United Nations Conference on Trade and Development

World Investment Report

2005 Transnational Corporations and the Internationalization of R&D

Overview

United Nations
New York and Geneva, 2005

Contents

World Investment Report 2005

Transnational Corporations and the Internationalization of R&D

Overview

END OF THE DOWNTURN

Led by developing countries, global FDI flows resumed growth in 2004 …

On account of a strong increase in foreign direct investment (FDI) flows to developing countries, 2004 saw a slight rebound in global FDI after three years of declining flows. At $648 billion, world FDI *inflows* were 2% higher in 2004 than in 2003. Inflows to developing countries surged by 40%, to $233 billion, but developed countries as a group experienced a 14% drop in their inward FDI. As a result, the share of developing countries in world FDI inflows was 36% (table 1), the highest level since 1997. The United States retained its position as the number one recipient of FDI, followed by the United Kingdom and China (figure 1).

Many factors help to explain why the growth of FDI was particularly pronounced in developing countries in 2004. Intense competitive pressures in many industries are leading firms to explore new ways of improving their competitiveness. Some of these ways are by expanding operations in the fast-growing markets of emerging economies to boost sales, and by rationalizing production activities with a view to reaping economies of scale and lowering production costs. Higher prices for many commodities have further stimulated FDI to countries that are rich in natural resources such as oil and minerals. In some developed as well as developing countries, increased inflows in 2004 were linked to an upturn in cross-border merger and acquisition (M&A) activity. Greenfield FDI continued to rise for the third consecutive year in 2004. Provided economic growth is maintained, the prospects for a further increase in global FDI flows in 2005 are promising.

FDI *outflows* increased in 2004 by 18%, to $730 billion, with firms based in developed countries accounting for the bulk ($637 billion). In fact, almost half of all outward FDI originated from three sources: the United

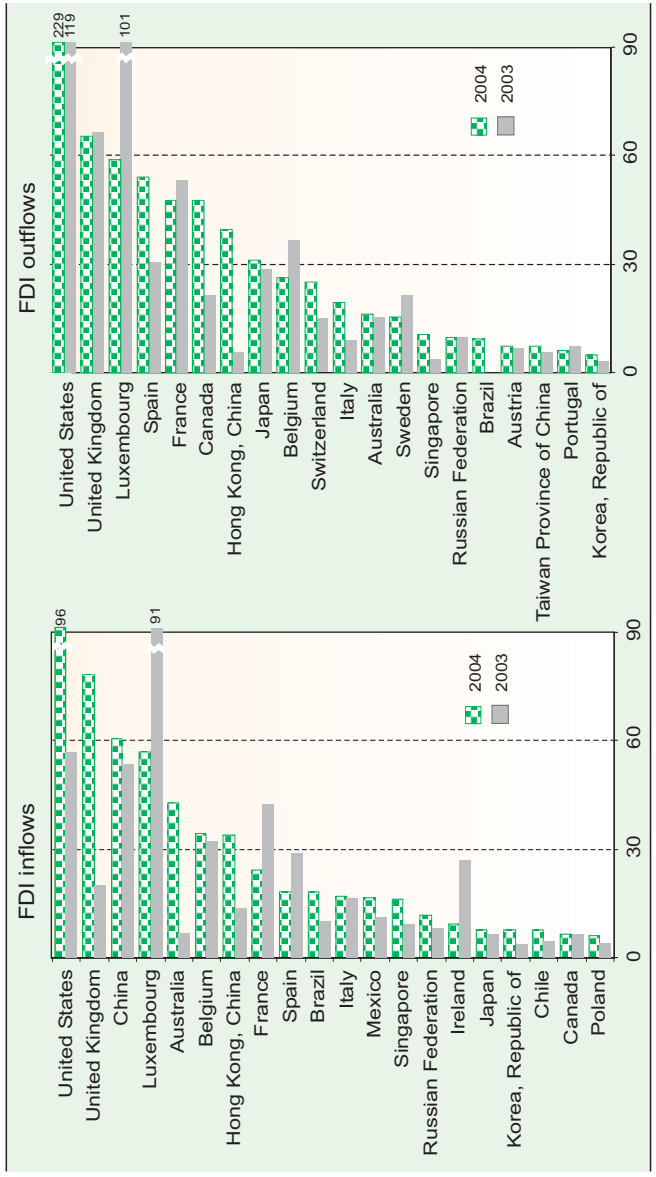
Table 1. FDI flows, by region and selected countries, 1993-2004

(Billions of dollars and per cent)

Region/country	FDI inflows								FDI outflows							
	1993-1998 (Annual average)	1999	2000	2001	2002	2003	2004		1993-1998 (Annual average)	1999	2000	2001	2002	2003	2004	
Developed economies	256.2	849.1	1 134.3	596.3	547.8	442.2	380.0		353.3	1 014.1	1 092.7	662.2	599.9	577.3	637.4	
Europe	147.3	520.4	722.8	393.9	427.6	359.4	223.4		218.1	763.5	866.1	451.3	396.9	390.0	309.5	
European Union	140.3	501.5	696.3	382.6	420.4	338.7	216.4		200.8	724.6	813.4	433.9	384.5	372.4	279.8	
United States	86.1	283.4	314.0	159.5	71.3	56.8	95.9		92.3	209.4	142.6	124.9	134.9	119.4	229.3	
Japan	1.3	12.7	8.3	6.2	9.2	6.3	7.8		21.4	22.7	31.6	38.3	32.3	28.8	31.0	
Other developed countries	21.5	32.5	89.2	36.7	39.6	19.6	52.9		21.5	18.5	52.5	47.7	35.8	39.1	67.6	
Developing economies	138.9	232.5	253.2	217.8	155.5	166.3	233.2		56.6	88.2	143.2	78.6	47.8	29.0	83.2	
Africa	7.1	11.9	9.6	20.0	13.0	18.0	18.1		2.3	2.5	1.6	- 2.6	0.4	1.2	2.8	
Latin America and the Caribbean	47.9	108.6	97.5	89.1	50.5	46.9	67.5		12.7	44.7	60.6	29.1	11.4	10.6	10.9	
Asia and Oceania	83.9	112.0	146.0	108.7	92.0	101.4	147.6		41.6	41.0	81.1	52.0	36.0	17.2	69.4	
Asia	83.4	111.6	145.7	108.6	92.0	101.3	147.5		41.6	41.1	81.1	52.0	36.0	17.2	69.4	
West Asia	3.5	1.9	3.8	7.1	5.7	6.5	9.8		0.2	1.6	1.4	1.1	0.9	- 4.0	0.0	
East Asia	51.6	77.3	116.2	78.7	67.3	72.1	105.0		31.7	29.8	72.0	26.1	27.6	14.4	53.5	
China	38.5	40.3	40.7	46.9	52.7	53.5	60.6		2.6	1.8	0.9	6.9	2.5	- 0.2	1.8	
South Asia	2.9	3.1	3.1	4.1	4.5	5.3	7.0		0.1	0.1	0.5	1.4	1.1	1.0	2.3	
South-East Asia	25.3	29.3	22.6	18.8	14.5	17.4	25.7		9.6	9.6	7.2	23.3	6.4	5.8	13.6	
Oceania	0.4	0.4	0.3	0.1	0.0	0.1	0.1		0.0	- 0.1	0.0	0.1	0.0	0.0	0.0	
South-East Europe and the CIS	6.6	10.5	9.1	11.8	12.8	24.1	34.9		1.3	2.6	3.2	2.7	4.5	10.6	9.7	
South-East Europe	1.6	3.7	3.6	4.5	3.8	8.4	10.8		0.1	0.1	0.0	0.2	0.6	0.1	0.2	
CIS	5.0	6.8	5.5	7.3	9.0	15.7	24.1		1.3	2.5	3.2	2.5	3.9	10.4	9.5	
World	401.7	1 092.1	1 396.5	825.9	716.1	632.6	648.1		411.2	1 104.9	1 239.1	743.5	652.2	616.9	730.3	
Memorandum: share in world FDI flows																
Developed economies	63.8	77.7	81.2	72.2	76.5	69.9	58.6		85.9	91.8	88.2	89.1	92.0	93.6	87.3	
Developing economies	34.6	21.3	18.1	26.4	21.7	26.3	36.0		13.8	8.0	11.6	10.6	7.3	4.7	11.4	
South-East Europe and the CIS	1.6	1.0	0.6	1.4	1.8	3.8	5.4		0.3	0.2	0.3	0.4	0.7	1.7	1.3	

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, annex table B.1.

Figure 1. Global FDI flows, top 20 economies,[a] 2003, 2004
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, annex table B.1.

[a] Ranked on the basis of the magnitude of 2004 FDI flows.

States, the United Kingdom and Luxembourg in that order (figure 1). Developed countries as a group remained significant net capital exporters through FDI; net outflows exceeded net inflows by $260 billion. While FDI outflows from the European Union (EU) declined by 25%, to $280 billion (a seven-year low), most other developed countries increased their investment abroad. In the case of the United States, outflows increased by over 90%, to $229 billion, a record high.

The stock of FDI in 2004 is estimated at $9 trillion. It is attributed to some 70,000 transnational corporations (TNCs) and their 690,000 affiliates abroad, with total sales by foreign affiliates amounting to almost $19 trillion (table 2). Ranked by foreign assets, General Electric (United States) remained the largest non-financial TNC worldwide, followed by Vodafone (United Kingdom) and Ford Motor (United States) (table 3). Among the top 100 TNCs worldwide, four companies, led by Hutchison Whampoa (Hong Kong, China), are based in developing economies (table 4).

The pace at which the top 100 TNCs are expanding internationally appears to have slowed down. Although their sales, employment and assets abroad all rose in absolute terms in 2003, their relative importance declined somewhat as activities in the home countries expanded faster. Japanese and United States TNCs are generally less transnationalized than their European counterparts. The top 50 TNCs based in developing economies (table 4), with a shorter history of outward expansion, are even less transnationalized, but the gap between TNCs from developed and developing countries is shrinking in this respect.

International investment in services, particularly financial services, continued to grow steadily, accounting for the bulk of the world FDI stock. The services sector accounted for 63% of the total value of cross-border M&As in 2004, with financial services responsible for one-third of the value of cross-border M&As in this sector. For the first time, this year's *WIR* ranks the top 50 financial TNCs. Large TNCs dominate world financial services, not only in terms of total assets but also in terms of the number of countries in which they operate. Citigroup (United States) tops the list, followed by UBS (Switzerland) and Allianz (Germany). Financial TNCs from France, Germany, Japan, the United Kingdom and the United States accounted for 74% of the total assets of the top 50 financial TNCs in 2003.

Low interest rates, higher profits and the recovery of asset prices, principally in developed countries, contributed to an upturn in M&As, including cross-border M&As; their value shot up by 28% to $381 billion. These transactions played an important part in the continued restructuring and consolidation process of many industries, especially in the developed

Table 2. Selected indicators of FDI and international production, 1982-2004
(Billions of dollars and per cent)

Item	Value at current prices (Billions of dollars) 1982	1990	2003	2004	Annual growth rate (Per cent) 1986-1990	1991-1995	1996-2000	2001	2002	2003	2004
FDI inflows	59	208	633	648	22.8	21.2	39.7	-40.9	-13.3	-11.7	2.5
FDI outflows	27	239	617	730	25.4	16.4	36.3	-40.0	-12.3	-5.4	18.4
FDI inward stock	628	1 769	7 987	8 902	16.9	9.5	17.3	7.1	8.2	19.1	11.5
FDI outward stock	601	1 785	8 731	9 732	18.0	9.1	17.4	6.8	11.0	19.8	11.5
Cross-border M&As [a]	..	151	297	381	25.9 [b]	24.0	51.5	-48.1	-37.8	-19.6	28.2
Sales of foreign affiliates	2 765	5 727	16 963 [c]	18 677 [c]	15.9	10.6	8.7	-3.0	14.6	18.8 [c]	10.1 [c]
Gross product of foreign affiliates	647	1 476	3 573 [d]	3 911 [d]	17.4	5.3	7.7	-7.1	5.7 [d]	28.4 [d]	9.5
Total assets of foreign affiliates	2 113	5 937	32 186 [e]	36 008 [e]	18.1	12.2	19.4	-5.7	41.1 [e]	3.0 [e]	11.9 [e]
Exports of foreign affiliates	730	1 498	3 073 [f]	3 690 [f]	22.1	7.1	4.8	-3.3 [f]	4.9 [f]	16.1 [f]	20.1 [f]
Employment of foreign affiliates (thousands)	19 579	24 471	53 196 [g]	57 394 [g]	5.4	2.3	9.4	-3.1	10.8 [g]	11.1 [g]	7.9 [g]
GDP (in current prices) [h]	11 758	22 610	36 327	40 671	10.1	5.2	1.3	-0.8	3.9	12.1	12.0
Gross fixed capital formation	2 398	4 905	7 853	8 869	12.6	5.6	1.6	-3.0	0.5	12.9	12.9
Royalties and licence fee receipts	9	30	93	98	21.2	14.3	8.0	-2.9	7.5	12.4	5.0
Exports of goods and non-factor services [h]	2 247	4 261	9 216	11 069	12.7	8.7	3.6	-3.3	4.9	16.1	20.1

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, table I.3.

[a] Data are only available from 1987 onward.
[b] 1987-1990 only.
[c] Based on the following regression result of sales against FDI inward stock (in millions of dollars) for the period 1980-2002: Sales=2 003.858+1.87288*FDI inward stock.
[d] Based on the following regression result of gross product against FDI inward stock (in millions of dollars) for the period 1982-2002: Gross product=622.0177+0.369482*FDI inward stock.
[e] Based on the following regression result of assets against FDI inward stock (in millions of dollars) for the period 1980-2002: Assets= -1 179.838+4.177434*FDI inward stock.
[f] For 1995-1998, based on the regression result of exports of foreign affiliates against FDI inward stock (in millions dollars) for the period 1982-1994: Exports=357.6124+0.558331*FDI inward stock. For 1999-2004, the share of exports of foreign affiliates in world exports in 1998 (33.3 per cent) was applied to obtain the values.
[g] Based on the following regression result of employment (in thousands) against FDI inward stock (in millions of dollars) for the period 1980-2002: Employment=16 552.15+4.587846*FDI inward stock.
[h] Based on data from the International Monetary Fund, *World Economic Outlook*, April 2005.

Table 3. The world's top 25 non-financial TNCs, ranked by foreign assets, 2003 [a]
(Millions of dollars and number of employees)

Ranking by: Foreign assets	TNI [b]	II [c]	Corporation	Home economy	Industry	Assets Foreign	Assets Total	Sales Foreign	Sales Total	Employment Foreign	Employment Total	TNI [b] (Per cent)	No. of affiliates Foreign	No. of affiliates Total	II [c]
1	77	37	General Electric	United States	Electrical & electronic equip.	258 900	647 483	54 086	134 187	150 000	305 000	43.2	1068	1398	76.39
2	7	95	Vodafone Group Plc	United Kingdom	Telecommunications	243 839	262 581	50 070	59 893	47 473	60 109	85.1	71	201	35.32
3	72	12	Ford Motor Company	United States	Motor vehicles	173 882	304 594	60 761	164 196	138 663	327 531	45.5	524	623	84.11
4	90	65	General Motors	United States	Motor vehicles	15 4466	448 507	51 627	185 524	104 000	294 000	32.5	177	297	59.60
5	10	78	British Petroleum Co. Plc	United Kingdom	Petroleum expl./ref./distr.	141 551	177 572	192 875	232 571	86 650	103 700	82.1	60	117	51.28
6	31	41	ExxonMobil Corp.	United States	Petroleum expl./ref./distr.	116 853	174 278	166 926	237 054	53 748	88 300	66.1	218	294	74.15
7	22	80	Royal Dutch/Shell Group	United Kingdom/ Netherlands	Petroleum expl./ref./distr.	112 587	168 091	129 864	201 728	100 000	119 000	71.8	454	929	48.87
8	68	94	Toyota Motor Corp.	Japan	Motor vehicles	94 164	189 503	87 353	149 179	89 314	264 410	47.3	124	330	37.58
9	16	48	Total	France	Petroleum expl./ref./distr.	87 840	100 989	94 710	118 117	60 931	110 783	74.1	419	602	69.60
10	62	69	France Telecom	France	Telecommunications	81 370	126 083	21 574	52 202	88 626	218 523	48.8	118	211	55.92
11	14	58	Suez	France	Electricity, gas and water	74 147	88 343	33 715	44 720	111 445	172 291	74.7	605	947	63.89
12	89	34	Electricite De France	France	Electricity, gas and water	67 069	185 527	16 062	50 699	51 847	167 309	32.9	204	264	77.27
13	80	63	E.On	Germany	Electricity, gas and water	64 033	141 260	18 659	52 330	29 651	69 383	41.2	478	790	60.51
14	85	74	Deutsche Telekom AG	Germany	Telecommunications	62 624	146 601	23 868	63 023	75 241	248 519	37.0	97	178	54.49
15	59	67	RWE Group	Germany	Electricity, gas and water	60 345	98 592	23 729	49 061	53 554	127 028	50.6	377	650	58.00
16	23	23	Hutchison Whampoa Ltd	Hong Kong, China	Diversified	59 141	80 340	10 800	18 699	104 529	126 250	71.4	1900	2350	80.85
17	32	40	Siemens AG	Germany	Electrical & electronic equip.	58 463	98 011	64 484	83 784	247 000	417 000	65.3	753	1011	74.48
18	53	46	Volkswagen Group	Germany	Motor vehicles	57 853	150 462	71 190	98 367	160 299	334 873	52.9	203	283	71.73
19	21	35	Honda Motor Co Ltd	Japan	Motor vehicles	53 113	77 766	54 199	70 408	93 006	131 600	72.0	102	133	76.69
20	34	89	Vivendi Universal	France	Diversified	52 421	69 360	15 764	28 761	32 348	49 617	65.2	106	238	44.54
21	42	83	ChevronTexaco Corp.	United States	Petroleum expl./ref./distr.	50 806	81 470	72 227	120 032	33 843	61 533	59.2	93	201	46.27
22	3	30	News Corporation	Australia	Media	50 803	55 317	17 772	19 086	35 604	38 500	92.5	213	269	79.18
23	65	29	Pfizer Inc	United States	Pharmaceuticals	48 960	116 775	18 344	45 188	73 200	122 000	47.5	73	92	79.35
24	93	85	Telecom Italia Spa	Italy	Telecommunications	46 047	101 172	6 816	34 819	14 910	93 187	27.0	33	73	45.21
25	50	18	BMW AG	Germany	Motor vehicles	44 948	71 958	35 014	47 000	26 086	104 342	54.0	129	157	82.17

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, annex table A.I.9.

[a] All data are based on the companies' annual reports unless otherwise stated.
[b] Ranking among top 100 TNCs worldwide. TNI, the abbreviation for Transnationality Index, is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment.
[c] Ranking among top 100 TNCs worldwide. II, the abbreviation for Internationalization Index, is calculated as the number of foreign affiliates divided by the number of all affiliates.

Note: Affiliates counted in this table refer to only majority-owned affiliates.

Table 4. The top 25 non-financial TNCs from developing economies, ranked by foreign assets, 2003[a]
(Millions of dollars, number of employees)

Ranking by: Foreign assets	TNI[b]	II[c]	Corporation	Home economy	Industry	Assets: Foreign	Assets: Total	Sales: Foreign	Sales: Total	Employment: Foreign	Employment: Total	TNI[b] (Per cent)	No. of affiliates: Foreign	No. of affiliates: Total	II[c]
1	7	41	Hutchison Whampoa Limited	Hong Kong, China	Diversified	59 141	80 340	10 800	18 699	104 529	126 250	71.4	1900	2350	80.85
2	27	39	Singtel Ltd.	Singapore	Telecommunications	17 911	21 668	4 672	68 848	8 642	21 716	43.1	23	30	76.67
3	42	35	Petronas - Petroliam Nasional Bhd	Malaysia	Petroleum expl./ref./distr.	16 114	53 457	8 981	25 661	3 625	30 634	25.7	167	234	71.37
4	26	48	Samsung Electronics Co., Ltd.	Republic of Korea	Electrical & electronic equip.	2 387	56 524	41 362	54 349	19 026	55 397	44.1	80	89	89.89
5	12	36	Cemex S.A.	Mexico	Construction Materials	11 054	16 021	5 189	7 167	17 051	25 965	69.0	35	48	72.92
6	23	37	América Móvil	Mexico	Telecommunications	8 676	13 348	3 107	7 649	8 403	18 471	50.4	12	16	75.00
7	31	24	China Ocean Shipping (Group) Co.	China	Transport and storage	8 457	18 007	6 076	9 163	4 600	64 586	40.1	22	56	39.29
8	46	7	Petroleo Brasileiro S.A. - Petrobras	Brazil	Petroleum expl./ref./distr.	7 827	53 612	8 665	42 690	5 810	48 798	15.6	13	79	16.46
9	25	47	LG Electronics Inc.	Republic of Korea	Electrical & electronic equip.	7 118	20 173	14 443	29 846	36 268	63 951	46.8	134	151	88.74
10	16	34	Jardine Matheson Holdings Ltd	Hong Kong, China	Diversified	6 159	8 949	5 540	8 477	57 895	110 000	62.3	16	23	69.57
11	10	14	Sappi Limited	South Africa	Paper	4 887	6 203	3 287	4 299	9 454	16 939	70.4	115	456	25.22
12	33	45	Sasol Limited	South Africa	Industrial chemicals	4 226	10 536	5 033	9 722	5 643	31 150	36.7	21	25	84.00
13	50	30	China National Petroleum Corp.	China	Petroleum expl./ref./distr.	4 060	97 653	5 218	57 423	22 000	1 167 129	5.0	119	204	58.33
14	22	2	Capitaland Limited	Singapore	Real estate	3 936	10 316	1 449	2 252	5 033	10 175	50.7	2	61	3.28
15	8	43	City Developments Limited	Singapore	Hotels	3 879	7 329	703	930	11 549	13 703	70.9	228	275	82.91
16	4	49	Shangri-La Asia Limited	Hong Kong, China	Hotels and motels	3 672	4 743	436	542	12 619	16 300	78.4	29	31	93.55
17	15	33	Citic Pacific Ltd.	Hong Kong, China	Diversified	3 574	7 167	2 409	3 372	8 045	12 174	62.5	2	3	66.67
18	45	16	CLP Holdings	Hong Kong, China	Electricity, gas and water	3 564	9 780	298	3 639	488	4 705	18.3	3	11	27.27
19	41	21	China State Construction Engineering Corp.	China	Construction	3 417	9 677	2 716	9 134	17 051	121 549	26.4	28	75	37.33
20	24	22	MTN Group Limited	South Africa	Telecommunications	3 374	4 819	1 308	3 595	2 601	6 063	49.8	6	16	37.50
21	2	26	Asia Food & Properties	Singapore	Food & beverages	3 331	3 537	1 232	1 273	32 295	41 800	89.4	2	4	50.00
22	11	46	Flextronics International Ltd.	Singapore	Electrical & electronic equip.	3 206	5 634	4 674	8 340	80 091	82 000	70.2	92	106	86.79
23	30	17	Companhia Vale do Rio Doce	Brazil	Mining & quarrying	3 155	11 434	6 513	7 001	224	29 632	40.5	16	55	29.09
24	29	10	YTL Corp. Berhad	Malaysia	Utilities	2 878	6 248	489	1 060	1 518	4 895	41.1	24	115	20.87
25	20	38	Hon Hai Precision Industries	Taiwan Province of China	Electrical & electronic equip.	2 597	6 032	4 038	10 793	78 575	93 109	54.9	25	33	75.76

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, annex table A.I.10.

a All data are based on the companies' annual reports unless otherwise stated.

b Ranking among top 50 TNCs based in developing countries. TNI, the abbreviation for Transnationality Index, is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment.

c Ranking among top 50 TNCs based in developing countries. II, the abbreviation for Internationalization Index, is calculated as the number of foreign affiliates divided by the number of all affiliates.

Note: Affiliates counted in this table refer to only majority-owned affiliates.

world. The largest M&A deal in 2004 was the acquisition of Abbey National (United Kingdom) by Santander Central Hispano (Spain), valued at $16 billion. In developing countries, cross-border M&As accounted for a more modest share of overall FDI activity, although firms from these countries were increasingly involved in M&As, including some high-profile cases. The upswing in FDI flows to developing countries was mainly associated with greenfield investments notably in Asia. China and India together accounted for about a half of all new registered greenfield (and expansion) projects in developing countries in 2004.

In terms of the three main forms of FDI financing, equity investment dominates at the global level. During the past decade, it has accounted for about two-thirds of total FDI flows. The shares of the other two forms of FDI — intra-company loans and reinvested earnings — were on average 23% and 12% respectively. These two forms fluctuate widely, reflecting yearly variations in profit and dividend repatriations or the need for loan repayment. There are notable differences in the pattern of FDI financing between developed and developing countries; reinvested earnings are consistently more important in the latter.

FDI continues to surpass other private capital flows to developing countries as well as flows of official development assistance (ODA). In 2004, it accounted for more than half of all resource flows to developing countries and was considerably larger than ODA. However, FDI is concentrated in a handful of developing countries, while ODA remains the most important source of finance in a number of other developing countries. This is particularly the case for most least developed countries (LDCs) even though FDI flows have surpassed ODA for individual countries in that group.

Countries continue to adopt new laws and regulations with a view to making their investment environments more investor friendly. Out of 271 such changes pertaining to FDI introduced in 2004, 235 involved steps to open up new areas to FDI along with new promotional measures (table 5). In addition, more than 20 countries lowered their corporate income taxes in their bid to attract more FDI. In Latin America and Africa, however, a number of policy changes tended to make regulations less favourable to foreign investment, especially in the area of natural resources.

At the international level, the number of bilateral investment treaties (BITs) and double taxation treaties (DTTs) reached 2,392 and 2,559 respectively in 2004, with developing countries concluding more such treaties with other developing countries. More international investment agreements were also concluded at the regional and global level, potentially contributing to greater openness towards FDI. The various international

Table 5. National regulatory changes, 1991-2004

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Number of countries that introduced changes in their investment regimes	35	43	57	49	64	65	76	60	63	69	71	70	82	102
Number of regulatory changes	82	79	102	110	112	114	151	145	140	150	208	248	244	271
of which:														
More favourable to FDI [a]	80	79	101	108	106	98	135	136	131	147	194	236	220	235
Less favourable to FDI [b]	2	-	1	2	6	16	16	9	9	3	14	12	24	36

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, table I.14.

[a] Includes liberalizing changes or changes aimed at strengthening market functioning, as well as increased incentives.
[b] Includes changes aimed at increasing control, as well as reducing incentives.

agreements are generally becoming more and more sophisticated and complex in content, and investment-related provisions are increasingly introduced into agreements encompassing a broader range of issues. There is also a rise in investor-State disputes, paralleling the proliferation of international investment agreements.

...with the Asia and Oceania region the largest recipient as well as source of FDI among developing countries.

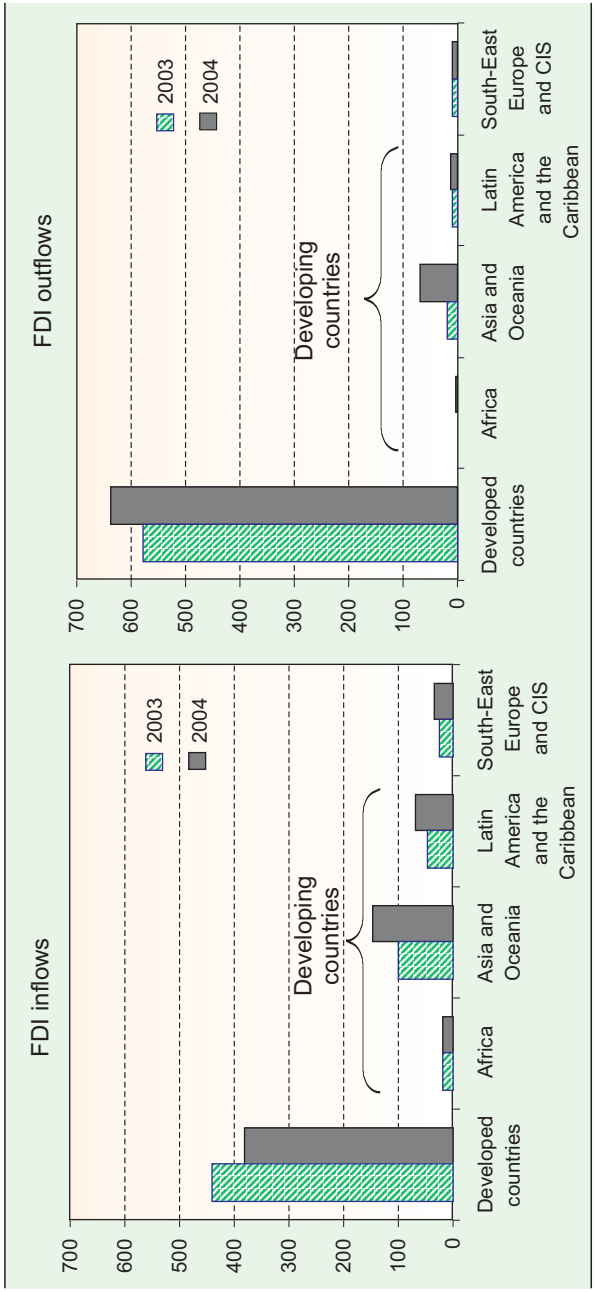
The upturn in global FDI was marked by significant differences between countries and regions (figure 2 and table 1). *Asia and Oceania* (for definition, see box 1) was again the top destination of FDI flows to developing regions. It attracted $148 billion of FDI, $46 billion more than in 2003, marking the largest increase ever. East Asia saw a 46% increase in inflows, to reach $105 billion, driven largely by a significant increase in flows to Hong Kong (China). In South-East Asia, FDI surged by 48% to $26 billion, while South Asia, with India at the forefront, received $7 billion, corresponding to a 30% rise. FDI inflows to West Asia grew even more, rising from $6.5 billion to $9.8 billion, of which more than half was concentrated in Saudi Arabia, the Syrian Arab Republic and Turkey. China

Box 1. Changes in geographical groupings used in *WIR05*

Major changes in the classification of groups of economies have been introduced by the United Nations Statistical Division. The EU now has 25 members, including the 10 countries that became new members on 1 May 2004. Eight countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia) have been reclassified from Central and Eastern Europe (CEE) to EU, and Cyprus from West Asia to EU. Malta has now been reclassified from "other developed countries" to EU. These ten countries are now included among the "developed countries". After the reclassification of the eight EU-accession countries from CEE as developed countries, the remaining CEE countries, along with countries formerly in the group Central Asia (under developing countries) are now classified under South-East Europe in a new grouping comprising South-East Europe and the Commonwealth of Independent States (CIS). CIS includes all of the former republics that were part of the former USSR except the Baltic States. In addition to the reclassifications mentioned above, the nomenclature used for the developing Pacific Island countries classified in previous *WIRs* under the Pacific subregion of the Asia-Pacific region is changed to "Oceania".

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, box I.2.

Figure 2. FDI flows by region, 2003, 2004
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, figure II.1.

continued to be the largest developing-country recipient with $61 billion in FDI inflows.

The Asia and Oceania region is also emerging as an important source of FDI. In 2004 the region's outward flows quadrupled to $69 billion, due mainly to dramatic growth in FDI from Hong Kong (China) but also to increased investments by TNCs from other parts of East Asia and South-East Asia. Most of these investments are intraregional, taking place especially among the economies of East and South-East Asia. However, interregional investment from Asian economies also increased. For example, a key driver of Chinese outward FDI was the growing demand for natural resources. This has led to significant investment projects in Latin America. Indian TNCs also invested large amounts in natural resources in other regions, primarily in African countries and the Russian Federation. Asian investment in developed countries is on the rise as well: the past year in particular has seen a few sizeable acquisitions of United States and EU firms by Chinese and Indian TNCs — such as the acquisition by Lenovo (China) of the personal computers division of IBM (United States).

The growth of both inward and outward FDI flows in Asia and Oceania is being facilitated by various policy changes at the national and regional levels. For example, the Association of Southeast Asian Nations (ASEAN) and China signed an agreement to establish a free trade area by 2010, and several Asian countries signed free trade agreements with the United States.

FDI rebounded in Latin America following four years of decline...

Following four years of continuous decline, FDI flows to Latin America and the Caribbean registered a significant upsurge in 2004, reaching $68 billion — 44% above the level attained in 2003. Economic recovery in the region, stronger growth in the world economy and higher commodity prices were contributing factors. Brazil and Mexico were the largest recipients, with inflows of $18 billion and $17 billion respectively. Together with Chile and Argentina they accounted for two-thirds of all FDI flows into the region in 2004. However, FDI inflows did not increase in all the countries of Latin America. There were notable declines in Bolivia and Venezuela, mainly linked to uncertainty regarding legislation related to oil and gas production. In Ecuador the completion of the crude oil pipeline construction explained the decrease in FDI inflows. A number of countries modified their legislation and tax regimes to increase the State's share in revenues from non-renewable natural resources. It is still too early to assess

the impact of these changes on the volume of FDI. Significant projects remain under development and additional ones were announced during 2004.

The sectoral composition of inward FDI to parts of Latin America and the Caribbean appears to be changing. For several countries of the region, natural resource and manufacturing industries became more popular FDI destinations than services in 2004. In Argentina, Brazil and Mexico, manufacturing attracted more FDI than services. FDI in Mexico's *maquiladora* industry surged by 26% in response to growing demand in the United States after three consecutive years of decline. The completion of most privatization programmes, coupled with financial difficulties facing foreign investors in the aftermath of the recent financial crisis and the ensuing economic stagnation in some countries, reduced the attractiveness of the services sector for FDI in Latin America. Firms in that sector suffered the most from the impact of the economic crisis, facing serious problems in reducing their large foreign-currency liabilities while at the same time being unable (owing to the non-tradability of their activities) to shift towards export-oriented production. In Central America and the Caribbean, however, renewed privatization activity made services the largest FDI recipient sector. In the Andean Community, high oil and mineral prices sustained the position of the primary sector as the main recipient of FDI flows.

... remained stable in Africa ...

FDI flows to Africa remained at almost the same level — $18 billion — as in 2003. FDI in natural resources was particularly strong, reflecting the high prices of minerals and oil and the increased profitability of investment in the primary sector. High and rising prices of petroleum, metals and minerals induced TNCs to maintain relatively high levels of investment in new exploration projects or to escalate existing production. Several large cross-border M&As were concluded in the mining industry last year. Despite these developments Africa's share in FDI flows worldwide remains low, at 3%.

Angola, Equatorial Guinea, Nigeria, Sudan (all rich in natural resources) and Egypt were the top recipients, accounting for a little less than half of all inflows to Africa. While FDI inflows to the last three rose, those to South Africa, another important FDI recipient, fell. LDCs in Africa received small amounts: around $9 billion in total in 2004. Most investment in Africa originated from Europe, led by investors from France, the Netherlands and the United Kingdom, and from South Africa and the United States; together these countries accounted for more than half of the region's inflows. FDI outflows from Africa more than doubled in 2004, to $2.8 billion.

A renewed wave of FDI-friendly measures and initiatives at national and international levels has sought to facilitate and attract more FDI to the African continent. At the national level, many measures focused on liberalizing legal frameworks and improving the overall environment for FDI. However, failure to move rapidly on economic and social policies important for attracting and retaining FDI, and a weak emphasis on capacity building, have hampered the ability of many countries in the region to attract FDI, in particular in manufacturing. Thus far, international market-access measures and initiatives targeting African countries (such as the United States' African Growth and Opportunity Act) overall have not been very successful in increasing FDI. In order to realize the potential for increased FDI and to derive greater benefits from it, African countries generally need to develop stronger industrial and technological capabilities.

The need for international support to Africa's development has been stressed in several recent initiatives. For example, the Commission for Africa (established by the United Kingdom) released a report in March 2005 recommending a substantial increase in aid to Africa: an additional $25 billion per year to be implemented by 2010. It also proposed several measures that could help the continent attract more FDI and enhance its benefits for development. Specifically the report called for donors to double their funding for infrastructure, adopt a 100% external debt cancellation, support an Investment Climate Facility for Africa under the New Economic Partnership for Africa's Development (NEPAD) initiative, and create a fund that would provide insurance to foreign investors in post-conflict countries in Africa.

... and increased in South-East Europe and the CIS for the fourth consecutive year.

FDI inflows to South-East Europe and the CIS**,** a new group of conomies under the United Nations reclassification (box 1), recorded a fourth year of growth in 2004, reaching an all-time high of $35 billion. This was the only region to escape the three-year decline (2001-2003) in world FDI flows, and it maintained robust growth in inward FDI in 2004 (more than 40%). Trends in inward FDI to the two subregions have differed somewhat, however, reflecting the influence of various factors. In South-East Europe, FDI inflows started to grow only in 2003. Led by large privatization deals, these inflows nearly tripled, to $11 billion in 2004. In the CIS, inflows grew from $5 billion in 2000 to $24 billion in 2004, benefiting largely from the high prices of petroleum and natural gas. The Russian Federation is the largest recipient of FDI inflows in the region.

By contrast, FDI inflows to developed countries continued to decline.

FDI flows into developed countries, which now include the 10 new EU members (see box 1), fell to $380 billion in 2004. The decline was less sharp than in 2003, possibly suggesting a bottoming out of the downward trend that started in 2001. The decline pertained to many major host countries in the developed world. However, there were some significant exceptions; the United States and the United Kingdom recorded substantial increases in inflows mainly as a result of cross-border M&As. Meanwhile, investment outflows from developed countries turned upwards again in 2004 to reach $637 billion.

FDI flows into the EU as a whole fell to $216 billion — the lowest level since 1998. However, the performance of individual EU members varied, with Denmark, Germany, the Netherlands and Sweden registering the most significant declines. To some extent the persistence of the downward FDI trend in the EU reflected large repayments of intra-company loans and repatriation of earnings in a few members. At the same time, FDI inflows into all the 10 new EU countries increased, attracted by high rates of economic growth, the availability of skilled human resources at competitive costs and reduced uncertainty with regard to the regulatory framework for FDI following EU accession. Flows into Japan surged by 24% to $8 billion, while those to other developed countries (Israel, New Zealand, Norway and Switzerland) declined.

Further increases in FDI are expected.

Prospects for FDI worldwide appear to be favourable for 2005. For 2006, global FDI flows can be expected to rise further if economic growth is consolidated and becomes more widespread, corporate restructuring takes hold, profit growth persists and the pursuit of new markets continues. The continued need of firms to improve their competitiveness by expanding into new markets, reducing costs and accessing natural resources and strategic assets abroad provides strong incentives for further FDI in developing countries in particular. Also, the improved profitability of TNCs is likely to trigger greater M&A activity, which should also push up the levels of FDI in developed countries.

Surveys of TNCs, experts and investment promotion agencies (IPAs) undertaken by UNCTAD corroborate this relatively optimistic picture, as do the findings of other recent surveys. In the UNCTAD surveys, more than half of the responding TNCs as well as experts and four-fifths of the IPAs

expected short-term (2005-2006) growth in FDI flows; very few predicted a decline of FDI in the near future. The competitive pressure on firms, continued offshoring of services, ongoing liberalization and the growth of TNCs from emerging markets were identified as factors that should lead to more FDI.

At the same time, there are grounds for caution in forecasting FDI flows. The slowdown of growth in some developed countries, along with structural weaknesses and financial and corporate vulnerabilities in some regions, continue to hinder a strong recovery of FDI growth. Continuing external imbalances in many countries and sharp exchange-rate fluctuations, as well as high and volatile commodity prices, pose risks that may hinder global FDI flows.

There is some variation in the FDI prospects of individual regions. In view of the improved economic situation in Asia and Oceania, its important role as a global production centre, its improved policy environment and significant regional integration efforts, the prospects for FDI flows to that region are strongly positive. According to the TNCs, experts and IPAs surveyed by UNCTAD, the region's outlook for FDI is bright. FDI inflows to Latin America and the Caribbean are expected to increase in 2005-2006 as most of the driving forces behind FDI growth in 2004 are set to continue. Prospects are also positive for Africa, partly as a result of higher commodity prices and Africa's natural resource potential. One out of four TNC respondents expected that inflows to Africa would increase in 2005-2006, suggesting more cautious optimism vis-à-vis this region.

FDI inflows into South-East Europe and the CIS are expected to grow further in the near future, based on the expectation that their competitive wages, in particular in South-East Europe, could attract an increasing number of efficiency-seeking or export-oriented projects, while the natural-resource-rich CIS countries could benefit from continued high oil and gas prices.

Despite the decline in 2004, prospects for renewed growth in both inward and outward FDI flows for developed countries in 2005 remain positive, underpinned by forecasts of moderate economic growth and a strong pick-up in corporate profits. Already, during the first six months of 2005, cross border M&As in developed countries increased significantly. For the largest recipient country — the United States — prospects for FDI are good, although the inflows may not reach the high levels recorded in 2004.

R&D INTERNATIONALIZATION AND DEVELOPMENT

TNCs are internationalizing R&D, including in developing countries …

WIR05 focuses on the internationalization of research and development (R&D) by TNCs. This is not a new phenomenon. When expanding internationally, firms have always needed to adapt technologies locally to sell successfully in host countries. In many cases, some internationalization of R&D has been necessary to accomplish this. However, it was traditionally the case that R&D was reserved for the home countries of the TNCs. By contrast, now a number of new features are emerging in the internationalization process. In particular, for the first time, TNCs are setting up R&D facilities outside developed countries that go beyond adaptation for local markets; increasingly, in some developing and South-East European and CIS countries, TNCs' R&D is targeting global markets and is integrated into the core innovation efforts of TNCs.

Consider the following illustrations. Since 1993 when Motorola established the first foreign-owned R&D lab in China, the number of foreign R&D units in that country has reached some 700. The Indian R&D activities of General Electric — the largest TNC in the world — employ 2,400 people in areas as diverse as aircraft engines, consumer durables and medical equipment. Pharmaceutical companies such as Astra-Zeneca, Eli Lilly, GlaxoSmithKline, Novartis, Pfizer and Sanofi-Aventis all run clinical research activities in India. From practically nothing in the mid-1990s, the contribution by South-East and East Asia to global semiconductor design reached almost 30% in 2002. STMicroelectronics has some of its semiconductor design done in Rabat, Morocco. General Motors (GM) in Brazil competes with other GM affiliates in the United States, Europe and Asia for the right to design and build new vehicles and carry out other core activities for the global company. There are many such examples.

In theory, the internationalization of R&D into developing countries is both expected and unexpected. It is expected for two reasons. First, as TNCs increase their production in developing countries, some R&D (of the adaptive kind) can be expected to follow. Second, R&D is a form of service activity and like other services, it is "fragmenting", with certain segments being located where they can be performed most efficiently. Indeed, according to a survey of Europe's largest firms conducted in 2004 by UNCTAD and Roland Berger, all service functions — including R&D — are

now candidates for offshoring. It is unexpected in that R&D is a service activity with very demanding skill, knowledge and support needs, traditionally met only in developed countries with strong national innovation systems. Moreover, R&D is taken to be the least "fragmentable" of economic activities because it involves knowledge that is strategic to firms, and because it often requires dense knowledge exchange (much of it tacit) between users and producers within localized clusters.

It is clear that, to date, only a small number of developing countries and economies in transition are participating in the process of R&D internationalization. However, the fact that some are now perceived as attractive locations for highly complex R&D indicates that it is possible for countries to develop the capabilities that are needed to connect with the global R&D systems of TNCs. From a host-country perspective, R&D internationalization opens the door not only for the transfer of technology created elsewhere, but also for the technology creation process itself. This may enable some host countries to strengthen their technological and innovation capabilities. But it may also widen the gap with those that fail to connect with the global innovation network.

…with important implications for innovation and development.

Innovative activity is essential for economic growth and development. Moreover, sustainable economic development requires more than simply "opening up" and waiting for new technologies to flow in. It demands continuous technological effort by domestic enterprises, along with supportive government policies. With the increasing knowledge-intensity of production, the need to develop technological capabilities is growing. Greater openness to trade and capital flows does not reduce the imperative of local technological effort. On the contrary, liberalization, and the open market environment associated with it, have made it necessary for firms — be they large or small, in developed or developing countries — to acquire the technological and innovative capabilities needed to become or stay competitive.

R&D is only one source of innovation, but it is an important one. It takes various forms: basic research, applied research and product and process development. While basic research is mainly undertaken by the public sector, the other two forms are central to the competitiveness of many firms. In the early stages of technological activity enterprises do not need formal R&D departments. As they mature, however, they find it increasingly important to monitor, import and implement new technologies. The role of

formal R&D grows as a firm attempts significant technological improvements and tackles product or process innovation. For complex and fast-moving technologies it is an essential part of the technological learning process.

But the process of acquiring technological capabilities is slow and costly. Technical change and advanced science-based technologies in many industries call for more high-level skills and intense technical effort. These require better infrastructure, not least in information and communication technologies (ICTs). They also require strong supporting institutions, as well as stable and efficient legal and governance systems. Finally, they require access to the international knowledge base, combined with a strategy to leverage this access for the benefit of local innovation systems. The cumulative forces that are increasing the gap between countries with respect to innovation make the role of policy increasingly important at both the national and international levels.

There are large differences in countries' capabilities to innovate and benefit from the R&D internationalization process. According to a new measure of national innovation capabilities — the UNCTAD Innovation Capability Index — the differences appear to be growing over time (table 6). Developed countries fall into the high capability group, as do Taiwan Province of China, the Republic of Korea and Singapore, along with some of the economies of South-East Europe and the CIS. The medium capability group comprises the remaining economies in transition, most of the resource-rich and newly industrializing economies and two sub-Saharan African economies (Mauritius and South Africa). The low capability group contains most of the sub-Saharan African countries as well as several countries in North Africa, West Asia and Latin America. Among developing countries, South-East and East Asia are the leaders in innovation capability, while the position of Latin America and the Caribbean has deteriorated over time and has been overtaken by North Africa and West Asia.

Table 6. Regional unweighted averages for the UNCTAD Innovation Capability Index

Region	1995	2001
Developed countries (excl. the new EU members)	0.876	0.869
The new EU members	0.665	0.707
South-East Europe and CIS	0.602	0.584
South-East and East Asia	0.492	0.518
West Asia and North Africa	0.348	0.361
Latin America and the Caribbean	0.375	0.360
South Asia	0.223	0.215
Sub-Saharan Africa	0.157	0.160

Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, table III.6.

The innovative capabilities of a country are directly relevant to its attractiveness as a host country for R&D by TNCs, as well as to its ability to benefit from such R&D. The quality of R&D performed abroad depends on local capabilities of the host country. The same applies to the resulting externalities in terms of how much local firms and institutions are able to absorb and learn from exposure to best practice R&D techniques and skills. Whether or not R&D deepens over time, and how far it spreads over different activities, are the result of an interactive process between the TNCs and local actors in the host economy, and this process is in turn affected by the institutional framework and government policies of the host country.

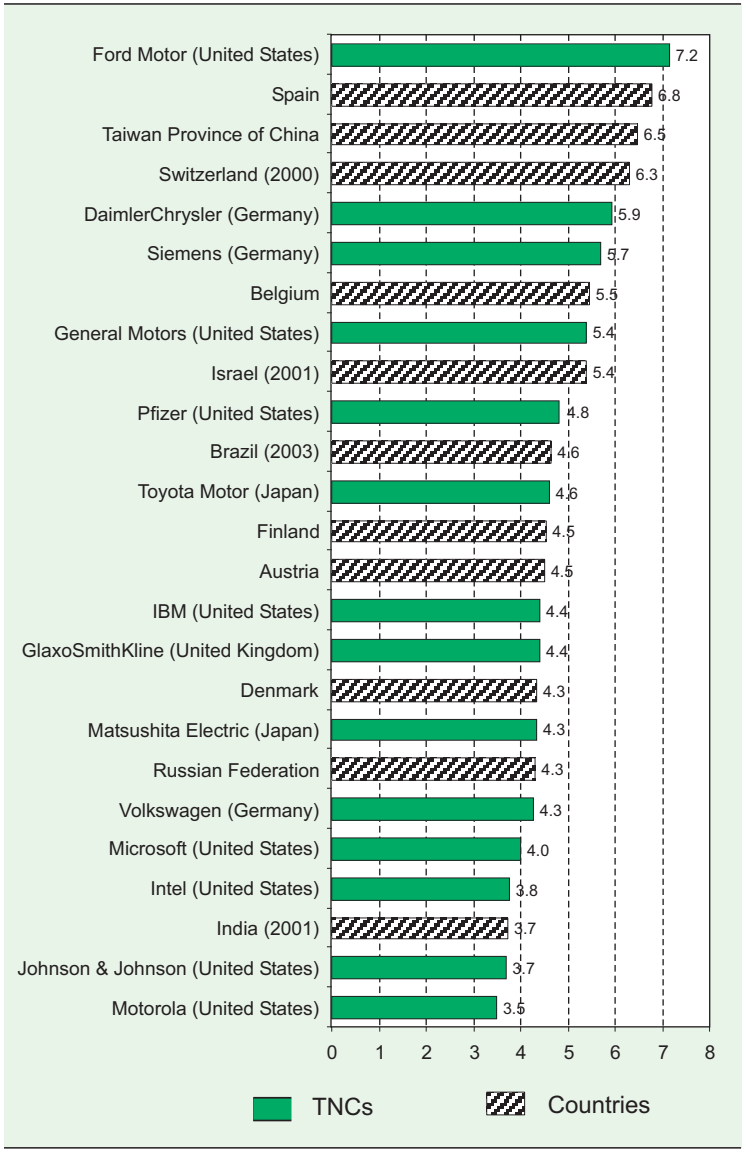
TNCs are the drivers of global R&D.

Global R&D expenditure has grown rapidly over the past decade to reach some $677 billion in 2002. It is highly concentrated. The top ten countries by such expenditure, led by the United States, account for more than four-fifths of the world total. Only two developing countries (China and the Republic of Korea) feature among the top ten. However, the share of developed countries fell from 97% in 1991 to 91% in 2002, while that of developing Asia rose from 2% to 6%. Similarly, there has been a rise in innovation outputs (as measured by the number of patents issued). For example, between the two time periods of 1991-1993 and 2001-2003, the share of foreign patent applications from developing countries, South-East Europe and the CIS to the United States Patent and Trademark Office, jumped from 7% to 17%.

TNCs are key players in this process. A conservative estimate is that they account for close to half of global R&D expenditures, and at least two-thirds of business R&D expenditures (estimated at $450 billion). These shares are considerably higher in a number of individual economies. In fact, the R&D spending of some large TNCs is higher than that of many countries (figure 3). Six TNCs (Ford, Pfizer, DaimlerChrysler, Siemens, Toyota and General Motors) spent more than $5 billion on R&D in 2003. In comparison, among the developing economies, total R&D spending came close to, or exceeded, $5 billion only in Brazil, China, the Republic of Korea and Taiwan Province of China. The world's largest R&D spenders are concentrated in a few industries, notably IT hardware, the automotive industry, pharmaceuticals and biotechnology.

The R&D activities of TNCs are becoming increasingly internationalized. This trend is apparent for all home countries, but starts from different levels. In the case of United States TNCs, the share of R&D of their majority-owned foreign affiliates in their total R&D rose from 11% in 1994 to 13% in 2002. German TNCs set up more foreign R&D units in the

Figure 3. R&D expenditure by selected TNCs and economies, 2002
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, figure IV.1.

1990s than they had done in the preceding 50 years. The share of foreign to total R&D in Swedish TNCs shot up from 22% to 43% between 1995 and 2003.

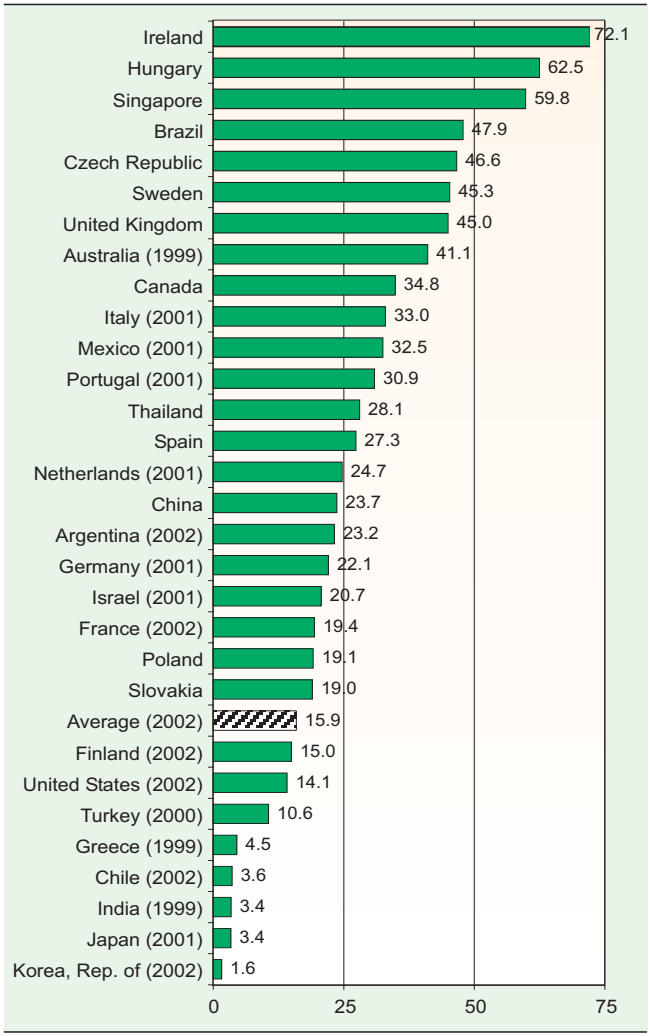
Reflecting the increased internationalization of R&D, foreign affiliates are assuming more important roles in many host countries' R&D activities. Between 1993 and 2002 the R&D expenditure of foreign affiliates worldwide climbed from an estimated $30 billion to $67 billion (or from 10% to 16% of global business R&D). Whereas the rise was relatively modest in developed host countries, it was quite significant in developing countries: the share of foreign affiliates in business R&D in the developing world increased from 2% to 18% between 1996 and 2002. The share of R&D by foreign affiliates in different countries varies considerably. In 2003 foreign affiliates accounted for more than half of all business R&D in Ireland, Hungary and Singapore and about 40% in Australia, Brazil, the Czech Republic, Sweden and the United Kingdom. Conversely, it remained under 10% in Chile, Greece, India, Japan and the Republic of Korea (figure 4). Other indicators, such as the rising number of R&D alliances and growing patenting activity, similarly confirm the increased internationalization of R&D activities in developing countries.

Their R&D is growing particularly fast, though unevenly, in developing countries …

The share of host developing countries in the global R&D systems of TNCs is rising, but unevenly. Only a few economies have attracted the bulk of the R&D activity. Developing Asia is the most dynamic recipient. In the case of R&D expenditures by majority-owned foreign affiliates of United States TNCs, for example, the share of developing Asia soared from 3% in 1994 to 10% in 2002. The increase was particularly noticeable for China, Singapore, Hong Kong (China) and Malaysia. In the foreign R&D activities of Swedish TNCs the share of countries outside the Triad more than doubled, from 2.5% in 1995 to 7% in 2003. Survey findings and other data for Germany and Japan support the growing importance of developing countries and some economies in transition as locations for TNCs' R&D.

Official statistics generally suffer from time lags, and may not fully capture the pace of R&D internationalization. More recent data on FDI projects indicate that the expansion of R&D to new locations is gaining momentum. Of 1,773 FDI projects involving R&D worldwide during the period 2002-2004 for which information was available, the majority (1,095) was in fact undertaken in developing countries or in South-East Europe and the CIS. Developing Asia and Oceania alone accounted for close to half of the world total (861 projects). A survey of the world's largest R&D

Figure 4. Share of foreign affiliates in business R&D, selected countries, 2003 or latest year available
(Per cent)



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, figure IV.5.

Note: In Argentina, Chile, Israel, theRepublic of Korea and Mexico, the R&D expenditure of United States-owned affiliates has been used as a proxy for the R&D spending of all foreign affiliates. In India, the share of foreign affiliates in total R&D spending has been used as a proxy for their share in business R&D spending.

spenders conducted by UNCTAD during 2004-2005 also shows the growing importance of new R&D locations. More than half of the TNCs surveyed already have an R&D presence in China, India or Singapore. In South-East Europe and the CIS, the Russian Federation was the only significant target economy mentioned by the responding firms as hosting R&D activities (figure 5).

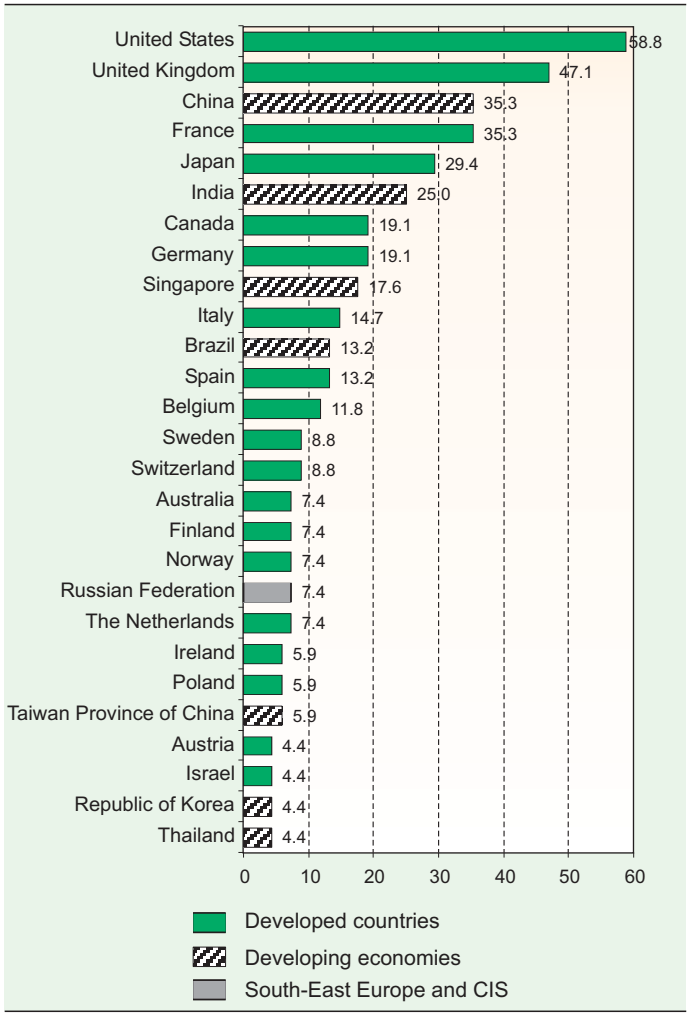
In the same survey, as many as 69% of the firms stated that the share of foreign R&D was set to increase; only 2% indicated the opposite, while the remaining 29% expected the level of internationalization to remain unchanged. The momentum appears to be particularly strong among companies based in Japan and the Republic of Korea, which until recently, have not been internationalizing their R&D to any large extent. For example, nine out of ten Japanese companies in the sample planned to increase their foreign R&D, while 61% of European firms stated such intentions. A further shift in terms of R&D locations towards some developing, South-East European and CIS markets is also envisaged (figure 6). China is the destination mentioned by the largest number of respondents for future R&D expansion, followed by the United States. In third place is India, another significant newcomer location for R&D. Other developing economies mentioned as candidates for further R&D by some respondents include the Republic of Korea, Singapore, Taiwan Province of China, Thailand and Viet Nam. Very few respondents indicated any plans to expand R&D to Latin America or Africa. The Russian Federation was also among the top 10 target locations.

Another new and notable trend in the internationalization of R&D is the emergence and fast growth of foreign R&D activities of developing-country TNCs. This trend is driven by the need to access advanced technologies and to adapt products to major export markets. Some of these TNCs are targeting the knowledge base of developed countries, while others are setting up R&D units in other developing economies.

... and the type of R&D undertaken varies by region.

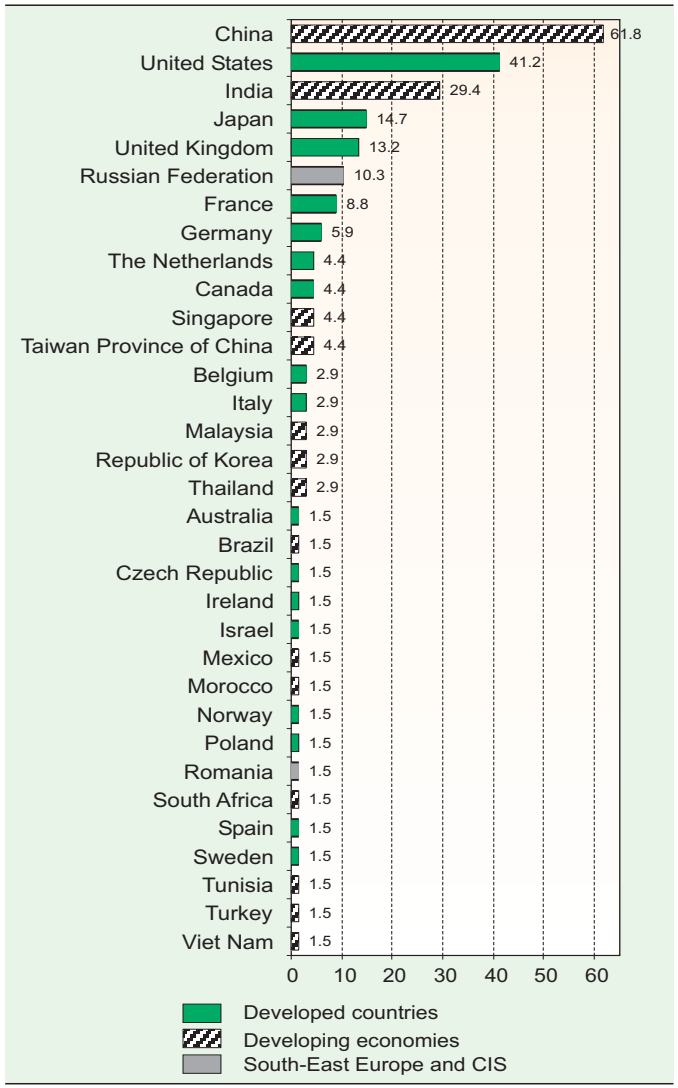
The R&D conducted in different locations varies considerably by region and economy. For example, in 2002, three-quarters of the R&D of United States majority-owned foreign affiliates in developing Asia were related to computers and electronic products, while in India over three-quarters of their R&D expenditure went into services (notably related to software development). In Brazil and Mexico, chemicals and transport equipment together accounted for over half of all R&D by United States foreign affiliates.

Figure 5. Current foreign locations of R&D in the UNCTAD survey, 2004
(Per cent)



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, figure IV.8.

Figure 6. Most attractive prospective R&D locations in the UNCTAD survey, 2005-2009
(Per cent of responses)



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, figure IV.11.

Moreover, TNCs carry out different types of R&D abroad. Foreign affiliates of TNCs may undertake *adaptive R&D*, which ranges from basic production support to the modifying and upgrading of imported technologies. *Innovative R&D* involves the development of new products or processes for local, regional or (eventually) global markets. *Technology monitoring* units are established to keep abreast of technological development in foreign markets and to learn from leading innovators and clients there.

While it is difficult to quantify R&D by type, among developing host economies the evidence points to the predominance of Asia in innovative R&D for international markets. R&D activities in selected Asian economies such as China, India, the Republic of Korea and Taiwan Province of China are becoming increasingly important within the global R&D networks of TNCs. Examples include the Toyota Technical Center Asia Pacific in Thailand, Motorola's R&D network in China and Microsoft's sixth global research centre in Bangalore, India. Some of the innovative R&D conducted there is at the cutting edge. The semiconductor industry is an example. One of the earliest to move production into developing countries, it has also been among the first to move advanced design to selected developing economies in Asia. Some of the design is done by foreign affiliates and some by local firms. A few firms from the Republic of Korea and Taiwan Province of China, and to a lesser extent from China and India, for instance, are now at the technology frontier of design work.

TNCs have so far located limited R&D in Latin America and the Caribbean. Relatively little FDI in Latin America and the Caribbean is in R&D-intensive activities; when it is, the R&D conducted is mostly confined to the adaptation of technology or products for local markets, called "tropicalization" in the Latin American context. Some important exceptions exist in Brazil and Mexico in particular. In Africa, the R&D component of FDI is generally very low; with the exception of some countries such as Morocco and, especially, South Africa, R&D by TNCs is virtually non-existent. This is partly because of weak domestic R&D capabilities, and in many cases the absence of institutional mechanisms that create sufficient incentives for investors to devote resources to R&D.

In some of the new EU members, foreign affiliates have emerged as important R&D players. In the Czech Republic, Hungary and Poland, R&D by foreign affiliates is often linked to manufacturing, mostly in the automotive and electronics industries. Some foreign affiliates also conduct "innovative" R&D for regional or global markets.

The process is driven by new push and pull factors, and is facilitated by enabling technologies and policies ...

The need to adapt products and processes to key host-country markets has always been an important motive for TNCs to internationalize R&D. The need to tap into knowledge centres abroad to source new technologies, recruit the best skills and monitor the activities of competitors is also well known in the literature. However, the recent surge of R&D by TNCs in selected developing host economies also reflects the quest for cost reduction and for accessing expanding pools of talent in these locations. It can be seen as a logical next step in the globalization of TNC production networks. It also resembles the international restructuring that has taken place in export-oriented manufacturing and ICT-based services through which TNCs seek to improve their competitiveness by exploiting the strengths of different locations.

R&D internationalization to new locations outside the Triad is driven by a complex interaction of push and pull factors. On the push side, intensifying competition, rising costs of R&D in developed countries and the scarcity of engineering and scientific manpower along with the increasing complexity of R&D, reinforce the imperative to specialize as well as to internationalize R&D work. On the pull side, the growing availability of scientific and engineering skills and manpower at competitive costs, the ongoing globalization of manufacturing processes, and substantial and fast-growing markets in some developing countries increase their attractiveness as new locations.

The expanding pool of talent in selected developing countries and economies in South-East Europe and the CIS is very important in this context — notably in science-based activities — especially for companies that fail to find a sufficient number of skilled people in their home countries. In recent years, there has been a dramatic increase in the number of people enrolled in higher education in developing countries and economies in transition. In 2000-2001 China, India and the Russian Federation together accounted for almost a third of all tertiary technical students in the world. In addition, more scientists and engineers are staying in, or returning to, China and India to perform R&D work for foreign affiliates or local firms or to start their own businesses. In Bangalore, for example, some 35,000 non-resident Indians have lately returned with training and work experience from the United States. Reflecting the growing importance of the human resource factor, both developed and developing countries are now adopting new policy measures to attract skills from abroad.

The internationalization of R&D is also facilitated by improvements in ICT and associated cost decreases, new research techniques that allow greater "fragmentation" of R&D and better information on research capabilities that are available worldwide. At the same time, overall improvements in host-country investment climates have all contributed to creating a more enabling framework. Important policy developments relate, for example, to intellectual property rights (IPR) protection, reform of public research activities, infrastructure development, and investment promotion efforts specifically targeting R&D-related FDI and R&D incentives.

There are some fundamental reasons why the current trend towards R&D internationalization is set to continue. First, the competitive pressure on firms is likely to remain intense, forcing them to innovate more. Second, the need for greater flexibility in R&D in response to rapid technological change requires sizeable numbers of research staff with a range of specializations, and it necessitates locating R&D activities where such pools of researchers are available. Third, ageing populations in many developed countries are likely to result in an insufficient supply of specialized, up-to-date skills, forcing TNCs to look elsewhere for fresh talent. Fourth, through cumulative learning processes involving local enterprises and institutions, the developing countries that take part in the internationalization of R&D will progressively enhance their own ability to conduct more R&D. At present however, it appears that only a few developing countries led by China and India, and some economies of South-East Europe and the CIS, can effectively meet the conditions required to participate.

... and has important implications for both host and home countries.

The creation of knowledge is a driver of economic growth, but no single country can produce all the knowledge needed to stay competitive and to grow in a sustained manner. Countries are therefore eager to connect with international networks of innovation. Outward and inward FDI in R&D are two ways of doing so. R&D internationalization opens up new opportunities for developing countries to access technology, build high-value-added products and services, develop new skills and foster a culture of innovation through spillovers to local firms and institutions. FDI in R&D can help countries strengthen their innovation systems and upgrade industrially and technologically, enabling them to perform more demanding functions, handle more advanced equipment and make more complex products.

At the same time these benefits do not appear automatically, and unwanted effects can also arise. The main concerns in economies hosting FDI in R&D relate to the potential downsizing of existing R&D when FDI involves takeovers of domestic firms, unfair compensation to local firms and institutions collaborating with TNCs in the area of R&D, the crowding out of local firms from the market for researchers, a race to the bottom in attracting R&D-related FDI and unethical behaviour by TNCs. There may also be tensions between TNCs and host-country governments, in that the former may seek to retain proprietary knowledge while the latter seek to secure as many spillovers as possible.

A key determinant of the development impact on a host economy is its absorptive capacity. Indeed, technological capabilities in the domestic enterprise sector and technology institutions are necessary not only to attract R&D but also to benefit from its spillovers. Other determinants are the type of R&D conducted, and whether the R&D is linked to production. The more a TNC interacts with a host developing country's local firms and R&D institutions, and the more advanced the country's national innovation system (NIS), the greater the likelihood of positive effects on a host economy.

R&D internationalization also has implications for home countries — both developed and developing. It can help a country's TNCs improve their competitiveness by accessing strategic assets and new technologies, acquiring unique knowledge at competitive prices, increasing specialization in their R&D, reducing costs, increasing flexibility and expanding their market shares. By extension, the improved competitiveness of TNCs often has positive impacts on their home economies. Foreign R&D can generate opportunities and spillovers in the home economy to the benefit of local firms and the home economy as a whole.

At the same time, the transnational expansion of R&D may give rise to concerns in home countries, especially with regard to the risk of hollowing out and the loss of jobs. These concerns resemble those voiced in connection with the general debate on services offshoring. The trend is so new that any assessment must be tentative. However, it does seem that protectionist measures to limit the expansion of R&D abroad will not effectively address these concerns as they would risk undermining the competitiveness of the country's enterprises. Rather, to turn the internationalization process into a win-win situation for host and home countries alike, policies aimed at advancing the specific innovation capabilities and the functioning of the NIS are key.

Appropriate policy responses are needed at the national level…

Enterprises are the principal agents of innovation. However, they do not innovate and learn in isolation, but in interaction with competitors, suppliers and clients, with public research institutions, universities and other knowledge-creating bodies like standards and metrology institutes. The nature of these interactions, in turn, is shaped by the surrounding institutional framework. The complex web within which innovation occurs is commonly referred to as the "national innovation system". Its strength can be influenced by government intervention.

A number of policy and institutional areas need to be addressed to attract FDI in R&D, to secure the benefits that it can generate and to address potential costs. The starting point is to build an institutional framework that fosters innovation. Particular policy attention is needed in four areas: human resources, public research capabilities, IPR protection and competition policy. Efforts to secure an adequate supply of human resources with the right skills profile involve educational policies — not least at the tertiary level — and measures to attract expertise from abroad. For public R&D to contribute effectively to the NIS, it is essential that it links with enterprise R&D and that public research institutes promote the spin-off of new companies. The attractiveness of a location for conducting R&D may increase if the IPR regime is more effective, but a strong IPR regime is not necessarily a prerequisite for TNCs to invest in R&D. The policy challenge is to implement a system that encourages innovation and helps to secure greater benefits from such activity, notably when it involves TNCs. At the same time, in order to balance the interests of producers and consumers, IPR protection needs to be complemented by appropriate competition policies.

Efforts in these areas need to reflect the comparative advantage and technological specialization of each country as well as the development trajectory along which a country plans to move. FDI policy is also vital to promote the desired forms and impacts of FDI. Selective policies in this area can include targeted investment promotion, performance requirements and incentives along with science and technology parks.

IPAs can play an important role in a country's strategy to benefit from R&D internationalization by TNCs. It can potentially serve two prime functions. The first is to communicate and market existing investment opportunities, for example, through targeted promotion, based on a careful assessment of the locations' strengths and weaknesses and a good understanding of the relevant locational determinants. If a location is unlikely to be able to offer the conditions needed to attract R&D by TNCs, an IPA may be better off focusing on its policy advocacy function. It may draw

the attention of other relevant government bodies to areas that are important for making a location better equipped to benefit from R&D by TNCs.

In a global survey of IPAs conducted by UNCTAD, a majority of the respondents were found already to target FDI in R&D. A large majority of IPAs in developed countries actively promote FDI in R&D activities (79%), and 46% of those based in developing countries do so as well. The highest percentage (94%) was noted for IPAs in Asia and Oceania. Conversely, a majority of IPAs in Africa promote it actively, and only 11% of the IPAs in Latin American and the Caribbean do so.

Finally governments need to pay attention to more focused policies aimed at boosting the capabilities of the domestic enterprise sector, notably through industry-specific and small and medium-sized enterprise policies.

The various objectives of education, science and technology, competition and investment policies can be mutually reinforcing. Whether a country tries to connect with global networks by promoting inward FDI, outward FDI, licensing technology, the inflow of skills or through any other mode, policies need to be coherent with broader efforts to strengthen the NIS. The stronger the NIS, the greater is the likelihood of attracting R&D by TNCs and of benefiting from spillover benefits generated by such R&D. In essence the policies pursued need to be part of a broad strategy aimed at fostering competitiveness and development.

Indeed, the emphasis on policy coherence may be one of the most striking lessons learned from those developing countries that are now emerging as more important nodes in the knowledge networks of TNCs. In most of these countries, the starting point has been a long-term vision of how to move the economy towards higher value-added and knowledge-based activities. The success of some Asian economies is no coincidence; it is the outcome of coherent and targeted government policies aimed at strengthening the overall framework for innovation and knowledge inflows. In some form (and to varying degrees), they have actively sought to attract technology, know-how, people and capital from abroad. They have invested strategically in human resources, typically with a strong focus on science and engineering; invested in infrastructure development for R&D (such as science parks, public R&D labs, incubators); used performance requirements and incentives as part of the overall strategy to attract FDI in targeted activities; and strategically implemented IPR protection policies.

For many developing countries at the lower end of the UNCTAD Innovation Capability Index any expectation of a major influx of R&D by TNCs would be unrealistic in the short term. However, that is not an excuse for a lack of action. Rather, countries should consider how to begin a process through which economic and technological upgrading could be fostered.

The creation of innovative capabilities is a path-dependent and long-term task. For latecomers, ensuring that a process aimed at strengthening their NIS gains momentum is an essential first step.

For home countries, current trends accentuate the need to rely even more on the creation, diffusion and exploitation of scientific and technological knowledge as a means of promoting growth and productivity. Rather than regarding R&D internationalization as a threat, home countries should seize opportunities arising from it. It is important to explore new ways of collaborating with the new R&D locations (e.g. through joint research programmes and careful attention to the benefits and costs of outsourcing and R&D-related outward FDI). Countries should also try to remove bottlenecks and "systemic inertia" in their NISs to be better positioned to benefit from R&D internationalization. They may also see the need to specialize more in areas where they hold a competitive edge to strengthen existing world-class centres of excellence and build new ones.

...taking developments at the international level into account.

Policy-making at the national level also has to consider developments in international investment agreements at various levels. Many international agreements give special attention to investment in R&D activities. Key issues relate to the entry and establishment of R&D-related FDI, the treatment of R&D performance requirements (whether by restricting or explicitly permitting them), incentives encouraging investment in R&D activities, and the movement of key personnel.

In general, international investment agreements confirm the importance of policies that seek to facilitate FDI in R&D. While most countries welcome FDI in R&D, many governments do not allow foreign companies to draw on certain kinds of public R&D support. Many bilateral agreements also state explicitly that governments are free to apply R&D requirements as a condition for receiving preferential treatment (e.g. an incentive). A small number of agreements prohibit the use of mandatory performance requirements in the area of R&D.

Most international investment agreements do not have provisions that specifically protect R&D-related FDI; they protect FDI in general. Related provisions include the definition of investment, the free transfer of returns arising from R&D activities and the application of the national treatment and most-favoured-nation standards to foreign investors.

The protection of IPRs at the international level and minimum standards set by international treaties are of particular relevance for R&D-related FDI. The most important instrument in this area is the WTO Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS). Some recent agreements at the bilateral and regional levels have extended the minimum standards set in the TRIPS Agreement. The protection of IPRs enshrined in these agreements is intended to encourage the development of proprietary knowledge; but at the same time, it limits the policy space of States in an area that is directly relevant to R&D activities. For developing countries it is therefore important to understand and make use of the flexibilities contained in the TRIPS Agreement. There is also a clear need for additional technical assistance to facilitate the implementation of IPRs in a development-friendly manner.

Some international investment agreements also encourage home countries to support the strengthening of NISs in developing countries, by promoting outward R&D-related investment in developing countries. In addition, international cooperation agreements in the areas of science, technology and innovation help create an enabling framework for R&D internationalization by facilitating the flow of information, the formation of alliances, the pooling of financial resources, the improvement of access to technological expertise, matchmaking and the establishment of private-public sector partnerships.

But there is scope for more cooperation to foster policy formulation and stronger innovation systems in developing countries. One key area is human resource development. The international community could play a more active role in this area, for example, by supporting the strengthening of the local educational infrastructure and by making educational opportunities to developing countries available in developed countries. Home countries could contribute to the improvement of the institutional framework for innovation in developing countries by assisting in the establishment of technical standards and certification systems through access to and provision of testing equipment for standard setting and quality assessment. Similar steps could be taken with regard to the implementation of IPR systems and through R&D collaboration between institutions in developed and developing countries.

Policies at the international level have direct implications for the ability of developing countries to formulate their R&D policies and to create the conditions that will enable them to benefit from the internationalization of R&D by TNCs.

Geneva, September 2005

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