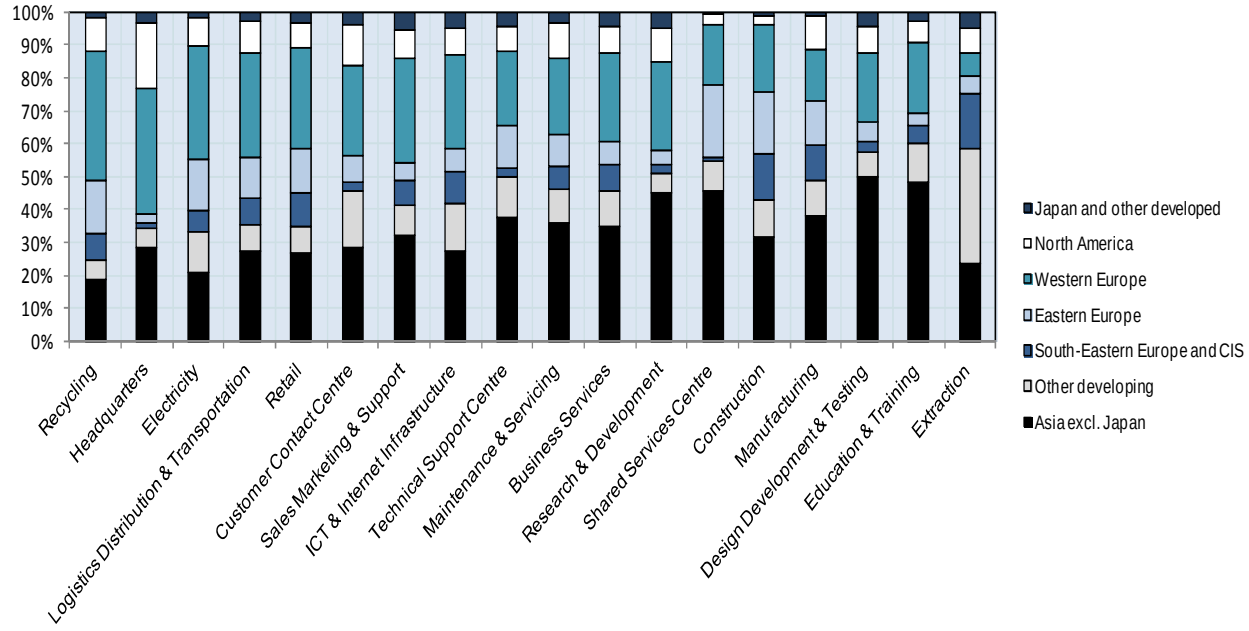


1. This percentage is calculated as the number of times the country has been mentioned, divided by the number of responding companies. Figures may add up to more than100 % due to possible multiple responses. Numbers in brackets indicate last year's ranking.

Source: World Investment Prospects Survey 2008-2011, UNCTAD (2009).

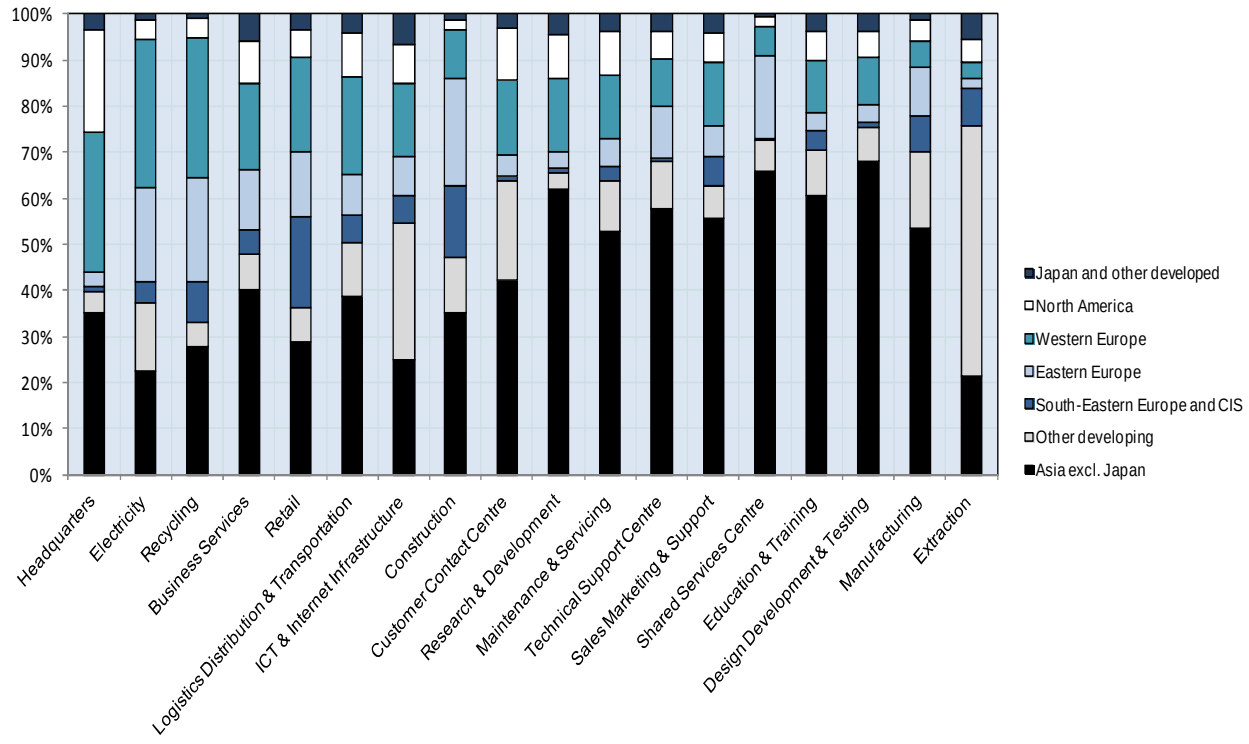
30. In addition, recent data on international investment projects demonstrate the growing market share of emerging countries in innovation related investments. Emerging countries have become increasingly attractive for international investments. Asia (in particular China and India) and, to a lesser extent, Central and Eastern Europe, have attracted considerable investment in recent years: data on greenfield investments in terms of the number of projects as well the (estimated) employment created by these new investments show the attraction of the Asian region (excluding Japan) for new investments in R&D and innovation (Figures 7 and 8). Changes in the investment behaviour of MNEs reflect the changing landscape of innovation and the increasingly global supply of science and technology (S&T) resources and capabilities. Emerging countries have become increasingly attractive for international investments. China and India for example have taken their place as important players with a growing capacity for research and innovation. While they lag OECD countries in terms of e.g. investment in R&D per capita, their capabilities are already large in absolute terms (OECD, 2008).

Figure 7. Number of greenfield projects in different business functions, by host country (% of world total, January 2003 to June 2010)



Source: FDI Markets database.

Figure 8. Job creation related to greenfield investments in different business functions, by host country (% of world total, January 2003 to June 2010)



Source: FDI Markets database.

31. There is some discussion about the precise nature of these new R&D investments in emerging countries: some argue that these activities concern especially (applied) development activities like product design, clinical research centres, software development, tests and research support centres, high-tech manufacturing facilities. While this observation seems to be valid for a number of countries and companies, there are several examples of large MNEs that have set-up R&D facilities with a clear (fundamental) research focus in emerging countries following the rapid catching up process of some of these countries in innovation capabilities (e.g. R&D investments).

32. Another point of discussion is the overall importance of these R&D investments in emerging countries: some studies seem to suggest that this investment flow remains relatively small in a global perspective and that most internationalisation of R&D by MNEs still seems to take place with major OECD regions (see for an overview OECD, 2008). This confusion mainly results from the lack of a complete database collecting all new investments (greenfield as well as mergers and acquisitions). Investment and location surveys typically display distinctive characteristics reflecting their different focus in terms of countries, industries, companies, business functions, type of investment, etc. The share of emerging countries in R&D investments seems to be especially large in terms of greenfield investments, next to Europe and North America which remain major destinations for investments in innovation (see Figures 7 and 8). Developed countries seem to be relatively more important in terms of mergers and acquisitions. This would be in line with aggregate figures on FDI, which show that the largest part of international investments (mainly mergers and acquisitions) is still concentrated between OECD countries (OECD, 2010).

33. Emerging countries are however not only important as destination of FDI, but increasingly become a source of international investments. A growing number of companies in these countries have implemented internationalisation strategies by setting up affiliates, including R&D affiliates, abroad. Over the years, one observes an increasing share of emerging countries in FDI flows and mergers and acquisitions (OECD, 2010). UNCTAD (2010) reports that 28% of the 82.000 largest transnational corporations originate from emerging countries in 2008 compared to less than 10% in 1992.

34. The rapid industrial/innovation development of emerging countries has resulted in a stronger competition for industrialised countries not only at the low-end, low-technology end of the value chain, but also increasingly in the more technology and knowledge-intensive components. This has raised concerns among policy makers in several developed countries since R&D activities were assumed to be rather isolated from international relocation. But after the relocation of major production and distribution investments by MNEs (including their own indigenous MNEs) also higher value added activities like R&D and innovation related activities seem to (re-) locate in emerging economies.

1.4. The impact of the recent economic crisis

35. The economic crisis which started late 2007 has significantly impacted international investments (in innovation) but has not altered the major trends. International investments in general have witnessed a drastic decline following the economic crisis: after a 16% decrease in 2008, global FDI inflows dropped by another 37% in 2009 while outflows fell by 43% (UNCTAD, 2010). The major explanations for this setback in FDI are first the reduced investment capability of firms as a direct result of lower profits and a lower availability and higher cost of external finance, and second the negative economic prospects especially in developed countries. International investments started to stabilize in the latter half of 2009 followed by a modest recovery in the first half of 2010.

36. The fall in FDI was strongest in terms of mergers and acquisitions which dropped by 34% in 2009, while greenfield investments declined by 15% (UNCTAD, 2010). As mergers and acquisitions are more sensitive to financial conditions, they were impacted early on but were also the first to bounce back

following the emerging recovery. Greenfield investments typically have a longer investment cycle and started to decline only in 2009; since then however new investments projects have been postponed or cancelled suggesting a rather slowly recovery of this type of international investments.

37. The drop in international investments was more severe in developed countries which experienced their most serious recession since the Second World War. Emerging countries showed a higher resilience in the downturn and also seem to take the lead in the recent recovery of FDI. This has resulted in a rising importance of developing and transition countries both as destinations and sources of international investments. There are however marked changes within this group of developing and transition countries, with especially large emerging countries like e.g. China and to a lesser extent India continuing their growth.

38. All industries, from the primary sector over manufacturing to the services sector, have witnessed significant drops in international investments. Cyclical industries have been among the most affected by the crisis: automotives and other transporte quipment, construction, electronic equipment and the financial sector. But also less cyclical industries like chemicals and food processing have shown significant decreases in international investments. The impact of the crisis on international investments in innovation in particular seems to follow a similar pattern. Looking into more detail at individual industries, technology intensive (manufacturing) industries and knowledge services e.g. showed a drastic drop in the number of mergers and acquisitions and greenfield investments over the years 2007 to 2009 (Table 1).

39. Data on international investments by business functions are not (yet) available but some surveys (Ernst & Young, 2010; IBM, 2009) report significant reductions in (new) investment projects including in R&D investments. Emerging countries like China and India remain (the most) attractive locations for different business functions. In addition, respondents point to changes in investment motivations following the crisis: cost savings and consolidation have become the priority especially in developed countries at the expense of market entry which seems to be only important in large emerging countries. Nevertheless many companies have indicated that they have put new investments projects on hold, even in emerging countries.

Table 1. Number of mergers and acquisition, and greenfield investments in innovation related industries, 2007-2009

	Mergers and acquisitions			Greenfield investments		
	2007	**2008**	**2009**	**2007**	**2008**	**2009**
Chemicals and pharmaceuticals	325	316	225	860	986	940
Electrical and electronic equipment	266	309	203	791	942	806
Motor vehicles and other transport	86	95	74	861	1090	840
Finance	712	563	458	1161	1616	1267
Transport and communication	436	343	211	1024	1269	1133
Business services	1972	1681	1109	2922	3647	2927

Source: UNCTAD (2010).

CHAPTER 2 LOCATION FACTORS FOR INTERNATIONAL INVESTMENTS IN INNOVATION

2.1. Attractiveness, location factors and MNEs

40. Because of its strong policy-oriented nature of the subject, territorial attractiveness has received growing attention from academics, public bodies, professional organisations and specialised consultants. But the policy interpretation of this work has proven not always straightforward. In general terms attractiveness refers to the capacity of a territory to meet the needs and requests of the investor better than the other territories in competition to attract a given project (Hatem and Py, 2008). The concept of attractiveness however has been defined differently across studies dependent on the objective and scope of the study, the data used and the methods applied to empirically measure the concept.

41. One category of studies that recently has received considerable attention is country rankings benchmarking the overall attractiveness of a given country, *e.g.* the Global Competitiveness Report of the World Economic Forum and the World Competitiveness Yearbook of IMD. These studies measure the overall attractiveness or competitiveness of a given country/region based on a multitude of attributes, including innovation factors[1]. In fact, most studies and surveys on attractiveness although general in scope, provide insights on innovation activities. The European Attractiveness Survey of Ernst & Young (2008a) *e.g.*, which is traditionally based on quantitative and qualitative data, has recently included specific questions on innovation in its opinion survey among business executives.

42. Other studies focus not on attractiveness per se but nevertheless benchmark the innovation capabilities of various countries around the world. The OECD "Science, Technology and Industry Scoreboard" (2009), examines the innovation potential of countries along several dimensions and brings together over 200 indicators to compare the innovation potential and performances of OECD members and major non-members. The European Innovation Scoreboard of the European Commission is a similar exercise benchmarking EU countries in terms of innovation.

43. Studies on territorial attractiveness are generally based on the academic discussion of location factors for international investments and MNEs. This academic literature on international investments is vast and diverse reflecting the different lines of thought that have attempted to explain the motives of MNEs (Box 1). Results originate from various fields of research, such as industrial economics, international economics, management and business, regional/local development dynamics, location theory, etc. Consequently a multitude of determinants, including country-specific location factors, have been discussed as determinants of international investments and MNEs.

44. The attractiveness of a country for international investment is directly determined by the advantageous character of their location factors, and it is this group of factors that is of direct relevance to this paper. An extensive list of location factors has been discussed in the literature ranging from tariff and investment barriers, to population size, to per capita income, the land-labour ratio, wage costs, market size,

[1] In addition, many studies compare the quality of the business environment and attractiveness of localities such as major metropolitan areas, like *e.g.* the 'European Cities Monitor' of Cushman-Wakefield (2007), the 'Business Readiness Indicators for the 21th Century' of PriceCoopersWaterhouse (2007) and the 'Global Cities Attractiveness Survey' of Ernst & Young (2008b).

distance, average education, the presence of other MNEs (of the same or different nationality), the presence of domestic companies (in the same and/or in upstream and downstream industries), the regulatory framework, property rights, industrial disputes, infrastructure, etc. [see for overviews, *e.g.* OECD/DSTI/WPGI(2008)6; Faeth, 2009].

Box 1. Theories of MNE

Earlier research has typically considered MNEs as pure financial flows (i.e. FDI) arising because of differences in interest rates between countries. However this has shown quickly to be an unsatisfactory explanation and economic motivations were increasingly explored to help explain the rapidly growing investments abroad by MNEs. Industrial economics stressed the fact that MNEs are oligopolistic firms competing against incumbent firms in different countries that posses some firm-specific advantages originating from imperfections in final goods as well as input factor markets (Hymer (1960), Caves (2007). In addition location theory has analyzed the different location factors that make (production) sites attractive for (domestic and international) investors.

Internalisation theory stressed the importance of market failure, the reason why MNEs organise an internal market to avoid transaction costs (Buckley and Casson (1991), Williamson). Many intangible assets transactions arrangements between firms turn out to be complex hence direct investment is preferred above e.g. licensing to a foreign producer. MNEs are the result of a process in which firms try to secure the rents from their monopolistic/intangible advantages in the presence of market imperfections. Later research has increasingly included MNEs in general-equilibrium models of international trade, distinguishing between vertical and horizontal MNEs (Helpman, 1984 and 1985; Helpman and Krugman, 1985).

Probably the most comprehensive framework that structures and synthesizes the different theories of MNEs' investments is the eclectic paradigm of Dunning (1993); it categorizes a variety of factors depending on whether the focus is on ownership, location or internalization advantages:

- Firm-specific ownership advantages explains what firms will become MNE: these advantages give MNEs a competitive advantage over domestic firms and allow them to operate on an international scale; examples of such advantages are property rights, intangible assets such as patents and trademarks, organizational and marketing expertise, and proprietary production technology.

- Market-specific internalization advantages refer to the how and why of international investments by MNEs; firms want to internalize their foreign activities through affiliates and subsidiaries, rather than using arm's length transactions; these advantages are related to the leakage of proprietary knowledge, lock in costs, high search costs in looking for suppliers with specific capabilities, etc.

- Country-specific location advantages explain where international investments by MNEs will take place; these advantages motivate MNEs to set up affiliates in specific locations: the access to (protected) markets, lower labour costs, a well educated labor force, etc.

45. Interpreting the diverse results of this literature for policy is challenging and the overall policy interpretation of this large and broad literature is not straightforward. Studies typically analyse different sets of location factors in different settings often using different methodologies and, not surprisingly, this has resulted in non-equivocal, sometimes contradicting observations:

- A general or specific activity scope: some studies cover a very broad scope of activities (*e.g.* several industries or business functions), while other studies are specifically focused on only one industry or function;

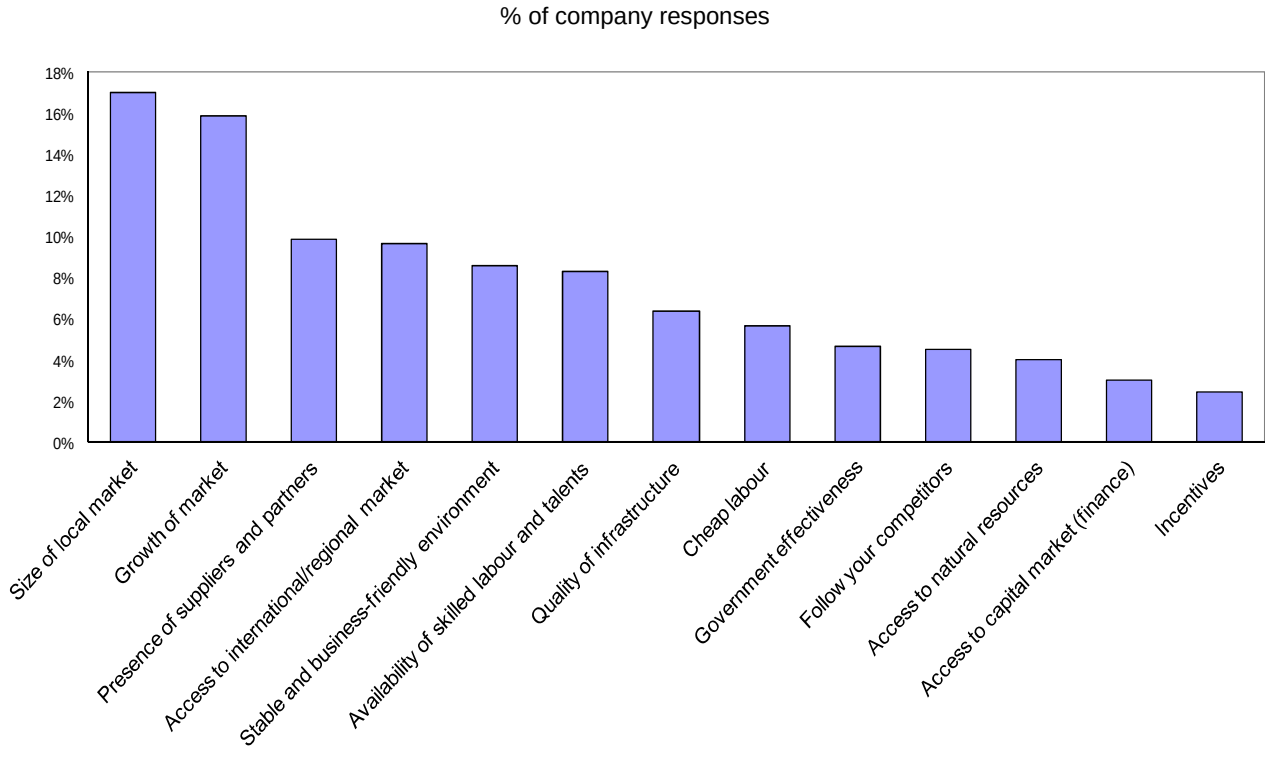
- From global to local geographical scope: some studies are based on information from a large range of home and host countries, while others are specifically focused on one (home or host country) or even on competition between regional/local entities within a country;

– Differences in methodological approaches: a large number of (academic) studies have used econometric methods in analysing the importance of location factors, while other studies (very common by consultants) rather apply surveys and case studies;

– Differences in data sources: earlier studies merely used data on foreign direct investment (FDI), while others use (aggregated) data on MNEs; the increasing availability of microeconomic databases on individual projects and firms has benefitted the particular analysis of MNEs as economic actors, often through the use of advanced econometric methodologies.

46. Surveys often allow for a more complete range of location factors as they are not limited by data availability, but suffer from other shortcomings.[2] The results of the World Investment Prospects Survey (UNCTAD, 2009) indicate, consistent with the academic literature, that different location factors are at play in deciding where to locate international investment and that these are closely related to economic fundamentals of the host location . Including different types of location factors, market related factors were the most frequently cited location factors, with respectively 17% and 16% of the responses for market size and growth (Figure 9). Other important categories of location factors were resource related factors (*e.g*. the presence of suppliers/partners, the availability of skilled labour) and the quality of the business environment (stability of legislation, quality of infrastructure). Interestingly, government incentives such as financial grants seem to be less important (as discussed further below).

Figure 9. Location factors by order of importance, 2009-2011



Source: World Investment Prospects Survey 2008-2011, UNCTAD (2009).

2 Among others: the often restricted sample of respondents-firms, the unknown identity of actual respondents within the firm, the intrinsic quality of the answers.

2.2. The need for differentiated analysis

47. There is a large diversity among international investments, hence the need for a more differentiated analysis. The importance of location factors depends among others on the (strategic) motivations of the MNE (Dunning, 2000). Market-seeking investments naturally emphasize market-related location factors like *e.g.* the size of the market, the growth potential of the market, the buying power of consumers, etc. Resource seeking investments typically look for countries with relatively cheap and abundant productive scarce resources (natural, physical or human). Efficiency seeking investments are especially motivated by cost advantages (raw material, land and labor) to realize economies of scale and rationalise operations , while strategic asset seeking investments are undertaken to get access to technology and other productive capabilities in host countries (Dunning, 2000; Faeth, 2009)

48. Theories of MNEs also traditionally distinguish between horizontal and vertical MNEs, where the former are motivated by the desire to place production close to customers and avoid trade costs (*e.g.* tariff jumping) while at the same time realising economies of scale. Hence, location advantages of countries for this type of international investment are typically related to a large market size and the existence of high trade barriers. In the case of vertical MNEs, different stages of production take place in different countries and the production in one country serves as input for production activities in other countries. Location factors of vertical MNEs relate to differences in endowments between countries, *e.g.* unskilled labour intensive production activities are typically located in countries with relatively abundant unskilled labour (Helpman, 1984 and 1985; Horstman and Markusen, 1987 and 1992; Markusen, 1997 and 2002).

49. Lower trade barriers and plummeting communication and transportation costs explain why the vertical model of MNEs is gaining importance (Chen et al., 2005). In addition to directly serving foreign markets (the domestic and adjacent markets of the country of location), foreign affiliates/subsidiaries are increasingly included in global value chains that spread out across different countries. In a global world characterised by an increasing vertical fragmentation of production, policy makers will clearly benefit from analyzing location factors in direct relation to the different activities in companies' value chains (see below). Market considerations are still expected to be crucial, but are likely to be complemented by additional location factors particularly relevant for specific stages in the global value chain.

50. Partially reflecting the differences in strategic motivations for international investments, the relative importance of location factors also varies by industry. The World Investments Prospects Survey indicates differences in locations factors between the primary sector, manufacturing and services industries (Table 2). The size and growth of the market are the most cited location factors for manufacturing and services but less so for the primary sector. Not surprisingly access to natural resources and government regulation in the host country are considered to be very important for the primary sector.

51. Even among individual industries within the manufacturing sector, location factors are not the same (see Table 3). For instance, labour cost plays a less important role in chemicals (a very capital intensive industry where labour productivity is typically very high) compared to the automotive industry (a relatively labour intensive industry employing many people in manufacturing plants). On the other hand, the quality of labour seems to be a more important location factor in industries such as pharmaceuticals, equipment, machinery and chemicals, than in the automotive industry. In many services industries such as transport and telecommunications, access to market and the overall openness of the country to foreign investors have a much more important impact than any other variable.

Table 2. Location factors by sector, 2007-2009
% of company responses

	Primary	Manufacturing	Services
Follow the leader	5	4	5
Skilled labour	10	10	8
Cheap labour	1	11	5
Size of local market	6	22	22
Access to capital market	1	1	6
Access to natural resources	22	5	3
Access to regional market	13	11	10
Growth of local market	7	22	20
Government effectiveness, incentives	15	4	8
Stable investment environment	20	8	13
Others		3	2
Total	**100**	**100**	**100**

Source: World Investment Prospects Survey 2007-2009, UNCTAD (2007).

52. Another dimension in the strategic decision process of the MNE that might affect the importance of location factors is the mode of entry. Certain location factors will be more important in the case of greenfield investment (*e.g.* the availability of appropriate location sites) or of mergers and takeovers (*e.g.* the availability of attractive target companies). Host country regulations such as investment barriers will also differ in importance depending on the chosen entry mode. Reversely, the entry mode chosen will depend on specific location factors of the host country: in the case of a lower market potential combined with a higher investment risk, firms might prefer to set up joint ventures rather than wholly-owned subsidiaries in serving the host country (Agarwal and Ramaswami, 1992; Pan and Tse, 2000).

53. A last dimension requiring a differentiated analysis of the location choice of MNEs is the geographical level, as location factors differ at the national, sub-national and local level. Firms are found to employ a sequential decision process when choosing new business locations. Instead of comparing all possible locations at the lowest geographical level, companies tend to first select a large geographical area (e.g. a country or group of neighbouring countries) based on one set of location factors and then select a smaller geographic area (*e.g.* a region or city) based on another set of location factors. In analyzing new investments in Europe by US MNEs, Mateloni (2007) shows that first a specific country is selected based on national attributes including industrial agglomeration, and then a region within that country based on regional attributes (*e.g.* worker skill levels, industrial agglomeration and transportation infrastructure). A similar sequential decision process was shown for Japanese investments in Europe (Mayer and Mucchielli, 1999).

Table 3. Importance of location factors by industry (% 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**

Note: *a*: excludes pharmaceuticals;
b: includes metal and metal products, non-metallic products and wood.
Source: World Investment Prospects Survey 2009-2011, UNCTAD (2009)

2.3. Attractiveness for innovation: an industry approach

54. A first approach to study the attractiveness for innovation activities by MNEs is to focus on high-technology industries as defined by the OECD (1997) [3]; these industries are characterised by large R&D investments and thus supposed to be among the most innovative. The discussion of location factors across individual industries above suggested already that differences between lower and higher technology industries exist. Empirical work studying the location factors for international investments particularly in these technology intensive industries is however rather limited. This scarcity however is partially balanced by the fact that a large number of empirical studies focus on the location of R&D activities (see below) and rely heavily on data of high technology industries.

55. It is clear however that this industry-definition of innovation encompasses a very large and at the same time somewhat heterogeneous set of activities. As such, this empirical approach has a major drawback since it risks confining innovation to be technological innovation happening only in high technology industries. Innovation is much broader, including also non-technological innovations like organisational/marketing innovations and also occurring in more 'traditional' industries (OECD, 2010; Robertson et al., 2009).

56. By examining the geographic patterns of high-tech industry location across United States counties, Goetz and Rupasingha (2002) found that the availability of college graduates, the presence of other high-tech establishments, the total income of the county, the degree of urbanisation of a county, the ease of highway access, the level of property taxes, and, to a lesser extent, the quality of educational institutions have a positive impact on the location of high-tech activities. Some studies have tried to identify specific location determinants for high tech industries in direct comparison with lower technology industries. Hackler (2003) *e.g.* shows that high-tech firms in the United States are, on average, more sensitive to scientific infrastructure than low-tech industries, but less sensitive to increase in wages and affordability of housing.

57. In analysing aggregate measures of MNEs presence in high and medium-high tech manufacturing industries and business services industries across the OECD, Hatem (2009) shows the importance of market size, agglomeration and specialisation effects, and, to a minor extent, the quality of public governance for the location of MNEs' activities. Also the overall degree of the country's openness to FDI is found to be a significant location determinant [OECD (DSTI/IND/WPGI(2009)1]. The same study also analyses differences in location factors between individual industries, largely confirming the observations in Table 2. In addition to the results valid for all industries, human capital is observed to be particularly important in pharmaceuticals while labour costs affect negatively the location of MNEs in the automotive industry and the electronics industry (see Box 2).

58. Some other studies also provide more in-depth insights on more specific industries. The quality of scientific infrastructure (*e.g.* excellence centres, research departments) is reported as a key location factors in the pharmaceutical industry in different studies (Gassmann and Von Zedwitz, 1999; Serapio and Dalton, 1999; Madhok and Osegowitch, 2000; and Abramowsky et al. 2007). Florida (1997) found that the internationalisation of biotechnology is motivated by access to foreign science and technology to a greater degree than other industries, such as the automotive industry, where market considerations are more important.

[3] The OECD classification of high, medium-high, medium-low and low tech industries applies only to manufacturing industries. A complementary classification, *i.e.* knowledge-intensive services, includes the sectors 'post and telecommunications', 'finance and insurance' and 'business activities'.

Box 2. Empirical analysis using OECD AFA and FATS databases

Attractiveness for innovation has been analysed in the WPGI by using the OECD databases on MNEs: Activities of Foreign Affiliates (AFA database) and Foreign Affiliates Trade in Services (FATS database). The empirical analysis related the presence of MNEs across different OECD countries to different location factors, like market size, market growth, human capital, other MNEs active in the industry, R&D investments, patents, etc. The advantage of this type of analysis on the aggregate level is the large comparability of the results across countries as standardised concepts and internationally comparable data are used. A drawback is maybe that the presence of MNEs in industries/countries is used as a proxy for attractiveness; this empirical approach of attractiveness is rather broad and hence may include other aspects which are correlated with MNEs' presence, like e.g. the structural shift towards more knowledge intensive industries (in which MNEs are typically active).

The analysis applied an industry approach by focusing on individual industries:

- high tech manufacturing industries: pharmaceuticals (ISIC 2423), office and computing equipment (ISIC 30), electronic equipments and components (ISIC 32) and precision and medical instruments (ISIC 33), aircrafts and spacecrafts (ISIC 353);
- medium to high tech manufacturing: chemicals excl. pharmaceuticals (ISIC 24 – 2423), machinery and equipment (ISIC 29), electrical machinery and apparatus (ISIC 31), motor vehicles and trailers (ISIC 34);
- knowledge services: post and telecommunications (ISIC 64), financial intermediation (ISIC 65, 66, 67), computer related activities (ISIC 72), research and development (ISIC 73), other business activities (OSIC 74).

The econometric analysis was done at the industry level across OECD countries for which data were available. The presence of MNEs in host countries was computed in 3 different variables: value added created by foreign affiliates, employment created by foreign affiliates and R&D investments done by foreign affiliates. Robustness tests were undertaken using the number of foreign affiliates and FDI stocks.

The overall results, i.e. all innovation-related industries grouped together, show the importance of market size, agglomeration effects and to a minor extent, the quality of public governance for the location of international activities in innovation-related industries. The overall degree of the country's openness to FDI was also found to be a significant location determinant.

Significant differences in location criteria were reported depending on the variable used as proxy for MNEs' presence. Foreign controlled value added was found to respond strongly to market size/growth and industrial agglomeration effects. MNEs' employment (expressed in headcounts) was the only variable for which labour costs played a significant role as location factor. The location of foreign controlled R&D investments was found to be very sensitive to total R&D investments and number of patents in host countries.

Separate results were reported for individual industries, showing significant differences between industries. However, the number of observations was limited for some industries and hence results should be confirmed in future work.

Source: Hatem (2009), Location Criteria of Activities Related to Innovation: an Econometric Study on OECD AFA and FATS Databases [OECD/DSTI/IND/WPGI(2009)1].

59. A study for the EU found that major location determinants for ICTs inside the EU included the level of regional GDP, the degree of industrial specialisation, the level of education and the density of small and medium-sized enterprises (SMEs) established in a particular region (Barrios et al., 2008). The level of industrial specialisation appears to be especially important in the case of the computing service industry while the presence of SMEs appear to be more influential for ICT manufacturing. Barry and Curran (2004) found that computer-assembly activities, very sensitive to labour cost, is likely to relocate from Western towards Central and Eastern Europe, while segments more in need of skilled labour and a high quality industrial environment, such as the production of electronic components and R&D activities, are less likely to migrate. Le Gall (2008) identifies in a survey among French subsidiaries of foreign companies three sets of location determinants in ICT industries: the proximity to market and consumers, the existence of technological and scientific resources, and the possibility to collaborate with local partners on innovative projects.

60. Overall, the size of the market, the availability of high quality resources like scientific infrastructure (especially in specialised fields of research) and the supply of skilled labour are reported to be important location factors for high tech industries. Cost considerations, including labour costs, appear more secondary than in other industries; instead, the quality of the location factors in the host country is much more important.[4] In addition, empirical studies also show the role of spatial proximity and agglomeration effects (at the regional or local level) as location factor in high tech industries (Box 3).

Box 3. Agglomeration economies

Agglomeration effects arise as proximate economic activity might benefit (domestic and foreign) companies because of the access to skilled labour, access to specialized suppliers and inter-firm knowledge spillovers. Shaver (1998) showed that foreign firms, in the presence of agglomeration economies, could be motivated to locate in areas where industry is already concentrated, such that in the case of the United States, agglomeration economies could lead to similar location patterns between US and foreign firms. Several empirical papers have shown that a large presence of firms active in the same industry and/or foreign affiliates originating in the same home country attracts international investments by MNEs (Head et al., 1999; Mayer et Mucchielli, 1999; Head and Mayer, 2004; Crozet et al; 2004; Py and Hatem, 2009).

It is clear that agglomeration effects may especially be important in technology and knowledge intensive industries; strategic-asset seeking MNEs (i.e. knowledge seeking) try to maximize (free) knowledge spillovers through their location choice and will favour locations rich with knowledge sources. As such they will locate in localities/regions with a high quality scientific infrastructure (*e.g.* top universities and (public) research organisations) and will co-locate with other knowledge intensive firms. Chung and Alcacer (2002) indeed show that in the United States especially MNEs in research intensive industries are more likely to locate in knowledge rich locations; MNEs in lower-tech industries do not display a similar location behaviour. This is confirmed by Driffield and Menghinello (2009) who by analysing the location behaviour of MNEs in high tech manufacturing industries and knowledge intensive services sectors, show the importance of local and regional effects of agglomeration [DSTI/IND/WPGI(2009)2].

However, while locating proximate to other firms is necessary to receive spillovers, firms risk at the same time becoming themselves potential knowledge sources following their co-location with direct competitors. As such, agglomeration effects might also act as a centripetal force and (domestic and foreign) firms might not want to locate in the proximity of similar industrial activity. Alcacer and Chung (2007) reported that less technologically advanced MNEs when locating for the first time in the United States, favoured locations with high levels of industrial innovative activity. In contrast, technologically advanced MNEs preferred location with high levels of academic/scientific activity, while distancing themselves from direct competitors by avoiding agglomerations with large industrial activity.

2.4. Attractiveness for innovation: a business functions approach

2.4.1. Location factors for innovation along the value chain

61. A second approach to study attractiveness for innovation is to analyse how locations factors differ for individual corporate activities and to focus on the (most) innovative activities in the value chains of companies. Particularly R&D laboratories and to a lesser extent of headquarter services have been analysed in this regard as R&D corporate functions constitute a key driving force for technological innovation in all industries while headquarters are supposed to play a determinant role in the innovation strategy of MNEs. The notion of R&D and headquarters though often covers a very heterogeneous range of activities in empirical work (like *e.g.* head office headquarters, regional headquarters, more

[4] Numerous studies have analysed the effect of labour costs and the availability of the (skilled) labour force on international investments. There is ambiguous empirical evidence with regard to the labour costs as higher labour costs often imply higher labour productivity and skills. Overall high technology intensive industries and activities (like R&D) seem attracted by a skilled labour and less by lower labour costs; the reverse is true for lower tech industries and activities (like production, assembly).

representative offices) and available data do not always allow a clear distinction between various categories. More importantly, other corporate activities most likely include also innovative activities given the broad and pervasive character of (business) innovation (OECD, 2010); however, not much research has been undertaken on the location of innovation related activities in production/distribution as opposed to *e.g.* pure assembly activities.

62. Earlier research has related different types of international production to specific industries instead of corporate activities (Dunning, 1993). This research suggested then already that the analysis of MNEs on an aggregate level might give an incomplete picture of the location factors at stake because of the different motivations of MNEs across industries (Table 4). Following the emergence of global value chains, the different activities of production, distribution, sales, R&D, headquarter services are increasingly unbundled across different locations also within industries in order to benefit more optimally from differences in location factors across countries (Jones et al, 2005; Baldwin, 2009). Hence, there is a need for analysis on a more detailed level, taking into account differences in industries and functional activities.

Table 4. Location factors for different types of international production

Types of international production	Location advantages	Industries
Resource- based	Possession of natural resources	Oil, copper, tin, zinc, bauxite, etc.
Import substituting manufacturing	Material and labour costs, markets, government policy	Computers, pharmaceuticals, motor vehicles, cigarettes
Export platform manufacturing	Low labour costs, incentives to local production by host governments	Consumer electronics, textiles & clothing, camera's, etc.
Trade and distribution	Local markets, need to be near customers, after sales servicing	A variety of goods, particularly those requiring close consumer contact
Ancillary services	Markets	Insurance, banking & consultancy services
Miscellaneous	Markets	Various kinds

Source: Dunning (1993).

63. More recent research has tried to identify and compare location factors for specific corporate activities across industries, on the premise that differences in characteristics between activities (*e.g.* position in the value chain, scale intensity, knowledge intensity) will be reflected in the different importance of location factors. Companies typically find it profitable to locate the production of intermediate goods or the assembly of final goods to a lower wage country, while keeping the more innovative, higher value added activities (design, R&D, etc.) at home (Venables, 1999).

64. In analysing a large set of manufacturing MNEs active in the Asia-Pacific, Enright (2009) suggested that location decisions for different corporate activities indeed differ to some extent, more specifically labour costs (which particularly discourage international investments in production) and openness (which positively affects sales and customer service). Market size is found to be important for all considered activities, including activities that are more associated with the development of knowledge (like *e.g.* R&D and corporate support). Market growth however is observed to be not/less important for R&D and corporate support, while positively affecting the location of production, sales and customer service activities. This last result seems to suggest that MNEs invest in primary activities ahead of the market but not in supporting, upstream activities.

65. A similar analysis of international investments in Europe has also demonstrated that the hierarchy of location factors may differ between business functions (see Table 5 based on Py and Hatem, 2009). *Production* activities were observed to be attracted to large markets and low labour costs. Agglomeration effects arising from a large presence of production plants and firms active in the same industry were also reported to positively affect the location decision for production activities (Py and Hatem, 2009; Defever, 2006).

66. Likewise, a large market size and low labour costs were also observed reported to be important for the location of *distribution* activities. But agglomeration effects and the availability of skilled labour seemed not to play an important role for distribution activities (Py and Hatem, 2009; Defever, 2006).

67. Considering more service related activities, the results show the importance of market size for service activities, especially for more downstream activities. Market size and access to skilled labour were found to significantly enhance the attractiveness of host countries for *sales activities and customer services*, but labour costs did not seem to play a significant role. Education as a proxy for human capital positively affected the location decision for marketing and sales activities (Py and Hatem, 2009; Defever, 2006).

68. Because of the close and frequent contact with customers, language (particularly the sharing of a common knowledge with the host country)[5] was found to be an important location determinant for sales and customer service. A common language was also important if not crucial for the location of *call centres*; other location factors were found to be not/less important because this activity can be typically undertaken from distant places (Py and Hatem, 2009).

69. The most commonly mentioned location determinants for *headquarter services* in the literature are the quality and diversity of business services and infrastructure, headquarter agglomeration effects, and levels of corporate taxes and wages (Davis and Henderson, 2004; Diacon and Klier, 2003). Agglomeration effects are observed to play a very large role, as MNEs prefer to locate their headquarters close to other firms/headquarters, preferably active in the same industry (Box 4; Strauss- Kahn and Vives, 2009). Location factors like a large market size, a skilled labour force, the knowledge of the language also positively affect the location decision for headquarter services; labour costs did not play an important role (Defever, 2006; Py and Hatem, 2009).

70. *R&D activities* are found to be located in large markets, and also here agglomeration effects are sought by MNEs in order to maximise spillovers from other R&D centers[6] (Py and Hatem, 2009; Defever, 2006). The location factors of R&D affiliates will be discussed in larger detail in the next section.

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5 This location factor (language, measured as a dummy variable with 1 indicating that home and host country share a common official language) positively affects the location decision of all activities considered.

6 Human capital was not found to be important for R&D activities; the authors explain this (surprising) result by the rather broad categories of human capital considered in the analysis.

Box 4. Agglomeration economies (bis)

The empirical evidence seems to point to a growing role of particularly functional agglomeration in the location of service-related activities: activities like marketing and sales, R&D, headquarter services are more likely to locate in regions and cities with a large presence of these respective activities. In contrast, agglomeration effects for production activities seem to play merely along sectoral lines: MNEs tend to cluster their production activities in regions/countries with a large number of firms active in the industry (but rather irrespective of the activity) (Head et al., 1999, Defever, 2006; Py and Hatem, 2009).

Evidence has been presented for the United States that cities are increasingly distinguished by their functional specialisation rather than by their sectoral specialisation. Strong functional agglomeration effects seem to result in (business service) regions/cities specialised in key tertiary functions such as headquarters and R&D activities, while other (manufacturing) cities specialise in more routine activities, with a low innovation and decision-making content, such as mass production or call centres. Since agglomeration benefits are typically larger for business services than for manufacturing, business centres are few and large whereas manufacturing centres are more numerous and smaller in size (Duranton and Puga, 2005).

Table 5. Location factors along the value chain

	Head-quarter	R&D	Production	Distribution	Sales	Customer service	Call centres
Market size	+	+	+	+	+	+	0
Unemployment	0	+	+	+	+	+	0
Labour costs	0	0	-	-	-	0	0
Skilled labour	+	0	-	0	+	+	0
Tax rate	0	0	-	0	+	-	-
Distance	+	+	-	0	+	0	0
Language	+	+	+	+	+	+	+
Agglomeration - industry	+	+	+	0	+	+	0
Agglomeration - function	0	+	+	0	+	+	0

Note: dependent variable: probability to locate plant in specific host country (logit estimation)
+: positive effect; - : negative effect; 0: no effect
Source: based on Py and Hatem (2009).

2.4.2. Location factors for research and development

71. Location determinants for R&D have been extensively discussed in recent years (see for an overview OECD, 2008). R&D has long been one of the least mobile activities of MNEs, but has increasingly become internationalised over the past decade. Technological knowledge is often tacit and embodied in persons and therefore not easily transferable; furthermore, a company's competitive advantage is often directly related to that of its home country and as such is strongly shaped by that country's industrial specialisations and national innovation systems, including its accumulated research

and labour force skills (Pavitt and Patel, 1999). While corporate R&D activities are still carried out predominately in the home country, MNEs are changing how they innovate and building globally distributed R&D (and innovation) networks. Following the fragmentation of the value chain and the resulting internationalisation of manufacturing, MNEs now increasingly establish R&D facilities at many locations worldwide (OECD, 2008).

72. One type of R&D investments abroad is designed to customise technologies developed in the home country to fit local conditions in which case the R&D is more adaptive. Motivations to decentralise this type of R&D are primarily demand-oriented and related to market proximity when it is important to be close to 'lead users' and to adapt products and processes to local conditions. Proximity and local requirements are key drivers in terms of both speed and relevance. These R&D activities are undertaken abroad to support the MNE's local manufacturing operations and often follow production investments with some lag. Technological knowledge tends to flow from the parent firm's laboratory to the foreign-based facility so that the affiliate's technological advantages primarily reflect those of the home country [where core innovation activities continue to be concentrated) while the foreign-based R&D units tend to exploit the parent company's technologies (OECD, 2008).

73. A second and more recent type of R&D investments is more aimed at the access to strategic assets[7]. Innovation strategies increasingly use global sourcing to tap into new markets and technology trends worldwide and to develop new ideas which can be implemented worldwide. Through investment in such R&D facilities abroad, MNEs aim to improve their existing assets or to acquire (and internalise) or create completely new technological assets. Knowledge is more likely to flow from foreign units to the parent company if the foreign affiliates undertake asset-augmenting R&D activities that generate knowledge that is valuable for the rest of the organisation (OECD, 2008). Location decisions for these kinds of R&D facilities are related to the host country's technological infrastructure, the presence of other firms and institutions that may create benefits which investing firms can absorb, access to trained personnel, established links with universities or government institutions, the existence of appropriate infrastructure for specific kinds of research, etc.

74. The shift towards international investments in R&D that are actively engaged not simply in incremental, adaptive R&D but also in radical innovation reflects the increasing importance of supply-related factors location factors. The differences in location factors between innovative and adaptive R&D parallel to some extent the differences between research and development respectively. While locations determinants for the older type of adaptive R&D activities are primarily related to market attributes, location factors for more innovative R&D are more supply driven. Von Zedtwitz and Gassmann (1999) have stressed the differences in location factors between research and development activities (Table 6) but have at the same time stressed the interdependencies between them. Also Sachwald (2007) distinguishes locations factors according to the type of R&D activities performed abroad (local development centre, global research laboratory and global development centre).

[7] These reflect the 'home-base augmenting' (Kuemmerle, 1997) and 'asset-seeking' (Dunning and Narula, 1995) motivations of R&D that have become more important, opposed to the earlier objectives of 'home-base exploiting' and 'asset exploiting'.

Table 6. Locations factors for research and development

Reasons to locate research in a particular location	Reasons to locate development in a particular location
Proximity to local universities and research parks Tapping informal networks Proximity to centres of innovation Limited domestic science base Access to local specialists/recruiting Sharing risk among research units Support of local development projects Adhering to local regulations Local patenting issues Subsidies Low acceptance of research in home country	Local market requirements Local support for global customers Customer proximity and lead users Co-operation with local partners Market access Local citizen image Simultaneous product launch Use of different time zones Country-specific cost advantages Facilitate manufacturing scale-up Process innovation and adaptation to local production National protection

Source: Von Zedtwitz and Gassmann (2002).

75. The distinction between adaptive and innovative R&D centres may seem clear in theory, but is less so in the real world. Criscuolo *et al.* (2005) found that most FDI in R&D still falls into the home-base exploiting category but that for most MNEs it tends to be simultaneous with home-base augmenting R&D. Research on the role of specific factors in attracting R&D facilities generally confirms these insights. A wide range of empirical studies indicate that both demand and supply motivations are behind the location of R&D activities in host countries, but that technology-sourcing motivations are on the rise (OECD, 2008).

76. Market size is found to be a major determinant for international investments in R&D reflecting the importance of R&D activities abroad at adapting products and processes to the foreign local conditions, (Kumar, 2001; Doh et al., 2005; Shimizutani and Todo, 2008). Likewise, the adaptive and demand-led strategy of R&D subsidiaries abroad is also underscored by the importance of the presence of foreign affiliates as this type of R&D is closely related to production (Hakanson and Nobel, 1993; Kuemmerle, 1999). Also the availability of highly skilled human resources appeared as an important location factor for (adaptive and innovative) R&D investments abroad (Florida, 1997; Kumar, 2001, Jones and Teegen, 2003).

77. Potential knowledge spillovers positively affect the location decision for international investments in R&D and a local concentration of similar and/or complementary activities could be a source of positive externalities and spillovers. High quality clusters and (scientific/industrial) districts bring about agglomeration effects and act as location determinants for R&D affiliates (Head et al., 1999, Head and Mayer, 2004). Not only proximity to competitors' R&D is found to be important, but also proximity to an advanced scientific infrastructure like *e.g.* universities, public research organisations (Karlsson and Anderson, 2005; Abramowsky et al.; 2007).

78. In analysing aggregated macro- and industry level data (instead of firm-level data), Erken and Kleijn (2010) reported that the stock of private R&D capital in host countries is an important location factor, in addition to human capital (particularly in technology intensive industries) and the value added created by foreign affiliates. This result can be interpreted as agglomeration of R&D activities positively affects the attractiveness of host countries for R&D investments.

79. The importance of labour costs for R&D personnel for the attractiveness of countries remains ambiguous. Some studies found a negative effect of labour costs, while others reported no significant

effect. The increasing share of R&D activities carried out in emerging countries might suggest that also the cost of R&D resources (in addition to their availability) plays a role (UNCTAD, 2005). Some argue that firms increasingly set up R&D facilities in countries like China characterised by a high availability of scientific personnel and lower labour cost (Ambrecht, 2003, Ernst, 2003). Other researchers like *e.g.* Thursby and Thursby (2006) confirm that countries such as India and China will continue to be major beneficiaries of R&D investments, but argue that this process is driven primarily by the quality of R&D personnel available as well as the adaptation of products to local markets.

2.4.3. The role of functional co-location along the value chain

80. In general, falling transport and communication costs have resulted in lower coordination costs between activities within MNEs and hence reduced the need of activities to locate together. However vertical linkages and complementarities between corporate activities might limit the spread of global value chains and instead of being fragmented across different countries, corporate activities might need to be located together (Head et., 1995; Markusen, 2005). Empirical evidence has showed to some extent that the location of individual stages is found to be related to the location of other activities along the value chain.

81. A recent survey in the United Kingdom showed that adjacent activities in the value chain benefit from being co-located (Table 7). Companies' answers indicated that 'production and assembly' was preferably located close to 'design and development' and 'logistics and integration'. In addition, 'branding and marketing' was found to be co-located with sales activities.

Table 7. Co-location along the value chain

% of firms responding 'it is important/very important to co-locate pairs of corporate activities'

	Research	Design & development	Production & assembly	Logistics & integration	Branding & marketing	Sales
Design & development	63					
Production & assembly	36	64				
Logistics & integration	10	22	68			
Branding & marketing	23	31	18	10		
Sales	23	38	27	28	67	
Service provision	14	28	36	34	35	56

Source: CBI (2007).

82. Econometric analysis has shown that especially production drives functional co-location along the value chain, by attracting other within-firm activities to its location. Within-firm linkages tend to locate service activities in the same country as production plants: particularly distribution/logistics and R&D are more likely to 'follow' production, while the co-location between production and sales/marketing is somewhat weaker (Defever, 2006; Py and Hatem, 2009). The reverse linkages seem much less

important: most service activities except R&D seem not to attract production activities to a country. Co-location effects seems to be less important for sales, distribution, etc. but also headquarter services; attracting headquarter services in the hope to attract other company's activities in a later stage seems to be not/less effective.

83. Instead, the results seem thus to suggest that particularly production and to a lesser extent R&D are the 'right' activities to promote as 'attractors'. R&D is the only service activity which has an attractive effect on production but it is not clear which type of R&D (adaptive or more innovative) generates the largest co-location effects. Overall, production and R&D plants are highly attracted to each other because of vertical within-firm linkages. In general, activities by R&D facilities are not carried out in an isolated way, but are increasingly embedded in cross-border innovation networks. Companies tend to co-locate adaptive R&D investments abroad near production facilities (Sachwald, 2008; OECD, 2008; Sachwald and Chassagneux, 2007). Facilities that are more market-seeking have strong links with production units while the location of technology sourcing R&D tends to be more independent of production (Ambos, 2005).

84. Co-location between production and headquarter services arises as companies have a tendency to locate their headquarters in countries where they already have established production facilities (Aarland et al., 2006). A trade-off is often made between on the one hand being close to production in order to save on information (and related costs) and on the other hand benefitting from business services and headquarters externalities. Firms prefer to locate their headquarters close to production facilities, unless cities or other locations offer substantial advantages. Among the most important of these advantages is the supply of business services, whereas rents and congestion effects play a more limited role (Henderson and Ono, 2008). On the other hand, the benefits associated with a separation of headquarters from production facilities have also been emphasized; this includes the availability of specialised local services suppliers and the proximity to other headquarters located nearby (Davis and Henderson, 2004).

CHAPTER 3 ATTRACTIVENESS POLICIES FOR INVESTMENT IN INNOVATION

3.1 The policy priority of attractiveness for innovation

85. A short targeted survey undertaken by the OECD Secretariat in 2009 revealed the prominent place of attractiveness for innovation within the economic policy of OECD countries.[8] Almost all countries which responded to the OECD questionnaire indicated that they had specific policies in place to attract foreign investors. A counter example is however New Zealand that decided in 2007 to scale back its subsidy program for foreign firms investing in the country and divert the budgeted funds to an outward investment strategy (Van Biesebroeck, 2008). The main objectives of these policies clearly demonstrated the importance governments attach to attractiveness for innovation:

i. To create skilled jobs

ii. To strengthen R&D (create and expand R&D laboratories)

iii. To improve innovation capacity (at the technological level of organisations or marketing)

iv. To transfer technology through patents, licences, know how, technical assistance etc.

86. Major reforms undertaken by countries in recent years aimed to enhance the attractiveness for foreign investment particularly related to innovation. Governments have among others implemented R&D tax credits, increased direct and indirect support for research, strengthened the links between universities, research centres and industry and improved labour market flexibility. Countries have increasingly been confronted with tougher financial constraints following the crisis and hence, have largely preferred reforms with a minimal (direct) budgetary impact. 87. The main countries which are considered by respondents to be in direct competition with them concerning attractiveness for innovation are generally the neighbouring OECD countries. A couple of countries mentioned Singapore, South Korea, China and Chinese Taipei as the key competing economies.

88. The empirical evidence shows that attractiveness for innovation is defined rather broadly and that most countries use an industry approach as well as a business function approach in formulating their strategies (Table 8). While differences exist between countries, common industries 'targeted' are especially electronics-telecommunications equipment, pharmaceuticals, aerospace, automobile (manufacturing) and business services and telecommunications (services). Prioritised activities do often not match traditional industry classifications, *e.g.* when a new activity concept is launched (*e.g.* low carbon activities) or when only a specific segment of a larger industry is targeted (*e.g.* automotive electronics).

89. Countries increasingly take into account the growing international fragmentation of companies' value chain and also implement a more functional approach by prioritising R&D laboratories, logistics, headquarters and other decision centres. In line with the literature on attractiveness (presented in Chapter 2), countries identify the quality of researchers, the strength of co-operation between reputable

[8] The response rate was rather low (11 OECD countries answered the questionnaire), but the answers were very similar among the responding countries, all pointing to the importance of attractiveness for innovation. The survey has been complemented with an analysis of annual reports and other publications of OECD countries' Investment Promotion Agencies as well as interviews with location experts.

universities and industry, the cost of research and the protection of intellectual property as the main location factors for investments in fundamental and applied research. For more 'development' oriented activities, market size is considered to be an important location factors in addition to the quality of researchers, direct and indirect support for R&D and the protection of intellectual property.

Table 8. Promotion priorities for international investment, a subset of OECD countries

Austria	R&D, automotive, mechanical engineering, medical technology, biotechnology, ICTs.
Czech Republic	Automotive, electronics, microelectronics, telecoms , engineering, to a less extend nanotech and life sciences, software, eco-energies, marketing, training centres, consulting, sourcing,
France	* Focus on innovation related activities, high-tech manufacturing and high added value services. * 'Invest in France' agency puts a special focus in its promotion policy on 15 activity niches with high growth potential. Most of them are innovation-intensive. * Since 2003, a global attractiveness policy has been set up; attraction of talents, skills and expertise are considered as a major priority of this policy.
Ireland	* Promotion policies based on the concepts of 'areas of convergence' and 'platform technologies' rather than on traditional industry classification (explicitly to take into account 'technological and industry convergence'). * Targeted promotion priorities: global services, high-tech manufacturing, R&D and innovation, life sciences, pharmaceuticals and medical devices, ITC, financial services, content industries, consumer and business services, diversified industries, clean technologies. * Notion of "smart economy": services, innovation, clean tech, convergence, health informatics, financial analysis, digital lifestyle management, smart buildings, nanotech, surgical implants, IP trading.
Korea	The strategic aim of 'Invest in Korea' is to promote the country a regional hub in North-East Asia, acting as a link between Pacific and continental economies. High added values activities are considered as a priority.
The Netherlands	A new promotion strategy has been implemented in 2006, focusing on innovation-related activities where the Netherlands enjoy a comparative advantage. At the same time, the Netherlands puts more focus on after-care to retain existing activities.
Sweden	Focus on some key sectors mainly related to innovation: R&D centres life sciences and health, ITCs, mobile communication, material sciences automotive, high added value services (logistics, headquarters), green solutions wood products, tourism.
United Kingdom	* Low carbon economy * Engineering technologies (mix of promotion activities and development of domestic capacities through TSB programmes). * Creativity and innovation (movies, music, design). * Renewable energies, such as wind, solar, etc. (international and national regulations favour the development of these activities). * Financial services * ICT * Life sciences, pharmaceuticals. The UK authorities have set up a Price regulation scheme (PPRS) favourable to companies + a more systemic approach to patient access scheme.

Source: OECD Survey 2009 and Investment Promotion Agencies' Annual Reports.

90. Overall, policies in most OECD countries 'target' specific industries or activities but have at the same time also a broader approach in attracting international investments. The importance of specific location factors for individual industries and business functions argues indeed for a more targeted approach and clear priorities. Moreover, the existence of agglomeration effects between companies in the same industry or covering the same activities (*e.g.* headquarter services) also suggests potential advantages of such an approach. But on the other hand, countries are aware that competition between locations is often strong, with only a limited number of locations emerging as specialised locations for a specific industry or activity. The existence of co-location effects between different activities of the same company also argues for a broader approach instead of a more targeted focus in terms of functional activities.

91. Attractiveness for innovation has become also a policy priority outside the OECD area and several emerging countries increasingly target innovation related activities in attracting international investments (Zanatta et al, 2008). China for example focused in the late 1970s more on labour-intensive manufacturing activities through its 'Open Door' policy and the creation of Special Economic Zones, but has recently favoured innovation related activities. A national development policy has been formulated aimed at the technological and scientific upgrading of the Chinese economy through different initiatives: the creation of technological development zones, the development of science parks, the reform of the STI system, an increased focus of R&D efforts toward industrial technologies, etc. In addition, foreign MNE affiliates were required to undertake R&D in some selected industries such as automotive.

92. India has experienced a rapid growth in high technology industries (in particular pharmaceuticals and software) during the past 20 years. Various initiatives have been implemented to support the development of domestic innovation as well as the attraction of MNEs investing in R&D. Regulation on FDI has been significantly liberalised allowing MNEs to set up activities in India and joint investments in R&D by MNEs have been promoted. In addition special R&D zones and parks for IT services have been developed and different mechanisms to support R&D (including fiscal exemptions) have been implemented.

93. In Brazil, measures have been taken to promote R&D, such as the Innovation Law passed in 2004 and a tax reduction for the acquisition of R&D equipments. Some progress has also been made in the development of a pool of high-quality human capital, but attractiveness policies (including FDI in R&D) seem to suffer from a lack of coordination between government agencies.

94. South Africa has developed several initiatives to promote innovation and R&D investments and has implemented strategic tax incentives measures to support employment-generating projects in manufacturing. In addition, 'innovation hub' and industrial development zones have been set up (*e.g.* the Cape Biotech Hub); other initiatives include the international headquarters company exemption, the SME development programme and the strategic investment project in South Africa.

95. Israel has focused on high technology since a long time in its economic development policy, not only in defence related industries but also ICT and biotechnology. A large number of high tech companies have been attracted to the country since the end of the 1970's, through R&D incentives, policies to stimulate capital investments, and incentives for the development of foreign venture capital.

96. Singapore has shifted its economic policies towards higher value-added activities since the early 1980s. Various measures towards the liberalization of FDI and the attraction of MNEs have been implemented which have resulted in major inflow of foreign affiliates in the country. National development priorities have been set and promotion activities for international investments have been developed (e. g. in ICT, chemicals, services.). Since 1998, Singapore has launched a plan to attract world-class universities to establish branch schools in Singapore (e.g. MIT, INSEAD, John Hopkins University) in order to cultivate high-level talents in Singapore.

3.2 A taxonomy of attractiveness policies for investment in innovation

Relationships between policies

97. The major importance of market size and growth as location factors for most activities in the value chain seems to argue for a rather small role of governments in influencing the location decision of companies as the size and growth of a market is largely outside the scope of government policies. However, several economists have pointed to a decreasing importance of market size following the further globalisation and growing integration of countries (Baldwin, 2009). At the same time, the growing importance of supply factors (agglomeration effects, labour costs, scientific infrastructure, etc) as motivations for the location of particularly innovative activities suggests that the scope for direct competition between host countries for the location of international investments might increase.

98. Attractiveness policies for innovation are an integral part of the broader economic/development policy of countries which are increasingly aimed at fostering innovation. The ongoing shift towards a knowledge economy in OECD countries has stressed the importance of innovation as an important driver of growth; innovative activities are increasingly recognised as being crucial for future competitiveness, productivity growth and jobs (OECD, 2010b). As innovation is increasingly organised in global innovation networks largely centred around the activities of MNEs and their foreign affiliates (OECD, 2008), countries try to attract a large number of MNEs as part of their national innovation strategies. As a result, the priorities and targeted industries/activities set out for attractiveness policies (Table 8) match closely the objectives of national plans for innovation in OECD countries, in particular in domains like green technologies (see OECD, 2010c for an overview of national S&T/innovation plans in OECD countries).

99. Attractiveness policies for innovation should be conceptualized as a combination of innovation policy and inward investment promotion (Guimon, 2008). Innovation policy aims to strengthen the innovation outcomes and performance of countries; given the broad and pervasive character of innovation today, it includes a broad range of policy instruments. In particular relation to the attractiveness for international investments, government policies try to enhance the quality of the economic/innovation fundamentals and foster their impact as location factors for international investment in the short term (*e.g.* incentives to business R&D) and the long term (*e.g.* human capital). Inward investment promotion policy aims to build a positive image of the country as location for future investments, among other by making policies more visible to potential investors.

Policy mix of instruments

100. The 2010 OECD STI Outlook Policy Questionnaire[9] included specific questions about new policy initiatives that countries have implemented in order to enhance their attractiveness for international investments (in innovation). The results (Table 9) show first that attracting foreign MNEs is in 2010 an important priority for OECD countries in designing national S&T policies to adjust to the increasing globalisation of innovation. Most countries attached a high importance to 'attracting foreign investment for innovation and R&D'; other important policy issues raised by countries were 'improving the ability of

[9] The two-yearly OECD STI Outlook Policy Questionnaire surveys the recent policy changes in the field of Science and Technology in individual OECD countries; the results are reported in the STI Outlook publication (*i.e.* OECD, 2010b). The 2010 questionnaire included a broad range of topics: Governance of Science, Technology and Industry; public sector research; government support for private-sector R&D and innovation; collaboration and networking; globalisation and innovation; human resources; multilateral collaboration in Science and Technology and innovation; evaluation and impact assessment.

national firms to compete globally through R&D and innovation', ' access to technology developed abroad for national benefit' and 'creation of skilled jobs in order to retain and attract talent'.

101. Second, the results show that several countries have implemented new policy initiatives and use a policy mix of different instruments to attract foreign MNEs in innovation, covering typical innovation policy instruments (e.g. R&D tax incentives), government incentives (e.g. direct financial support and general fiscal incentives) and investment promotion policies (*e.g.* active recruitment of foreign MNEs, advertising). The optimal policy mix differs between countries and the importance of individual policy instruments directly depends on factors like the innovation performance and industrial structure of countries, the objectives of a country's innovation strategy and priorities of attractiveness policies.

Table 9. Policy mix of attractiveness for innovation: new policy initiatives (2008-2010)

	Priority level 'attractiveness for R&D and innovation'	Direct financial support	General fiscal incentives	R&D tax incentives	Taxation of intellectual assets and revenues	Adminis-trative support	Provision of infrastructure	Public procure-ment	Active recruit-ment of foreign firms	Advertising and interna-tional campaigns	Other
	Country self-reported note (1-8)	New or enhanced policy initiatives to attract new R&D activities through FDI (taken between 2008 and 2010)									
Austria	8	v	v	v			v		v		
Canada	n.a.	v	v	v (1)			v		v	v	
Czech Republic	6		v	v		v	v		v		
Denmark	5					v					
Finland	7	v				v	v	v	v	v	
France	8			v			v		v		
Germany	7	v				v	v		v	v	
Hungary	7	v		v		v				v	
Israel	8		v			v			v	v	
Japan	n.a.			v							
Korea	7	v	v	v	v	v	v	v	v		
Netherlands	6		v	v	v		v		v		
New Zealand	7			v							
Norway	7			v							
Poland	5	v	v	v		v	v		v	v	
Slovenia	8	v		v						v	
South Africa	4	v	v	v						v	
Spain	6	v		v							
Sweden	7						v	v			
United Kingdom	n.a.			v					v		
United States	3										v (2)

Note: only countries that have responded the STI Outlook Questionnaire 2010 are included in the table.
(1): Canada's Scientific Research and Experimental Development tax incentive programme enhanced access for SMEs since 2008
(2) : US States have own/additional measures
Source: OECD (2010c).

102. The majority of respondent countries have enhanced or implemented R&D tax credits to stimulate international investments particularly in R&D and innovation. R&D tax credits have become one of the most widely used instruments of innovation policy in recent years and recent evidence shows that R&D tax subsidies have become more generous over the years 1999-2008 (OECD, 2010c). There exists a large variety in fiscal schemes across countries reflecting differences in e.g. eligible R&D activities, expenses base, rolling-base versus fixed-base for incremental credits, carry forward of unused R&D tax credits, tax credit refund mechanisms (OECD, 2010c). Three major forms of R&D tax incentives can be roughly distinguished: *i)* R&D tax credits that allow a deduction from the tax payable; *ii)* R&D allowances that represent an additional deduction from the taxable income and finally *iii)* depreciation allowances. In

addition to these three types of schemes, a fourth category aims at lowering the cost of researchers by diminishing the tax on wages and/or the social contributions (*e.g.* in Belgium and the Netherlands).

103. Many countries have recently brought changes to their R&D tax credit schemes with the goal of expanding the number of beneficiaries and increasing the amount of business R&D spending. Some countries have modified the criteria of eligibility, extended the coverage of R&D activities or the coverage of firms eligible for tax relief (see Annex 1 for more specific information). R&D tax credits are also increasingly being developed outside the OECD area; countries like Brazil, China, India, Singapore and South Africa which have provided a generous and competitive tax environment for R&D investments (OECD, 2010c).

104. The other instruments specifically targeting innovation and R&D investments seems to be used by only a limited number of countries: the specific taxation of intellectual assets and revenues (Korea and the Netherlands) and public procurement of R&D and innovation (Finland, Korea and Sweden). Administrative support and the provision of scientific infrastructure seem to be more important across respondent countries, but it is not clear if these measures were particularly targeted towards R&D and innovation, or were offered more generally. Demand-side policies like e.g. public procurement seem until now to be less used in attracting international investment, notwithstanding this type of policies has become increasingly important in stimulating innovation in general.

Innovation policy at large

105. The OECD STI Outlook Policy Questionnaire only included a sample of possible policy instruments to attract FDI in innovation while countries typically have a multitude of innovation policy instruments in place (OECD, 2010b and 2010bc). Most of these policy instruments are open for foreign affiliates of MNEs located in the host country and hence directly leverage specific attractiveness policies for innovation. Business R&D e.g. is supported in most OECD countries through direct public support (grants, subsidies and loans, which are all increasingly provided in a competitive manner) and foreign affiliates are eligible for this support in most countries. Prioritised activities and technologies in national innovation plans (e.g. green technology, nano- and biotechnology) typically receive extra public funding, which is in most of the cases also available for foreign firms with an affiliate or subsidiary in the country. Overall, non-discrimination vis-à-vis domestics firms and free access to national funding for domiciled foreign-owned companies is the guiding principle for the treatment of foreign companies in most OECD countries (OECD, 2008a).

106. The availability of human capital has come clear as a crucial location factor for international investment in R&D and innovation; the existence of a large pool of world-class researchers has been shown to positively affect the location of R&D facilities. In general OECD countries have attached a high priority to the development of human resources in science and technology (HRST) in their national innovation strategies. A broad range of measures have been implemented by individual countries (see for an detailed overview OECD, 2010c): to raise the interest of science among the youth (e.g. mentorship, national communication campaigns), to improve education for innovation (e.g. financing of PhDs and post-docs, industry involvement in PhD training) and to improve employment conditions and life-long learning (e.g. increased attractiveness of innovation careers, improving sectoral mobility, enforcing life-long learning). Strengthening the domestic supply of human capital will also directly enhance the attractiveness for innovation. In addition, policies to increase the international mobility of highly skilled through e.g. changes in immigration legislation, changes in employment law, return migration programmes, etc. will also positively affect countries' attractiveness for future investments.

107. Another important policy domain concerns the quality and availability of the science & technology infrastructure in countries, as technology sourcing has become an important motivation for

international investments. By locating innovation and R&D facilities abroad, MNEs aim to get (better) access to foreign knowledge and centres of excellence (public research institutions, universities and higher education, etc). There has been a lot of attention in OECD countries recently to improve their knowledge base and infrastructure through different measures (better governance of public research, re-investment in the science base, more evaluation, etc.). In addition, countries increasingly try to stimulate industry-science linkages by supporting collaborative schemes and public-private partnerships (OECD, 2010c). More generally, collaboration and interaction within so-called National Innovation Systems has become more important because of the more global and open character of innovation nowadays. The success of countries in fostering this networking between actors (industry, university and government) will directly enhance attractiveness of these countries for international investments in innovation.

108. Likewise, international investors are particularly attracted to clusters (foreign affiliates of other MNEs, specialised local firms, start-ups, etc.) because of potential agglomeration economies. Economic and inventive activity is observed to be concentrated geographically because of various reasons: critical mass in terms of industrial supply as well as markets, a specialised labour force, technological spillovers, local partnerships, etc. Several OECD countries have implemented specific measures to link local domestic firms to foreign sources of research and innovation, including foreign affiliates located in the host country (OECD, 2010cb).

109. A broader policy domain that calls for specific attention within the framework of innovation policy, is the development of the ICT infrastructure. Companies increasingly cooperate within global innovation networks, and hence high- speed communication and broadband networks are necessary for companies getting connected within these cross-border innovation networks. ICT infrastructure has created a platform for innovation and has benefitted the creation and diffusion of knowledge (OECD, 2010b).

Intellectual Property Rights (IPR)

110. Another priority for countries is to develop a transparent and enforceable intellectual property rights (IPR) regime, since a weak IPR regime increases the probability of imitation. The risk of leakage of proprietary know-how to local competitors has traditionally favoured maintaining R&D at home and encouraged investors to undertake projects abroad focusing on sales/distribution rather than local production and R&D (Javorcik, 2002). The protection of intellectual property is considered an important problem particularly in emerging economies and may deter FDI in innovation (OECD, 2008); however several countries have implemented stronger IPR rules and better enforcement practices in recent years.

111. Empirical studies examining the impact of IPR on foreign investment in R&D are somewhat mixed[10] but tend to show that effective IPR protection has a positive impact on inward R&D although the impact is not equally important in all industries (see for an overview OECD, 2008a). Previous OECD work has also shown that stronger IPR helps attract foreign multinationals, which subsequently helps strengthen domestic capabilities. In emerging countries with weak IPR regimes, MNEs may still set up foreign R&D affiliates but choose typically for technologies that need to be used in combination with complementary technologies. In the absence of such technologies, local technology leakage does not pose a major threat to MNEs (UNCTAD, 2005; OECD, 2008a).

112. This finding seems to be confirmed by the study of Thursby and Thursby (2006) focusing on differences in location factors between developed and emerging countries. The study reports that the lack

[10] Brantstetter et al. (2006) relate these mixed results to the fact that most studies are typically cross-country comparisons suffering from the heterogeneity of IPR measurement across countries, e.g. the effectiveness of enforcement is seldom taken into account. Furter on, the length of time-series is also very limited, thus not allowing comparison over time.

of an effective IPR regime (especially in enforcing IPRs) is an important deterrent for locating R&D in emerging countries. The same study also confirms that firms undertake different kinds of R&D activities in emerging countries, which may to some extent be related to IPR.

3.3 Direct government incentives for investment

The rationale of incentives

113. In addition to the broader and more general measures supporting (attractiveness for) innovation, governments have traditionally been offering targeted/direct support to new (international) investments with especially large companies being able to negotiate incentive packages. While there exists a wide range of different incentives implemented by governments, three broad categories can be distinguished (Faeth, 2009): fiscal incentives (*e.g.* tax exemptions and credits, etc.), financial incentives (grants, subsidies, etc.) and other incentives (e.g. subsidized services and infrastructure, preferential treatment). The choice of countries for one or/and another incentive depends on the specific objectives of the attractiveness policies (*e.g.* attracting specifically R&D and innovation investments versus attractiveness in general), the ease of design and administration of incentives, the direct burden on the government budget, etc.

114. There is a great deal of (political) debate as to whether this use of public money is economically justifiable. Economic theory has provided only mixed results and has not been able to identify the cases where government support is desirable (Glaeser, 2001). Critics argue that government support merely reflects officials' private interests and that consequently the costs to the host economy are larger than the benefits (Greenstone and Moretti, 2004). The argument in favour of government intervention in attracting international investment is largely based on the existence of externalities, as (unintendend) benefits might spill over from MNEs to local firms and result in productivity growth for the host economy (Caves, 1996). Given that these externalities are not reflected in market prices, government incentives may correct for this market failure and may result in a more efficient location of firms across countries (Glaeser, 2001).

115. FDI is one of the most important channels through which technology is transferred across countries and by encouraging MNEs to establish local facilities, governments hope to generate the transfer of technology to local firms. Numerous studies have discussed the different channels along which positive spillovers arise: backward and forward linkages with local firms through which MNEs may foster the entry and growth of local suppliers and final goods producing firms (Markusen and Venables, 1999), imitation and demonstration effects (Wang and Blomstrom, 1992; Glass and Saggi, 2001), as well as movements of workers from multinationals to local firms (Fosfuri, Motta and Ronde, 2001). The location of MNEs might also induce other MNEs to locate in the same location because of agglomeration effects. In addition, foreign entry will increase competition and may forces local firms to introduce new technologies (quicker).

Challenges in administering incentives

116. While spillovers might be expected from a theoretical point of view and hence location-based incentives may be welfare-enhancing for local residents (consumers, workers, firms, etc.), spillovers from MNEs to the host economy however do not occur automatically and might not materialise in reality. The empirical literature on the presence of spillovers is mixed but has demonstrated that they will only arise if local firms invest and learn to absorb foreign knowledge and skills. Empirical evidence, particularly from developing countries, has shown that local firms often lack the necessary absorptive capacity for the advanced technology and skills of MNEs (see for an overview Blomstrom and Kokko, 2003). At the same time, MNEs develop different protection mechanisms to prevent their knowledge from spilling over (too easily) to local competitors.

117. It is very hard for governments to decide about the appropriate level of incentives as the measurement of spillovers ex ante as well as ex post is very difficult[11]. Calculating the (exact) value of externalities is however important since government action is only welfare improving if the investment incentives are smaller than the value of the externalities. However, reliable calculations about the future benefits are typically lacking and the empirical measurement of spillovers is necessarily somewhat indirect, hence directly hampering policy action[12]. Projected benefits because of (potential) spillovers typically span a wide range from being very small to very large depending from whom these estimates come from. As a result, governments often merely use a rough accounting approach by calculating the (expected) number of jobs gained and the cost of the incentive packages to companies in order to come up with an indication of the rate of return of public money. However, simplicity does not result always in better policy decisions; a crude average measure is not very likely to reflect the marginal benefits brought by the new investment; furthermore, these calculations are typically done ex ante but are rarely verified *ex post* (Greenstone and Moretti, 2004).

118. Implementation challenges arise not only in determining the level but also choosing the form of government incentives for international investors. What types of incentives should be offered to potential investors which is of course directly related to the objectives of the attractiveness policy: employment incentives, R&D incentives, training incentives, etc.? Should the incentive(s) be across the board and thus available to all international investors or rather discretionary and apply only for specific investments that meet some requirements? What criteria should be used to allocate incentives? Should the incentives be paid up-front or should they be made dependent on the realisation of specific objectives (in terms of investments, employment, R&D undertaken locally, etc.)?

119. Lastly, it should be noted that the spillover-argument in support of government intervention is not necessarily only valid for new international investments. Existing firms may apply for support with the government in order not to locate away (even in cases where they not seriously contemplate to relocate) and not to eliminate existing spillovers (Van Biesebroeck, 2008). Furthermore, spillovers may not only arise from foreign MNEs but also from domestic firms particularly indigenous MNEs. If international investors do not differ fundamentally from local investors, selective government incentives for FDI may distort competition with local firms (Blomstrom and Kokko, 2003).

The effect of incentives

120. It is generally believed that location-based incentives play some role especially in the final stages of the decision making process particularly when different countries are 'bidding' for the same investment. What typically happens is that MNEs first draw up a short list of preferred sites on the basis of economic fundamentals while in a later stage they consider and/or actually seek for government support in the shortlisted locations (see Box 5). It is clear that when having two or more relatively similar location alternatives, government incentives can tilt the investment decision (Blomstrom and Kokko, 2003). But at the same time, governments should be aware that the existence of incentives, often provided in a selective and non-transparent way, creates scope for rent-seeking behaviour.

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[11] " Knowledge flows . . . are invisible; they leave no paper trail by which they may be measured and tracked, and there is nothing to prevent the theorist from assuming anything about them that she likes" (Krugman 1991, p. 53).

[12] The economic literature has traditionally tried to analyse the correlation between the (international) investment at the one side and the performance (productivity, sales, R&D, etc.) of the likely beneficiaries in the host country. This typically implies developing a metric for measuring the "closeness" of the likely recipients based on technological similarity, geographic proximity, or economic relationships (e.g. such as vendors and their customers).

Box 5. Deciding about the location for future investment(s)

The decision process of companies choosing a location for future investment(s) usually starts with drawing up a long list of possible locations; this is often done in close cooperation with consultants hired for the selection process. A long list typically includes 8 to 20 countries belonging to 3 groups: 1) most popular MNE locations in the world, 2) countries in the proximity of existing activities abroad of the investing company and 3) emerging MNE locations (often included on the basis of marketing campaigns by or personal contacts with countries' investment agencies).

The long list is then narrowed down to a short list of around 5 possible locations taking into account different factors (cost, quality, etc.). This is usually done without visiting the potential locations, but merely on the basis of investment information and data provided by the countries in question.

In a next stage, the locations on the short list are visited in situ, mostly by the company executives and hired consultants. The visits, often of multiple sites in the country, are organised in close cooperation with the investment agencies of the countries.

The actual choice for a specific location/site happens in the final stage bringing all information together, including the availability of potential sites and the incentives offered by the different governments.

Source: Harding and Javorcik (2007) and Multilateral Investment Guarantee Agency (2006).

121. Several theoretical contributions have explored and modelled the negotiation process between the host government and the MNE deciding about the location of its future investments and have demonstrated how different policy incentives impact outcomes [see for an overview Faeth, 2009]. Investment incentives offered by other (neighbouring) countries in the same geographic region are correlated with lower FDI inflows in one country (Harding and Javorcik, 2007). Even if one specific location is the best place to locate, it might lose the new investment to a more aggressive country if its government does not offer any support (Van Biesebroeck, 2008).

122. Government support can however not compensate for the negative effect of other more important factors. Devereux et al. (2007) showed that government subsidies are less effective in influencing location decisions when there are fewer existing plants in an industry and hence agglomeration effects are small. Recent OECD work on tax effects on FDI concludes that although tax is an important factor in decisions where to invest, it is not the main determinant. Lower tax burden cannot compensate for a generally weak or unattractive FDI environment. Conversely, a number of large OECD countries with relatively high effective tax rates are very successful in attracting FDI. Where a higher corporate tax burden is matched by well-developed infrastructure, public services and other host country attributes attractive to business, including market size, tax competition from relatively low-tax countries not offering similar advantages may not seriously affect location choice (OECD, 2008b).

123. Business has typically played down the role of government support although it increasingly admits the growing importance of incentives (Easson, 2001). Location surveys overall also show that government support is limited importance for the location decision of companies (see also Figure 7 and Table 2). This seems in line with empirical research which has largely shown that policy variables (corporate taxes, subsidies, tariffs, etc.) may influence the location decisions of MNEs but that the effect, if any, is rather small. Corporate taxation *e.g.* is found to have a non-negligible impact on FDI location choices, but it has been shown that omitting other factors and policies that shape the business environment of host countries may lead to a serious overestimation of the effect (Hajkova et al., 2006).

Policy competition and bidding wars

124. As an increasing number of (developed and emerging) countries actively seek to attract FDI preferably in innovation, there is a broad recognition that governments at all levels (national and sub-national) engage in one or another form of incentives-based competition for international investment. An UNCTAD report of the mid-1990s indicated that more than 100 countries provided some form of government incentives for international investment, and it is generally believed that more countries have introduced support measures since then (UNCTAD, 1996).

125. There is *e.g.* some evidence that international tax competition in particular is increasing, and that what may have been regarded as a competitive tax climate for business in a given host country at one point in time may no longer be so after rounds of tax rate reductions in other countries (Box 6). Some governments have reduced the statutory corporate income tax rate, since this is relatively simple and readily observed by international investors. However, rate cuts have in general been accompanied by measures to broaden the tax base, thereby reducing the overall revenue costs. Other countries have implemented tax reliefs to certain sectors or activities, to encourage investment at lower foreign revenue cost (OECD, 2008b). A multitude of provisions have been included in the tax code to attract international investors as a non-exhaustive list made by UNCTAD (2000) shows: reduced corporate income tax rate, loss carry forwards, tax holidays, investment allowance, investment tax credits, reduced taxes in dividends and interest paid abroad, preferential treatment of long-term capital gains, deductions for qualifying expenses, zero or reduced tariffs, employment based deductions, tax credits for value addition, tax reductions/credits for foreign hard currency earnings.

126. A major reason for the increasing prominence of government support for international investment is the globalisation of the world economy. On the one hand, international investment has grown quickly over the last decades with large numbers of investment projects undertaken yearly over an increasing number of countries. On the other hand, the scope for active government policies (e.g. trade, exchange rate, etc.) to attract these investments has significantly decreased following global/regional trade and investment liberalisation. Government incentives are likely to matter more in choosing an investment location as barriers to international investment have gradually been removed and national economies become more integrated. Considering that market integration is more important at the regional level, the effect of government incentives is stronger in the competition between countries within regions (Blomstrom and Kokko, 2003; Harding and Javorcik, 2007).

127. The (partial and thus tentative) evidence seems to indicate indeed that the competition for international investment between countries merely shows a rather intra-regional character, since government incentives are likely to matter more to location choice when other investment determinants (*e.g.* economic fundamentals) are roughly equivalent. In addition, the policy competition for FDI between countries seems to be quite intense in particular industries (*e.g.* automotives) or for particular investment projects (especially large ones). Government support for international investment also tends to discriminate against smaller firms, against local firms and against firms in industries that are not targeted (OECD, 2000).

128. Concerns emerge that the increasing competition between countries result in so-called ‘bidding wars’ and undesirable effects (too costly incentives for public finances, distortion of the investment allocation globally, etc.). Theoretical models suggest that policy competition between host countries in attracting international investments might result in negative effects on welfare, notably when an MNE finds itself in a quasi-monopolistic position *vis-à-vis* a fragmented community of host locations. While perceived benefits (*e.g.* jobs created) are easily observable, most of the costs are hard to measure since they are typically incurred over a longer and uncertain time. Hence, there might be a tendency for governments to overbid and grant governments incentives in excess of the expected spillovers. Although there is some

anecdotic evidence that a race to the bottom" may be possible, systematic empirical evidence in this area is still lacking (Fitzgerald, 2001). There is also no robust evidence that environmental or labour standards are negatively associated with investment inflows (OECD, 2000; OECD, 2001b).

Box 6. Tax effects on Foreign Direct Investment (Inbound)

Tax competition for FDI is a reality in today's global environment and countries try to ensure that their tax system is supportive of FDI. In general, governments have to find a balance between the desire to offer a competitive tax environment for FDI and the need to ensure that an appropriate share of domestic tax is collected from MNEs. In doing this, concerns over the international competitiveness of the tax system together with claims by business groups that accommodating treatment is available elsewhere run counter to possible revenue requirements and fair domestic competition arguments which call for the same tax rate between domestic and foreign owned business.

The influence of tax on inbound FDI is complex and depends on a number of factors difficult to measure. Studies examining cross-border flows suggest that on average, FDI decreases by 3.7% following a 1 percentage point increase in the tax rate on FDI. There is however a wide range of estimates, with most studies finding decreases in the range of 0% to 5%. This variation partly reflects differences between the industries and countries being examined, or the time periods concerned. Some recent studies find, for example, that FDI is becoming increasingly sensitive to taxation, reflecting the increasing mobility of capital as non-tax barriers to FDI are removed.

The comparison of tax rates and regimes across countries is however not straightforward since in the first place because different tax rate(s) can be considered. The most popular comparison is based on statutory "headline" corporate income tax (CIT) rates, but international investors often prefer to compare average effective tax rates (AETRs) or marginal effective tax rates (METRs) as these incorporate rules determine the percentage of profits that are taxable. AETRs consider the average tax burden on investment projects, while METRs consider the tax burden at the margin (on the last unit of capital invested in a given project, where profits are exhausted). It is clear that statutory tax rates may differ significantly from effective tax rates, to the extent that taxable profits differ from true (economic) profits.

Another difficulty is that the FDI response to tax (reform) is unlikely to be uniform. Recent analysis seems to suggest that the sensitivity of FDI to tax depends on the host country and the mobility of business activities underlying the tax base. In particular, where firms benefit from locating production in large markets to reduce the costs of trade, a certain degree of inertia is predicted in the location choice of firms. Host country benefits and some fixity of capital mean that profits may be taxed up to some point without discouraging investment (Baldwin and Krugman, 2004).

Also tax planning plays an increasingly important role since MNEs are able to design business and/or fiscal strategies that minimize the tax burden on their foreign affiliates, taking advantage of the possibility to arbitrage among different tax regimes.

Another important factor for international investors comparing tax regimes across countries is the perception of the tax administration in relation to the business sector. International investors look for certainty, predictability, consistency and timeliness in the application of tax rules, and in many cases these considerations are as important as the effective tax rate paid.

Source: OECD (2008b).

3.4 Inward investment promotion

129. Investment promotion policies concern a broad range of activities aimed at creating an attractive image as investment location largely by disseminating (targeted) information and by providing investment services for prospective investors. Just like in the case of government incentives, the rationale for investment promotion is based on the existence of market failure since information asymmetries may prevent the efficient allocation of investments across countries. International investors typically do not have perfect information about all countries and investment opportunities and face large costs with

gathering the necessary information. As a result, they often consider only a small range of potential investment locations (mostly the ones they are familiar with) and are rather reluctant to consider new ones.

130. Countries typically carry out their investment promotion through Investment Promotion Agencies (IPA) who have in general three major roles: 1) to communicate and disseminate information about the general business environment and specific investment opportunities among prospective investors; 2) to coordinate activities to improve the business environment; and 3) to create investment leads and generate investment by identifying investors and targeting specific sectors and companies (Piontkivska et al., 2003). Nevertheless, large differences exist between IPAs across countries especially in terms of different organisational structures (see Box 7) and mandates for IPAs. For example, while in most countries IPAs only have an informational and advisory role in deciding about possible incentives to individual investors, IPAs of some countries (e.g. Ireland and Singapore) may negotiate incentives directly with the investors. Recent data show that there are more than 160 IPAs at the national level and over 250 at the sub-national level; most IPAs seem to have been established only during the last 20 years (Harding and Javorcik, 2007).

Box 7. The effectiveness of investment promotion

Some studies have analyzed if investment promotion policies results in a larger number of investments since the sometimes large budgets governments spend on investment promotion (estimates suggest that worldwide more than 1 billion USD is spent) have attracted quite some attention. While incentives packages are relatively easily to calculate, the non-pecuniary elements of investment promotion like information dissemination, coordination and facilitation are much harder to capture. Nevertheless some studies have shown that investment promotion is positively correlated with larger FDI inflows (Woodward, 1992; Wells and Wint, 2000; Morisset and Andrews-Johnson, 2004; Bobonis and Shatz, 2007). Recent empirical work has additionally shown that in particular industry targeting has resulted in larger FDI inflows (Charlton and Davis, 2007; Harding and Javorcik, 2007).

A survey of the Foreign Investment Advisory Service (FIAS, 2006) analysed in greater detail the effectiveness of IPAs, in particular in relation to their organizational structure and their embeddedness in the whole government decision making process. The results showed that a quasi-governmental status was preferable since the public good nature of investment promotion required some integration of the IPA within the government sector but that at the same time some degree of independence is necessary as IPAs perform activities that are typical for the business sector. This private-public sector mix has clear repercussions on the management of the IPA and should be reflected to some extent in the hiring of personnel, the formation of steering/advisory boards and the financing of IPAs' activities (Harding and Javorcik, 2007).

The success of investment promotion is further enhanced by a clear distribution of responsibilities between the relevant government bodies particularly those in charge of science, technology and innovation, industrial, trade, education and labour policy. A clear distribution of responsibilities is also necessary between different geographical levels within countries. Investment promotion is increasingly undertaken at sub-national level and examples in some countries showed that different IPAs in one country rather competed with each other instead of cooperating (Zanatta et al., 2006).

131. Countries typically have a set of policies in place to promote themselves to foreign investors (Table 10). A first category of policy instruments aims especially in the earlier stages of investment promotion, at creating a positive image of a country as a location for future investment projects. Because of imperfect information with investors, investment promotion is in the first place about creating awareness or correcting weak or misperceptions about the country (Loewendahl, 2001). A broad range of 'marketing techniques' are available: general public relations campaigns, brochures and newsletters, participating in exhibitions, fairs and conferences, mailings, an IPA website, etc. Some of these instruments can be conceptualized as very general (i.e. for all types of investors) while others can be more targeted towards specific types of investors.

Table 10. Investment promotion policies[13]

FUNCTION		OBJECTIVE	ACTIVITIES
Image building		To create a positive image of the country as an attractive site for international investment	* advertising * PR events * mass media campaigns abroad * investor forums * maintaining relationships with journalists and business partners * developing the IPA website
Investment targeting/generation		To create investment leads that target investment projects in specific sectors, development areas or companies	* identification of potential investors * matchmaking * direct mailing, telephone campaigns * seminars for targeted investors
Provision of investment services	***Pre-investment services***	To facilitate the international investor's arrival in the country; to assist in analyzing investment decisions	* information provision * 'one-stop-shop' registration/approval service * sectoral analyses * various assistance in obtaining sites, suppliers, etc.
	Post-investment or aftercare services	To assist the international investor in maintaining his business, faciliating re-investment decisions in the future	* legal or advisory support to on-going foreign investment projects * dealing with bureaucracy
Policy Advocacy		To improve an investment climate by establishing an effective feedback between the internatioanl investor and the government	* surveys of the business sector * participation in task forces * policy and legal proposals to authorities * lobbying

Source: Piontkivska et al. (2003) based on Wells and Wint (2000).

132. Many countries have been trying to position themselves as attractive location for investments in R&D and innovation recently and have launched large marketing and publicity campaigns (see Table 11). In addition, regular announcements of new or planned investment projects preferably in different media help establishing the brand name of countries/region. Because of 'imitation' and 'follow the leader' behaviour among international investors, the track record of a country in attracting international investment may be a powerful tool. Next to the broadcasting of success stories, IPAs also make sure that new policies (e.g. specifically targeted at R&D investments) are made public as wide as possible.

133. Investment promotion policies are increasingly targeted towards specific (*e.g.* high tech) industries and functional activities (*e.g.* R&D and innovation); in addition, countries also increasingly focus on key disciplines and technology platforms (*e.g.* nanotechnology, biotechnology, ICT, green technologies) covering different industries and activities. Different techniques are used to identify the priority industries and activities to be targeted, but overall it is clear that there has to be a maximal congruence between the important locations factors of the targeted industries/activities at the one side and the strengths and attractive characteristics of the country at the other side. A unique selling proposition of the country has to be developed in order to be selected in the long and short lists of international investors.

13 According to a recent survey of Foreign Investment Advisory Service (FIAS), 35% of IPA's activities overall were devoted to image building, 33% to investment servicing (out of which 75% entails pre_investment services), 22% to investment generation, and 10% to policy advocacy.

The marketing instruments discussed above are often tailored for specific audiences in order to maximize the reach towards prospective companies (*e.g.* through tailored presentations and road shows, targeted mailings and telephone campaigns, investment missions).

Table 11. The marketing of EU countries/regions as locations for innovation, selected examples

COUNTRY OR REGION	SLOGAN OR BRAND NAME
Germany	'Land of ideas'
Italy	'Log on to Italy'
United Kingdom	'Want to be part of the UK cutting-edge technological revolution?'
Ireland	'Knowledge is in our nature'
Sweden	'New ways of thinking'
Denmark	'Creative Denmark'
Spain	'Technology for life'
Catalonia(Spain)	'Look at innovation. Look at Catalonia'
Lower-Austria	'Enjoy high performance in the high-tech business'
Wallonia (Belgium)	'The pursuit of technological excellence'
Portugal	'Technology from the heart'
Czech Republic	'The skills hub of Central Europe'

Source: Guimon (2008).

134. In addition to targeting in terms of industries and activities, IPAs increasingly target individual companies by scanning industry databases and through contacts with industry experts and consultants. Relationship building is crucial in this activity since most companies will seldom have immediate investment projects. By staying in contact and providing specific information on a regular basis, a strong relationship with company executives can be nurtured over the years. Successful investment promotion is increasingly based on company intelligence next to industry intelligence; it is important to understand the internationalisation strategies of companies in order to identify the company requirements (long) before the decision to invest abroad is actually taken.

135. A third large category of policies aims to assist potential investors in analyzing investment decisions by providing specific services and facilitating the investment decision process. Before the investment takes place, this function is about the provision of tailored investment information, the assessment of the costs of doing business, fulfilling requirements about specific legislation and procedures, etc. IPAs act often as a 'one-stop-shop' for facilitating administrative procedures such as registration or approval processes, obtaining sites, utilities, suppliers, etc. Also the development of package offers of government incentives will be often discussed during this stage. In most countries, IPAs will closely cooperate with other ministries and agencies to see what can be offered to potential investors and under which conditions. There are some examples of countries who attach specific conditions at the incentives, like *e.g.* to hire local high skilled workers, to cooperate with local research institutes, to source intermediates locally (Zanatta et al., 2006).

136. Aftercare services concern the services provided to existing investors and are very instrumental for re-investment prospection and policy advocacy. There is some evidence that R&D investments largely happen through the expansion of existing subsidiaries: MNEs with no previous presence in a country are

more likely to locate in a first stage manufacturing plants and/or retail units. It is often only after a certain time that local activities are expanded or upgraded; this observation is directly linked to the importance of co-location effects between manufacturing and R&D activities discussed above. Hence, IPAs should not only target new investors but should also stay in close contact with existing investors already present in the country who might upgrade their activities or complement them with higher value added activities.

137. Policies might benefit significantly from the expertise build up within IPAs on the investment trends in industries and the specific requirements of investing companies. As such, IPAs are asked in most countries to advocate changes in investment policies, ranging from small improvements in administrative procedures to the preparation of new investment legislation and regulations. IPAs are in a favourable position to draw attention to existing bottlenecks in the investment climate in order to make the country more attractive for international investment.

CHAPTER 4 POLICY PRINCIPLES

138. The challenge for governments in enhancing countries' attractiveness for innovation is to design a coherent and efficient strategy based on the right mix of policies and in direct relation to the characteristics of the host country. As such, there is no 'one size fits all' set of policies for all countries/regions as the optimal policy mix will depend on the industrial structure of countries, their innovation performance, their size and institutional organisation, the presence of MNEs, etc. Instead of clear policy recommendations, some policy principles are formulated that can guide governments in formulating and implementing effective attractiveness policies for innovation.

139. In addition, the OECD has developed the Policy Framework for Investment which is a tool to identify the important issues governments should consider in improving their countries' attractiveness to investment in general. The framework is based on the principles of policy coherence, transparency and accountability and regular evaluation and considers different policy areas that will affect how attractive countries are for international investment: investment policy, trade policy, competition policy, tax policy, human resources, infrastructure, corporate governance, responsible business conduct, public governance, promotion and facilitation. This framework could be usefully applied when designing attractiveness policies for innovation as most of the principles and policy domains are directly related to innovation.

140. While taking the host country characteristics as the starting point, governments should be aware – probably more than before - of the specific requirements of potential investors. Attractiveness policies focusing on FDI 'in aggregate' or the 'average' MNE risk to be less successful because location determinants typically differ between industries, entry modes, internationalisation motives, etc. International fragmentation has recently added another dimension as companies increasingly locate different parts of the value chain across different countries. Attractiveness for innovation differs from attractiveness for production and sales since different location factors are at play; agglomeration effects seem to emerge differently (sectoral versus functional) between production and service activities. Hence, a more differentiated approach including some prioritising in terms of industries and functional activities seems to be warranted; recent research has also shown that targeting in investment promotion has resulted in better outcomes.

141. Almost all governments nowadays target international investments in high technology industries and in innovation and R&D as these investments are generally believed to bring large(r) benefits to host countries. Developed countries hope that these new investments compensate for their decreasing comparative advantage in more labour intensive activities, while emerging countries consider these activities as an important leverage for their economic development. The implementation of active policies of countries for a rather limited supply of investments projects has resulted in an increasing policy competition between countries. While there is no systematic evidence on a 'race to the bottom' (*e.g.* lower social and environmental standards, an upward spiral of government incentives packages), policy makers should remain vigilant for the negative effects of such policy competition and should refrain from market distorting behaviour. Some regulation on FDI incentives has already been included in multilateral agreements as well regional integration agreements like NAFTA and EU, but further steps might be required to create a level-playing field.

142. Governments should know that their impact on attractiveness is limited. Market size and growth are still observed to be the most important location factors for international investments but are largely

outside the scope of government policy. Attractiveness specifically for innovation however is, in addition to these market demand factors, more responsive to supply factors which are affected by government instruments. Hence, there seems to be scope for more effective general government strategies to enhance attractiveness for innovation.

143. Attractiveness for innovation should not be developed on the basis of a couple of a limited number of isolated policies. Evidence for some countries suggests that a coherent and structured strategy to attract investment is often not in place and that negotiations with international investors are often tackled on an *ad hoc* basis. Instead a broad, horizontal strategy is needed that focuses on different policy domains (reflecting the simultaneous importance of several location factors) and that is an explicit part of the broader economic/industrial policy of countries. A strong embeddedness in the broader industrial policy aims to maximise the contribution of MNEs' foreign affiliates to the overall creation of employment, value added and innovation in host countries. MNEs play a central in role in global value chains and global innovation networks; industrial policy should typically explore how countries position themselves within these international networks, how to attract MNEs and how the local economy can benefit from these.

144. Attractiveness for innovation requires a close coordination/integration of innovation policy and inward investment promotion policy. Innovation policy aims to foster the innovation performance and outcomes of host countries, while investment promotion attempts to create a positive image of the country as location for international investments. An attractive marketing of the host country that is not based on strong economic fundamentals will be rapidly perceived as non-credible by potential investors. In each case, the track record of countries in attracting international investments gives a first glance of the true potential of alternative locations.

145. Potential investors carefully study the underlying location determinants (strong and weak) of the alternative locations they typically consider; location decisions are in most cases the result of a lengthy and thorough decision process by MNEs because of the typically long-term character and the large investments involved in setting up an affiliate abroad. As such, a long-term stability of the policy framework and regulation is of crucial importance to attract new investment; investments plans become difficult to decide upon when rules are rapidly changing and regulation is unclear.

146. The horizontal character of attractiveness policies for innovation is directly related to the broad and pervasive character of innovation; a successful innovation strategy needs to act upon several policy domains, including specific measures to attract international investments in innovation. It is clear that a strong innovation policy will enhance attractiveness for innovation by strengthening the innovation environment of countries; but also reversely, an effective attractiveness policy will significantly contribute to the broader innovation strategy given the important role in of MNEs in innovation on a global scale. Technology sourcing and access to local knowledge have become important motivations for international investments of R&D and innovation; hence an excellent and accessible scientific infrastructure, a large pool of highly skilled labour, networking among innovation actors, support for business R&D, a strong and transparent IPR system are important policy areas.

147. Given that innovation is increasingly the result of a networked approach between different innovation actors, agglomeration economies have been emerging as an important location factor. MNEs want to locate their foreign affiliates in the proximity of research centres, universities, other companies, etc. in order to maximise knowledge spillovers. A major challenge for governments is to design policy instruments (public-private partnerships, collaboration in innovation, clusters, etc.) that foster this interaction, are maximally open to MNEs but at the same time optimise the benefits to the local economy. This is not a straightforward task but it would allow connecting the national innovation system to the emerging global innovation networks.

148. Innovation policy has to be complemented with an effective investment promotion policy to inform potential investors about the attractive characteristics of the country (*e.g.* new policy instruments to foster innovation). By targeting specific types of investors, formulating marketing and information instruments and providing tailored services, investment promotion can result in better investment outcomes. Investment Promotion Agencies (IPA), typically in charge of these policies, should work closely together with other government ministries and agencies in charge of science, technology and innovation, industrial, trade, education and labour policy, etc. In addition IPAs need to develop strong business intelligence (in terms of industries as well as individual companies) over time which also could be used for policy advocacy. Just like is the case for innovation policy, investment promotion policy will benefit from a long-term perspective as IPAs have to built a good relationship with potential investors to learn about their investment plans in the immediate and near future.

149. In targeting potential investors, governments and IPAs should duly consider existing investors in the country, including MNEs having only invested in production and/or sales activities thus far. MNEs are more likely to locate in a first stage manufacturing plants and/or retail units in a specific location and expand these activities to include R&D and innovation in a later stage. Co-location and proximity between functional activities of the same company is observed to be important, hence putting to some extent a boundary on the international fragmentation of activities across different countries. Particularly production activities attract other activities including R&D and innovation while reversely also R&D seems to act as attractor for production activities but this only to a smaller extent. Interestingly, headquarters seem not be effective as an attractor for other activities (instead there are strong agglomeration effects among headquarter services of other firms), but more research is needed in order to corroborate these results.

150. Investment promotion seems to become more dispersed at the sub-national level as several locations (on the regional or even municipal level) compete within the same country to attract international investors. In the absence of an efficient cooperation between the national and sub-national levels, this may create confusion for potential investors and reduce the bargaining power at the national level. MNEs typically decide about future locations through a sequential process, where they first decide on a larger area (e.g. between regions and countries) and then between specific locations in that area. National and sub-national policymakers should in the first place work together in making sure that their country appears on the short list of the international investor.

151. As a result of the increasing policy competition, countries are willing to offer direct incentive packages (e.g. subsidies and taxes including R&D tax credits) to individual investors, in addition to the more general government policies discussed until now. The dynamics of competition between countries in attracting international investment creates a 'prisoner's dilemma': while governments have a collective interest in limiting government incentives, individual governments fear that they might lose out if they do not offer (enough) incentives while neighbouring countries do. There is indeed some evidence suggesting that incentives may divert investments from one country to the other country within a geographic region. Nevertheless, countries should be very cautious in granting incentives to investors:

- The economic rationale of government support is based on the market failure of technology spillovers since MNEs are expected to create important knowledge that may/will spill over to the local economy. The literature has however clearly shown that, while important in theory, in a lot of cases these spillovers do not materialise at all or are very limited;
- The empirical measurement of spillovers is only indirect and is very difficult (dependent on specific assumptions, considered time frame, most likely recipients, etc). A clear and accurate measurement (ex ante) is however necessary as incentives will be only welfare enhancing for the host country if they are smaller than the (realised) spillovers;

- At the one hand, larger (expected) spillovers would entitle international investors to larger incentives, hence some discretion would be valuable to government. At the other hand however, evidence has shown that discretionary measures typically attract rent-seeking investors, while transparent rules-based incentives do not/less;
- International investors often expect ex-ante incentives granted prior to the investment. Governments may however be better off by providing performance-based incentives where the payment is conditioned on the realised performance of the MNE on specific criteria (employment, R&D investments, etc.).
- The argument in favour of government incentives is based on the differences between foreign MNEs and domestic firms. If international investors however do not differ fundamentally from local investors, the incentives provided selectively to MNEs may distort competition with local firms;
- The existence of spillovers does not only depend on the sending company (*i.e*. the international investor) but also on the receiving companies (i.e. domestic firms). Evidence has shown that in many cases, the magnitude of these spillovers may limited by the lack the absorptive capacity of domestic companies for the advanced technology and knowledge of MNEs. Hence, there is a need for an inclusive and strong innovation policy fostering the innovation performance of international investors as well domestic companies at the same time. Support measures to strengthen innovation in domestic companies should be seen as complements of government incentives provided to international investors in innovation. The different policy instruments discussed above (support to private R&D, human resources, access to public research, innovation networking, etc.) are also important in this perspective. In addition, specific measures could be designed to facilitate the connectivity between domestic firms and foreign investors (OECD, 2005);
- A continuous monitoring and regular evaluation of the granted support by the government as well as of the investment performance of the MNE would be valuable and would enhance the accountability of government policy in this area.

152. Attractiveness policies for innovation relate to the attraction of countries to international investment and hence focus merely on inward investment policies. Research has pointed to the benefits that outward investment can bring to the home country, including the knowledge spillovers from domestic companies investing and exporting abroad. An optimal integration in the global economy results from incoming as well as outgoing investments, which may imply a need for specific outward investment policies as a complement to the inward investment policies discussed above.

153. Substantial knowledge has already been developed on the attractiveness for investments in innovation and evidence has been gathered which policies are more effective than others. There remain nevertheless some gaps in the existing knowledge; particularly the growing importance of global value chains and global innovation networks raises new questions. More insights are needed how attractiveness policies can better respond to this changing organisation in international production and innovation. This calls for a better understanding of how MNEs function in the global economy and how countries can enhance their connectedness in these global networks. The OECD is planning future work on these topics within the WPGI during the next years.

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ANNEX 1

Recent and proposed changes in R&D tax incentives in OECD and selected non-member countries

Australia	Australia has announced its intention to replace its R&D Tax Concession with an R&D Tax Credit. The new scheme will provide 45% on volume refundable for small firms (aggregate turnover of less than AUD 20 million) and 40% of volume non-refundable for large firms (aggregate turnover of greater than AUD 20 million). Eligibility for the scheme has been expanded in line with OECD non-discrimination articles to include all Australian resident companies and foreign companies, subject to certain requirements.The new R&D tax incentive redirects assistance to those activities most likely to generate spillovers. It tilts assistance in favour of smaller innovative firms as they are more likely to respond to fiscal incentives. The new incentive also removes the requirement that intellectual property be held in Australia, encouraging investment by the growing number of multinational enterprises in Australia that hold their IP overseas.
Belgium	A partial exemption of payment to the tax administration of withholding tax on earned income has been gradually introduced (since October 2003) with respect to remunerations paid to research workers. This exempted part that is deducted but not paid to the tax administration stays at the disposal of the employer. The research workers are allowed to set off that part (not paid to the tax administration) against their income tax liability in their tax return. The payment to the tax administration of withholding tax on earned income is exempted to 75% (new percentage since January 2009), valid for the following research workers: • European universities and “hautes écoles”, as well as for one of the Belgian research institutes; • Scientific institutions approved by royal decree; • Private companies employing research workers collaborating with all the above mentioned institutions; • Companies employing research workers having either a PhD in Applied Sciences, Exact Sciences, Medicine, Veterinary Medicine or Pharmaceutical Sciences or Civil Engineering, or a Master or equivalent in fields of sciences. Those persons shall be working on R&D programmes.
Canada	On the basis of consultations with stakeholders, the Government of Canada introduced in 2008 several changes to enhance the availability and accessibility of the financial support for R&D for Canadian SMEs. It also allocated additional funding to improve the administration of the Scientific Research and Experimental Development (SR&ED) investment tax credit programme. In particular: Budget 2008 improved the availability and accessibility of financial support for small and medium-sized R&D performers by increasing the expenditure limit for the enhanced refundable SR&ED investment tax credit available to small Canadian-controlled Private Corporations (CCPCs) from CAD 2 million to CAD 3 million and increased the upper limit for the taxable capital phase-out range from CAD 15 million to CAD 50 million. Budget 2008 also extended the SR&ED tax credit to certain activities carried out outside of Canada. Finally, Budget 2008 also announced some improvements to the administration of the SR&ED programme that will facilitate access to the programme, improve its consistency and predictability, and enhance the quality of the claims process. Changes to SR&ED as a result of the 2008 federal budget are explained at: http://www.cra-arc.gc.ca/txcrdt/sred-rsde/whtsnw/bdgtch-eng.html.

Denmark	Denmark provides tax incentives for experimental research conducted by the private sector. Foreign researchers and key staff are also taxed at a lower income tax rate than the normal income tax. Foreign researchers and key staff can choose between a 25 % tax rate in 36 months or a 33% tax rate in 60 months. There are a number of limitations and conditions for the reduced tax rate to be allowed. The system was introduced in 1991 and was modified in 2008 with the opportunity to choose between the 25 or 33 tax rate (including labour market contribution the tax rates are 31 and 38,4 %). From 2010, individuals will get a deduction for gifts to charities etc., which use their resources for research in the benefit of the public. The purpose with the law is to give an opportunity, that there can come more resources to research, which benefits the public.
France	The reform of the national "Crédit d'impôt Recherche (CIR)" is effective since 2008 and no major change has been made since. As part of the stimulus package the French government has agreed to temporarily modify the statutes of the tax credit "Crédit d'Impôt Recherche" in order to provide temporary tax relief to companies that carried out R&D activities between 2005 and 2008. As from 2011 the immediate reimbursement of R&D tax credit will be systematic for SMEs.
Germany	The new German Federal Government has agreed to introduce R&D tax incentives within the current legislative period 2009-2012.
Hungary	Since 1 January 2005, a tax credit on wage costs related to R&D activity and software developers has been applicable, and as of 1 January 2006, a specific tax credit on wage costs incurred in connection with software developers was introduced for SMEs. As of 1 January 2008, the limit of the development reserve was increased from 25% to 50% of the pre-tax profit. The VAT regulation for enterprises changed on 1 January 2006 to make purchases under funded project eligible for refund of VAT.
Ireland	In 2009 (accounting periods commencing on or after 1 January 2009), the tax credit for incremental R&D spending has been increased from 20% to 25% with base year fixed at 2003 until 2013. Such expenditure can be taken against corporate tax. Companies may claim cash payments over three years in the event of insufficient or no corporation tax. The tax credit on Buildings/Structures can be fully claimed (25%) in the period the expenditure is incurred. The requirement that building/structure be used wholly and exclusively for R&D is removed. Credit is now due if at least 35% of all activities carried on in the initial four year period are R&D activities. Companies may claim cash payments over three years in the event of insufficient or no corporation tax.
Israel	Israel has adopted a slightly different tax scheme to support R&D. Tax benefits are calculated on annual turnover but eligible firms are intensive R&D performers. Since September 2007 the Law for the Encouragement of Capital Investment allows companies that are considered to have high rate of R&D expenditures (at least 7% of annual turnover and 20% of employees devoted to R&D activities) to reduce annually their turnover base by 10% and benefit from tax credit. Additional benefits that a company could make after capital investment approved by the authorities will enjoy tax reliefs and deductions.
Italy	Italy has introduced a volume R&D tax credit of 10%.
Japan	In FY 2003, the government established a permanent volume-based credit of 8-10% (12% for SMEs) for total R&D expenditures within 20% of corporate income tax. In this system, firms are allowed to carry-forward the unused portion of their R&D tax credit only if they increase the amount of R&D expenditures the next fiscal year. In FY 2006, the government abolished a special depreciation of equipment for "developmental research." In FY 2008, the government modified its tax incentive system to allow firms to claim an additional credit for 5% for the increase in R&D expenditures or an additional credit for 0.2 multiplied by the amount of R&D expenditures exceeding the equivalent of 10% of average sales, both within additional 10% of corporate income tax. In FY 2009, the government, as a measure of addressing the economic crisis, temporarily increased the limitation of total tax credits up to 30% of corporate income tax for FY 2009 and 2010; and allowed firms to carry forward the exceeded tax credits in those fiscal years to 2012.

Korea	In 2008, the tax credit rate for research and human resource development was raised to 10% (previously at 7%). In 2009, this tax credit became permanent and the preferential tax credit rate for SMEs was raised to 25% (previously at 15%). In 2010, a 20% preferential tax credit rate is expected for new-growth-engine R&D (30% for SMEs), and a 25% preferential tax credit rate expected for original-sourcing-technology R&D (35% for SMEs).
Mexico	In 2009, the government converted its R&D tax credit to direct assistance.
Netherlands	The budget for the WBSO tax scheme (reduction of wage tax and social security contributions for companies with R&D personnel) was increased by up to EUR 115 million by 2011. In addition, an extra deduction will be created for existing companies (not start-ups) embarking on R&D for the first time. Finally, consideration is being given to raising the limit up to which companies may profit from the high rate. As of 2009 the R&D definition has been extended in the direction of the development of services based on software.
New Zealand	A R&D tax credit was introduced on 1 April 2008 and was stopped after a year. The R&D tax credit was therefore in force from 1 April 2008 to 31 March 2009.
Norway	In 2002, the Ministry of Finance launched a tax incentives scheme (Skattefunn) as a broad instrument that covers every sector and all companies. The scheme gives enterprises with business activity in Norway a tax credit on their R&D projects. The R&D content must be approved by the Research Council of Norway *ex ante*. The scheme offers a rebate of 20% of expenses for SMEs and 18% for large enterprises. In 2009, the cap on expenses per enterprise for intramural R&D projects increased to NOK 5.5 million (previously of NOK 4 million), and NOK 11 million (previously of NOK 8 million) for projects conducted at an R&D institution. If the calculated rebate exceeds the assessed taxes of the enterprise, the difference is refunded as part of the assessment. About three-quarters of the total tax expenditure under the Skattefunn scheme has been such cash refunds. The total R&D tax rebate for 2008 is approximately NOK 1.0 billion.
Poland	The act on some forms of support for innovation activity was modified as of 1 January 2006 to enable all enterprises to deduct from their tax base no more than 50% of their expenditures on purchase of new technologies (including patents and intangible assets). In 2009 the government introduced a deduction from the tax base for development costs in the month the expenditures were carried out. In 2010 the government is working on the R&D tax credits for the enterepreneurs granted with the status of R&D Centre.
Portugal	Portugal has an established policy of tax credits granted to companies that perform or contract R&D activities called SIFIDE. This tax measure was created in 1997, suspended in 2004 and 2005, re-established in 2006 (under severe public budget constraints imposed by the European Union) and reinforced in 2009. Following SIFIDE's last reinforcement, companies can now reduce their tax debts by a double percentage of the amount invested in R&D activities (*e.g.* the basic rate that corresponds to 32.5% of the expenses, and an incremental rate of 50% of the increase of expenses in regard to the average of the two previous years but up to the new limit of EUR 1 500 000). The institution responsible for this measure is the Ministry of Science, Technology and Higher Education and the Innovation Agency (AdI) is responsible for managing the program.
Russian Federation	The Russian Federation now allows full deduction of current R&D expenditures for tax purposes when previously only 50% of such expenditures were taken into account.
Slovenia	In 2010 general tax allowances on business R&D expenditure will be increased from 20% to 40%, thus enabling total (general + regional) allowances on business R&D expenditures of a maximum 60%.
South Africa	The enhanced R&D tax incentive introduced in November 2006, offering 150% tax deduction on current expenditure, and a 3-year accelerated depreciation on R&D capital investment of 50:30:20. Before 2006, the tax deduction was 100% and depreciation was 40:20:20:20.

Spain	To compensate for the general decrease in corporate taxes (started in 2007), R&D and innovation corporate tax credits were gradually reduced and were to be phased out completely by 2011. However, the Royal Decree-law 3/2009, suppressed the temporary limit of the deductibility of R&D investments from tax income, and the R&D tax retains its indefinite character since January 2009.
Turkey	Issued in 2008, the Law on Promoting Research and Development Activities (No. 5746) is a policy tool that primarily aims at addressing the need of creating R&D centers with a critical mass. It aims to increase the scale of R&D carried out even in large firms so that it is at a favorable level with the top global competitors and in this way, it is an additional incentive mechanism to promote large R&D centers in Turkey. In particular, within the context of this Law, without any sectoral or regional distinction, several incentive instruments are provided, including R&D allowances (100% on volume; and for large R&D center with at least 500 FTE researchers, 50% on incremental R&D from the previous year), incentives on income tax withholding (90% of FTE Ph.D researchers and 80% of other R&D workers) insurance premiums, stamp duties, and incentive R&D depreciation (100%) of the capitalized R&D expenditures for R&D centers with at least 50 FTE researchers. These incentives are provided until the end of 2023.
United Kingdom	The Pre-Budget Report of December 2009 announced the Government's commitment to promoting innovation through the R&D tax credit scheme. At the time of publication, over 36 000 claims had been made with over GBP 3 billion of relief claimed, supporting over GBP 32 billion of research and development activity by companies. To enable companies to more easily access the scheme, the Government announced the dropping of the condition that any IP deriving from the research and development must be owned by the company making the claim. This will allow companies to benefit from the scheme without distorting their commercial arrangements in relation to IP. In 2008, the R&D tax credit scheme for SMEs was extended to mid-size companies and the enhanced relief was increased to 175% (for SMEs) and 130% (for large companies) of eligible expenditure.
United States	The *Federal Research and Experimentation* (R&E) tax credit was established by the *Economic Recovery Tax Act of 1981*. Given its temporary status it is subject to periodic extensions and it was last renewed by the *Emergency Economic Stabilization Act of 2008* through 31 December 2009 The *American Recovery and Reinvestment Tax Act of 2009* (P.L. 111-5; February 2009) increased the research credit for energy research and allowed to claim a refundable credit for certain unused research credits in lieu of depreciation allowance for eligible qualified property Legislation to extend the R&E tax credit continues to be considered in both chambers of the US Congress.

Source: OECD responses to the STI Outlook 2010 policy questionnaire and OECD, responses to the 2009 NESTI R&D tax incentives questionnaire.