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Best Practices in Investment for Development

How to integrate FDI and skill development
Lessons from Canada and Singapore

United Nations

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

BEST PRACTICES IN INVESTMENT FOR DEVELOPMENT

CASE STUDIES IN FDI

How to Integrate FDI and Skill Development

Lessons from Canada and Singapore

UNITED NATIONS
New York and Geneva, 2011

NOTE

As the focal point in the United Nations system for investment within its mandate on trade and development, and building on three and a half decades of experience in this area, UNCTAD, through the Division on Investment and Enterprise (DIAE), promotes understanding of key issues related to foreign direct investment (FDI) and enterprise development. DIAE also assists developing countries in enhancing their productive capacities and international competitiveness through the integrated treatment of investment and enterprise development.

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The following symbols have been used in the tables:

Two dots (..) indicate that data are not available or not separately reported. Rows in tables have been omitted in those cases where no data are available for any of the elements in the row.

A dash (-) indicates that the item is equal to zero or its value is negligible.

A blank in a table indicates that the item is not applicable.

A slash (/) between dates representing years – for example, 2004/05, indicates a financial year.

Use of a dash (–) between dates representing years – for example 2004–2005 signifies the full period involved, including the beginning and end years.

Reference to "dollars" ($) means United States dollars, unless otherwise indicated.

Annual rates of growth or change, unless otherwise stated, refer to annual compound rates.

Details and percentages in tables do not necessarily add to totals because of rounding.

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PREFACE

The *Investment Advisory Series* provides practical advice and case studies of best policy practice for attracting and benefiting from foreign direct investment (FDI), in line with national development strategies. The series draws on the experiences gained in, and lessons learned through, UNCTAD's capacity-building and institution-building work in developing countries and countries with economies in transition.

Series A deals with issues related to investment promotion and facilitation and to the work of investment promotion agencies (IPAs) and other institutions that promote FDI and provide information and services to investors. The publications are intended to be pragmatic, with a how-to focus, and they include toolkits and handbooks. The prime target audience for series A is practitioners in the field of investment promotion and facilitation, mainly in IPAs.

Series B focuses on case studies of best practices in policy and strategic matters related to FDI and development arising from existing and emerging challenges. The primary target audience for series B is policymakers in the field of investment. Other target audiences include civil society, the private sector and international organizations. Series B was launched in response to a call at the 2007 Heiligendamm G-8 Summit for UNCTAD and other international organizations to undertake case studies in making FDI work for development. It analyses practices adopted in selected countries in which investment has contributed to development, with the aim of disseminating best practice experiences to developing countries and countries with economies in transition. The analysis forms the basis of a new technical assistance work programme aimed at helping countries to adopt and adapt best practices in the area of investment policies.

For Series B, UNCTAD's approach is to undertake case studies of a pair of developed and developing or transitional economies that exhibit elements of best practices in a selected issue. Country selection follows a standard methodology, based primarily on the significant presence of FDI and resulting positive outcomes.

The *Investment Advisory Series* is prepared by a team of UNCTAD staff and consultants in the Investment Policies Branch, under the guidance of Chantal Dupasquier and Joerg Weber. This study of the Series B was prepared by Vincent McMahon, Meyer Burstein and Hui Weng Tat. Fact-finding missions were undertaken in Canada and Singapore in January and February 2009. The report was finalized by Ioanna Liouka and Cam Vidler. Contributions and comments were received from Quentin Dupriez, Kalman Kalotay and Massimo Meloni. The report has also benefited from views of current and former government officials, the domestic and foreign private sector and academics. Financial support was received from the Asia-Pacific Economic Cooperation forum (APEC) under the APEC-UNCTAD Joint Capacity Building Project for Addressing Knowledge Gaps in the Use of Foreign Direct Investment. The programme has also received financial support from the Government of Germany.

Geneva, June 2011

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Boxes

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ABBREVIATIONS

CIC	Citizenship and Immigration Canada
CPTE	Council for Professional and Technical Education (Singapore)
DFAIT	Department of Foreign Affairs and International Trade (Canada)
EDB	Economic Development Board (Singapore)
FDI	foreign direct investment
GDP	gross domestic product
HRSDC	Human Resources and Skills Development Canada
IPA	investment promotion agency
LDC	least-developed country
LIUP	Local Industry Upgrading Programme (Singapore)
MaRS	Medical and Related Sciences
MOE	Ministry of Education (Singapore)
MOM	Ministry of Manpower
MTI	Ministry of Trade and Industry (Singapore)
NAFTA	North America Free Trade Agreement
NES	National Education System
NMC	National Manpower Council
NTUC	National Trade Union Congress (Singapore)
OECD	Organization for Economic Cooperation and Development
PNP	Provincial Nomination Programme
R&D	research and development
SDF	Skills Development Fund (Singapore)
SME	small and medium-sized enterprise
ST	STMicroelectronics
TNC	transnational corporation
VITB	Vocational and Industrial Training Board (Singapore)

Canada

Singapore

KEY FACTS TABLE

	Canada			Singapore		
	1981-1990	**1991-2000**	**2001-2010**	**1981-1990**	**1991-2000**	**2001-2010**
Population (million)*	27.7	30.68	33.7	3.0	4.0	5.1
Annual GDP growth (%)*	2.8	2.9	3.1	6.3	7.3	9.6
GDP per capita ($)*	21037	23623	48192	12233	23073	42383
GDP by sector (%)						72.8
Services	59	62	78	63	65	72.8
Industry	31	28	20	37	33	27.2
Agriculture	3	3	2	1	0.1	0
FDI inflows (annual average) ($ million)	3960	16530	35948	2341	9567	19880
FDI outflows (annual average) ($ million)	4548	16832	42059	409	5030	13647
FDI inflows (% of GDP)	1.0	2.7	3.1	10	12	17.9
FDI inflows (% gross fixed capital formation)	4.5	14.2	14.5	28.3	35.1	50.9
Exports of goods and services (% GDP)	26.7	36.6	35	175.8	177.3	297
Imports of goods and services (% GDP)	25.2	34.4	33.3	175.2	163.6	258

Source: UNCTAD, FDI/TNC database and GlobStat database.
Note: Simple annual average.
* Data are for 1990, 2000 and 2010 only.

I. INTRODUCTION

Improving the national skill set is an important policy objective for both developed and developing countries. The level of skills in the local population – a nation's human capital – is a key determinant of economic development and growth. At the same time, globalization has made human capital and skills development even more important. The reduction in trade barriers and the surge in international trade and foreign direct investment (FDI) by transnational corporations (TNCs) have resulted in the need for workers and businesses to be competitive on a global scale.

TNCs, being on average more productive and technology-intensive than domestic firms, tend to bring positive contributions to the local economy, including in the form of skills development. TNC activity and skills upgrading have a complementary relationship, as they tend to reinforce each other (UNCTAD, 2002). While an enhanced skills base leads to a more attractive investment climate for TNCs, FDI can be exploited as a vehicle to promote human capital formation. However, the positive impact of FDI inflows on the local skills base is not automatic. This study examines the cases of Canada and Singapore to consider the types of policies that can be used to integrate FDI and skill development.

A. Conceptual framework

The complementarities between FDI and human capital development can initiate a "virtuous circle" (figure I.1). A strong local skills base tends to attract FDI inflows, while foreign TNCs can, in turn, contribute to the local skills base through spillovers[1] to employees and local firms, induced migration, and participation in local education and training institutions. The host country's level of human capital determines not only how much and what type of FDI can be attracted, but also the extent to which the local economy is able to absorb the potential skill transfers associated with TNC activities. Each iteration of the virtuous circle results in higher value-

added FDI and better skills. In other words, the circle is upward sloping.

Government policies are instrumental in initiating and fostering the upward sloping FDI and skills circle. *First*, to attract TNC investments, host countries need to have a relatively open framework for foreign investment and an attractive business climate. However, more targeted policies are also important, as they can help secure the types of FDI most likely to contribute to skill formation. *Second*, foreign investors require policies that provide sufficient access to skilled labour. Domestic education and training policies are fundamental to ensuring a sufficient level of appropriate skills for a given economy. Yet, migration policies can also be designed to augment the national skills base and ensure that foreign investors have access to skills that may be missing domestically. *Third*, government action is often necessary to maximize skill spillovers from TNC activities. Dissemination policies, such as incentive programmes, may be required to partially compensate TNCs for their skill transfers. Moreover, a national innovation system that encourages cooperation between local research institutions, foreign TNCs, and local firms can lead to higher levels of skill spillovers.

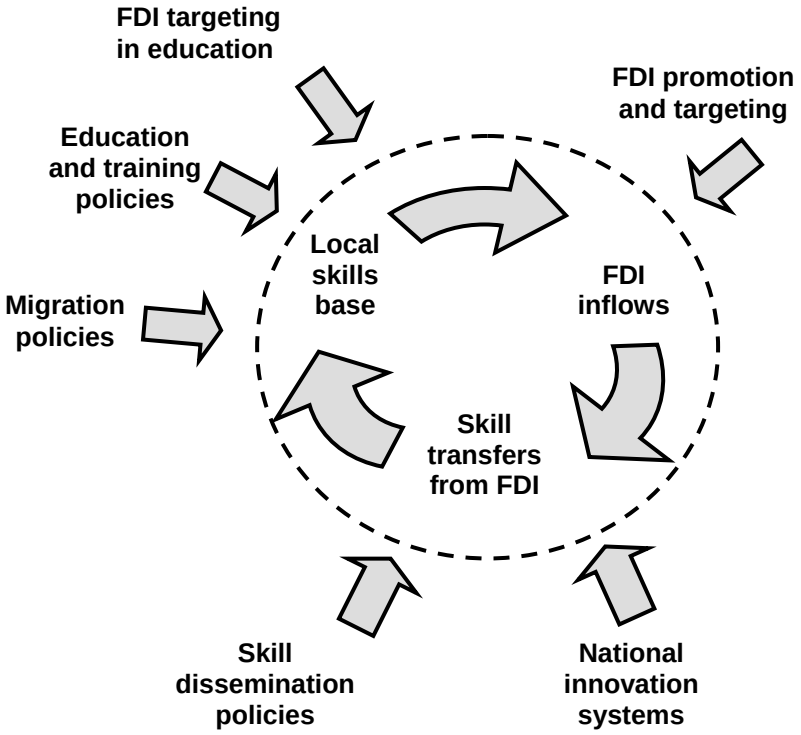
The above policy elements need to be carefully designed and sequenced for the FDI-skills circle to initiate and function effectively. Inadequate attention to specific policy areas may result in discontinuations and interruptions of the upward sloping cycle and lead to unsatisfactory or even unintended outcomes.

FDI promotion and targeting

Securing investments from TNCs is a pre-requisite for the FDI-skills virtuous circle to take place. This requires a stable foreign investment framework and attractive business climate. Yet, if FDI is to be strategically integrated with skill development, investment promotion and facilitation policies also become important. Government authorities can identify and target TNCs based on their potential to contribute to skill upgrading, while keeping in mind the host country's level of development and economic structure. Early and on-going contact with these potential investors can identify

mutually beneficial arrangements for TNCs to contribute to local skill development.

Figure I.1. FDI and Skills: The Virtuous Circle



Education and training policies

Although FDI can indeed play a role, enhancing the general and technical skill base of the workforce is ultimately "something that host countries need to do themselves" (UNCTAD 1999: 42). The primary responsibility for skills development in a country rests with the national education system, which typically relies on public investment. An effective national education system seeks to develop

universal elementary, secondary, tertiary and vocational education, and to ensure that curricula and research infrastructure keep up with the requirements of a country's economic structure.

While effective education policies directly enhance the domestic skills base, they also serve two other important functions: *First*, they promote FDI attraction, as TNCs are more likely to locate in areas with pre-existing human capital (Noorbakhsh et al., 2001). *Second*, they ensure that the local workforce has the capacity to absorb skill spillovers from TNC activities. Generally, local economies are more likely to receive skill spillovers if the workforce already possesses a minimum level of human capital (Blomström *et al.*, 1994; Borensztein *et al.*, 1998). Consequently, when TNC knowledge and technology are "too sophisticated" for the local economy, skill spillovers are likely to be more limited.

FDI targeting in education

FDI may complement host country efforts and make positive contributions to national education systems. From a policy perspective, this can be pursued through two mechanisms. *First*, governments can directly target foreign educational institutions to set up local locations. Efforts to attract FDI in higher education and vocational training can bring about better quality universities and technical schools. This approach has proved useful in many countries, such as China, Malaysia, Singapore and Viet Nam, where it has led to the adoption of international standards in tertiary education, as well as the creation of high-quality professional and technical training institutes. *Second*, governments can work with TNCs in other sectors to participate in management and funding of specialized programmes. They can use their industry-specific knowledge and expertise to improve curricula and research infrastructure, benefiting both the local skills base, and providing the foreign affiliate with access to workers that fit their unique skill needs.

Migration policies

In addition to the education system, migration policies are useful tools to reduce the skills gap in a given country. General migration programmes that seek to attract skilled workers for permanent residence are increasingly used to compensate for shrinking numbers of local graduates in countries with low birth rates. Aside from these broad-based programmes, migration policies can also be focused on labour entry in cases where specific local skills are in short supply or unavailable. These policies include programmes that allow domestic and foreign companies to directly recruit foreign talent, as well as procedures for visas and temporary work permits. The integration of foreign workers into the domestic labour market can also lead to cross-fertilization of skills, given diverse educational and professional backgrounds. However, achieving the right balance between the needs of investors, on one hand, and job protection, training, and career advancement for national citizens, on the other, is not an easy task.

Skill dissemination policies

Dissemination policies are those specifically designed to encourage skill spillovers from FDI. Policies may include schemes for direct training of local workers by foreign affiliates. The acquired skills can then be disseminated to the rest of the economy through job turnover and labour mobility. In this regard, incentives can be provided for foreign affiliates to undertake on-the-job training and retraining, by sharing the financial burden, or by offering other concessions. Such concessions include allowing the use of foreign employees as long as locals are being trained, or providing supplementary income tax deductions for personnel training expenses.

Policies that promote FDI spillovers to local suppliers and competitors are also important. In the first case, foreign affiliates

may require their local suppliers to use higher levels of technology, resulting in pressure or assistance to train staff. In the case of firms within the same industry, foreign affiliates may partner with local firms to, for instance, undertake joint R&D activities, resulting in a need for the local firm to train or up-skill their workers. In another case, the entry of the foreign affiliate may increase competitive pressure on local firms in their market, requiring them to enhance their use of technology and train their staff. Active government programmes to link TNCs with local firms can facilitate these types of skill transfers.

National innovation systems

A good understanding of the national innovation system can help policymakers identify other leverage points for enhancing local human capital. National innovation systems combine policies to enhance the innovative capacity of firms with those that improve networking among the different actors and institutions in the system, including firms, research centres, laboratories, universities, relevant ministries, among others. Interactions between these actors are important mechanisms through which skill transfers can materialize. These interactions can take various forms, including joint research activities, other technical collaborations, connections between companies, universities and public research institutes; and diffusion of knowledge through worker mobility.

In this context, innovation systems stand at the intersection between innovation policy and FDI promotion. On the one hand, the role of innovation policy is to improve the investment climate for R&D by identifying and acting upon the strengths and weaknesses of the national innovation system. Innovation policies may include incentives for corporate R&D, enhancement of the research infrastructure, promotion of collaboration and linkages, improvement of intellectual property rights, human capital development, and attraction of foreign talent. On the other hand, the role of FDI promotion is to improve perceptions of the country as an R&D

location, and to provide targeted services to both potential and existing foreign investors in R&D.

B. The cases of Canada and Singapore

Against this background, the objectives of this study are to (a) illustrate how the FDI–skills virtuous circle can take place and (b) to identify policies to promote it. The required policies will depend on a country's level of development and the characteristics of the domestic economy. For instance, a country at an early stage of development may also not have the necessary skills base to attract skill-intensive FDI, even with incentives, and may have less to offer to skilled economic migrants (in terms of housing, for example). The primary focus for such a country would be to improve its national education infrastructure. At the same time, the country should adopt a strategy to attract FDI that is consistent with its skills base. A developed country with a strong domestic skills base will generally be in a better position to attract skill-intensive FDI. Yet, such a country would still benefit from policies to maximize the impact of FDI, as well as appropriate mechanisms to align FDI inflows with skill development objectives.

In explaining how to integrate FDI and skills development, this study identifies empirical regularities, policy experiences and best practices from two countries – Canada and Singapore. Both countries consistently rank high in terms of human resource development[2] and both have incorporated FDI in their respective skill development processes, although the link has been more explicit in the case of Singapore. The analysis of Canada, focusing on recent episodes, presents the approach of a developed country to enhance skills and, in particular, the relationship between its extensive immigration programme and FDI attraction. Singapore is examined primarily during the 1970s and 1980s to understand how it used FDI to help transition from an economy competing based on labour costs to one that is more skill-intensive.

These case studies are complementary and do not intend to compare or contrast the two countries. The focus is instead on identifying policies to maximize the synergies between FDI inflows and skill development in two very different contexts.

Notes

[1] FDI spillovers occur when knowledge and technology possessed by TNCs is acquired by local firms or workers (Blomström et al., 2000).

[2] See, for example, World Economic Forum (2010).

II. THE CASE OF CANADA

Although Canada has no overarching strategies or administrative machinery explicitly combining FDI and skill development, a link between the two is generally acknowledged. For instance, an Industry Canada (2004) discussion paper on internationally mobile resources argues that location decisions regarding FDI, R&D and highly educated workers are jointly determined, and that "success at attracting one resource draws more of each". They characterize this as "a new stage in the evolution of industrial policy", highlighting the "virtuous circles" in which the entry of one factor promotes another. Although systemic coordination has been limited, governments at the federal and provincial level have implemented a set of policies and programmes in Canada to help facilitate this process.

A. Promoting and targeting FDI

Since Canada liberalized its foreign investment regime in the early 1980s, various levels of government have been actively seeking FDI, particularly in industries seen to promote skill development, high-paying employment, innovation and exports. At the Federal level, the Department of Foreign Affairs and International Trade's (DFAIT) Invest in Canada Bureau (2008) is charged with creating "a modern, systematic and more targeted FDI strategy that directly communicates to investors the value propositions that Canadian locations offer". The Bureau focuses on projects that boost the domestic production of high value-added goods and services, promote skilled and high-paying employment, contribute to product and process innovation, and expand the global reach of Canada-based companies. The marketing approach employed by DFAIT, among others, emphasizes the availability of a skilled multicultural labour force, accessible via the education system or through immigration channels.

The Invest in Canada Bureau runs advertising campaigns in selected markets and participates in important international trade

fairs and commercial events, working with private sector partners who are seen as credible by the business community. The Bureau also operates a more targeted programme focusing on specific foreign TNCs. This programme identifies targets through three successive levels of analysis: at sectoral or industry level, at country level, and at firm level. Recently, the Bureau identified 15 industry sub-sectors characterized by high productivity and high growth (specific skill sets are not targeted in the exercise). These include aerospace and defence manufacturing, pharmaceuticals and biotechnology, business and financial services, environmental technologies, and information and communications technologies. It then selected 20 target countries in the Americas, Europe and the Asia–Pacific region. Within the targeted sectors and countries, specific firms with potential to establish or expand their operations in Canada were identified and pursued. Though not the stated objective, firms attracted in these sectors are more skill-oriented than others, and thus have the potential to both take advantage and add to Canada's pool of skilled labour.

At the subnational level, investment promotion methods vary. The Province of Ontario is by far the largest recipient of external investments. Its FDI promotional activities, undertaken by Ontario Trade and Investment, target medium-sized companies engaged in high-value work (e.g. software development) and seek to capitalize on talent niches, such as the "technology triangle" around the University of Waterloo. The Province's promotional efforts are increasingly sophisticated and data-driven. Within the Ministry of Economic Development and Trade, a strategic intelligence unit works with sector-specific industry groups to develop proactive promotional approaches. These focus on specific industries and, within them, individual firms that are identified with the help of banks, Ontario's international trade secretariats, corporate lawyers and industry insiders. Contact with the firms is established via human resource departments, senior executives, and legal counsels. Every aspect of a potential investment is examined so the ministry

can formulate a compelling case for FDI to be attracted in Ontario, including infrastructure requirements, industry linkages, personnel requirements, transport needs, training opportunities with universities and so forth.

Both the federal and provincial Governments attach considerable importance to cooperation in their foreign operations. Provincial economic officers are frequently located with their federal counterparts in Canadian consulates abroad and provincial missions participate in and support federal promotional efforts. Notwithstanding inter-provincial competition, it is generally recognized that 'brand Canada' carries a stronger cachet than provincial brands.

In terms of investment incentives, Canada generally does not have fiscal or other concessions specifically targeted at FDI. However, FDI often utilizes general investment incentives. For example, special tax subsidies, which receive both federal and provincial support, apply to R&D. In some cases, however, subsidies negotiated at the provincial level are used to attract and increase the local impact of certain large-scale projects. For example, Pratt and Whitney recently obtained a $142 million supplement from Quebec to build a new plant there, involving some 7,000 jobs. The grant is tied to local hiring and training, creating a direct link between FDI promotion and local skill development.

B. Building a competitive skills base

Education and training policy

Canada's strong existing skills base has been one of its important selling points in attracting FDI. Although immigration has played a role in recent years (see below), this skills base is primarily due to the country's historically sophisticated education and training infrastructure. Enrolment and spending on elementary and

secondary education expanded dramatically in 1950s and 1960s. Education policy over this period was focused on the provision of new infrastructure and education professionals. Declining enrolment has since shifted the priority towards making education professionals more accountable to the state and parents, and tailoring education to the perceived needs of the knowledge economy (Lessard and Brassard, 2005). Today, Canada's elementary and secondary education system is considered one of the best in the world. In 2006, an OECD survey of 57 countries found that Canadian students ranked fourth in reading, seventh in mathematics and third in science (Bussière *et al*., 2007).

Canada's system of tertiary education expanded rapidly after World War II (Skolnik, 1997). The provincial and federal governments formulated their needs and plans with the aid of government-appointed commissions, and used the growing economy and tax base to finance an expansion of student capacity, both by investing in existing institutions and by creating or accrediting others. Due to this expansion, full-time university enrolment rates rose significantly. By 2000, more than 20 per cent of Canadians between the ages of 18 and 24 were attending university, up from 12 per cent at the end of the 1960s, and 5 per cent in the early 1950s (Warren, 2000). In addition to high enrolment, completion rates in Canada have been above the OECD average (Canadian Education Statistics Council, 2009a). In 2007, 25 per cent of Canadians aged 25 to 64 had completed at least an undergraduate (i.e. bachelor) degree. Graduate enrolment (i.e. masters or doctorates) has been growing particularly quickly in recent years, with enrolment rising by 5 per cent annually from 2001 to 2007 (Canadian Education Statistics Council, 2009b). Besides universities, Canada also has an extensive network of community colleges and other non-university post-secondary education institutions.

One of the latest policy trends, as seen in several provinces, is to link tertiary education institutions with public and private

sector research initiatives. The Province of Ontario, for instance, has been actively fostering "regional innovation networks", such as the Medical and Related Sciences (MaRS) initiative in Toronto (box II.1). This initiative, involving a range of government, health, education and business stakeholders, supports entrepreneurial activities and the commercialization of research by offering office space to both domestic and foreign companies. The success of the initiative is attributed in part to Ontario's ability to attract and welcome top scientists from around the world, as well as the close proximity of MaRS to the University of Toronto, Canada's largest research university.

Box II.1. Medical and Related Sciences – Ontario

The Ontario Investment and Trade group was one of the sponsors of the Medical and Related Sciences (MaRS) project, an ambitious attempt to create synergies by bringing scientific and technological know-how together, under one roof, with investment capital firms. The resulting convergence centre – consisting of three buildings in downtown Toronto – houses publicly-funded research, small-to-medium sized technology companies, venture capital businesses, an "incubator" that provides office and research facilities to start-up enterprises, and on-site access to large, co-located pharmaceutical companies. The Centre is designed to promote innovation and to strengthen support for commercialization in the field of biotechnology and medical and related technologies. The principal research engines for the MaRS venture are Toronto's universities, major hospitals and technology centres. The focus in the biotechnology area has been on the commercialization of basic research.

Ontario is implementing a commercialization framework based on a system of "regional innovation networks." These are multi-stakeholder, regional development organizations supported by Ontario and by other levels of Government and aimed at promoting innovation.

Source: Interview notes, Ontario Government, Toronto Regional Research Alliance report and assorted public reports.

Migration policy

Aside from the country's domestic education system, Canada relies on the entry of high-skilled migrants to help boost its skills base. Rising levels of immigration to Canada have coincided with the liberalization of foreign investment, beginning in the early 1980s. The relaxation of migrant entry controls was, to a degree, motivated by an understanding that migration programme expansion, as "hidden wiring", would work with, and probably stimulate, FDI, productivity and growth.

Corporate stakeholders confirm that Canada's relatively open immigration stance plays a role in the country's attractiveness as an investment location. For instance, both Microsoft and Tata Consultancy Services point to the importance of migration policy in their decisions to invest in Canada. The Canadian Council of Chief Executives' March 2009 bulletin singles out the immigration programme as a key ingredient in Canada's global competitiveness. The Conference Board of Canada, the country's leading economic research institute, particularly emphasizes recent changes to improve programme responsiveness to industry needs and temporary workers.

Canada's system for managing the entry of skills is fairly complex. This is because responsibility is shared between the Federal Government and the provinces, as well as because Canada's immigration and temporary entry programmes have evolved with time, resulting in sophisticated selection mechanisms. Although immigration is a shared jurisdiction, in practice, it has traditionally been federally controlled, with Citizenship and Immigration Canada (CIC) administering both migration levels and selection criteria through the federal entry programme. Yet, the provinces are increasingly playing a role too. While Quebec has long had extensive powers over selection and integration, due to concerns about preserving culture and the French language, other provinces

now have immigration agreements with the federal Government that set out mutual obligations and powers. The rising influence of the provinces can be seen in the proliferation and use of provincial immigration programmes (see below), the prioritization of certain regional destinations in federal entry criteria, as well as provincial involvement in overseas campaigns to attract new immigrants.

Canada's immigration programme is distinguished, apart from its size and composition, by its emphasis on economic migration, and skilled workers in particular. According to data from CIC, new permanent residents in the economic migrant category rose from 26,000 (30 per cent of total immigration) in 1984 to 149,072 (60 per cent) in 2008.[1] Skilled workers make up the vast majority of migrants in this stream. Applicants are screened on the basis of their education, skills, age, language ability, business experience and other qualifications, prior to being admitted into the country. The underlying selection philosophy is to choose individuals on the basis of their human capital with the aim of promoting economic success, prosperity and labour market mobility. The resulting flow tends to be made up of highly educated professionals, often exceeding the average level of the native-born population.

The flow of both students and temporary workers has also grown substantially. According to CIC, from 1999 to 2008, the number of students entering the country per year rose from 58,000 to 80,000, while the number of temporary workers rose from 107,000 to 193,000. This increase is important because of new programmes to facilitate and encourage the transition from temporary to permanent status. This is seen as a way to better support employer and investment interests, as well as a means to improve integration outcomes.

Canada's immigration regime has relatively generous provisions for companies to sponsor skilled foreign workers, both in the permanent and temporary streams. Businesses in Canada,

including FDI, are highly reliant on these provisions to access foreign skills that may not be locally present (box II.2). In the permanent stream, the high value attached to job offers during the assessment process helps ensure that foreign entry is partly conditioned by local skill requirements. Similarly, a limited number of temporary work permits with the possibility of extension are available to foreign workers with job offers from locally-based employers. To further integrate immigration and skill development policies, Human Resources and Skills Development Canada (HRSDC) screens employer job offers for both permanent and temporary applicants. For permanent applicants, it assesses whether the job offer is genuine and constitutes full-time, continuing employment. In the temporary stream, its primary interest is in protecting the job market for Canadians and ensuring compliance with health and safety regulations. The requirement to screen job offers does not apply to persons entering Canada under North American Free Trade Agreement (NAFTA) provisions, or those entering under Provincial Nomination Programmes (PNPs).

Box II.2. Access to skills in the biotechnology industry – British Columbia

British Columbia is the seventh largest biotech cluster in North America, and the fastest growing in Canada. In the 1990s, Vancouver was ranked third in North America in terms of the number of new companies created. It is currently home to over 90 biotech companies. Over 60 per cent of British Columbia's companies focus on bio-pharmaceuticals and biomedical applications in cancer, inflammatory diseases, cardiovascular health, infectious diseases and drug delivery. The presence of foreign firms in the area has been growing quickly in recent years. From 1996 to 2003, for instance, the portion of total biotechnology firms owned by foreign companies in Vancouver rose from under 10 per cent to nearly 30 per cent.

An important part of the success of this industry has been the existence of a strong medical infrastructure. For example, Canadian medical institutions are part of a coordinated network enabling researchers to undertake genetic research. The growth of the Vancouver biotech sector

/…

Box II.2 (concluded)

has also been tied closely to the University of British Columbia (UBC), which has had a history of successful technology transfer involving the University–Industry Liaison Office. The Liaison Office has spun off numerous companies in coordination with the Faculty of Medicine, which has also played an active role.

Despite the importance of education and research infrastructure, Canada's liberal migration regime is increasingly a determining factor of foreign investment the cluster. Biotechnology is a highly skill-intensive industry, and providing a steady supply of qualified workers is posing a problem. A recent case study, based on structured interviews with HR managers, scientific officers, executives and members of the industry association, concludes that, while the University of British Columbia and Simon Fraser University turn out excellent students, they lack experience and knowledge of international markets and practices. This knowledge is necessary for local firms to thrive in the global marketplace. Furthermore, local firms often lack the capacity to provide training to overcome these gaps.

While larger firms with more capacity to train staff might be expected to avoid these constraints, the study finds that up to 90 per cent of the executive and professional staff in these firms came from abroad. The reasons given for this are that the foreign-born have essential skill sets not available domestically, including experience raising capital and working through international approval processes for biotech products, as well as possession of unique scientific knowledge. Respondents in the case study advance the view that the labour pool for biotech is global and internationally competitive, and that foreign hires generate domestic employment by stabilizing the domestic industry. Respondents also argued that there is a need to create a larger pool of trained executives and scientists in order to help small and medium-sized firms develop, since they often have limited capacity to recruit internationally. Firms identify the positive contribution that NAFTA arrangements and the PNP makes to facilitating entry, but felt that both HRSDC and CIC needed to adopt a more relaxed stance towards the entry of foreign workers.

Source: Richardson (2006); Hennessy (2008).

NAFTA contains important provisions governing non-permanent migrants between Canada, Mexico and the United States.[2] Under these provisions, professionals with certain eligible credentials and an employment offer from a Canadian-based enterprise are permitted to work in Canada. In addition, intra-company transferees are allowed to enter Canada temporarily to receive training or skills upgrading, or to familiarize themselves with corporate business practices. Typically, the trainees will fall into the category of managers, executives and technical experts.

At the provincial level, the use of the PNPs has proliferated rapidly in recent years, rising from only 151 entries in 1999 to 8,343 in 2008, according to data from CIC. PNPs allow provinces to nominate skilled foreign workers and business migrants for accelerated entry under the federal migration system (box II.3). These programmes have been used to support foreign investors and business migrants who require senior managers, professionals and other experts, but who cannot bring them in by other means, or cannot otherwise access them quickly. While the provinces determine the economic selection, the federal Government remains responsible for health and security checks.

The primary focus of PNPs has been economic and demographic. On the economic front, the focus has been on creating a more responsive, agile, and targeted response to provincial employers and potential investors needing foreign workers. In particular, the programmes have been used to target certain strategic sectors associated with economic development and sustainability objectives. In terms of demographic objectives, in a number of jurisdictions, the PNP has been used to promote population growth in isolated regions. This is managed by controlling eligible occupations (e.g. self-employed farmers in New Brunswick and Saskatchewan and primary occupations in British Columbia), by lowering processing charges for employers in Ontario outside

Toronto, and by working with local employer and civil society groups in small to medium-sized communities in Manitoba.

Box II.3. Ontario's Provincial Nominee Programme

Opportunities Ontario offers skilled worker entry arrangements for established Ontario employers, as well as for new investments, including FDI. Existing businesses can nominate a foreign worker for a permanent and full-time skilled occupation, on the condition that they have been actively in business for at least three years, have a minimum of $500,000 to $1,000,000 in gross revenues, and a minimum of three to five employees, depending on their location in the province. Employers are typically limited to one foreign worker position for every three to five full-time employees. Within 60 days of having the desired position pre-approved by Opportunities Ontario, the foreign worker must submit a separate application.

For new investments in the province that are over $3,000,000 and create at least five permanent, full-time jobs for Canadian citizens or permanent residents, investors can request a nomination for a foreign skilled worker. The investor is limited to one foreign worker for the first five net local jobs created, but can apply for one foreign worker for each additional net local job created. Thus, for example, for an investment creating a total of 50 jobs, 23 of them could be filled by foreign workers. This programme also applies to potential business immigrants or investors looking to be nominated for permanent residence in Ontario, although they are, in addition, required to prove that they will play a long-term management and ownership role in the business.

Source: Ontario Immigration website.

C. Acquiring skills from FDI

As with most countries, foreign-owned firms based in Canada exhibit higher levels of productivity than their domestic counterparts, suggesting the possibility of knowledge and technology spillovers to the Canadian economy (Rao and Tang, 2000). The importance of skill spillovers in particular is emphasized by Investment Partnerships Canada – a partnership between DFAIT

and Industry Canada. In terms of the mechanisms underpinning these spillovers, researchers at Human Resources and Skill Development Canada (HRSDC) emphasize the importance of technology transfer to local firms and on-the-job training. The Conference Board of Canada argues that competitive pressure on local supplier firms to make greater use of technology and up-skill their workers is a major factor. An additional mechanism pointed to by the Conference Board is the disproportionate number of senior foreign executives in major companies, many of whom have long since left the firm that had initially sponsored their entry. Researchers at HRSDC agree that high-profile foreign companies often have an advantage when it comes to attracting worldwide talent. When these individuals settle in Canada permanently, or become employed by domestic firms, their human capital is absorbed by the Canadian economy.

The following pages present two cases illustrating some of the aforementioned ways in which FDI interacts with the local skills base in Canada, as well as the role of different policy factors.

Skill development in Montreal's aerospace cluster

The aeronautical and aerospace industry in Canada, primarily located in the Montreal area of Quebec, is a major contributor to the local economy and has significant FDI involvement (box II.4). The attraction of the industry to foreign investors is based on a combination of factors, including sophisticated institutions to train the local workforce, liberal entry policies for foreign skills, and the presence of a cluster of firms specializing in various aspects of the production process.

Montreal has perhaps the most sophisticated set of training institutions in North America for turning out technical workers in the aeronautical and aerospace sector. Included in this is the National Aerotechnical School at the Collège Edouard Montpetit,

the Montreal Aerospace Trade School, the École Polytechnique de Montréal, the École de Technologie Supérieure, the Université de Sherbrooke and a graduate programme in aerospace engineering offered jointly by six universities in the area. More recently, the Integrated Aerospace Institute was created, which houses three levels of education – secondary, college and university – in a single building, locating professors and students in close proximity to major foreign and domestically owned aerospace companies.

Box II.4. Aerospace Industry – Quebec

Some 60 per cent of Canada's aerospace production takes place in the Montreal area. It is one of the world's hubs for aerospace manufacturing, bringing in revenues of some $10 billion and accounting for up to 70 per cent of Canadian R&D expenditure in aeronautics. Some 260 companies, including major domestic and foreign corporations, such as Bombardier, Rolls Royce, Bell Helicopter, CMC Electronics, CAE, and Pratt and Whitney, employ roughly 48,000 workers. These consist of 20,000 skilled tradespeople, 10,000 technicians, 12,000 engineers, and 6,000 administrative personnel.

Investments in Montreal's aeronautics industry are actively courted by both provincial and federal Governments. Significant public investments have been made by the province in training and education capacity, often in conjunction with the private sector. Notwithstanding these investments, until the slowdown induced by the current recession, educational institutions were having difficulty keeping up with industry growth.

Source: Interview notes; Quebec Government.

When the indigenous skill base cannot keep up with the industry's demand, firms often rely on migration to access foreign skilled workers, both by selecting workers coming in through the general economic migration programme, or by taking advantage of arrangements that allow companies to directly sponsor the entry of foreign skilled workers. Officials from the Ministère de l'Immigration et des Communautés Culturelles emphasize the importance of having a sophisticated skill entry programme for

attracting FDI in the province. For example, their view is that Rolls Royce chose Montreal as an investment location partly due to the availability of trained workers, of whom a large number are foreign-born engineers.

Once foreign aerospace and aeronautical firms have settled in the Montreal area, they contribute to the local skills base in several ways. One of the most obvious is the cooperation of these firms with local educational and research institutions, which provide not only training for current staff, but also ensure that future skill development is tailored to the needs of the industry, resulting in higher levels of technical expertise and specialization in the local workforce. For example, Pratt & Whitney currently offers an in-company MBA in concert with the University of Montreal's École des Hautes Études Commerciales. The Integrated Aerospace Institute, in order to ensure the continued relevance of the curriculum, relies heavily on input from a consultative committee composed of representatives from the largest companies in the region, as well as the Quebec Education Ministry, the Department of National Defence and the Space Agency. Similarly, an aerospace research consortium brings together representatives of the major contractors in the Québec aerospace industry, as well as the eight engineering schools, to encourage collaborative and pre-competitive research. By relying on firms in the industry, many of which are foreign, to integrate their insights into local educational and research institutions, their presence is leveraged to improve the skills of the local workforce.

Another driver of local skills upgrading comes about through the competitive and cooperative interactions between foreign firms, on the one hand, and local competitors and suppliers on the other. By entering the market and adding to the mass of existing firms in the aerospace cluster, foreign firms introduce sophisticated technology and process innovation, which often disseminate rapidly due to pressure on local competitors to upgrade

and modernize, including through employee training. With respect to local suppliers, foreign firms often play a mentoring role and engage in collaborative projects that can improve their partner's human capital. For example, Rolls Royce, which has a large facility in Montreal, has put in place a programme that seeks to integrate small, local businesses into the company's supply base. Rolls Royce operates an extensive supplier training programme consisting of elaborate guidance notes and online training modules for how to interact with Rolls Royce and ensure consistent, high quality transactions.

Local training initiatives by JR Simplot in Manitoba

The case of JR Simplot, which invested in a major agribusiness project in Manitoba, shows the effectiveness of careful government FDI facilitation efforts (box II.5). High-level coordination was important in order to bring together the departments involved in the various steps of the investment process, and to assess the appropriateness of the investment to the locality, including its relationship to skill development objectives.

Even more important to securing the investment were the liberal entry arrangements allowing Simplot to hire foreign workers when skills were unavailable locally. Significant flows of managerial, professional and technical staff came into Manitoba under NAFTA provisions. These were supplemented by temporary work authorizations that were used to secure quick entry, pending conversion to longer-term permanent migration status. To address the expanded agricultural requirements, migrant low-skill workers were brought in from Mexico and El Salvador, along with their families.

In terms of disseminating skills to the local economy, JR Simplot's investment resulted in an expansion of local training programmes. The management of the investment required

developing a comprehensive human resource plan, which included providing funding for training of the indigenous population following consultation with local Aboriginal leaders. Active on-reserve promotion was also undertaken. The training was conducted by the local community college. The skilling of indigenous populations is particularly important for the resource sector in Canada, where there is a high level of indigenous ownership over land and extraction rights. Many resource operations are remote, making it difficult to recruit and retain trained workers from elsewhere.

Box II.5. JR Simplot – Manitoba

Manitoba offers a resource-rich, diverse economy covering agribusiness, primary industry and manufacturing. In 2003, the Government of Manitoba facilitated the investment of the JR Simplot potato processing plant at Portage La Prairie. The new facility required an investment of $120 million and employed 230 people in its initial phase. It introduced a number of technological innovations, including being the first potato processing plant in Canada to use an environmentally friendly biogas recovery and reuse system, in order to lower greenhouse gas emissions and fuel costs. This occurred in a community of some 12,000 people.

The entire exercise was coordinated by a Community Economic Development Committee of the Manitoba Cabinet, which brought together the key people needed to secure the investment and make it work. The province undertook a "whole-of-town" assessment around facilities and infrastructure, including housing and education, to ensure there was the local capacity to deal with the increased economic and social demands associated with the investment.

Source: Interview notes – former Manitoba Government official; assorted public documents.

Notes

[1] This figure, however, also includes the spouses and children of economic migrants, and therefore overestimates the contribution of migration to skills formation. For example, in 2008, over 61,000 of total economic migrants were spouses and dependents of the principal applicant.

[2] There is no data on the NAFTA-related migrant flows and the use of this provision by foreign companies, as persons are free to cross the border without special documentation.

III. THE CASE OF SINGAPORE

Singapore represents a very successful model of FDI-related skill development. Tracing through its different stages of development, Singapore exemplifies a tight “coupling” between economic development strategies and skills development policies (Kuruvilla and Chua, 2000). During early industrialization, Singapore focused on developing basic primary and secondary education to complement its labour-intensive economy (Kuruvilla *et al.*, 2002). As the country began to attract and rely on FDI in more capital-intensive and skill-intensive industries, education and training policy started focusing more on specific technical skills required by investors. Since the 1980s, the technical and vocational training system has been deepened, while the university system was reformed and expanded. Throughout the country's development, the Government of Singapore has targeted and leveraged the knowledge and technology of foreign investors to enhance domestic education and training efforts, including through the direct training of foreign affiliate employees and those of their local suppliers. As a result of these integrated skills policies and their responsiveness to economic change, Singapore has developed one of the most highly qualified workforces in the world.

A. Promoting and targeting FDI

Tax incentives have played an important part in encouraging FDI and its expansion in Singapore. The Economic Development Board (EDB), a government agency under the Ministry of Trade and Industry (MTI), was given the authority to grant incentives, the most important of which was "pioneer status". This allowed for a tax break of up to 10 years, negotiated in light of what the FDI was likely to offer Singapore. As Singapore developed economically, the range of tax breaks available and the government agencies that could offer them expanded. Yet, the EDB functioned effectively as a one-stop centre for investors by working closely with all government ministries and bodies. The impact of these tax incentives was so pervasive that the average tax rate for companies

was only around 8 per cent compared to the nominal flat rate of 17 per cent. However, the focus was on growing total revenues which the Government believed would be more successfully achieved by an expanded tax base rather than protecting the average tax return. Also, the offered loans and tax incentives were often seen as a form of risk sharing, since many of them became unavailable once profit was made.

Apart from financial incentives, the EDB, acting as a single point of entry and communication, took a wide view of managing investments, including assisting potential investors with accommodation and schooling. The relationship did not end with the investment, but acted as an important ongoing diagnostic tool to identify further opportunities to expand the size and complexity of the investment.

As early as the 1970s, the Singapore Government began to phase out incentives for labour-intensive industries and focused on attracting more skill- and knowledge-intensive industries. This involved an active targeting approach, whereby particular TNCs were selected based on their potential contributions to the Singaporean economy, including in terms of skills enhancement. The Singapore Government saw a clear strategic link between FDI attraction and skills targeting. The cases of Sunstrand (box III.1) and STMicroelectronics (presented further below in box III.2), illustrate how FDI attraction in Singapore had a clear relationships to local skill development objectives. The Singapore Government used a combination of tax and grant incentives to convince Sunstrand to locate in Singapore in part to bring in new skills to build the country's aerospace industry.

Box III.1. The case of Sunstrand

Sunstrand is a high-tech aerospace components and systems company with headquarters in Illinois, United States. It sells high-tech machine tools to Boeing, generators and fuel pumps to commercial and military aircraft makers, industrial compressors to infrastructure development companies and, at the lower-end of the scale, sanding discs for American furniture makers.

In 1969, Sunstrand was approached by staff from the EDB's office in Chicago. Out of more than 10,000 precision engineering companies in and around Illinois, it identified Sunstrand, which had 90 per cent market share of the constant speed drives used in commercial airplanes, as one of the best companies for EDB's promotion programme. Sunstrand was a market leader respected by its peers with good track record backed by sale and profit figures. The company was unable to expand its United States operations due to a shortage of skilled workers in its base in Rockford, United States. Due to the high quality standards required of its products, the company typically required its employees to undergo two to three years of specialized training.

EDB officers quickly invited Sunstrand to Singapore to view what the country could offer. The quality of the training centres as well as the meticulous and efficient planning of the visit programme sufficiently impressed Sunstrand's executive to recommend to its senior management to invest in Singapore. However, Sunstrand was uncertain about Singapore's skills capabilities and investment climate. After a year's deliberation, the company decided to adopt a minimum risk approach and move its least profitable, lowest-end manufacturing component to Singapore. It sent a young, inexperienced manager not over 30 years of age to start its manufacturing base. As it was willing to commit only $250,000, Sunstrand did not qualify for pioneer status as this required a fixed asset investment of $1 million or above. Despite this, EDB took Sunstrand's interest as a positive first step and went out of its way to help it obtain pioneer status, obtain lease to factory space and recruit its workers who were some of the best trainees the country has to offer from its training centres.

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Box III.1 (continued)

During the initial two years, Sunstrand Singapore struggled to attain financial viability. It announced it was planning to withdraw from Singapore. But the EDB worked hard to address the company's concerns. It encouraged Sunstrand to capitalize on its special tax-free status and lower cost structure by investing in higher margin businesses in Singapore. To support this, Singapore extended its pioneer status and helped Sunstrand groom skilled technicians by providing it with top prospects for training in the company's American plant. Sunstrand was also assured that there would be no absenteeism among its Singapore workers, something that had plagued the company's Colorado plant. Sunstrand committed $60 million to its Singapore plant – an increase of 250 times its start-up investment, and sent a senior executive to lead the Singapore subsidiary. Thus was born Singapore's long-term relationship with Sunstrand, which would become part of the country's successful aerospace industry.

Source: Chan (2002) and interview notes.

B. Building a competitive skills base

Education and training policy

Throughout its development, Singapore has tailored its education and worker training system according to broader economic objectives. This has been facilitated through multidepartmental and tripartite institutional arrangements to coordinate policies for skills development (Osman-Gani, 2004). Three institutions in particular are important (Kuruvilla *et al.*, 2002). *First*, the high-level National Manpower Council (NMC) – like its predecessor, the Council for Professional and Technical Education (CPTE) – brings together the MTI, the Ministry of Education (MOE), and the Ministry of Manpower (MOM) to jointly manage the supply of skills given current and estimated future demand. To accomplish this task, the NMC sets targets and coordinates with universities, polytechnics, institutes for technical education, and

other industry-specific training institutes. *Second*, the MOE has formal jurisdiction over education and training institutions and is responsible for setting and implementing long-term human resource development plans. *Finally*, the EDB, in its role as an investment promotion agency under MTI, helps to identify and satisfy the short-term skill needs of foreign investors. These three government institutions, as well as the network of specific education and training institutions, benefit from interlocking board and council membership, ensuring a steady flow of information and encouraging a common approach to skill development. Moreover, the management of these institutions is often tripartite. The involvement of employers, labour unions, and public officials helps ensure that skill development reflects the interests of all interested parties concerned.

Using this coordinated and inclusive governance model, Singapore's education and technical training policies have evolved significantly over time, as they have adjusted to different economic conditions and strategies. Early in Singapore's industrialization, the Government initiated an accelerated school building programme (ILO, 1997). To meet the dramatic increase in primary and secondary school enrolment, large numbers of teachers were recruited and trained. Two-year vocational education was introduced in secondary schools. With the shift to export-oriented industrialization in the late 1960s, greater emphasis was given to technical education. A separate system of industrial training was brought in to replace the secondary school vocational programmes. It was at this time that the EDB started offering support for training through grant and scholarship schemes, such as the Industrial Training Grant Scheme and the Overseas Training Grant Scheme. The EDB also started working with foreign TNCs to set up joint-training centres for various industries (to be discussed below).

In 1979, the MOE undertook a broad review of the education system and proposed significant reforms. Changes

included the creation of the National Education System (NES), which standardized primary and secondary education. The primary school curriculum was refocused on math, science and English, while the secondary level introduced a system to stream students according to ability. Entry to university was based on examinations according to the British model. Significant curriculum changes were also introduced in universities to refocus certain engineering programmes. A new Vocational and Industrial Training Board (VITB) was given jurisdiction over all technical, vocational and commercial training institutes, although most of the joint-training centres set up with foreign TNCs remained separate. Technical and industrial training was given further support through the Skill Development Fund (SDF), enacted in 1984, to share training costs with employers.

The SDF had two major objectives related to Singapore's broader development model. *First,* it was meant to provide financial support for technical and vocational training through subsidies of 50 to 80 per cent of employee training costs. Under the SDF, employers are required to contribute a portion of the training cost to ensure that the specific skills being offered are in demand, and to ensure that employers have a vested interest in the nature and success of the training programmes. *Second,* the SDF was meant to function as a tax on employers to discourage them from using cheap labour. Initially, the legislation required employers to contribute 1 per cent of gross salary of all employees earning less than $750 per month (revised upward to $1500 in July 2000). The SDF, therefore, has played an important role in Singapore's shift from labour-intensive to skill-intensive industries. By 2003, SDF participation rates had reached 100 per cent of all companies with more than 10 employees and 41 per cent of companies with 10 employees or less (Pillay, 2005). Moreover, company training investment as a share of payroll expenses reached and exceeded the set target of 4 per cent.

Migration policy

Accessing foreign skills through migration programmes has been an important factor for FDI attraction in Singapore. Foreign worker entry decisions have typically related to the specific needs of foreign investors and have been integrated into the FDI approval process itself, as administered by the EDB. This means that immigration authorities concern themselves primarily with the fitness of an individual in terms of health threats and criminal or security issues, while the EDB sets the overarching agreement with investors on access to foreign workers. To finalize the terms of the agreement, the EDB negotiates with the Ministry of Labour/Manpower on behalf of the foreign company. The criteria for assessment are typically based on the ability of the companies to transfer technology to the local economy. At times, in order to attract strategic investments, the EDB has negotiated for temporary allocations of foreign workers above the standard allowances.

Broadly speaking, the migration framework in Singapore has differentiated between skilled and unskilled entry. Singapore imposes a limit to the entry of low-skilled labour through a system of quotas, dependency ratio, levies, and approved source country. In addition, low-skilled foreign labour is permitted to be employed only in activities were specified in their work permit. They cannot freelance or be self-employed. Employers of low-skilled foreign labour are responsible for their lodging, maintenance and eventual repatriation. Harsh penalties, including jail terms and fines, are imposed on employers who do not conform to employment legislation. Foreign unskilled labour faces restrictions on marriage to Singaporean residents, and citizenship is largely unavailable.

In contrast, Singapore has had very limited restrictions and entry barriers for skilled labour, in particular those who possess acceptable degrees, professional qualifications, or specialist skills. Skilled workers are eligible to take up permanent residence or

citizenship, as well as to bring their dependants into the country. Unlike unskilled workers, they often integrate with the resident population. This tiered approach to foreign workers is seen by Singapore as a way of dealing with the problems of integration faced by many developed countries.

In terms of figures, the number of foreign workers in Singapore was very low until the late 1970s (Pang and Lim, 1982). The 1980s saw a rise in temporary residents, most employed by foreign TNCs with no intention of settling. Since then, according to the Singapore Department of Statistics, the level of non-residents has expanded at a significantly higher rate than the domestic population. However, the number of new permanent residents has also increased. Whereas in 1986 it was estimated that only around 5,000 people were granted permanent residence, by the late 1990s, the number had increased fourfold (UNESCO, 2003).

C. Acquiring skills from FDI

Singapore's success in transforming itself into a highly skilled economy is partly due to an innovative model of public-private cooperation which gave foreign affiliates a direct role in skills development, even in the earliest stages of industrialization (Kuruvilla *et al.*, 2002). The strategy of actively targeting leading TNCs provided access to a network of technologically superior affiliates[1] through which skills could be transmitted to the domestic economy. Government policy promoted skill spillovers by working with foreign affiliates to train local staff and upgrade the skills of local supplier firms. The EDB, with its mandate to address skill development in addition to investment promotion, played a major role in these initiatives.

Incentives for training

The EDB's cooperation with foreign TNCs to enhance the local skills base took two general forms:

- Combining public efforts with the expertise and resources of leading TNCs to create a network of specialized joint-training institutes, eventually to be absorbed into the country's broader technical and vocational training system.
- Offering grants and scholarships to both local and foreign companies to train their employees.

In the 1970s, the EDB worked with TNCs to establish joint-training centres focused on high skill areas relevant to the activities of these investors. These centres included, among others, the EDB-Tata Training Centre for tools, dies and moulds (Indian TNC, formed in 1972), the EDB-Rollei Training Centre for optics and precision mechanics (German TNC, formed in 1973), and the EDB-Philips Training Centre for precision machining (Dutch TNC, formed in 1975). The training centres were established with the EDB providing land and buildings, machinery and equipment, as well as a share of operating costs. For example, to facilitate the EDB-Tata Training Centre, the Government provided loans, low land rents, grants to purchase training equipment and materials, and up to 70 per cent of the centre's operating costs (Kuruvilla *et al.*, 2002). The TNCs initially supplied the training experts, programmes, and systems for the joint-training institutes. The close involvement of TNCs in management of these institutes ensured that the trained labour force possessed relevant skills to meet the demand of existing and new industries. Moreover, involved investors were guaranteed the first right to hire graduates from these centres. For example, the EDB granted Rollei and other German firms 44 per cent of the graduates from the EDB-Rollei Training Centre.

By the early 1980s, the constant need to enhance the supply of skills prompted the EDB to create training centres that were funded jointly with the home governments of major TNCs (Kuruvilla *et al.*, 2002). As a result, several institutes were formed, such as the Japan-Singapore Government Training Centre, the German-Singapore Institute for Production Technology, and the French-Singapore Institute for Electro-technology. Foreign governments had an incentive to cooperate since their company's would be given priority access to workers. Over time, the institutes were made open to TNCs from other home countries as well.

The EDB participated in the management of both types of joint-training centres, sometimes taking them over after several years, or integrating them with pre-existing training institutes in Singapore. For example, some of the joint-training institutes were merged into a single polytechnic in 1993. Effectively, foreign TNCs and their home governments helped build Singapore's industrial training infrastructure, providing both resources to support their establishment and operation, and expertise to develop advanced and relevant curricula.

Around the same time that it started establishing training infrastructure with leading TNCs, the EDB also began to offer various grants and scholarships to encourage companies to train their staff. As mentioned earlier, these included programmes such as the Industrial Training Grant Scheme and the Overseas Training Grant Scheme, both of which were used heavily by foreign TNCs. Leading semiconductor TNC STMicroelectronics, for example, took advantage of these types of grants to train staff abroad in order to handle the company's shift towards higher value-added activities (box III.2). Since the mid-1980s, the SDF has become the major channel through which companies are encouraged to train local staff. As noted, by the late 1990s, all major foreign (as well as domestic) companies had used some form of support from the Fund.

The Local Industry Upgrading Programme (LIUP)

Within the context of Singapore's broader strategy of FDI-driven growth, foreign TNCs have been encouraged to increase their sourcing from the local economy. Among other benefits, linkages with local suppliers provide a platform through which skill spillovers could occur, as TNCs seek to improve their partner's capabilities and human capital. Yet, local firms initially faced major challenges, limiting the incidence of supplier linkages. One reason for this was the fact that many local suppliers were happy to produce for the domestic market, which had less demanding requirements in terms of continuity of supply. Moreover, many local suppliers did not have the quality control standards required by TNCs.

The Local Industry Upgrading Programme (LIUP) was initiated in 1986 with these types of challenges in mind. It provides incentives for TNCs to upgrade their local suppliers through a long-term mentor relationship. The objective was to enhance their efficiency, reliability, and international competitiveness, with the ultimate goal of taking on new products and processes and engaging in joint-R&D with their mentor TNC. Under part of the LIUP scheme, the EDB subsidizes a share of the salary of a TNC manager or engineer sent to work in the local supplier's facility. Through this mechanism, among others, local suppliers have received new knowledge and training. More generally, the LIUP has put pressure on local suppliers to meet TNC standards, leading many firms to independently train their staff in order to take on new tasks or deal with more advanced technology.

With the assistance of these TNC mentors, local firms have gained expertise and capabilities to become efficient suppliers. In many cases local Singaporean firms have been able to transition out of low-wage, labour-intensive activities, and into more capital- and knowledge-intensive industries (McKendrick *et al.*, 2000). An example of this is provided by STMicroelectronics. In the late

1980s, the company received financing under the LIUP to send a manager to train local manufacturers on issues related to large-scale production processes, quality control, standard setting, and the broader needs of TNCs (box III.2). This helped result in nine indigenous companies becoming significant international players.

Box III.2. The case of STMicroelectronics

STMicroelectronics (ST) was created in 1987 by the merger of semiconductor companies SGS Microelettronica of Italy and Thomson Semiconducteurs of France. ST is one of the world's top five semiconductor suppliers with sales nearing $10 billion with over half being in Asia. Since beginning its operations in Singapore in 1969, STMicroelectronics has invested around $3.4 billion in the local economy. Its activities in Singapore are an example of the country's success in targeting and facilitating the entry of leading TNCs, providing necessary skills for their activities, and ensuring that there are significant skill spillovers to the local workforce.

When the ST Managing Director visited Singapore in January 1969, he dealt with the EDB and within three days they had agreed to: a preferred site, a start-up loan of $12 million, and the release of EDB's liaison officer to join the company as its first Singaporean employee. In subsequent discussions with the Singaporean Government, ST had a long list of requirements and questions. Among these was the need for electricity and water to service the plant. The result was that the Singaporean Government expanded the capacity of the local electricity generation plant and diverted a water main to the factory.

In the initial start-up phase, 40 managers were permitted to enter from Europe to cover the various production and management functions. Their job was both to manage the processes and to train. Most completed their transfer of skills and left at the end of their two-year contracts, leaving only a nucleus of expertise to support the newly trained indigenous talent. Further plant upgrades similarly involved temporary placements of specialists in Singapore for 6–10 months. When lower-end facilities were set up in Malaysia in 1974, largely Singaporean expertise was used to train the Malaysians.

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Box III.2 (concluded)

The transfer of skills in the second investment phase (R&D and wafer fabrication in the 1980s and 1990s) had to be achieved through a different strategy, with Singaporean staff trained in the European plants with EDB subsidies of over 50 per cent. In addition, there was a strong incentive to develop local suppliers in order to lower supply costs (up to 30 per cent) and to better collaborate and increase service levels. The EDB supported these efforts through the LIUP by, for example, financing the placement of ST staff in local suppliers for training purposes. Partly as a result of this support, nine indigenous supplier firms became significant local and international players.

Source: Interview with STMicroelectronics.

Notes

[1] Recent figures show that workers in foreign manufacturing firms earn 60 per cent more income and have 4.4 times higher productivity than those working for local companies (EDB, 2007). Figures refer to wholly-owned foreign firms.

IV. LESSONS ON HOW TO INTEGRATE FDI AND SKILL DEVELOPMENT

Skills development is an important policy priority for all countries, regardless of their level of economic development. A solid skills base is a precondition for the growth of skill-intensive industries, and thus a necessary step for developing countries to move away from relying on low labour costs to compete in the global economy. Improvements to the skills base are above all a function of the domestic education system. Yet, other policy tools can make significant contributions. By reviewing the trends, institutions and policies related to education, migration, FDI promotion, and the subsequent dissemination of skills to the local economy, this study identifies lessons on how countries can effectively integrate FDI in pursuit of their broader skills development objectives.

1. There is no single model for skills development

Differences in development levels and existing skills base, as well as other contextual factors, shape the objectives and options available to governments with respect to skills development. Plans to integrate FDI should be designed accordingly.

Canada and Singapore offer two distinct, yet successful, approaches to integrating FDI and skills development. Considering the countries' different starting points, both in terms of their stage of economic development and also the level and quality of their local skills base, this is not surprising. Canada is a highly-developed, resource-rich economy with a pool of skills built up over a long period of time through its education system and advanced immigration programme. As a result, the link between FDI and skill development policies has been less explicit. There are mechanisms for investors to bring in foreign workers, and investment promotion agencies do target certain foreign companies partly based on their expected contributions to local skill development. But there are no dedicated programmes directed towards transferring skills from

local TNC activities. Instead, government policies tend to set framework conditions that facilitate interactions between FDI and skills.

Singapore, on the other hand, has relied on FDI as a key tool to develop its skills base. Early in its industrialisation, the country focused on expanding primary and secondary education. These basic skills supported the economy's shift towards labour-intensive manufacturing activities. To support more capital and knowledge-intensive industries in subsequent years, the Government targeted leading TNCs based on their potential to transfer technology and skills to local workers and firms. Accordingly, investment facilitation, education, training, and migration policies were formulated with the needs of foreign investors in mind. Moreover, the Government undertook proactive measures to identify and exploit opportunities for TNCs to contribute to local education infrastructure, as well as to directly train local workers and supplier firms. This extraordinary level of policy attention and convergence allowed Singapore to "leapfrog" and attract FDI in activities beyond their given level of skills, relying at first on foreign workers and then on the training of local staff.

Integrating FDI with skills development policies requires sophisticated institutional structures. Interaction, coordination, and synergies between different institutions can support a self-sustaining model.

Singapore's successful skills development model is the result of a systematic, concentrated national effort that brought diverse government agencies together. Interconnected management allowed different functional agencies to share information and identify gaps. Formulation of long-term skill development objectives was done through a high-level council which included, among others, representatives from the Ministry of Education (MOE) and the Economic Development Board (EDB), the country's

main point of contact for foreign investors. At an operational level, public agencies, industry groups and labour all played a role in managing industrial training institutions, ensuring that curricula were adapted to changing circumstances.

Singapore's concerted approach to skills development was facilitated by the country's limited size and population, which allowed a more centralized model. In Canada, by contrast, low population density and a federalist political system makes centralized efforts more difficult. Skill development policies are most often set at the sub-national level, while much of the county's FDI policy remains at the national level. That said, ad hoc cooperation between the provincial and federal governments in investment promotion and migration policy is increasingly common.

2. Government educational investment is critical for building a strong skills base

The primary responsibility for skills development in a country rests with the national education system. Successful efforts in this area will improve the local investment climate, as well as ensure that local workers have the opportunities and capacity to absorb spillovers of knowledge and skills from foreign affiliate activities.

Although foreign TNCs can make valuable contributions to local skills, UNCTAD (2000: 17) notes that a strong national educational system is fundamental: “Such investments are generally more expensive and long-term, and here it is educational institutions that have to meet the needs. In other words, the upgrading of the general skill level and provision of high-level specialized training is something that host countries have to do for themselves. Indeed, such upgrading itself can be used to attract higher-quality inward FDI and to induce existing investors to move into more complex activities” (UNCTAD,).

Both Canada and Singapore have made significant educational investments to build up their human capital. As a developed country, Canada has a very well-established domestic education system. This has led to a high rate of educational attainment, which partly underpins the country's investment attractiveness. Singapore's human capital development relied more heavily on FDI, but domestic efforts were still the determining factor. For instance, early and rapid provision of primary and secondary education helped lay basic skills necessary to kick-start the country's industrialization. Without these, the country would not have attracted such high levels of FDI, nor would TNCs have been as willing to hire locals or provide more advanced technical training.

Studying the experience of other countries is useful.

Singapore studied the experience of industrialized countries such as Japan and Germany, identified their best practices, and used them as inputs to develop the country's national education and training system. For example, in basic education, it looked at how these two countries taught language and mathematics. In terms of vocational and technical training, Singapore learned from Germany's "dual" apprenticeship system and Japan's on-the-job training programmes. By learning from others, Singapore avoided some of the cost and complications which inevitably arise from trial and error.

Adopt flexible, demand-driven policies to ensure that, over time, the supply of skills matches demand. Building and regularly updating a list of skills that are scarce is a useful guide to domestic educational investment. There is a role for investment promotion agencies (IPAs) to identify and communicate the skill needs of domestic and foreign investors.

Singapore's human resource development policies were demand-driven and systematically re-evaluated at each stage of

industrial development in light of the economy's evolving skill needs. Information on existing educational outcomes, along with the types of industries that the country wanted to attract, was used to determine the future supply of skills in the economy, identify potential skill shortages, and set targets for the system as a whole.

In this respect, an effective IPA with clear mandates and strong management to help coordinate skills development, such as Singapore's EDB, is a valuable policy tool. IPAs need to have good links with industries and TNCs to help identify the skill needs of the economy and establish a continuous dialogue with relevant ministries, such as those related to labour and academia.

3. Align investment promotion with skill development priorities. Target investments from leading TNCs likely to transfer technology and skills.

A generally favourable business climate is critical to attracting foreign investors. Investment promotion activities should target FDI that can help upgrade local technology and skills.

A sound business and policy environment is important for host countries to successfully attract FDI. Among others, key factors include the presence of economic opportunities, stability of macroeconomic and political climate, quality of institutions, openness to trade, availability of infrastructure, and level of taxation. Human capital has become increasingly important as well, as many modes of production are becoming more skill-intensive. A rising number of manufacturing and services TNCs are seeking labour forces equipped with knowledge in engineering, technology, organizational skills and business administration.

Some developing countries may wish to separate short-run and long-run FDI promotion objectives. In the short-run, the priority may be to simply expand tax revenues and employment by

promoting FDI in labour or resource-intensive industries. At the same time, however, IPAs should be looking for opportunities to attract foreign investors most likely to benefit the economy in the future, through increased training opportunities and technology spillovers. The next step is to assess whether the country has the right investment climate for these types of TNCs, and to adopt corrective measures when appropriate. In Singapore, the EDB induced and sustained investments from leading TNCs, such as Sunstrand (box III.1) and STMicrosystems (box III.2), through careful targeting and follow-up facilitation. Although their investments were modest at first and often staffed by foreign workers, companies such as these have gone on to play a major role in the country's shift to more capital and knowledge-intensive production.

Well-designed incentives may be necessary for developing countries to secure strategic FDI projects.

Incentives such as tax breaks are straightforward policy instruments to help countries attract desired levels and types of FDI. The justification for incentives is strongest when two conditions are met. *First*, the investment has significant potential to transfer technology or knowledge to the domestic economy. *Second*, the investment would not occur, or would be much more limited, in the absence of incentives. Developing countries looking to target FDI in more value-added, skill-intensive production are likely candidates for the use of such measures. Incentives can be provided at a general level, or can be customized to the needs of a given project.

In contrast to Canada, where special incentives for foreign investment are rarer, Singapore offered a wide range of tax breaks to attract leading TNCs. Many of these incentives, such as Pioneer Status, were offered on a project-by-project basis. The EDB would assess the investment based on its likelihood to transfer technology and skills to local firms and workers. In addition, the EDB could

offer special loan financing, land access, and infrastructure. This wide range of tools gave the EDB the flexibility to negotiate mutually beneficial arrangements with potential investors, balancing their needs with Singapore's broader development objectives.

4. Encourage FDI in education and training infrastructure, particularly in areas of skill shortages

FDI from foreign educational institutions can complement public investment and help build a strong national education system.

The national education system in developing countries should be formulated and financed primarily by local entities to ensure sustainability and host country control. Nonetheless, these investments have increasingly been complemented by FDI from leading educational institutions based in developed countries. The direct benefits of such FDI include, among others, expanded enrolment, higher teaching and research standards, faster responses to short-term skill shortages, and financial savings to host country governments. This trend has become particularly common at the tertiary level.

UNCTAD (2009) identifies a variety of modes through which foreign universities can enter a host country. One mode is for them to export their services through distance learning programmes. Despite the potential for large-scale coverage, the services provided through this mechanism can often be inadequate. Collaborative modes take the form of associations or partnerships between universities in the home and host country, and typically involve more substantial contributions by foreign universities than export modes. Joint venture and wholly-owned subsidiary modes are differentiated from collaborative modes by the establishment of campuses in the host country. These modes entail a greater degree of commitment, including, for example, the training of host country faculty abroad. Some joint ventures can be established by

intergovernmental agreements e.g. between a foreign university (acting on behalf of the foreign government) and the host country government. In Singapore, for example, intergovernmental joint-training institutes were created in cooperation with the governments of Germany, Japan and France.

Major TNCs can also make strong contributions to local training infrastructure.

Making space for TNCs to create and manage training centres or research institutes, or to consult on broader educational initiatives, can translate their specialized knowledge into more effective training infrastructure. Motivated by a need for highly skilled graduates, TNC support for local training infrastructure manifests itself in the form of financial support to business schools and science facilities, as well as the provision of assistance and advice through membership of advisory boards, curriculum review committees, councils and senates (UNCTAD, 1994: 218).

In Canada, domestic and foreign investors are involved in managing many training and research institutions. For example, the MaRS facilities in Toronto and Integrated Aerospace Institute in Montreal rely heavily on the input from the private sector to tailor services and curricula to the specific needs of industry. In Singapore, contributions from foreign investors to local training infrastructure were even more important. The EDB worked closely with leading TNCs, including Tata, Rollei, and Phillips, establishing joint-training centres for specific industrial skill sets. Although public support was forthcoming, the TNCs were responsible for much of the initial curriculum, teaching resources, and faculty. These centres were a highly effective way to secure knowledge and skill transfers from foreign investors.

5. Flexible migration programmes allowing the entry of foreign skills are necessary to attract certain FDI projects

Flexible and targeted migration policies allow investors to overcome local skill shortages that could jeopardize their projects. A regularly updated list of skill shortages in all economic sectors allows foreign skills to enter the country on a selective basis.

Access to skilled workers is a key factor for many investment decisions. No economy can expect to be able to meet all current and future skill requirements associated with a given FDI project, particularly if the investment involves higher levels of technology in a competitive marketplace. In the absence of adequate local skills, flexible and focused migrant entry requirements are essential to a project's viability. Yet, achieving a balance between the legitimate interests of investors to have their necessary staff, and the national interest of citizen job protection, training, and advancement, is not an easy task.

Countries can adopt different approaches to introduce foreign labour to service FDI projects. For example, they can determine the number of positions open to foreign entry based on the value of capital invested in the country and, in some cases, the priority attached to attracting investment in a specific sector. UNCTAD (2005) recommends that countries adapt their entry system based on an assessment of corporate training efforts, to ensure that expatriate hiring goes hand in hand with local skills development. Under this system, countries would introduce an open list of skills shortages to be reviewed annually. Investors would be allowed to recruit foreign employees in these areas. However, the credentials of foreign workers would be verified by the immigration authorities, and their entry would be conditional on the company's commitment to training efforts for local staff.

The Canadian immigration system responds to skill demands in a number of ways: it has relatively liberal short-term entry provisions and provides for market-testing to fill systemic skill shortages. Moreover, there is a range of employer-sponsored entry programmes. There is general agreement among government and industry stakeholders in Canada that the ability of investors to bring in key executives, managers and technical personnel has enhanced the country's investment attractiveness. Singapore similarly focused on ensuring access to skilled foreign workers. It imposed nearly no restrictions or barriers to their entry. To simplify matters, foreign investors could negotiate the entry of foreign workers directly with the EDB during the FDI approval process.

FDI can act as a magnet for international talent, which, upon permanent settlement, adds to the national skill base.

Leading TNCs with well-known brand names, extensive human resource networks, and effective recruiting and training practices possess an advantage when it comes to drawing international talent. If these skilled workers settle in the country permanently, their foreign education and work experience is absorbed by the national skills base. In other words, there is potential for TNCs to work with immigration authorities to identify, select and channel highly skilled migrants into the host country. In Canada, for example, many foreign-born executives have settled in the country, having long since left the company that originally sponsored their entry. Canadian immigration policy is moving in this direction to facilitate and encourage such transitions from temporary to permanent status.

Although major TNCs have the capacity to attract highly skilled workers, perceptions of the host country environment are likely to affect long-term settlement decisions. In Singapore, during the 1980s, there was a significant increase in temporary migration, but permanent residence was not a significant feature of these

movements. This partly reflected the fact that professionals working for TNCs often had no settlement intentions. However, by the end of the 1990s, this trend had shifted, largely due to positive perceptions of the country as a place of residence.

6. Consider policies that promote the diffusion of foreign skills to the local economy

Provide incentives for foreign affiliates to undertake employee training.

Studies have shown that TNCs generally invest more in training than their local counterparts. They are also more aware of emerging trends in training, more able to use state-of-the-art training materials and techniques, and more likely to orient their training towards the needs of global markets (Miyamoto and Todo, 2003; UNCTAD, 2000). TNC training is important for developing countries since it brings in advanced skills and knowledge relatively unavailable to domestic firms. Even in low-wage operations in developing countries, where training efforts could be expected to be low, export-oriented TNCs still invest significant sums (UNCTAD, 1999: 275). This is because they must meet high standards of quality and delivery.

Although the needs of TNCs result in some spontaneous investments in employee training, it will often be below the optimal level. This is because these investments may be appropriated by other firms through labour mobility. Therefore, there is a strong case for governments to provide incentives for employee training. This usually includes sharing the financial burden, or offering other types of concessions. In general, financing schemes in developing countries can be categorised as follows (Batra, 2003): (a) levy-grant scheme, where payroll levies are later used by fund administrators to give grants to employers for approved training; (b) levy-rebate schemes, where payroll levies are later partially reimbursed for approved training; (c) levy-exemption schemes, where payroll levies

are exempt for employers that spend a given percentage of their payroll on training; and (d) tax-incentive schemes, where firms can deduct training expenditures to calculate their profit before tax.

Singapore's early employee training programmes were grant-based. They were typically available to both domestic and foreign companies, although the latter were targeted due to the greater potential for skill and knowledge transfer. The grants could be used in a variety of ways, including to sponsor the training of local workers overseas. Subsequently, a Skill Development Fund (SDF) was introduced, which has since become the main channel through which employee training is encouraged. Based on a levy-grant scheme, the Fund is financed through fees based on the use of unskilled labour (usually a share of salary). Employers can use the Fund to cover a substantial portion of training costs, although they must contribute as well to ensure that they have an interest in the outcome. By taxing unskilled labour and financing training, the SDF helped support Singapore's transition to more skill-intensive production. Other notable countries that have adopted a levy-grant scheme include Taiwan Province of China, Argentina, and Costa Rica.

Incentives for training can also be provided in kind. This can be seen in Singapore's ad hoc cooperation with TNCs to establish join-training centres (see above). Here, the EDB would typically provide land and buildings, machinery and equipment, as well as a share of operating costs for the centre, while the TNC would contribute much of the training materials. The TNC was also given first right to hire graduates from these centres, allowing it to recoup gains from its investments in worker training.

Develop active schemes to link foreign affiliates and local firms.

Beyond employee training, TNC contributions to the skills base can also come through vertical linkages with local firms. TNCs may train or provide technical support to domestic firms that supply

them with intermediate goods (backward linkages), or to buyers of their own products (forward linkages). There is significant evidence of such spillovers taking place in both developed and developing countries (UNCTAD, 2000; Lim, 2001). Foreign affiliates especially have an incentive to work with suppliers to improve the quality and cost of inputs into their production. In Canada, Rolls Royce, for example, operates an extensive internal supplier training programme which seeks to integrate small, local businesses into the company's supply chain.

Yet, as with employee training, foreign affiliates may be reluctant to transfer knowledge to local firms without compensation or control over its use. Moreover, there may be a lack of information on linkage opportunities. To correct for this, government programmes can match foreign and domestic firms and provide incentives to engage in such relationships. Singapore created the Local Industry Upgrading Programme (LIUP) for these purposes. The LIUP provided financial support for TNCs to train and upgrade their local suppliers. For example, the Programme paid the costs of seconding managers from STMicrosystems to local supplier companies to provide training and information on production processes and product standards. Subsequently, several of these suppliers developed into significant international player.

Other types of linkage between TNCs and local firms can be characterized as horizontal. These occur when firms in the same industry collaborate through research or skills development institutions. Support for these institutions from TNCs, in terms of infrastructure development, technical support, programme design, and advanced technologies, can bring benefits to participating local firms in the form of skill acquisition. Government policies to support spillovers through horizontal linkages can take the form of public investment in infrastructure and business services to support the co-location or "clustering" of domestic and foreign companies.

Increasing the geographic proximity of firms makes them more likely to collaborate and learn from each other.

The case of Canada provides a few examples of institutions encouraging horizontal linkages. The Medical and Related Sciences (MaRS) Centre in Toronto, for instance, consist of three buildings housing public research, as well as small technology companies and start-ups. Office and research facilities are available to resident enterprises, and they have on-site access to major pharmaceutical companies. Similarly, the recently created Integrated Aerospace Institute in Montreal houses three levels of education and brings together major domestic and foreign-owned companies to collaborate on programme design. Many of these same companies also participate in a research consortium involving eight engineering schools to encourage collaborative and pre-competitive research in the aerospace industry. These institutions provide a facilitative framework through which horizontal linkages can be established between foreign and domestic companies.

Horizontal linkages may also occur through the competition effects of TNC entry, which can prompt innovation, efficiency and technical improvements in domestic firms. Stronger competition urges host country firms either to use existing technologies and resources more efficiently, or to adopt new technologies and organizational practices (Glass and Saggi, 2002). Skill spillovers occur when increased competition leads local firms to train their workers or expose them to higher levels of technology. Representatives from the Conference Board of Canada emphasize the importance of this mechanism in the Canadian context.

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