

## Technological co-operation between firms

Technological co-operation between firms can be essential to boosting successful innovative businesses by creating networks of knowledge flows. Another contribution is pooling competencies to enable firms to overcome barriers, such as limited funding and lack of management resources and technological competencies. That is, technological collaboration can help innovative businesses get access to complementary assets, including labour and finance. Technological collaboration critically depends on effective IP systems and developed markets for technology. The extent to which firms collaborate differs across countries but also across types of firms. Several factors, including market conditions and firms' access to knowledge and finance, impact on the extent of collaborations.

### What is technological co-operation between firms?

This brief discusses various types and dimensions of collaboration between firms:

- Partners in such collaborations can be at the horizontal level, with businesses working together on research, technology licensing, or cross-sales and marketing agreements. At the vertical level, buyers and suppliers can collaborate in product or process innovation or in outsourcing specialised inputs.
- There are many types of technology collaborations, such as formal arrangements (**e.g. joint ventures, strategic alliances and sponsored research agreements**) but also more informal yet relevant arrangements (**e.g. collaborations of regionally close firms**).
- There are several dimensions here worth considering:

**Local technology collaborations**, i.e. regional proximities between firms, including firms in clusters, and their impact, whether through formal or more informal types of relations.

**Global technology collaborations** that, in contrast, involve businesses located not only in different regions but also in wider zones. Cross-border alliances contribute to knowledge inflows and outflows by involving firms and organisations in activities, such as international product licensing or joint agreements for product or process development. Global knowledge transfers can also take place through the attraction of Foreign Direct Investment (FDI) and the development of business linkages with local suppliers, as well as through the attraction of a foreign skilled labour force.

### How does technological cooperation between firms affect innovation in firms?

Technological collaborations between firms can be essential for the success of innovative businesses by creating a **network of knowledge flows**. Beyond the simple knowledge connection, strategic alliances are also important in that **by pooling competencies, they enable companies to overcome other types of barriers, such as limited funding, lack of management resources and insufficient technological competencies**.

### Evidence on the importance of technological co-operation for the success of innovative businesses

**There is evidence to highlight the importance of technology collaboration for innovative businesses.** For instance, Winters and Stam (2007), in an analysis of high-tech enterprises, show that innovation networks positively affect both product and process innovation. Regarding **global collaboration**, participation in global value chains contributes positively to the efficiency and innovative potential of firms (OECD, 2008b). This is particularly true in knowledge-intensive sectors, where cutting-edge suppliers are unlikely to be locally available and strategic alliances are crucial to launching new products and exploring new markets.

There are some factors that seem particularly important for technology collaborations to work: **knowledge spillovers and spatial proximity**. Cognitive proximity is important and knowledge spillovers will be possible only if both parties involved in the exchange share some technical commonalities. Knowledge from one industry will spill over more easily to another related industry and major innovations are more likely to occur when knowledge spillovers take place between sectors that share competencies, rather than within one specific sector. As a result, industries that rely on a common science base tend to cluster geographically and a related variety of local industries are deemed to further economic development (OECD, 2008a, 2009). For instance, Feldman and Audretsch (1999) find that diversity among complementary economic activities with a common science base is more conducive to innovation in terms of returns on R&D investments than narrow sector specialisation. Similarly, Fritsch and Slavtchev (2007) find an inverse U-shaped relationship between industrial diversity and regional economic performance, which implies the existence of an optimum degree of industrial diversity, beyond which both broader diversification and narrower specialisation will have a negative effect on local innovation (measured through patent applications disclosed by regional inventors). Specifically, firms that are located nearby have been identified as important for SMEs (OECD, 2005).

#### **What is specific about technological cooperation between firms and innovative entrepreneurship?**

The often smaller scale of start-ups may require a greater reliance on technological co-operation to overcome competitive disadvantages with larger businesses. Due to limited assets and resources, SMEs invest less in R&D than large companies, in both absolute and relative terms, and are more prone to innovate by drawing on collaboration.

Knowledge untapped by existing enterprises may also provide the basis for innovative start-ups, such as in the case of corporate spinouts. Indeed, knowledge spillovers have been increasingly associated with the entrepreneurial process (Acs et al., 2006).

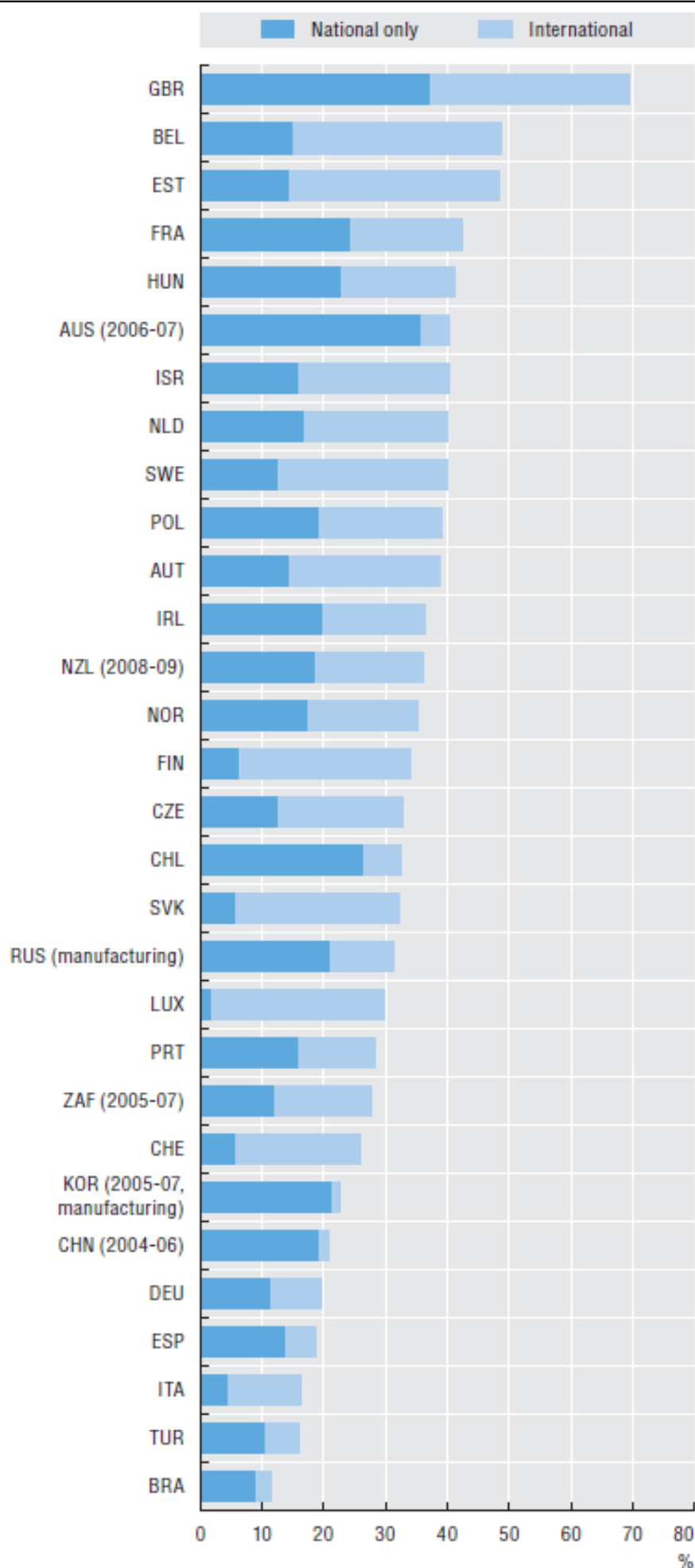
#### **What is the evidence on technological cooperation between firms and innovative businesses?**

##### **International collaboration on innovation**

Collaboration with foreign partners can play an important role in the innovation process by allowing firms to gain access to a broader pool of resources and knowledge at lower cost and to share risk. It can take a variety of forms and levels of interaction, ranging from simple one-way information flows to highly interactive and formal arrangements.

Among European firms, intra-European collaboration remains the predominant form of cross-country collaboration on innovation. In terms of collaboration outside Europe, European firms tend to partner mainly with US firms, although Sweden, Finland and Belgium have significant collaboration with firms in China and India.

**Figure 1. National and international collaboration on innovation by firms, 2006-08 (as a percentage of innovative firms)**



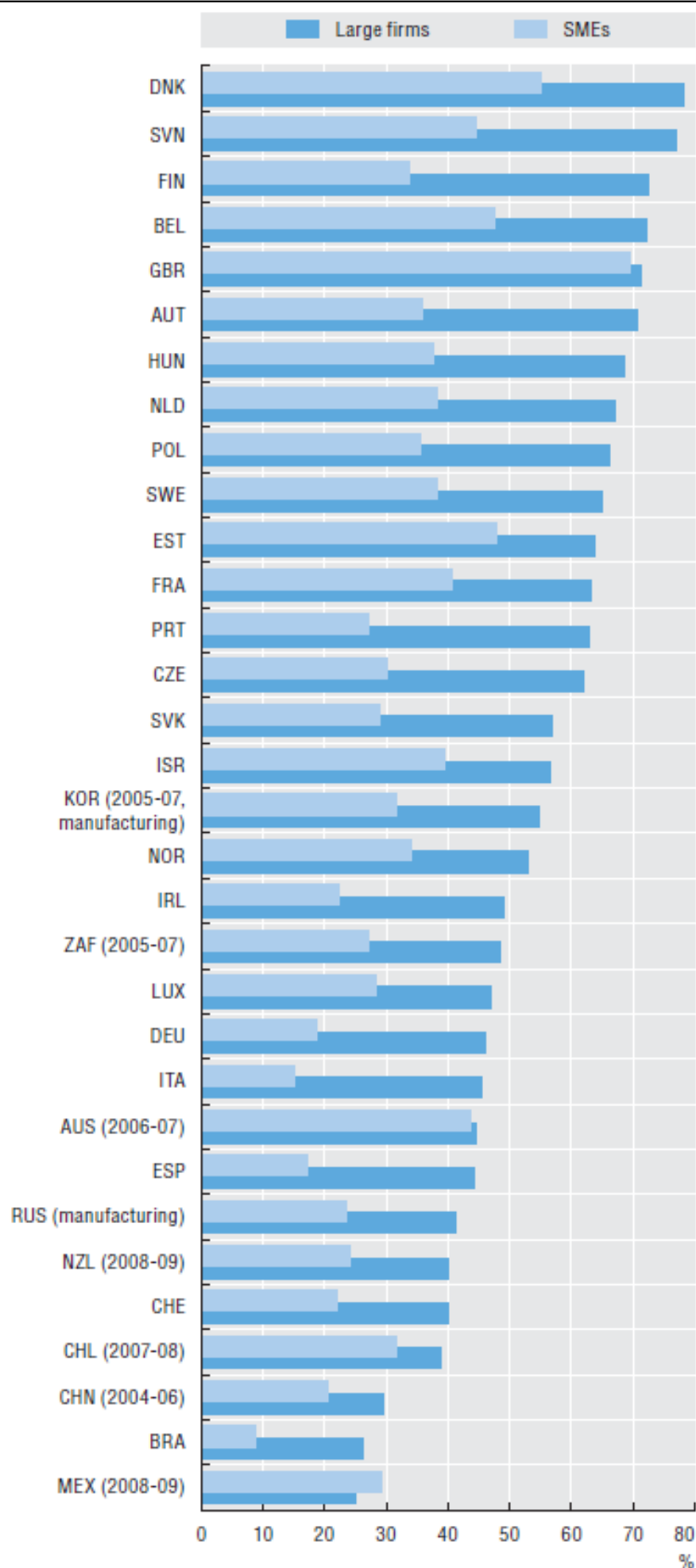
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Source: OECD Science, Technology and Industry Scoreboard (OECD/STI, 2009 & 2011)

**Evidence on technological co-operation and innovative entrepreneurship**

Figure 2 shows that during 2006-08, in the great majority of countries, large firms were significantly more likely to collaborate on innovation than small and medium-sized enterprises (SMEs). Among innovative SMEs, the rate of collaboration is between 25% and 40% in half of the countries surveyed, but it varies widely for large firms. More than 70% of large innovative firms collaborated on innovation in Denmark, Slovenia, Finland, Belgium, the United Kingdom and Austria, while less than one-third did so in China, Brazil and Mexico.

**Figure 2. Firms collaborating on innovation activities, by size, 2006-08 (As a percentage of innovative firms).**

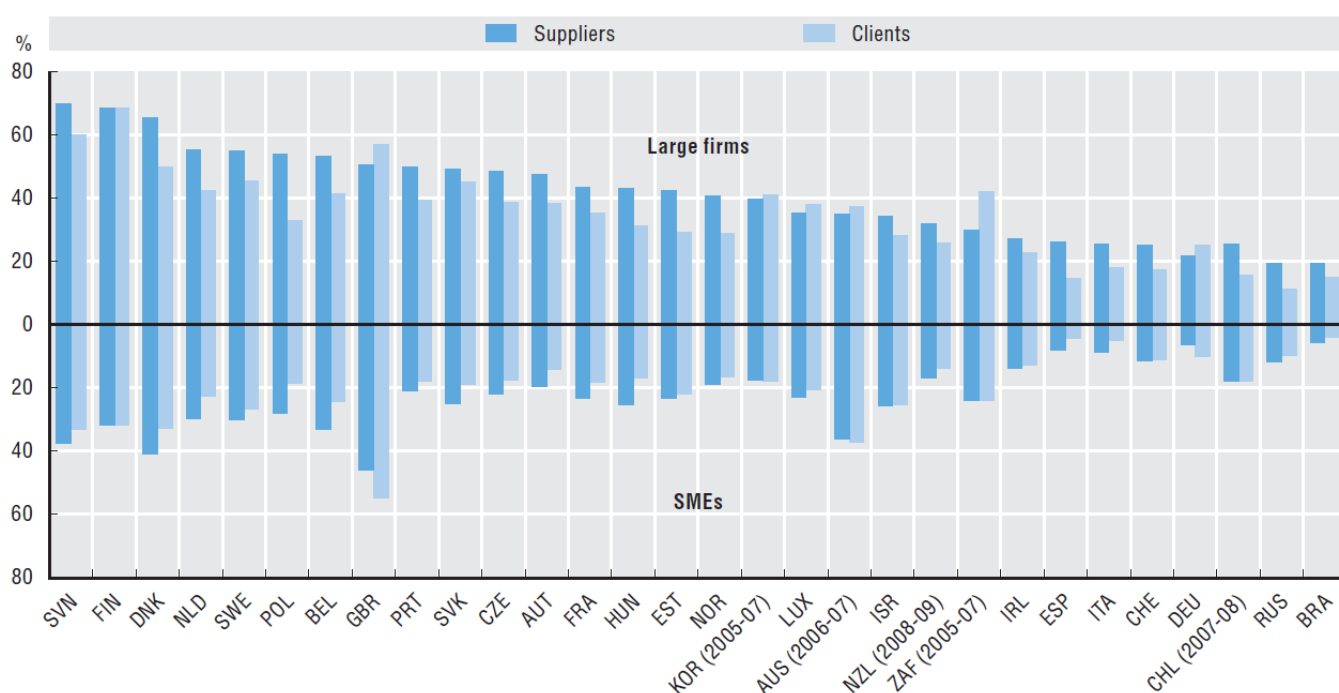


Source: OECD, based on Eurostat (CIS-2008) and national data sources, June 2011.

**Note:** The classification of firms by size follows the recommendations of the Oslo Manual. It is calculated on the basis of the number of employees. SMEs are firms with 10-250 employees, with some exceptions: New Zealand: 6+; the Russian Federation: 15+; China: at least CNY 5 million in turnover. For South Africa, firm size is based on turnover. Collaboration refers to active participation even if both parties do not benefit commercially and excludes pure contracting out. For Switzerland it only includes collaboration on R&D.

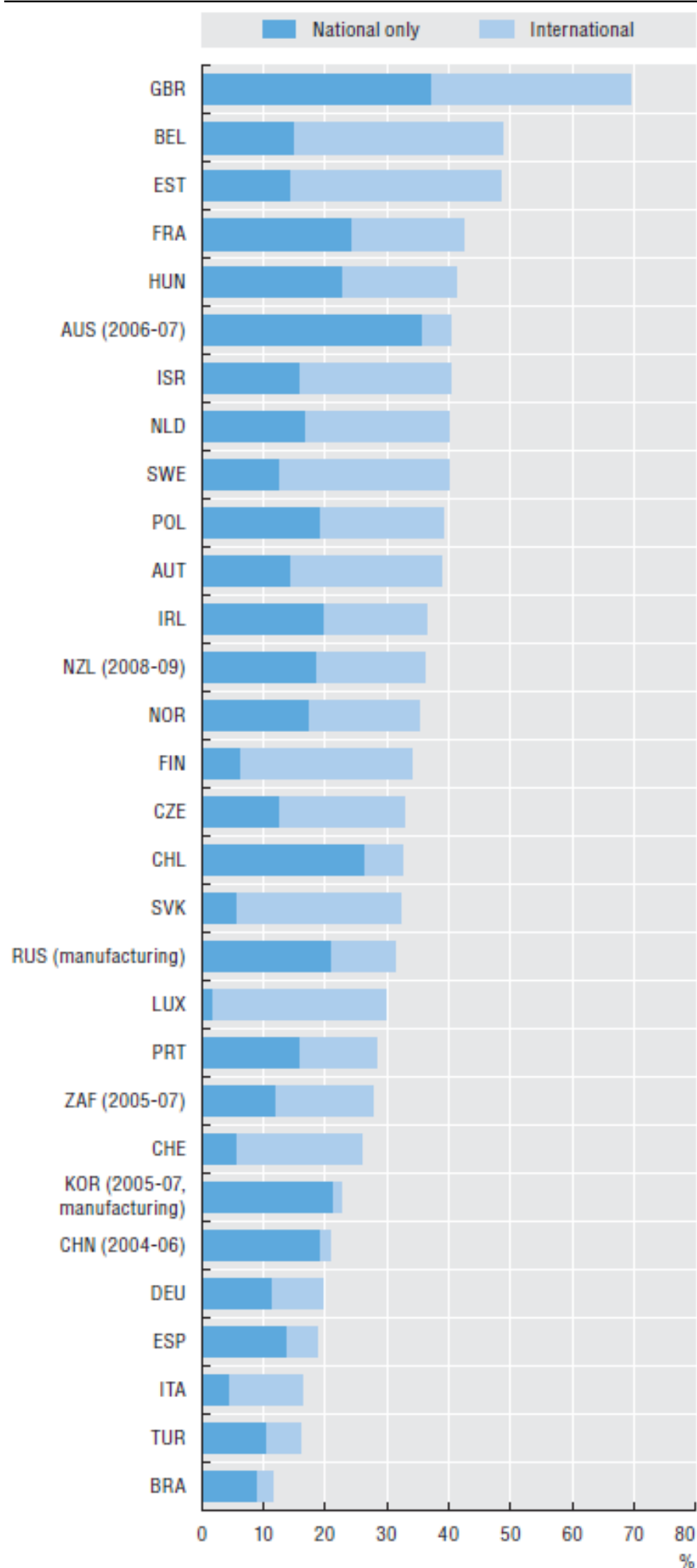
Figure 3 shows how size is a strong determinant of firm collaboration with suppliers and clients. Moreover, Figure 4 shows how the level of firm collaboration on innovation varies across countries. There are also differences with regards to international partners. Among European firms, intra-European collaboration remains the predominant form of cross-country collaboration on innovation. In terms of collaboration outside Europe, European firms tend to partner mainly with US firms, although Sweden, Finland and Belgium have significant collaboration with firms in China and India.

**Figure 3. Firms collaborating on innovation activities with suppliers and clients, by firm size, 2006-08 (as a percentage of innovative firms)**



Source: OECD, based on Eurostat (CIS-2008) and national data sources, June 2011.

**Figure 4. National and international collaboration on innovation by firms, 2006-08 (as a percentage of innovative firms)**



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Source: OECD Science, Technology and Industry Scoreboard (OECD/STI, 2009 & 2011)

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## **What other topics relate to technological cooperation between firms and innovative businesses?**

**Intellectual property rights and innovation in firms** (see [Intellectual property rights and innovation in firms](#) [1]) and Intellectual property rights for innovative entrepreneurship (see [Intellectual property rights for innovative entrepreneurship](#) [2]). Patents greatly facilitate the realization of market deals, especially when knowledge is codified and hence easily imitable. It allows both the disclosure and protection of technology. Effective IP systems can also be critical for technology collaborations, as IP reduces concerns related to opportunistic behaviour by partners.

**Markets for technology** (see [Markets for technology](#) [3]). Markets for technology, defined as transactions for the use, diffusion and creation of technology, include various types of interaction and co-operation between firms, from licensing of well-defined intellectual property, to collaborative agreements that may aim at developing new technologies.

**Business support infrastructure** (see [Business support infrastructure](#) [4]). Business support infrastructure can play a critical role in facilitating cooperation between businesses, including that of innovative entrepreneurs with established firms or other innovative businesses (e.g. by facilitating connections).

**Access to labour for innovative entrepreneurship** (see [Access to labour for innovative entrepreneurship](#) [5]) and Firms' access to labour for innovation (see [Firms' access to labour for innovation](#) [6]) Innovative firms can draw on technology collaborations to get access to complementary assets, including labour. The success of technology collaborations will, however, depend on sufficient skills on the side of innovative firms.

**Access to finance for innovative entrepreneurship** (see [Access to finance for innovative entrepreneurship](#) [7]). Collaboration with companies can be particularly important for innovative entrepreneurs, since it may help them compensate for limited internal resources and difficulties accessing finance, which can constrain their activity and growth. Yet lack of financing can also be a barrier to collaboration if firms cannot engage in necessary investments to make such co-operation happen.

## **What policies relate to technological cooperation between firms and innovative businesses?**

There are several barriers that may hamper technological co-operation. Concerns about disclosing proprietary knowledge and substantial transaction costs in the process of finding the right partners and negotiating collaboration deals are examples. Policies can address opportunities for cooperation in the following ways:

### **Cluster policies**

A range of cluster policies will have an impact on collaboration at regional levels.

### **Strengthen the Awareness and Capabilities of Businesses**

Clear barriers exist to the emergence of international networks of innovative businesses. Firms may not be aware of overseas opportunities or may be too inward looking to search for knowledge sources abroad. Similarly, they may also be unaware of the steps and procedures needed to enter into formal agreements with a foreign partner or may be discouraged by the high costs and risks involved in the internationalisation process (OECD, 2008b). As a result, public policy has a key role to play in helping to address information barriers and ensuring that the risks and costs of international networking are minimised for participating businesses (i.e. through the provision of loans and



guarantees). Chambers of Commerce and Business Associations can play an important role in both the design and delivery of effective support instruments at the local level.

### **Promote cross-fertilising technologies with multiple industrial applications**

This will favour cross-sectoral knowledge flows and the possible emergence of new industries, rather than only strengthening existing sectors. Programmes that promote the overall commercial use of biotechnologies, nanotechnologies or material sciences go in this direction, though they require a strong knowledge base at the university level. The United States has traditionally been at the forefront in the promotion of cutting-edge and cross-fertilising technologies, through a comprehensive approach in which two key programmes are Small Business Innovation Research (SBIR) and the Technology Innovation Programme (TIP). The two programmes are complementary: the large awards granted by TIP focus on next-stage commercialisation and help advance the commercialisation potential of successful prototypes funded by SBIR.

### **Other Policies with Implications for Collaboration**

#### **Encourage openness to global sources of knowledge**

External sources of knowledge are key to eschewing technology lock-ins and economic slowdowns. Policy makers can help businesses cope with information barriers and the risks and costs associated with international networking by setting up legal services or guarantee schemes, or by organising study visits and business forums for entrepreneurs. Inward FDI is also an important – although sometimes overlooked – source of new knowledge for the local economy, and policies should strive to embed it by developing linkages between foreign ventures and local firms, such as supplier development programmes.

#### **Financing policies**

Financing can be a barrier, so policies aimed at facilitating funding for collaborative ventures are another direct policy dimension.

#### **IP policies**

IP policies, particularly as they relate to collaboration, can have an impact on formal arrangements and, therefore, on collaboration between firms (see [Intellectual Property Rights](#) [8]).

## **References**

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Cluster policies

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