POLICIES TO BENEFIT FROM THE INTERNATIONALISATION OF R&D

Autoren: Bernhard Dachs, Sami Mahroum (ARC systems research)
Brigitte Nones, Andreas Schibany (Joanneum Research))
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1 Introduction

This report aims at answering what countries can actually do to maximise the benefits of the globalisation of R&D. Screening the relevant literature as well as policies adopted by OECD countries resulted in the identification of exemplary measures in three important fields of R&D internationalisation:

- policies towards attracting R&D units from abroad,
- governments' measures to link domestic firms to knowledge from abroad and
- policies towards the mobility of human resources.

These three topics will be discussed in three separate chapters, each of them sketching and discussing the issue and drawing conclusions for policy. Before going into these topics, the reports presents the international policy context in which national policies act. The report closes with a summary of the main findings.

2 International policy context[1]

Before going to the national level, we briefly discuss how international policy frameworks influence the topics discussed in this chapter. National policies towards the internationalisation of R&D are embedded in a number of transnational policy initiatives. With 19 of the 30 OECD member states being also members of the European Union and two others (Iceland and Norway) participating in the European Single Market with their membership in the European Economic Area (EEA), EU regulations concerning state aids and research policy have a decisive influence on internationalisation policies in the OECD. But also other Trade Agreements and regulations established under the World Trade Organisation, although not dealing directly with R&D topics, have an impact on OECD member states policies with regard to the internationalisation or R&D.

2.1 Policies of the European Union

Two aspects of the common policies within the European Union (EU) are relevant in the context of this chapter. Firstly, regulations in competition policy prohibit state aids which may lead to distortions of the Single Market and hence the free movement of goods, capital, persons and services within the member countries. This also includes investment incentives to a certain degree. Secondly, the common research policy of the EU aims at promoting transnational co-operation and coherence in science and technology in Europe.

2.1.1 EU competition policy

The treaty establishing the European Communities prohibits all measures of the members states that results in the prevention, restriction or distortion of competition within the common market (Art 85-89). Special reference is given "dissimilar conditions to equivalent

[1] Contribution from ARC systems research

transactions with other trading parties, thereby placing them at a competitive disadvantage" (Art 85d). This regulation does not only refer to financial treatment but also to a variety of forms of state intervention like grants, interest and tax relieves, guarantees, or the provision of goods and services on preferential terms.

Furthermore, the EU has settled a political Code of conduct[2] to eliminate harmful business tax regimes in 1997. Among others, criteria for identifying potentially harmful measures include tax benefits reserved for non-residents or tax incentives for activities which are isolated from the domestic economy and therefore have no impact on the national tax base (*European Commission,* 1999). The cited report also lists tax measures, some of them related to research and development, which are regarded as harmful features by the authors. The Code is not a legally binding instrument but it clearly does have political force because by adopting this Code, the Member States have undertaken to take back harmful measures and refrain from introducing such measures in the future.

EU competition policy has some important implications for the topic of the report. First, it removed most restrictions to market entry and the set-up of affiliates within the EU and therefore ensures free movement of capital within the Single Market. Second, all kinds of unequal treatment (like exclusion from or exclusive R&D funding for foreign firms, performance requirements like compulsory technology transfer to domestic firms) between domestic and foreign-owned domiciled firms are prohibited as they may distort competition. Third, since movement of persons within the EU is unlimited, there is also no legal restrictions for employment of scientists and engineers abroad, as long as they are citizens of an EU member in principle.

The rules for state aids in the EU are strict, but there exist a number of exceptions[3]. Two important exceptions in the context of this document are state aids for promoting the economic development of underdeveloped areas and for research and development. Moreover, a number of temporally exceptions for to the New member countries exist for free movement of people, but also for financial incentives to attract foreign investment[4].

2.1.2 EU science and technology policy

Research and development is one of the most important exceptions from the general ban of state aids in the Single Market. The European Commission itself is actively promoting research and development with its Framework Programmes for Research and Technological Development (see also *Caracostas – Muldur,* 2001). This promotion scheme is open to organisations and persons from the EU Member states (including affiliates of non-EU companies located in the EU). Moreover, it is worth noting that the programmes are also open to participants from a number of Third countries outside of the EU. As a principle, the Framework programmes only support transnational projects; proposals are only accepted from consortia with partners from different countries. The FWP also offers support for transborder researcher mobility at different stages (undergraduate, postgraduate, experienced researchers).

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[2] http://www.europa.eu.int/comm/taxation_customs/taxation/company_tax/harmful_tax_practices/index_en.htm

[3] An overview gives http://europa.eu.int/comm/competition/state_aid/overview/

[4] see http://europa.eu.int/comm/enlargement/negotiations/pdf/negotiations_report_to_ep.pdf

Facing a widening gap between Europe and the US and Japan in science and technology, the European Union, has launched an initiative toward supporting the creation of an "European Research Area" (ERA)[5] in 2000 (*European Commission,* 2000). The main goal of ERA is to reduce fragmentation and stimulate transnational interactions in European research by creating a border-free zone for research in Europe. In this respect, ERA is a continuation of the policy of integration already pursed by the FWP. A second task of ERA is to improve cohesion in European research by bringing together scientific communities, companies and researchers from all over Europe. This also includes networking of existing centres of excellence and support for the formation of 'critical masses' and the combination of complementary expertise. Third, ERA aims at an improved coordination of national policies which still account for most of the public funds available for S&T in Europe. In the words or the EU, "National research policies and Union policy overlap without forming a coherent whole" (*European Commission,* 2000, p. 7). Therefore, various instruments has been put in place to promote co-ordination between the national research agendas and, in the long run, increase scientific specialisation among organisations and countries in Europe. An increased specialisation and a clearer profile of European regions, in turn, may considerably affect location decisions for R&D units of MNEs.

2.2 International investment agreements

The purpose of Bilateral Investment Treaties (BITs) and Multilateral Investment Agreements (MIAs) is to protect investments abroad and grant them national or most favoured nation treatment. This includes several rights like the right to make investment-related transfers, the right to hire personnel in a foreign country without regard of nationality, regulation concerning dispute settlement and in some cases rules regarding access to funding. As the treaties concerning economic regions like the Treaty of the European Community or the NAFTA treaty include most of or even go far beyond the regulations of a BIT, their importance between OECD countries has diminished with the accession of the new Central and Eastern European member states to the European Union. BITs, however, remain an important instrument for international protection of investment for non-EU member states as well as between the EU and developing countries. *UNCTAD* (2000) reports a total world-wide number of treaties of more than 2.000.

Finally, also the WTO agreements, although dealing with trade of goods and services, include rules on investment and competition protection[6] which may affect internationalisation policies of the WTO members. The Agreement on Trade-Related Investment Measures ("TRIMs") prohibits measures that impose certain performance requirements to investors such as local content requirements (e.g. mandatory local sourcing of supplies to integrate local firms into the supply chains of foreign affiliates or mandatory technology transfer) or joint venture requirements. Moreover, the GATS Agreement on trade in services also affects investment as it regards FDI ("commercial presence") as one mode of supply of services.

To sum up, there is an international policy framework already in place which poses some limitations to government policies on the subject discussed in this report. These regulations seem to prevent an unequal treatment of foreign-owned and domestic firms regarding

[5] Extensive information on the EU's policy towards the European Research Area is given on the EC's internet site at http://www.cordis.lu/era/

[6] see http://www.wto.org/english/tratop_e/invest_e/invest_e.htm

performance requirements and public R&D funding. Moreover, limits are imposed to financial and non-financial investment incentives by national treatment clauses in a number of cases. Since the effectiveness of general FDI incentives (regardless of their wide spread) is more than disputed among economists (*Blomström,* 2001), BITs and similar regulations are an important step to overcome 'negative-sum' dynamics between countries competing for FDI (*Oman,* 2000).

3 Policies towards attracting R&D from abroad[7]

Globalisation is a major dimension of economic activity, and beside the new information technologies, multinational enterprises (MNEs) and foreign direct investment (FDI) are the key drivers of this process. As R&D capabilities and science-based innovation tend to become increasingly important factors in attracting foreign R&D, policy makers need to place more emphasis on an integrated R&D policy strategy; i.e. instead of pursing simple "me too" strategies more emphasis has to be placed on sustainable leadership positions regarding R&D capabilities, dynamic firms, effective clusters of business activity, as well as dynamic lead markets (*Mayer-Krahmer – Reger,* 1998; *Edler – Mayer-Krahmer,* 2003; *Tekes,* 2004). Thus, perhaps one of the most important questions dealing with the internationalisation of R&D policy is today: Which political instruments can be devised to make national knowledge infrastructure more attractive in order both to attract new (foreign) industrial R&D investments and to retain existing ones?

3.1 A new environment for national R&D policies

Analysis of the innovation activity of MNEs shows that the 1980s were a period during which the internationalisation of R&D was associated with decentralization and dislocation of activities, whereas from the 1990s on, there is a clearly recognisable trend towards strengthening R&D in foreign countries and extending the global competence portfolio. MNEs as the leading performers of R&D mainly pursue a strategy of presence at precisely those locations where the best conditions worldwide for innovation and generation of knowledge are given today; i.e. they are no longer satisfied with locations "just to keep up" with the global technology race, they deliberately look for unique centres of excellence following the idea of concentrating 'core technologies' in centres of competence (*Mayer-Krahmer – Reger,* 1998; *Edler – Mayer-Krahmer,* 2003). Furthermore, facing the changing pattern of competition, the research focus of many corporations has become more "near-to-market" so that thinking in terms of integrated process chains as well as dynamic value drivers such as learning from technological excellence (as for instance from lead markets) is of growing significance today (*Beise,* 2004).

As a new era for competition among firms and countries to attract FDI has begun, it's additionally enhanced by capital mobility and removal of barriers to trade resulting from various international and regional agreements (i.e. World Trade Organization, Single Market programme in the European Union, North American Foreign Trade Agreement). Increasing internationalisation has challenged the role of the nation state for some time already (see *Filippaios,* 2004): on the one hand, the nation-state is the locus of regulatory regimes, a set of laws, regulations and customs governing production and exchange, and not just a geographical area sharing some common cultural characteristics. On the other hand,

[7] Contribution from Joanneum Research

territorial networks spanning across the border of nations or located at a regional level are competing for international trade and investments. This implies that the national policy towards attracting foreign R&D gets particularly influenced by the social, political, and cultural dimensions of the dynamics and the existence of "neighbourhoods" around the world.

3.2 Instruments to attract industrial R&D capabilities from abroad

There has been an ongoing shift in emphasis in policies designed to attract FDI, shifting: the focus to high tech industries and R&D itself. With regard to the choice of location, the success of attracting foreign R&D depends on the one hand on the internal strategies of MNEs, and on the other hand on locational characteristics such as adequate infrastructure, public research facilities, educational system and science base of location (*Molero – Alvarez,* 2004). As the analysis of the European Union as a recipient of FDI inflows and foreign R&D activities indicates, there is a recent trend towards boosting business R&D and innovation through a variety of policy instruments in respect to enhance the national capacity of attraction. Direct support mechanisms have lost, while indirect mechanisms gained in importance (*OECD,* 2004).

Table 1: Specific measures to support the location of new R&D activities through foreign direct investment

	Direct financial support	Administrative support	Provision of infrastructure	Public procurement	Active recruitment	Advertising
Australia	×				×	
Austria		×			×	×
Denmark					×	×
Finland					×	×
France			×			
Germany		×			×	×
Italy		×				
Japan						
Netherlands		×			×	
N. Zealand						
Norway						
Poland				×		

Source: Internationalisation of R&D – policy questionnaire, OECD, December 2004.

3.2.1 Basic support for business R&D and innovation

Facing the fierce competition within the Triad, policy makers use a variety of instruments attracting leading performers of R&D. For the most part, OECD countries continue to provide some form of direct support for business R&D as, for instance, new financing programmes including grants and loans (in Australia, Luxembourg, the United Kingdom, Iceland and a number of Eastern European countries like the Czech Republic and Hungary), as well as new tax incentive schemes for R&D (in Norway and the United Kingdom) or lowering corporate tax rates (in Austria, Canada, Iceland and Luxembourg). However, as table 1 indicates, both direct financial support and fiscal incentives are not extensively used by OECD countries as specific measures of attracting new R&D activities of foreign MNEs. Of

course, this does not imply that the existence and generosity of these measures is of no importance in locational decisions of forms. In many countries these measures face tight budgetary constraints.

3.3 Best practices

So far, only few countries have developed an integrated policy strategy to address issues enhancing the inward R&D activities for foreign companies. Ireland provides an example for a successful, integrated approach (Box 1).

Box 1 Ireland: an integrative approach

In contrast to other European countries, Ireland's rapid economic development has been strongly based on industrial policy and substantial investments in innovation measures. Although business expenditure on R&D remains low, 80% are accounted for by foreign-owned MNEs. Therefore, Ireland is commonly regarded as a success story in terms of inward investment policy that due to its proactive stance, headed by the Industrial Development Authority (IDA), gained international reputation, mainly for its emphasising policy independence, continuity and consistency (*Tekes,* 2004).

With regard to the framework on which decisions are taken, grant concession was tied to well-defined objectives (employment, R&D), and repayment was required in case of failure of compliance by the MNE. Additionally, policy implementation always occurred on a project-company basis, and explicit sectoral targeting was a defining feature of the Irish policy. In fact, MNEs were not attracted to sectors where Ireland was traditionally advantaged, but to high tech industries, so that FDI had a tangible impact in Irish industry as it motivated a structural shift in sectoral and regional terms. As a result, in the last decade Ireland showed significant growth in FDI inflows where the greatest part is accounted for by greenfield investment or expansions, as opposed to mergers and acquisitions (*Molero – Alvarez,* 2004; *Tavares,* 2004).

In order to attract new investments, from the end of the 1990s on, Ireland has used a very bold and expensive set of instruments, upgrading the physical infrastructure of the universities and making massive investments in strategic research in biotechnology and ICT. The Science Foundation Ireland (SFI), an agency of the industry ministry, offers very large grants to foreign-based researchers willing to move to Ireland and establish research groups, followed by smaller grants, open to nationals as well as those abroad. Other incentives include inward mobility schemes for individual researchers and those with key skill, and reduced fees for non-EU post-graduate students. Furthermore, there is an innovation support programme aimed especially at strengthening the capabilities of Irish plant, and corporation taxes are still low. Recapitulating the Irish strategy, it involves large risks: the new research measures are planned to cost about EUR three billion over 2000-2006. But nevertheless, without the consistency and credibility of Irish institutions and policies, and accompanying indirect measures, results would not probably be the same as they have been (*Tavares,* 2004; *Tekes,* 2004).

Switzerland, the USA and the UK are countries that are highly attractive for inward FDI in R&D. In these countries the overarching, strategic orientation of policy is world-class excellence in science based on the perception that generates sufficient attractiveness for FDI by MNEs (*Edler – Boekholt,* 2001). In other countries such as Finland, Austria and the Netherlands incentives are offered in order to raise the proportion of R&D activities of foreign MNEs.

Box 2 European Union: ERA-NET

The ERA-NET initiative launched by the European Commission addresses national policy makers and promotion agencies pursues two lines: First, the networking of research support activities conducted at national and regional level and second the mutual opening of national and regional research programmes being part of the networking activities. Both contribute to realise the European Research Area by improving the coherence and coordination of such research programmes across Europe. One of the main benefits is that it enables national systems to take on tasks collectively that they would not have been able to tackle independently, attending to avoid duplication as well as to develop complementarities between different national research systems. Designed in such a way, the foreseen coordination is ambitious in the sense that it includes an impact on: systematic exchange of information and best practice; strategic activities; implementation of joint activities; transnational research activities.

Giving no preference to one specific research topic over another, the ERA-NET scheme is implemented through a bottom-up approach and carried out in the whole field of science and technology, expecting that it involves stronger forms of co-operation and coordination in world-class technology of today (*European Commission,* 2003).

The creation of the ERA-NET scheme (Box 2) has been an important step towards enhancing the co-operation and coordination of research activities carried out at national and regional level in the Member States and Associated States of the EU. Another example of best practice is provided by Tekes in Finland Box 3), aiming at opening up of national technology programmes, considering that foreign companies are not treated differently from domestic firms. This is also consistent with the competence centre programmes initiated in Austria (Box 4) and the Netherlands (Box 5) aiming at the development of public-private research centres in high-technological fields that are sustainable, user-driven and co-operative.

Box 3 Finland: Tekes

While in the 1980s Tekes technology programmes were mainly focused on accessing and managing rapidly developing technologies for industrial purpose, the scope of technology programmes has been broadened in the 1990s, addressing issues such as the changes in the competitive environment of enterprises and regulatory issues. Today Tekes technology programmes cover a much broader mission than just technology providing opportunities to participate in networking and to gain from spillovers from other projects.

More than half of Tekes R&D funding for large enterprises is directed today through technology programmes following a strategy for internationalisation of R&D that is based on four mechanisms: selective project funding, national technology programmes, the promotion of innovative activity, as well as the development of innovation environments. As Tekes technology programmes are in principle targeted or mission oriented, and open to foreign companies to participate in four different ways:

– Joint project which is based on common objective, shared resources and tasks. Each party covers its own costs and uses the results as agreed among the participants;

– Subcontracting which provides the possibility that participants may purchase services from a foreign entity to complement the project, provided no such domestic source is available;

–Technology transfer which enables project participants to purchase licensed or existing technology from a foreign entity to complement R&D project work, and

– Collaboration for marketing and distributing the project results which facilitates that project participants may collaborate with foreign enterprises in order to bring the products to the market.

In 2001, 36% of all technology programmes financed by Tekes included international co-operations. The expenditures for these internationally initialised projects were about 45% of the total volume provided by Tekes, while 56% of the foreign participants came from Europe, 28% from the USA and 5% from Japan (*Tekes,* 2004).

Box 4 Austria: The Kplus programme

Facing the key challenge of improving the effectiveness and efficiency of its innovation system, Austria has chosen to create new structures for science-industry co-operation. To build up scientific capacities operating in thematically relevant and technological fields, temporary research institutions called Kplus Centres have been established. Kplus Centres are generally founded through formal partnerships with universities and enterprises, focusing on the creation of a new culture of collaboration as well as following the principle of non-discrimination. In order to support the inter-disciplinary and complementary co-operation within the specific scientific fields, foreign-owned firms are encouraged to participate.

Today there are 18 active Kplus Centres in Austria directed towards carrying out R&D on an internationally competitive basis in networks with about 270 partners from industry and 150 from science and technology. The proportion of foreign companies participating is high: in 2003, 10% of total expenditures came from foreign-domiciled companies, i.e. companies which have not yet settled down in Austria but participate in its Competence Centre Programme. According to the programme guidelines the accumulated proportion of foreign-domiciled companies has to be less than 25% of the total volume of each Competence Centre. Furthermore, 13% of all participating companies are foreign-domiciled; a percentage that even increases up to 34% in individual Kplus-Centres, e.g. in the Austrian Centre of Competence for Tribology (ACT); and regarding the percentage of foreign PhDs, the percentage is 50% in centres such as the Competence Centre of Applied Electrochemistry (ECHEM).

Box 5. The Netherlands: Twinning Centres

Since the Netherlands is the home-base of a number of significant MNEs, for some time, there have been concerns that corporate R&D might migrate out of the country. Accordingly, a major policy challenge is seen in improving the climate for innovation, and therefore in enhancing international networking. One approach contributing to make the Dutch economy more dynamic is the establishment of the Twinning Centres, a sophisticated cluster approach that combines a local competence centre and an incubator model with strategic networking with global lead markets. For this purpose, existing networks of local companies have been activated and additionally, leading foreign companies and universities integrated into already existing local networks. As public incentives foster the increase of new companies operating especially in the ICT sector, they include funding, coaching as well as networking, pursuing a policy scheme that from the very beginning on local competence clusters become established, and the international exchange between competence clusters increased and intensified (*Edler – Mayer-Krahmer,* 2003).

3.4 Implications for national R&D policy

Most countries, developed and developing alike, nowadays engage in a race to attract FDI and MNEs' activities. FDI attraction seems to be one of the major ways by which governments seek to stimulate rapid economic growth, assuming that the positive spillovers from FDI outweigh possible negative effects. Therefore, countries are competing to attract projects and to boost their attractiveness by granting higher incentives than their locational

competitors facing the challenge that qualitative factors and dynamic upstream- and downstream-interactions are increasingly driving R&D location decisions. As a consequence, a change of perspective in technology and innovation policy is required – a change away from technical aspects towards "soft" innovation factors as organization, qualification, etc. calling for a set of initiatives focusing on inter-industry and scientific networking that aim at a long-term integration of MNEs.

The need for a change in R&D policy is supported by an empirical study on the roles of foreign R&D units of MNEs in Austria (*Nones,* 2003). Considering the characteristics of affiliates, it was demonstrated that companies that are both highly integrated within the corporate group and highly embedded within their environment (through regular contacts to suppliers, customers, universities, research institutes, *etc*. from Austria as well as from abroad) show up a significantly higher innovation rate than companies not so strongly embedded in their field of science/ technology. Furthermore, in a follow-up study by *Schibany et al.,* (2004) it is proved that affiliates performing R&D characterised by high embeddedness represent much more sustainability. Observing the recent years, it is evident that the probability of closing down is significantly higher for foreign affiliates "standing alone".

At present, actors in science and technology policy in many countries and at the EU level are embracing this process of change. Based on a wide variety of instruments and funding tools for supporting science and technology, the policy scheme for attracting foreign, leading R&D capabilities is particularly focused on four main themes:

- The building up of world-class science systems including excellent human capital as well as special talent;
- The organisation of clusters involving an innovative mix of research and learning activities;
- The establishment of competence centres enhancing industry-science linkages in order to achieve agglomeration effects, and
- The opening-up of national technology programmes based on the principle of non-discrimination.

National technology programmes should work as platforms that facilitate a flexible integration of different types of R&D projects, different kinds of operators and sufficient internal and external instruments for joint objectives. For this purpose, interconnection should be as easy and efficient as possible, regardless of its location. As for instance in Austria where the Kplus programme stimulates indigenous industry on the one hand, and on the other, knowledge pools of technical expertise, independently of their domestic base; or as for instance in Finland, where Tekes has opened its technology programmes in order to gather big enough clusters of competence attracting international interest. In the face of persistent budget constraints it is perhaps one of the best ways of attracting foreign R&D, to pursue a consistent policy that turns local agents into more attractive partners and by doing so, to support the increase of linkages/interactions with them.

4 Linking domestic firms to foreign sources of research and innovation[8]

Going abroad is not sufficient for enterprises to tap foreign knowledge and reap the benefits thereof for the home economy. Similarly, attracting R&D-intensive FDI from abroad is not a sufficient condition for inward knowledge spillovers to occur. The mere incidence of internationalisation only increases the opportunities for knowledge spillovers; the appropriation of new knowledge, however, is not straightforward and requires a high level of absorptive capacity. Therefore, prior building of technological capabilities within a country's firms is crucial for their ability to interact and absorb knowledge made available by inward and outward FDI (*Janz – Gottschalk,* 2003). In this context one may raise two important and related questions: What policies will be conducive for MNEs to transfer technology to domestic firms in the host country? And how can domestic research be linked to international knowledge resources?

4.1 Promoting international linkages

Policies directly aiming at new and deepening linkages between domestic R&D and actors from abroad commonly involve various elements, including financial support, support for networking, the provision of information, matchmaking activities and provision of consultancy services.

4.1.1 Financial support for research and development abroad

Financial support to firms that want to conduct research and development abroad may provide an important incentive to take this step. However, in most countries direct funding seems to be limited to R&D activities carried out within the national borders. A noticeable exception is funds to promote the participation in international programs like the EU Framework Programs. Moreover, in a number of countries indirect funding of R&D (*e.g.*, tax credits) is also granted if R&D expenditure is incurred outside the country (*e.g.*, purchase of R&D services from foreign research institutes). A recent study reports that most jurisdictions do not differentiate in this matter (*IBFD,* 2004). Exceptions are Belgium, France, Japan, the Netherlands, Spain and the United States.

4.1.2 International networking

All OECD countries are highly aware of the importance for international networking (see *Allen Consulting Group,* 2003 for a recent overview). An obvious approach to the internationalisation of R&D followed by all countries is to participate in existing international R&D networks or international promotion schemes (such as the Framework Programmes within Europe or the worldwide Intelligent Manufacturing Systems (IMS)). Acknowledging the benefits of co-operation, most countries allow for additional or preferential funding of projects with international partners. At times the commitment towards international collaboration is even a mandatory requirement to participate in public R&D support schemes. The advantages to hold membership in relevant international organizations (OECD, IFSR, IAEA, UN bodies such as UNITAR/UNESCO and the like) and to further engage in existing multilateral collaboration projects (CERN, joint projects within the EU Framework Programmes, *etc.*) is highlighted by numerous policy documents. Moreover, some countries

[8] Contribution from the Austrian Institute of Economic Research (WIFO)

provide additional funding for participating in international organizations and the Framework Programmes to domestic enterprises, especially SMEs, or enter into specific bilateral co-operation agreements to help domestic enterprises to access foreign knowledge.

Table 2: Measures to link domestic firms to foreign sources of knowledge in different OECD countries

	Additional/preferential funding for projects with international partners	Support to find international partners	Other measures
Australia	x	x	
Austria	x		
Denmark		x	
Finland	x	x	x
France	x	x	x
Germany	x	x	
Italy	x		
Japan			
Netherlands	x	x	
New Zealand	x		
Norway	x	x	x
Poland			x

Source: Internationalisation of R&D – Policy Questionnaire, OECD, December 2004.

4.1.3 Information

Another basic line of policy initiatives to help domestic firms link up with foreign sources of excellence involves assistance in identifying appropriate partners and projects. Accordingly, governments can play a role in disseminating information regarding the buyer's (foreign affiliate's) commercial, technical and quality requirements as well as the selection criteria by which they choose potential suppliers. At a more general level, available instruments include all kinds of information services such as the organization of respective seminars and missions, holding *of* or participation *in* international fairs and exhibitions, or the provision of highly sophisticated electronic databases. Governments may either provide such kind of information services by their own or they may choose to leave the gathering and dissemination of relevant information to private sector firms/institutions.

4.1.4 Matchmaking

Matchmaking is the art to find suitable local suppliers for foreign R&D players entering the host country. It may occur "naturally" as a result of former joint participation in international networks and programmes. Most governments, however, follow a more proactive strategy and have founded own agencies that offer benchmarking services to foreign affiliates to identify and select suitable suppliers. Tekes, the government's R&D agency in Finland, has even established such offices overseas (in Japan, China and the U.S.). Matchmaking may also be accomplished via internet platforms with online business-matching services. Maintenance of respective database recording the capabilities of local firms does, however, require considerable effort on behalf of the government agency. Alternatively (or complementary), the host economy may organize meetings to bring suppliers and buyers in particular industries together, to enable them to show their products, make contracts and initiate deals. The government of the host country may be more directly involved into the

matchmaking by acting as a broker in negotiations, or it may even try to establish the input needs of foreign affiliates and identify parts and components for local supply. In these days most countries support domestic firms (and SMEs in particular) in finding international partners. In less advanced countries matchmaking initiatives need to be complemented by efforts aiming at the enhancement of the skills and expertise of the local resource base for match-making activities only make sense when there are matches to make, i.e. if domestic firms or research institutions are competent enough to qualify as collaboration partners or as suppliers.

4.1.5 Consultancy

The most important consulting services include the provision of practical tasks related to collaborative actions such as advice on how to get access to international funds, or how to coordinate multilateral international projects. This calls for consultancy services providing for managerial and technical assistance and which provide for logistic support in marketing and distribution. The government may also provide advice on subcontracting deals, or provide for legal consulting services in respect of the joint project, or it may even monitor linkages and act as trouble-shooters when problems arise. *Lundin et al.* (2004) make a point that consulting services must be user-friendly and provide sufficient value added to be attractive to firms. Again, if appropriate private sector consulting services are readily available, grants/financial assistance to tap such services should be given.

4.2 Increasing absorptive capacity

Many authors argue that any public action scheme aiming to increase the potential for spillovers is deemed to fail unless it was complemented with measures to improve absorptive capacity of the host country and to maintain a competitive local business surrounding (e.g. *Blomström – Kokko,* 2003; *Kumar,* 2003). Therefore, policy measures towards attracting foreign R&D require a local environment that is open to continuous technological upgrading. A high degree of local "embededdness" of foreign firms, which manifests itself in intense contracts with domestic enterprises and universities is also an important prerequisite if foreign engagements should be long-lasting (*Schibany, Nones et al.,* 2004).

Governments take a direct role in providing financial assistance to local firms to improve their technological capacities. The modes of support vary with respect to the potential beneficiaries (SMEs vs. large players, for-profit entities vs. universities and research institutes), with respect to the instrument mix – grants, (preferential) loans, provision of guarantees, assumption of liabilities and the like – and with respect to eligible R&D activities. Among the many factors that have been proposed to stimulate R&D spillovers from foreign affiliates to the local R&D resource base and the economy at large, two stand out, viz. a high educational level of the local labor force and a well-developed technological capacity of domestic firms. Both are associated with the notion of absorptive capacity, *i.e*. the idea that a firm or country needs to have a certain type of skill in order to be able to successfully adopt foreign technology (*Kumar,* 2003; *Keller,* 2004). Similarly, own R&D activities of local firms are regarded as necessary so as to de-codify the "spilled" knowledge (*Kathuria,* 2002). R&D investment of indigenous firms is crucial for enabling them to understand and evaluate new technological trends and innovations and eventually to acquire outside technologies.

Except for the high importance of local competence (absorptive capacity), *Kokko* (1994; 1996; *Blomström – Kokko,* 2003) argues that simultaneous interactions between foreign and local firms are crucial for spillovers to materialize and the scope for learning would be the

greatest when foreign affiliates and local firms are in direct competition with each other. Conversely, spillovers are less likely to occur when foreign firms operate in "enclaves", where neither products nor technologies have much in common with those of local firms (*Kokko,* 1996), ruling not only horizontal linkages, but also backward and forward linkages.

In the policy area discussed in this section governments of technologically more advanced countries may limit their initiatives to the provision of information, matchmaking and consultancy services, *etc*. Where the host country's R&D resource base is still at a basic stage and the suppliers' potential is still to be developed, governments' efforts are more directed to measures that upgrade the absorptive capacities of local firms.

4.2.1 Technological upgrading

In the first place technological capacity building is a task to be complemented at the national level prior to internationalisation. The national innovation systems with their dedicated programs provide for ample support and incentive schemes.

Capacity building in innovation and technology involves setting up a local infrastructure for industrial research, technological development and innovation. The government may set up science parks, establish business incubators, support centers for technology transfer. An effective way to link foreign to domestic firms is to support the building of clusters, *i.e*. networks of companies, universities, educational and other institutions. The ultimate aim of such clusters is to improve the ability to compete through collaboration ("co-opetition"). Clusters can be formed among companies in the same sector, specialized suppliers, service providers, and associated research and educational institutes, all at the regional, national, or even cross-border level.

Once a certain threshold has been reached, technological upgrading may also come via technology transfers from foreign affiliates firms to domestic suppliers and the policy task would be to encourage such transfers and to promote technology cooperation between (foreign affiliate) buyer firms and (domestic) supplier firms, respectively. One way to prompt such objectives would be to establish performance requirements, *e.g*., technology transfers to subcontracting local firms could be declared as mandatory, or foreign firms could be forced to obey to so-called local content provisions. These provisions require foreign affiliates to make use of local intermediate inputs, or to employ local staff. Also, the provision of tax incentives could be conditioned on technology transfer requirements. However, today such practice would only be an option for developing countries as a means to promote the development of vertical linkages. With respect to industrialized countries any such provisions must be compatible with the TRIMs Agreement ruling out not only prescriptive measures such as local content requirement, but also such measures whose compliance is necessary in order to obtain an advantage (*UNCTAD,* 2001, p. 165 ff).

4.2.2 Training

There are arguments in favour of public support to support the training of highly skilled workers.. Governments could offer incentives to both, foreign and domestic firms for engaging in co-operation with other firms or research institutes where particular emphasis is laid on learning effects of the local staff. Likewise governments may give incentives to universities and public research institutes to cooperate with both domestic and foreign firms with a focus on training. Further, host country measures would include promotion of supplier associations, *i.e*. fora to exchange skills and techniques between suppliers, with major customers or consultants hired by the program. As it turns out, however, measures that are

related to the promotion of training and education are generally confined to the SME sector and only few countries would provide explicit incentives (in kind of financial or fiscal incentives) for this purpose. A notable exception is Hungary where the government provides subsidies for firms that incur training expenditures. The human resource development program of CzechInvest supports related activities in regions with poor training infrastructure by means of setting up such facilities and equipping them with training materials and tools. In selected key professions training programs have been implemented. In the Czech Republic such programs are open to SMEs as well as large enterprises and in some cases also to non-business entities (universities, educational and research institutes) linked with business entities.

5 Policies towards foreign talent[9]

Across OECD countries, governments have been changing or modifying national immigration and income taxation policies as well as higher education structures to make them more compatible to each other (*Dumont – Lemaître,* 2004; *Mahroum,* 2005). The changes have emanated from governments' acknowledgement of the necessity of foreign highly skilled workers in the process of internationalisation of national innovation systems. Some countries find themselves at an advantage[10] over others in where they lie in this process, while others find themselves precariously lagging behind.

Table 3: Classification of policy action vis-à-vis types of barriers

Policy Action Area	political/technical	cultural/structural
Immigration	x	o
Taxation	x	
S&T legislation	x	o
Accreditation	x	
Internationalisation	o	x
Retention/Repatriation	o	x
Image/Culture	o	x

O = Overlapping Type
X = Type of Barrier

Source: own research

5.1 Removing barriers to the international mobility of highly skilled labour

In order to deal in a systematic way with the issue of attracting and retaining S&T labour in the more general context of the international circulation of highly skilled labour, we try to link specific national policies to their policy-relevant perspective, differentiating the debates and stakes among countries. A clarification of the arguments and assessments regarding the topic is proposed in the form of a classification of the issues ("structural – cultural" and "political technical"). Then, a review of policy actions is made along those lines.

[9] Contribution from ARC systems research

[10] For instance, Hira, R. (2004) found that India's IT industry grew because of its use of U.S. immigration regulations as a competitive business practice.

Across the OECD a variety of policy actions have been taken aiming at removing barriers to the international conduct of science and technology. These have targeted two broad categories of impediments: Cultural/structural barriers and political/technical barriers. These types of barriers differ only in the nature and the extent of change needed to adapt to the requirements of increasingly internationalised systems of innovation. Technical barriers tend to fall directly under the influence of government. Its executive, judiciary and legislative branches can make the necessary decisions to change the situation for the better or for the worse. Cultural-structural barriers are harder to change, as they do not fall under the influence of any one organizational "power" in society, but are rather more pervasive and organic. They require longer time to change. Table 3 provides an overview the two different categories of barriers to mobility and the relevant policy action area. In what follows, these two broad types of barriers will be defined and a systematic analysis of the policy response concerning of these barriers provided.

5.2 Political/technical barriers

Political/technical barriers are matters such as immigration legislation, red tape, taxation, and science and technology related legislation. Any of these matters may become a major barrier for internationalisation including that of the workforce. Strict immigration and work permits regimes have the potential to dissuade many potential highly skilled emigrants from seeking to go to particular destinations. Likewise, "red tape" can easily dispirit many from pursuing the relocation to a particular country. Taxation is another possible barrier to the inflows of talent, as it puts pressure on local employers to increase their offers for foreign recruits way beyond what their local peers would get in order to compensate for high taxation.

5.2.1 Immigration regimes

Immigration legislation can be instrumental in the drive to attract, retain, and develop human resources at the national level. This is particularly true in an era that is increasingly characterized by an aging and shrinking workforce. In recent years, the focus of immigration policy in most OECD countries has shifted from "immigration stop" to "smart immigration" (*Mahroum,* 2001). Smart immigration entails a shift towards highly skilled persons and an increased use of temporary immigrant workers. It also entails a more male-biased immigration due to its concentration in S&T sectors that tend to be male-dominated (*e.g*., corporate upper management, IT sector, and R&D). This shift was triggered by real and perceived skill shortages, with industrial and business associations playing a powerful role in convincing national governments in changing immigration legislation to help them meet their skills demand from overseas. Much of the change can thus be described as "client-driven" (*Kofman,* 2003).

Most governments have found similar solutions for similar problems, introducing changes to their immigration regimes to facilitate and allow foreign trained highly skilled labour to enter their internal labour markets, and fill existing or perceived gaps. Beyond regional agreements between countries (*e.g*., the EEA and NAFTA), new policies have been adopted to facilitate the entry of highly skilled workers from anywhere in the world. Entry facilities vary, ranging from sector and skill-specific visas, usually sponsored by employers, to point-based and qualification-specific immigration visas. Table 4 provides an overview of the various types of facilities introduced in a number of countries.

Table 4: Measures to facilitate immigration procedures for highly skilled workers in selected countries

Country	Simplifying application process	Expediting application process	Increasing entry numbers	Spousal work visas	Worldwide promotion
Canada	x		No quotas	x	x
UK	x	x	No quotas	x	
Ireland	x	x	No quotas		x
Italy	x	x	No quotas		
Germany	x	x	No quotas	x	x
Finland	x				
France	x	x	No quotas	x	
Singapore	x			x	x
Netherlands	x	x	No quotas	x	
EU	x	x	No quotas	x	x
Australia	x		No quotas	x	x

Notes: x = known to be engaging in this practice to attract highly skilled workers; blank = not known to be engaging in this practice.

Source: ISA's Council of Economic Advisors (2001); author's updates.

At the supra-national level, the EU has recently adopted a Green Paper "On an EU approach to managing economic migration" (*European Commission,* 2005) in which it raised the idea of establishing an EU-wide Green Card for highly skilled workers from outside the EEA. The document states "recognizing the impact of demographic decline and ageing on the economy, the Commission highlighted the need to review immigration policies for the longer term, particularly in the light of the implications which an economic migration strategy would have on competitiveness and, therefore, on the fulfilment of the Lisbon objectives." It also acknowledged the international competitive dimension to this matter "The EU must also take account of the fact that the main world regions are already competing to attract migrants to meet the needs of their economies."

5.2.2 Income taxation

Significant differences in compensation and reward can be major pull and push factors for mobility among highly skilled workers. This is a widely adopted perception that is yet to be substantiated by empirical evidence. The traditional way of comparing fiscal attractiveness of regions competing with each other internationally is to concentrate on the tax burdens on capital and corporate income. Lately this approach has been broadened by paying increasing attention to the mobility of employees, especially those with high and highest qualifications (*Elschner – Schwager,* 2005). Accordingly, employees will be willing to put up with higher taxes and social insurance contributions at a given location only if these are offset by being paid higher gross salaries than elsewhere. Tax discounts are now provided by many countries to lure foreign skilled workers to local labour markets, including, among others, Australia, Austria, Denmark, the province of Quebec, the Netherlands, Sweden and the UK (For a full list of countries providing tax discounts to foreign highly skilled labour see *Dumont – Lemaître,* 2004). For instance, in Denmark, foreign experts receive a *tax reduction* for their first three years of residence. More lenient tax rules for foreign researchers and other experts have been proposed by the Ministry of Taxation. In the Netherlands, foreign highly skilled workers (including EEA workers) benefit from a 30 per cent discount on income tax for a period of 10 years. In the UK, non-domiciled residents get tax refunds upon filing for relocation.

5.2.3 S&T legislation

Increasingly governments are competing for talent by enacting legislation beyond immigration and taxation issues. This is most notable in science legislation related to ethics (life sciences), safety (food science), and intellectual property. For instance, countries, such as Australia and Britain, are perceived as having more liberal legislation governing stem research than other countries, especially concerning the use of embryonic tissues. Sweden, Finland, the Netherlands, Belgium and Britain have, relative to other EU countries, more liberal legislation governing stem cell research. Australia, Singapore and South Korea are all keeping the talent issue in focus while enacting new science legislation. Across all countries that have had the ethical debate around stem cell research, the "pro camp" has made extensive use of the argument that a strict legislation in this field of research will result in a significant brain drain. A similar debate might be emerging in the field of nanotechnology. Individuals and organizations with concerns regarding advanced nanotechnology have suggested delays in development, even moratoria or bans. The variations between the various national legislation governing emerging S&T areas with potential strong controversial application are increasingly being cited as drivers of attracting or losing important talent.

5.2.4 Accreditation of qualifications

In order to facilitate the inflow of foreign talent, especially that of engineers and medical personnel, and assure its quality, many countries increasingly adopt accreditation regimes for qualifications obtained from foreign educational and training systems. The aim is to gradually establish a quality assurance system at the international level acting as an international framework for confirming the competencies of students, graduates and professionals[11]. This is primarily due to pressure from local business associations and other employers who need quick access to international talent.

Towards that end, a new Accreditation Agency for Programs in Engineering and Computer Science (ASII) has been established in Germany and in Japan. Similar initiatives emerged in many countries including Canada, Finland, Netherlands, and Sweden. In Europe, the Bologna Declaration provided for pan-European accreditation and harmonization regime for university qualifications.

5.3 Cultural/structural barriers

Cultural/structural barriers often result from the internal structures and local traditions that characterize the innovation systems of certain countries. For instance, UK universities are known for enjoying high degrees of autonomy in their hiring policies and tend to make larger use of temporary academic staff than their continental counterparts. This allows for greater temporary inflows and circulation of talent, while perhaps deters more serious long-term inflows (lack of tenure). France and Germany, however, have highly regulated academic career structures and far less autonomy in this respect than their British counterparts (*Casey, Mahroum et al.,* 2001). As a result foreign inflows tend to be regulated and restricted to structured exchange programmes. Furthermore, the significance of the role played by public institutes vs. private sector institutes in the national innovation system also has a cultural/structural impact on internationalisation.

[11] For instance there is now The International Network for Quality Assurance Agencies in Higher Education (INQAAHE).

5.3.1 Internationalisation

The main issue is structural, namely, the extent to which the local research community is internationalized. Internationalisation, in terms of academic and research personnel, programmes, students, and project collaboration, is perceived as a prerequisite for sustained participation in, and access to, global science. There are a number of ways that internationalisation can take place, for instance, through international scientific organizations (*e.g.*, CERN), international facilities (*e.g.*, ESO), programmes (*e.g.*, Eureka, Cost, *etc.*), bilateral agreements, collaborative agreements between research en institutes, or at a personal level. Internationalisation can be a strong driver of talent from overseas, as through it local research communities become better known across the world (*Mahroum,* 2000).

With internationalisation, the main concern for many governments is not whether their local researchers stay or go, but whether their local research environments appear prominently on the international map of scientific exchanges. Germany, for instance, attracted only 10% of the 2,080 Marie Curie fellowships awarded between 1999 and 2001 to study at a university, research institute or industry research programme. The Netherlands with a much smaller science base than Germany attracts almost the same number. Moreover, a review of the foreign PhD population in different countries shows a tendency of countries with English as first language and multi-lingual countries (*e.g.*, Belgium and Switzerland) to attract more international PhD students than other countries.

5.3.2 Retention, repatriation and connection

The prime concern around the issue of retention and repatriation focuses on two main challenges that are very much interlinked: firstly, providing attractive career opportunities at home and secondly, in order to be able to do so, improving the quality of research activities at home. In contrast with developing countries, where the focus has been on poverty, political instability, and lack of resources for scientific research, governments in advanced economies focus more on the facilitation of retention and repatriation. The main issue is how to facilitate the return of national scientists from abroad and how to provide attractive career opportunities for the local ones to stay? Another contesting issue is whether to develop initiatives that target people with certain calibre, the "star" scientists who are working overseas and the crème de la crème of the local scientific community, or whether to target local young scientists to help them build their careers at home?

The idea of networking and connecting with the expatriated talent is based on the promise of being able to draw the flows of talent in both ways. In other words, it is based on the principle of "*if you can't beat them, join them*". Hence, policies to facilitate connection rather than full repatriation have been on the rise, among which the idea of connecting with a country's diaspora (*Meyer,* 2001). This is an issue that relates both to structural-cultural impediments and to technical barriers.

However, the idea is increasingly being adopted by some advanced economies in Europe, such as Austria (ASCINA) and Switzerland (Swiss Talent) and elsewhere, such as Australia (AsciNA), for instance, holds regular meetings of local and regional groups to acquaint Austrian scientists with one another's scientific or scholarly work. Swiss Talent is a web platform for Swiss scientists abroad and foreign scientists with strong ties to Switzerland as well as for those that have moved or returned to Switzerland. It provides different services such as personal and professional information about the members of the network, job offers, *etc*. Likewise, several Australian scientific diaspora organisations have emerged recently

seeking to connect and build bridges with Australian researchers across the world (*e.g.*, Network for Expatriate Australian Researchers (NEAR)).

5.3.3 Image and culture

The image of a country and its culture can be a possible barrier to access to scientific talent from overseas. This also includes the reputation of its scientific culture. At the cultural level, language restrictions on foreign academics have been relaxed in a number of countries (*e.g.*, Germany, Netherlands, and Sweden) and many positions are being advertised in English. This does not mean that language itself is no longer a barrier. On the contrary it remains necessary for acquiring important local social skills that are crucial for long term success in the local labour market.

There is also a growth in academic "cultural harmonization" across the world. This is reflected in, among other things, the educational structure, titles of awards and certificates, and career ladders (*e.g.*, Assistant Professor, Associate Professor, *etc*. In Europe, harmonization is sought through the Bologna Accord, which is a declaration of the European Ministers of Education, which sets out an agenda for the future harmonization of learning structures in higher education across Europe.

5.4 The role of policy

Policy and legislation do not drive the mobility of highly skilled labour but can facilitate or hinder it. The impact of the various policy actions targeting the attraction and retention of talent will depend on a number of factors. Firstly, it remains unclear to what extent the various policy actions can change structural asymmetries between countries across various sectors and S&T fields. Countries and regions that already enjoy a strong reputation for excellence in specific fields will continue to be in an advantageous position to attract top talent in these fields. Likewise, countries with long traditions of immigration and relative openness to immigrants will continue to benefit from established social networks between them and the rest of the world. Thus, it might take a long time for the new entrants to the competitive international market of talent to acquire an advantage in this regard vis-à-vis other countries.

Additionally, the increased similarity of incentives and pay levels across OECD countries and beyond may neutralise their expected impacts on competition between countries. Thus, competition may start to take other forms, such as in quality of life, real estate prices and social services. The dynamics of this market will become increasingly more complicated and more flux. Finally, as the supply and demand for highly skilled workers continue to change in accordance to macro-economic conditions and technological change, policy action regarding international talent might become more market-specific. Governments will eventually find it necessary to guide highly skilled immigration by setting quota and restricting it to specific sectors in the labour market.

6 Main findings

The main findings of this report include the following:

- While incentives to attract foreign direct investment (FDI) in general are quite common, special incentives for FDI in R&D play only a minor role. This is in line with theoretical and empirical findings that show that R&D investment by multinational enterprises (MNEs) is to a high degree driven by fundamental economic factors (market size, tax

rates, labour market conditions, etc.), the political environment (stability and endowment with an appropriate public infrastructure) and the scientific and technological specialisation and capabilities of the country.

- Non-discrimination vis-à-vis domestic enterprises and free access to national funding for domiciled foreign-owned enterprises is the guiding principle concerning the treatment of foreign affiliates in most countries of the OECD.
- An important determinant of a country's attractiveness is the quality and specialisation of the domestic knowledge base. Hence, all measures to improve the scientific and technological capabilities of an economy will also increase the country's attractiveness for R&D investment by MNEs. In this context, the most import measures relate to human resource development, intellectual property protection, a first-class infrastructure, excellent universities and research organisations and to co-operation partners in the business enterprise sector.
- Promoting international collaboration in science and technology and helping to link domestic enterprises to knowledge abroad is high on the agenda of OECD countries. However, domestic enterprises must have a certain level of technological expertise to be able to absorb spillovers from foreign affiliates. Since these spillovers are regarded as one of the main benefits a country derives from the presence of MNEs, the technological capacities of the domestic economy are also crucial with respect to the degree countries benefit from FDI.
- Countries take a number of initiatives to actively recruit foreign firms and link domestic firms to foreign knowledge. Respective measures are mostly non-monetary in nature and concentrate on administrative and managerial support, match-making between domestic and foreign firms willing to co-operate, provision of information services, consultancy services, *etc.*
- Another key area for policy initiatives is that of attracting international talent where countries take considerable efforts to remove barriers for mobility of highly-skilled personnel. This issue can be expected to gain in importance in the coming years.

The analysis contained in this part leads to three main conclusions:

- First, if countries want to attract foreign R&D, it is essential to look at the economic fundamentals. Inward R&D investment is not independent of policies that influence the attractiveness for foreign direct investment in general. Fundamental factors like political stability, public infrastructure, market size and development, tax rates, labour market conditions are highly decisive for R&D location decisions. Policy should provide and secure a "healthy business environment" (*OECD,* 2003).
- Second, measures to build an innovation-friendly environment and increase the scientific and technological capacities of a country will also help to attract foreign R&D. A strong and vibrant academic and industrial research base, efficient protection of intellectual property rights and a well-trained workforce are major determinants for MNE investment in R&D, but will also promote the growth of domestic enterprises. As a main principle, governments should not discriminate between domestic and foreign-owned domiciled enterprises.
- Third, we see policies towards attracting and retaining foreign highly-skilled labour as the most important field for governmental policy with respect to the internationalisation of R&D. Policy and legislation do not drive the mobility of highly skilled labour but can

facilitate or hinder it. Measures to be taken include grants, immigration legislation and tax issues, but also excellent research organisations to attract top researchers.

7 Annex: Internationalisation of R&D – Policy Questionnaire

In co-operation with Belgium and Austria, the Secretariat is currently preparing a background report for the Forum on the Internationalisation of R&D to be held in Brussels on 29-30 March 2005. This report will review the main trends and drivers of the internationalisation of R&D and S&T activities, and highlight related opportunities and challenges. A special section of the report will deal with the Member and observer countries' policy measures in response to these challenges and opportunities.

The following questionnaire focuses on major policy areas in which governments can develop measures deemed to have an impact on the benefits that can be derived from the process and anticipated patterns of internationalisation of R&D or limit their possible adverse effects. For each policy area, respondents are invited to indicate if the measure(s) mentioned in the questionnaire (or similar ones) exist in their country and, when applicable, to briefly describe each of these measures in a few sentences. Respondents are encouraged to highlight and describe in more detail those measures that they consider to be particularly important, or to represent good practices that could be emulated at the international level.

Countries are expected to send their responses to the questionnaire by **13 January 2005** to

Bernhard.Dachs@arcs.ac.at

and

jean.guinet@oecd.org

1. **Does your country have an explicit strategy to adapt to and benefit from the internationalisation of R&D? What are the most important policy issues and objectives in your country with respect to the process of internationalisation of R&D? How is the increasing internationalisation of R&D taken into account in the design and implementation of S&T policy measures?**

Summary (1 page); references to the relevant white papers or policy documents (preferably on the internet):

2. **Are there any specific measures that support the location of new R&D activities in your country through foreign direct investment?**

   - ☐ Direct financial support
   - ☐ Fiscal incentives (tax breaks, R&D tax credits …)
   - ☐ Administrative support
   - ☐ Provision of infrastructure
   - ☐ Public procurement
   - ☐ Active recruitment of foreign firms
   - ☐ Advertising
   - ☐ Other measures: ……..

Description of the measure(s):

3. **Are there any specific measures <u>at the national level</u> to link domestic firms, in particular SMEs, to foreign sources of research and innovation, including international co-operation in R&D?**

- ☐ Additional/preferential funding for projects with international partners
- ☐ Co-funding for project partners not located in the country
- ☐ Support to find international partners
- ☐ Other measures: ……..

Description of the measure(s):

4. **What are the principles concerning the treatment of foreign firms (both non-domiciled firms and foreign-owned subsidiaries) or foreign research institutions in your country's R&D related policies? Please describe the most important changes concerning these principles and their implementation over the past decade?**

   This may concern, e.g.,

   - ☐ Access to national R&D funding
   - ☐ Rules for co-operation in domestic Public Research Institutions
   - ☐ Rules for co-operation in Public Private Partnerships
   - ☐ Public procurement
   - ☐ Use and definition of "national benefits" as eligibility criterion
   - ☐ Other issues: ……..

Description of principles and changes over the past decade:

5. **Are there any specific measures that support the internationalisation of domestic Public Research Institutions?**

   - ☐ Additional funding for projects with international partners
   - ☐ Co-funding for project partners not located in the country

- ☐ Support for the set-up of affiliates abroad
- ☐ Other measures: ……..

Description of the measure(s):

6. Are there any obstacles to subsidiaries of foreign Public Research Institutions setting up and operating in your country?

Description of obstacle(s):

7. Please describe the most important developments in immigration policy with respect to the requirements of Science and Technology in the past decade. Have any specific measures been introduced in your country to attract and facilitate the immigration of foreign scientists and engineers? What are the remaining obstacles?

Description of important changes over the past decade:

8. Are there any specific measures in your country to encourage the return of expatriated scientists and engineers who work abroad?

- ☐ Funding of scholarships, grants
- ☐ Creation of special positions at universities or public research centres
- ☐ Fiscal incentives (income tax breaks …)

- ☐ Relocation support
- ☐ Other measures: ……..

Description of the measure(s):

9. **If you wish please add a description of any other measure you consider important in the present context but is not reflected in the above questionnaire?**

   Are there any other important policy documents in this field not mentioned yet?

Description of the measure/reference to policy document:

Thank you for your participation!

Please return the questionnaire by email to: Bernhard.Dachs@arcs.ac.at (Bernhard Dachs, Department of Technology Policy, ARC systems research, Seibersdorf, Austria) and jean.guinet@oecd.org (Jean Guinet, OECD, Directorate for Science, Technology and Industry)

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