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Technology Transfer and the Restructuring of New Market Economies: The Case of Poland

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Abstract

The paper is an attempt to generalise some empirical evidence on the relationship between technology transfer and structural adjustment in the new market economies in Central and Eastern Europe. The Polish experience in 1989-1994 is selected as a point of reference.

It is argued that ten stylised facts concerning the initial conditions of transformation for new market economies are decisive, if FDI is to become the most important channel of technology transfer. The model of structural adjustment of G Dosi, K Pavitt and L Soete, and the model of investment development path developed by M Porter and J Dunning, are merged to obtain a theoretical insight into the relationship between FDI-based technology transfer and economic restructuring. Implications for policy considerations are developed with regard to three types of structural adjustment: Ricardian, Keynesian and Schumpeterian.

The analysis of data on FDI inflow into Poland in 1989-1994 shows a clear contrast between two periods - 1989-1991 and 1992-1994 - which fit well into two adjustment models, respectively Ricardian and Keynesian. The point is supported by evidence on FDI policy measures, FDI modes of investment, and strategies and performance of FDI-based firms. There are suggestive changes on all these indicators around 1992. A comparison of sectoral patterns of FDI with changes in patterns of revealed comparative advantage provides further support for the hypothesis that a switch from Ricardian to Keynesian adjustment processes occurred at that time. This comparison also gives us an indirect insight into the characteristics of the technology transfer embodied in FDI. Finally, the prospect for Schumpeterian adjustment are explored.

1 INTRODUCTION

One of the most important points of the reforms undertaken within the Balcerowicz Plan in 1989 was to open up the Polish economy to foreign direct investment, which had been practically non-existent in the centrally planned economy. It was expected that FDI inflow would help to restructure the economy, in particular through:

- supplying funds to finance major *investment* requirements
- accelerating the *privatisation* process through foreign acquisition of Polish companies and mergers involving foreign companies
- transfer of *modern technology* and management techniques
- introduction of new quality products leading to greater *product differentiation* and enhanced *competitiveness* on the domestic market
- easing the *balance of payments* deficit by providing convertible foreign exchange over and above current export earnings.

The aim of this paper is to discuss, within that context, the role of technology transfer (TT) in the industrial restructuring of the Polish economy, with special emphasis on inward direct investment, as the most important TT channel to open up after the 1989 liberalisation. The general propositions, as outlined above, were not always adequately translated into specific policy instruments within the reform package, and adequate account was not taken of the global situation in which the transformation and integration of the Polish economy into the world market was to take place. Five years on from the beginning of transformation, then, it seems appropriate and timely to try to take stock of what has been achieved by the Polish economy in opening up towards technology and capital inflows from abroad.

We will look first at the general economic environment in which the process of opening up took place, with special focus on the specific features of technology transfer in the conditions of today. Then a simple taxonomy of restructuring models will be sketched, as a basis for

exploring the potential role of technology transfer through FDI, as distinct from other forms of transfer. After an overview of FDI inflow into Poland in the period 1989-90, a preliminary comparison of FDI performance trends and sectoral patterns with changes in the contours of revealed comparative advantage 1989-94 will be made. This should serve as a basis for capturing the possible contribution of FDI inflows to structural adjustment through the technological upgrading of the Polish economy.

The data coverage provided by the Polish State Agency for Foreign Investment and the Foreign Trade Institute in Warsaw will be used as a main source of information on FDI in Poland. This is in turn based on the information collected by the Central Statistical Board and the balance of payment statistics published by the National Bank of Poland. There is solid data for the period 1989-1993, and estimates for 1994 compiled by the Polish State Agency for Foreign Investment as a first approximation, based on a survey covering only major foreign investors.

The methodological approach adopted here draws heavily on the consultations and discussions which took place during the author's fellowship at SPRU, University of Sussex, undertaken with support from the European Commission's PHARE ACE Programme 1994 (94-0312-F). The author is greatly indebted for valuable and insightful comments from Keith Pavitt, Margaret Sharp, David Dyker, Slavo Radosevic and Pari Patel.

2 GENERAL THEORETICAL BACKGROUND

2.1 Ten stylised facts

It may be useful to get a more synoptic view of the problem in question, and to do so let us state *ten stylised facts* relating to the circumstances in which the process of liberalisation started. The first five of them describe the heritage of central planning, while the other five summarise some features of the global environment for technology transfer into new market

economies in the early 1990s. Between them, these two factors have a determining influence on the way and forms in which technology transfer into the new market economies of Central and Eastern Europe unfolds.

The legacy of centrally planned development

1 *Secular isolation from world production networks*: the absence of foreign direct investment and multinational enterprises, the insularity of national production systems, caused by a combination of total state monopoly of foreign trade, centrally planned trade and tariff barriers, and the rationing of underpriced foreign exchange, all resulted in a product and factor price structure at odds with world demand and supply conditions.

2 *Profound structural misdevelopment*: in the absence of a rational price system and in the context of separation from world production networks, centrally planned coordination of economic activities led to structural misallocation of resources, often described in terms of the *shortage economy*, but essentially the outcome of heavy, misplaced investments. (sometimes financed by foreign loans). This distortion of the investment process was in turn due to the lack of a market allocation mechanism. The result should clearly be classified as misdevelopment rather than underdevelopment.

3 *Distributional distortions as between the share of labour and capital in national income*: the high level of centralisation of economic power made it possible to push down labour's share in the distribution of income; this amounted to a profound distortion of factor prices, and led to a depressed aggregate level of consumption, and also to poor consumer product differentiation.

4 *Technological lock-in within fossils of the third long wave*: the centralised economies missed out completely on the microelectronic and information technology revolution, which could only have been developed and diffused with a more decentralised, market-based system

of coordination; instead, they became increasingly obsessed with investing in heavy-industrial technologies of the third Kondratieff wave, based on concentration of production facilities but nevertheless exhibiting a stronger and stronger tendency to diminishing returns; central planning simply failed to promote the creativity and innovation required for the development of knowledge-based industries.

5 *Absorption capabilities for technology transfer and growth limited by financial distress*: the centrally planned economies found themselves in financial distress on account of failure to participate in world production networks, misallocation of resources, lack of labour productivity incentives, and imprisonment within technologies subject to rapidly diminishing returns; in this context they were simply incapable of autonomous absorption of new technologies and sustained economic growth through new investments.

Global environment

6 *Opening-up in the context of a liberalised world economy (EU + WTO)*: the process of transformation and catching-up is unfolding at a time of increasing liberalisation of the world economy, which makes traditional trade policy instruments less and less relevant for promoting economic growth; putative import substitution and infant industry protection policies would soon lead to deeper separation from the global economy, and increasing distance from a world technology frontier which is rapidly shifting outwards with the development of knowledge-based industries; simultaneous access to world markets and world knowledge-production networks emerges as much more important than any more or less sophisticated strategic trade policy.

7 *Globalisation of world financial flows and technology development*: increasing globalisation and integration of world financial markets coincides with the development of new technologies on an integrated, world basis; in fact, the two processes reinforce each other - deregulated capital markets constantly seek for new investment opportunities created by the

development of new technologies, and the latter rely ever more heavily on access to funding through liberalised capital markets; the combination of both processes creates a new perspective of global entrepreneurship, born out of the separation and recombining of savings and investment functions on a global scale; the choice is not between capital inflow and capital flight through the fine tuning of monetary and exchange rate policies, but rather between switching into the global entrepreneurship network or falling behind, into financial distress and technological backwardness; this creates pressure to build up efficient internal capital markets integrated into global financial sources, and to institute sound monetary policies to facilitate the channelling of finance to emerging investment opportunities in promising technological niches.

8 *Growing concentration of FDI within the Triad*: the pattern of globalisation of world finance and technology is most visible in the growing concentration of FDI within the Triad - the three world entrepreneurship centres; this makes it increasingly difficult for new market economies to attract foreign capital and technology; they must be able to offer outstanding investment opportunities and compensate for inadequate infrastructural facilities, if they are to do so; in the context of recent trends towards the concentration of capital flows, there is a case for developing sharply-focused selection mechanisms, to reveal comparative advantage in areas of high growth potential rather than creating short-term opportunities for rent-seeking activities.

9 *Technology transfer based on sourcing rather than bargaining*: the increasing complexity of new technologies means that implementation increasingly requires uncodified, often tacit, knowledge, and this makes arm's-length relationships as a mode for technology transfer less appropriate; with the limited absorptive capabilities of the recipient economy to assimilate unbundled technologies, sourcing arrangements based on hierarchical, long-term relationships between firms may provide a better vehicle for transfer of technological capabilities; by the same token, the rapidly shifting technological frontier renders technology transfer strategies based on the product-cycle model obsolete, as continuous dynamic learning

through simultaneous access to markets and new technological ideas becomes increasingly pre-eminent. On both counts, sourcing arrangements (equity- or non-equity-based) inevitably squeeze out other modes of technology transfer, in particular between partners of unequal technological level; this conditions a significant shift from import-substitution regimes, based on contract bargaining, towards involvement in the race for higher value activities within global production systems.

10 *Technological protectionism takes over from the old trade protectionism*: in the new, globalised and liberalised international context, traditional trade policy measures are losing ground, as a strong trend towards technological protectionism has emerged in the main technology- supplying countries; strategies on technology transfer are increasingly influenced by perceptions of the appropriability of technological advances, and internalised forms of technology transfer, which systematically avoid licencing and engage in transnational activities almost exclusively via wholly-owned subsidiaries, are likely to be preferred by technology holders. This tendency to raise the appropriability of technology is further enhanced by the growing network of strategic alliances among leading technology holders, and the reinforcement of intellectual property regimes by national states; in this context, it may be increasingly difficult for less developed countries to get access to state-of-the-art technologies through arm's-length relationships.

It follows from all this that structural adjustment in former centrally planned economies should be oriented toward linking those economies to world production networks, with a view to reversing inherited structural and distributional distortions. In this process of transformation, a special role is properly played be foreign direct investment, to the extent that it combines new technology flows with provision of finance for investment. A similar argument emerges from consideration of trends in the global environment, which highlight FDI as the most appropriate means of restructuring consistent with current trends in technology transfer and increasing globalisation and liberalisation of world production and financial networks.

2.2 Simple models of adjustment and structural development

In order to define the role of FDI in the structural adjustment (restructuring) of a given economy, we attempt to merge two types of model:

- models of structural adjustment in an open economy
- models based on investment development paths involving FDI

We find it interesting and revealing that the two types of model can be easily integrated, although they had been developed from two different theoretical perspectives. Models of structural adjustment have been mainly derived from theoretical considerations on macroeconomic factors determining the evolution of competitive advantages of open economies, while investment development path models are based on generalised empirical evidence of international investment activities, ordered in consecutive development stages. If we merge both approaches, we can obtain more insights into the complexity of the transformation processes currently unfolding in the new market economies.

Dosi, Pavitt and Soete (1990) suggest an interesting taxonomy of structural adjustment an open economy; they distinguished three types of adjustment - Ricardian, Keynesian and Schumpeterian.

Ricardian adjustment is primarily a response to the static comparative advantage of a given country. The crucial policy instrument is opening up the economy to trade and international capital movements, and letting the exchange rate float freely to equilibrate balance of payments, in order to get prices right. Thus real costs of production and the exchange rate determine the pattern and scope of specialisation. In this context, structural change is seen as a smooth and continuous process. Keeping real wage rates low is of crucial importance in the establishment of comparative advantage in many products on international markets. With

flexible exchange rates and downward elasticity of real wages, the demand and balance of payments constraints really do not matter.

The *Keynesian* type of adjustment is based more on domestic demand (consumption and investment) and export demand. With more or less sticky prices, the main mechanism operates through changing quantities. What determines the volume of output is the absolute technological advantage of a country, and the absorptive capacity of domestic and foreign markets. Consumer demand coming from higher wages and investment demand dependent on supply of relatively cheap capital is of crucial importance. The balance of payments constraint becomes more important because growth possibilities are constrained by the relationship between export competitiveness and income elasticity for imports; thus a flow of investment capital is needed, and this may be attracted by the opportunity of acquiring underpriced, if idle assets. Export-led growth combined with inflow of foreign capital is the ideal solution in a liberalised international context.

In distinction to the first two types, *Schumpeterian* adjustment relies principally on increasing absolute technological advantage through innovative dynamism. It is the capacity to innovate or imitate rapidly that opens up access to new expanding markets in high value-added products. This type of adjustment is particularly powerful in that it affects profoundly the scope and direction of the first two adjustment mechanisms: it underlies (though it may sometimes conflict with) both Ricardian and Keynesian adjustment, because it creates the playing field for both of them.. The efficiency of Schumpeterian adjustment depends on creativity, learning capability, and the foresight of agents and institutions (national innovation systems) It is the possibility of leapfrogging onto a higher technological trajectory offered by Schumpeterian adjustment that makes it so attractive to new market economies.

New market economies are, of course, in desperate need of all three types of adjustment - to be carried out in parallel and simultaneously, given the current state of the global environment. They need Ricardian adjustment to counteract the impact of long-term autarky and structural

misdevelopment; they need Keynesian adjustment because of underdeveloped demand for differentiated products and financial distress, combined with idle physical assets; finally, they need Schumpeterian adjustment to resolve the paradox of being rich in human capital, while also being locked-in to the technological fossils of the third long wave.

2.3 Investment-development paths, FDI strategies and TT modes

Porter (1990) and Dunning (1981, 1992) have developed an investment development path model which generally corresponds to the three types of adjustment mechanism outlined above:

Factor-driven: During this stage nations draw their advantage almost entirely from the mobilisation of basic factors of production, which are abundant and relatively inexpensive. Little technology is created locally, and domestic firms use imported technology mostly through licencing and joint ventures. The factor-driven development path is supported by a relatively low level of inward investment, and more importantly by subcontracting and outward processing as far as resource-based and traditional industries are concerned. The bulk of FDI is channelled by trading companies facilitating exports and imports.

Investment driven: here two stages may be distinguished (Narula, 1993); in the first stage, domestic market conditions, buttressed by import-substitution policies, attract investment in the manufacture of standardised products; at the second stage, changes in factor conditions attract investment into export-oriented mass production of medium-technology products, with inward FDI placing increasing emphasis on economies of scale, as low labour costs are no longer sufficient grounds for the establishment of local production. Growth in FDI slows down, as the ownership advantages of MNEs vis-à-vis domestic firms weaken. At both stages, inward FDI through direct acquisition or greenfield investment develops as a major source of technology transfer. This should (particularly at the second stage) actually tend to change the pattern of (acquired)comparative advantage of the recipient country.

Innovation-driven: at this stage, the national innovation system reaches a level of maturity which enables the economy not only to appropriate and improve technology from foreign locations, but also to create its own. The bulk of inward investment is now seeking strategic assets in applied and basic research activities. Outward investment is growing rapidly, and inward and outward investment become increasingly complementary. This trend is further enhanced by the shift from arm's-length trade to trade through hierarchies, cross-border mergers and acquisitions and strategic alliances. The country's net investment position fluctuates around zero as non-equity (intangible) investments become prevalent. The national innovation system is now the main source of a given country's competitive advantage, systematically acquired through the process of generating new knowledge and technological capabilities.

To each type of adjustment mechanism we may now assign an appropriate investment development path, as conditioned by the prevailing strategies of international business (inward and outward investments of MNEs); there are further implications in terms of different modes of technology transfer, as demonstrated below.

It must be noted that given adjustment mechanisms, investment stages, patterns of international business activity and modes of technology transfer are not related to each other in a unilinear way; in reality they may overlap and occur in various configurations, depending on the technological distance between home and host countries, sectoral differences in technological development and the technological specificity of industries, locational specificities of factor supply conditions, gaps in economic development between countries, and even stages of the business or product cycle. However, long-term evidence supports a general correspondence between adjustment mechanisms, international investment activities and technology accumulation processes as depicted in Table 1. This conceptualisation may, then, be a useful instrument for classifying the observed tendencies in the new market economies. The problem with these economies is, on the other hand, precisely that they do

Table 1 Structural adjustment mechanisms, investment development paths, international business strategies and modes of technology transfer

Adjustment	Investment path	IB* strategy seeking	Modes of TT
Ricardian	Factor-driven	Resources Cost efficiency	Licencing Joint-ventures Sub-contracting
Keynesian	Investment-driven	Market: domestic export-oriented	IDI** Acquisition Greenfields
Schumpeterian	Innovation-driven	Human capital R&D assets	IDI-ODI** Non-equity

*IB = international business
**IDI = inward direct investment, ODI = outward direct investment

not follow an ordinary path of development as evinced by the history of underdeveloped countries. We may, nevertheless, expect that the involvement in international business activities of new market economies should lead to structural adjustments based on changes in the pattern of competitive advantage over the course of the transformation process. We should accordingly be able to identify the nature of these adjustments by looking at the outcomes of shifts in competitive advantages, as conditioned by technology transfer through FDI, and in the light of the structural classification of adjustment processes shown in Table 1.

2.4 Types of structural adjustment and policies on FDI in the global context

The big problem, when it comes to policy, is that any package of instruments that would simultaneously address all three types of adjustments would be riven by internal inconsistencies. And, unfortunately, all the above listed considerations conspire to impose the requirement of simultaneity of three types of adjustment process that would usually follow each other in turn, as investment-development stages in an underdeveloped economy. In the case of the new market economies of central Europe it is surely an immediate necessity to

correct - in parallel - factor price and distributional distortions, to utilise idle production capacities and their human capital potential - all of those things being the result of misdevelopment over a long period of time, confronted suddenly with the economic and technological conditions of the global economy. Here is a fundamental difference between the economic transformation process in Central and Eastern Europe and economic transformation processes in the less developed countries of Asia, Latin America or Africa, And this uniqueness in the situation of the transition countries is probably the main technical reason for the ambiguity and inconsistence of the policy measures addressing FDI and the restructuring process in these countries, and of the complete absence of any industrial policy oriented toward the development of national innovation systems, which are fundamental to the Schumpeterian type of adjustment.

To specify the problem, let us simply look at the different policy instruments suitable to the different adjustment mechanisms:

Ricardian	get fundamental price relatives right, go for macro-financial stability with flexible exchange and wage rates;
Keynesian	create investment protection shelters through investment-related trade measures (IRTM), enforce import substitution policy and tax/subsidy incentives;
Schumpeterian	implement export-oriented competition policy, coupled with trade related investment measures (TRIM), introduce national treatment of FDI, develop national innovation system.

It may clearly be extremely difficult, if not impossible, to find a coherent package of policy instruments that enhances Ricardian efficiency without inhibiting Keynesian or Schumpeterian, or the other way round. If we assume that the new market economies are simply misdeveloped, the relevant transformation programme should surely include massive reconstruction based on large-scale FDI inflow and assimilation of world state-of-the-art

technologies oriented toward relatively well developed human capital endowments. A more gradualist approach would tend simply to petrify existing industrial structures and related traditional patterns of trade specialisation. There is, therefore, a case for developing industrial and commercial policy to promote the massive reconstruction model, along the lines of Schumpeterian adjustment and making use of and further developing advanced factor endowments (created assets), rather than relying exclusively on simple Ricardian adjustment, which mostly makes use of natural assets and may even erode existing technological capabilities (created assets) under the pressure of a level of financial distress exacerbated by Ricardian transformation. On the other hand, inherited distortions *do* require also extensive Ricardian corrections, and this is in total conflict with the requirements of Schumpeterian adjustment, in that Ricardian adjustment does not involve any dynamic investment disallocations (static efficiency being the primary target).

We may, finally, try to take account of sectoral specificities in relation to types of adjustment and specialisation pattern. Pavitt (1984) and Bell and Pavitt (1993) explore extensively the relationships between technological accumulation and industrial growth, while introducing a taxonomy of industrial sectors with respect to innovational dynamism. They identify five types of industries, primarily through a combination of indicators reflecting technology sources, technology user requirements and means of technology appropriation. Ordered accordingly to increasing technological dynamism, they are: primary-resource-intensive, supplier-dominated or traditional sectors; scale-intensive sectors; specialised suppliers; and science-based sectors. Without presupposing linear industrial development, it may be expected that the higher the share of the latter sectors in the composition of industrial production, or in the exports of a given country, the more technologically advanced the economic structure.

There may, then, be a relationship between technological capability and international trade performance. Positive adjustment effects might thus be reflected in an increasing degree of revealed comparative advantage of the given country with respect to industries towards the upper end of the technological ladder. We should note, however, that different adjustment

mechanisms encourage growth of particular industrial groups, as indeed do different FDI flow models. Resource-intensive and traditional-supplier-dominated industries require a more Ricardian pattern of adjustment, with low-volume, gradualist FDI inflows, while scale-intensive, and especially science-based industries need massive restructuring, with Keynesian or Schumpeterian adjustment, in the face of a misdeveloped economy (see Table 2). We may thus test the process of structural adjustment under FDI inflow on the evidence of the changing RCA and international trade performance of particular industrial groups in a given period.

Table 2 Models of FDI development and patterns of specialisation

FDI inflow model	Specialisation pattern	Host industries
Gradualist	Traditional	Resource- and capital-intensive
Mixed	Factor-price-driven	Labour-intensive
Restructuring	Factor-endowments-driven	Skill-intensive

3 FDI PATTERNS AND MODES OF TECHNOLOGY TRANSFER IN POLAND SINCE 1989

3.1 FDI regimes and MNE strategies

The main institutional innovations in the regulatory framework introduced in 1989 to open up the economy to international business activities, including technology transfer, may be identified as having followed generally the lines of Ricardian and Keynesian adjustment. We can pick out in particular: liberalisation of FDI laws, and of trade and exchange-rate regimes, which dramatically changed the conditions for the operation of FDI in the local environment. This meant a basic departure from the *enclave model* approach to foreign investment of the late 1980s, and a gradual shift toward the *national treatment* approach finally adopted in the

1991 FDI law.[1] We can, then, distinguish between two periods - 1989-1991, when the enclave model, combined with the Ricardian approach, prevailed; and 1992-1994, when a move towards national treatment of FDI opened the way for Keynesian-type adjustment. This distinction is clearly evidenced in the two waves of FDI inflow, differing significantly in investment pattern, that correspond to the two periods.

According to the FDI laws in force before 1989, foreign capital participation was allowed only in the form of foreign partnerships, limited to small-scale production and joint ventures with foreign minority interest. The establishments thus formed were subject to a complicated procedure of authorisation which excluded entry into sectors deemed of importance for social or state interests. They were also subject to severe restrictions on repatriation of profits and capital invested, which were made dependent on the results of their hard currency balance of payments, with the remainder of their hard currency proceeds being compulsorily resold to the central bank under strict exchange controls. All tax allowances were strictly related to the companies' export performance. With limited access to state regulated distribution of material supplies, and effective prohibition on the acquisition of real estate, these partnerships and joint ventures were essentially treated as foreign-financed vehicles/enclaves earning hard currency for the central bank of Poland. Without compensation guarantees in the event of expropriation, with licences usually issued for only ten years and restricted transferability of ownership interest even within Poland, it is not surprising that these partnerships and joint ventures usually adopted a *quick buck* strategy, turning in extremely effective export performance in market niches with unusually high profitability (see Tables 10 and 11). However, the average capital investment per firm was always as low as they could get away with (tending to the minimum foreign capital requirement of $50,000). The investors were usually people of Polish origin living in neighbouring countries, content to spend their profits on living expenditures in Poland.

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[1]The term *enclave model* is used here to denote a pattern of separate legislation for FDI firms, which usually discriminates them, as compared to domestic investors, with respect to licencing procedures, taxation, international financial transfers, access to local facilities, etc. The opposite type of regulation, based on level playing field conditions for both domestic and foreign investors, is called *national treatment.*

The first big wave of new FDI establishments came after the joint venture law was fundamentally amended in 1988, and reached its peak in 1990. The law was further modified in December 1989 in connection with the liberalisation of the foreign exchange law, and in July 1990 in connection with the law on privatisation. The whole package was a major step toward national treatment of companies with foreign participation. Joint ventures gained free access to all material supplies, and the right to acquire real estate under the permit of the minister of interior. The restrictions on majority holdings were abandoned, though the transfer of shares and the initial setting-up of operations still required a permit form the Foreign Investment Agency. The regulations on expatriation of profits were much relaxed, though the connection with companies' hard currency balances of payments was maintained, while the proceeds from the sale of shares on the dissolution of company could not be transferred until ten years had elapsed, unless the proceeds were in hard currency, or the company was liquidated pursuant to a judicial execution (for example expropriation). This was still *enclave* treatment in comparison with what home enterprises enjoyed, but continued drawbacks were significantly counterbalanced by privileged tax status, as joint ventures gained a general three-year income tax holiday combined with three-year concessions on duty on imports of production inputs. It turned out to be a genuinely attractive legal arrangement for foreign investors, provoking a massive explosion in new registrations with relatively small amounts of capital invested. These investors followed what might be called a *foothold* strategy, marked by presence rather than extended economic operations.

The final step towards national treatment of foreign direct investment was made with the promulgation, in July 1991, of a law on economic activity with the participation of foreign parties. Under this law, practically all restrictions on the transfer of profits or equity capital were abandoned. The requirement that the setting-up of such activities be authorised by a state body was also abandoned, except for a few special areas (defence, sea- and airports, legal practice and real estate services) where permits would still be required, as they would also where privatisation of state companies was involved. At the same time, however, the automatic three-year corporate tax exemptions were also discontinued, except for investments

above 2 million ECUs, or if the joint venture were located in a depressed area with high structural unemployment, or brought with it new technology, or exported more than 20% of its output. At the same time, a total guarantee of payment of equivalent compensation for losses in the event of expropriation was now offered by the Ministry of the Treasury. These new regulations may be regarded as the most important factor in the second wave of FDI inflows - in 1992 - which was comparable to the first one in terms of number of establishments, but far more impressive in terms of capital invested, with the annual inflow reaching nearly $1bn for the first time - and all this despite sharply declining profit margins on sales and returns on equity. At the same time, foreign investors increased significantly their stake in established joint ventures as measured by the percentage of foreign capital participation or average capital invested per firm. This may have signalled a change in investment strategy in favour of more long-term involvement, less affected by the short-term prospects of a temporary tax holiday.

3.2 Two waves of FDI: from Ricardian to Keynesian adjustment

The different FDI regimes clearly produced different trends in inward investment flows in successive periods. Up to 1989 foreign investment in Poland was negligible, whether measured in terms of number of projects or of dollar value. Most of the establishments were foreign partnerships set up in the 1980s (688 entities), and there were also some 1986-law-based joint ventures (53). In 1989 a number of new joint ventures were registered (814) of which only a minority (241) actually became operational. In 1990 a wave of newly registered joint ventures hit the Polish economy, raising the total number of these entities to almost 3,000 (with the number of foreign partnerships marking time). The second big wave of joint ventures came in 1992, resulting in more than 10,000 entities registered. (The number of foreign partnerships was falling back by this time.) The total number of FDI-based establishments had reached nearly 16,000 by the end of 1993 and 20,000 by December 1994.

Table 3 Number of FDI-based establishments, 1989-1994

Number of establishments	XII 1989	XII 1990	XII 1991	XII 1992	XII 1993	XII 1994
Joint ventures registered	867	2799	4796	10131	15393	19312
Joint ventures operational	241	1119	2207	5740	7935	na
Foreign partnerships	705	730	442	440	425	425
Total entities operational	946	1849	2659	6180	8360	na
JV operating as % of registered	27.8	40.0	46.0	56.7	51.6	na
JV registered % change		322.8	171.3	211.2	151.9	125.5
JV operational % change		464.3	197.2	260.1	138.2	na
Total entities operational % change		195.5	143.3	233.3	135.3	na

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995

The different pattern of FDI in the second wave becomes apparent if we turn to investment flows. The cumulative direct foreign investment (stock) in 1989 was probably not much higher than $70m, of which the bulk was involved in foreign partnerships. The FDI stock was more than doubling each year, but again its rate of growth reached a peak in 1992 (second wave) when the stock more than tripled in one year (see Tables 4 and 5). Thus while the growth in value terms was more evenly spread over time than the growth in number of establishments, the most visible acceleration in the former variable occurred again in the period after an approximation to national treatment, favouring the Keynesian type of adjustment, was adopted. It is equally noteworthy that the most important vehicle channelling FDI inflow were joint ventures (acquisitions in the case of majority foreign interest[2]), which accumulated foreign capital at a rate of more than 300% in 1991 and 1992. In aggregate, the foreign capital stock increased by a factor of 24 between 1990 and 1994, while the number of establishments multiplied only by a factor of seven. Thus the second wave witnessed a reversal of the relationship between new registrations and capital invested.

[2]It should be noted that the new joint venture law applied to all cases of foreign participation, and did not discriminate between actual joint ventures, majority holdings and wholly-owned subsidiaries, which were in fact outright acquisitions.

Table 4 Stock of foreign direct investment, 1989-1994 (cumulative, $m)

	XII 1989	XII 1990	XII 1991	XII 1992	XII 1993	XII 1994
Joint ventures	8.2	105.2	323.6	1030.1	2431.6	na
Foreign partnerships	59.0	74.5	135.1	378.0	638.9	na
Total entities	67.2	179.7	458.6	1408.1	3070.5	4321.0

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995.

Table 5 Stock of foreign direct investment, 1989-1994 (index numbers)

	XII 1989	XII 1990	XII 1991	XII 1992	XII 1993	XII 1994
Joint ventures						
previous year = 100	x	1283	308	318	236	na
year 1990 = 100	8	100	308	979	2311	na
Foreign partnerships						
previous year = 100	x	126	181	280	169	na
year 1990 = 100	79	100	181	508	858	na
Total entities						
previous year = 100	x	267	255	307	218	141
year 1990 = 100	37	100	255	784	1709	2405

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995.

We now proceed to develop some standardised FDI inflow measures, as a basis for assessing the relative importance of foreign investment to the Polish economy. Table 6 shows 12 FDI flow variables for Poland for the period under review.

The table highlights the rapid increase in annual level of inflow (FDI-1) from about $60m in 1989 to more than $100m in 1990, and to about $1bn in 1992 and over $1.5bn in 1993. It seems that the year 1992, with an incremental inflow of $670m (FDI-2), marks a turning point in terms of inflow volume, and a benchmark for the Keynesian adjustment process. However, the annual inflow difference tended to stabilise in 1992-93, and FDI-3 fell sharply from about 240% in 1992 to 75% in 1993 - below the FDI-3 level at the beginning of the

Table 6 FDI flow measures, 1990-94

	1990	1991	1992	1993	1994
FDI-1: Annual Inflow in $m	112.5	278.9	949.5	1662.4	1250.5
FDI-2: Annual Increment in Inflow	52.5	166.5	670.5	712.9	-411.9
FDI-3: % Change in Inflow	87.5	148.0	240.4	75.1	-24.8
FDI-4: FDI-1 as % of GCF[a]	0.9	1.7	6.4	12.1	8.6
FDI-5: % Point Change in FDI-4		0.8	4.7	5.6	-3.5
FDI-6: FDI-1 as % of GDP	0.18	0.36	1.13	1.94	1.33
FDI-7: % Point Change in FDI-6		0.18	0.78	0.81	-0.61
FDI-8: FDI-1 as % of Exports	1.04	2.19	6.78	12.34	8.06
FDI-9: % Point Change in FDI-8		1.15	4.60	5.56	-4.28
FDI-10: FDI-1 as % of Imports	1.30	2.19	7.04	10.55	7.49
FDI-11: % Point Change in FDI-10		0.89	4.85	3.51	-3.06
FDI-12: FDI-1 per capita	3.0	7.0	25.0	43.0	33.0

[a]Gross Capital Formation

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995.

transition, in 1990 (87%). Inflow actually goes into decline - by 24.8% - in 1994, and this decline was expected to continue - to the tune of 60% - in 1995. We can interpret these trends in terms of a gradualistic or mixed sort of pattern, supporting Ricardian or Keynesian adjustment, but stopping short of turning into an impetus for massive reconstruction - which, according to rough estimates, would require, for the period 1996-2005, more than $20bn yearly (Antowska-Bartosiewicz and Malecki, 1993).

FDI as a share of gross capital formation (FDI-4) generally tends to be low in the region, though there are some variations between countries. For Poland, it rose dramatically from less than 1% in 1990 to 12.1 % in 1993, with the highest increases being reported in 1992 and 1993. This seems to mark a growing involvement of foreign capital in terms of a Keynesian type of adjustment. One of the reasons why FDI-4 is high are the low and falling total investment outlays over the whole period. It is nevertheless noteworthy that the foreign capital invested by mid-1993 in Poland had already matched the funds placed by domestic commercial banks in treasury bonds and bills. The banks, it seems, were unable to discover

better investment opportunities, in terms of funding enterprises, for that money; foreign capital somehow did find such opportunities.

FDI as a proportion of export revenue (FDI-8) and of import expenditure (FDI-10) provide measures for assessing the significance of foreign direct investments as a channel for technology transfer in relation to other modes (imports, participation in the world export market, licences). The two measures rose from about around 1% to over 10% 1990-93, but the growth rate in FDI-8 was more rapid than that in FDI-10. On the other hand, the relative positions are reversed after 1992 (before FDI-10>FDI-8, after FDI-8>FDI-10), and this may reflect a tendency for FDI to become a complement rather than a substitute for direct imports. That in turn provides strong evidence of a switch from Ricardian (FDI and imports as competing substitutes) to Keynesian adjustment (FDI and imports as complements, with both being driven by increasing demand).[3]

We can obtain some impression of the role of FDI as a vehicle for the transfer of technology by looking at the pattern of production under licence, and share of production under licence in total exports. The number of active licences in Poland actually fell from 59 to 39 between 1989 and 1993, with sales of goods produced under licence remaining relatively stable in relation to total sales, in the range of 1.2-1.7%. But the share of exports of goods produced under licence in total exports remained two to three times below the share of exports of FDI-based companies in total exports (Korona, 1994). It appears, then, that FDI emerged increasingly as the most important channel of technology transfer, which supports our hypothesis on the dominance of the Keynesian type of adjustment, corresponding to the investment-driven development stage.

[3]With a given level of demand, FDI and imports are clearly substitutes. When income and demand *increase*, scope is created for increments in both FDI-based production and imports, with some of the extra imports related to the input requirements of FDI. Where imports increase *faster* than FDI, it may be that the two are complements, with FDI and the level of imports both being largely determined by changes in the general level of GDP.

3.3 Modes of foreign direct investment

What has been the pattern of FDI in terms of main modes - greenfield, (direct) acquisitions and joint ventures (indirect acquisitions)? Table 7 provides clear evidence of the steadily growing importance of greenfield investments (rising from 27.5% to 50.3% of the total 1989-93), and of a dramatic shift from indirect to direct acquisitions between 1991 and 1992, when the new FDI law based on national treatment came into force. It is clear, then, that, as soon

Table 7 Greenfield investments, indirect and direct acquisitions, 1989-1993

Year	Greenfield		Indirect acquisition		Direct acquisition		Total	
	$'000s	%	$'000s	%	$'000s	%	$'000s	%
1989	26,514	27.5	54,399	56.4	15,500	16.1	96,413	100
1990	72,992	35.7	91,266	44.6	40,200	19.7	204,458	100
1991	180,666	42.5	126,796	31.4	105,300	26.1	403,646	100
1992	320,272	47.1	9,712	1.4	350,000	51.5	679,984	100
1993	692,092	50.3	4,934	0.4	678,903	49.3	1,377,929	100
Total	1,294,308	46.4	293,748	10.6	1,189,903	43.0	2,768,006	100

Calculated from data provided by the Ministry of Privatisation which are not completely consistent with the figures presented in other tables.

Source: Bellas *et al*, 1995

as legal obstacles had been removed, foreign business turned immediately to outright acquisition, as a way of securing full control over the conduct of business activities. Table 8 shows, furthermore, that the average size of directly acquired firms, in terms of capital stock, was much greater than with other modes of involvement. This suggests that the type of foreign investment targeted was more scale-intensive, in line with the surmised shift from Ricardian to Keynesian adjustment. The process appears to have gone much further in Poland than in other CEE countries (See Table 8).

Table 8 Distribution of FDI in Poland and CEE by type of investment, 1993

	Number of projects	%	Total capital in $m	%	Average capital size of firm in $'000s
Poland					
Mode of Investment					
Greenfield	10,672	92.4	1,294,308	46.4	121.3
Indirect acquisition	815	7.1	293,748	10.6	360.4
Direct acquisition	66	0.5	1,189,903	43.0	18,028.8
Total	11,553	100.0	2,768,006	100.0	239.6
CEE					
Mode of Investment					
Greenfield			7,038,000	36.1	
Indirect acquisition			5,458,000	28.0	
Direct acquisition			6,997,000	35.9	
Total	99,533	100.0	19,493,000	100.0	195.8

Based on data provided by the Ministry of Privatisation which are not completely consistent with the figures presented in other tables.

Source: Bellas *et al* (1995)

Table 9 shows the average capital structure of FDI-based firms as it evolved between 1989 and 1993. The most striking feature of this development is a steady rise of the equity share of foreign investors - from 24% in 1989 to 73% in 1993. The observed trend signifies that foreign investors were gradually changing their investment strategy and beginning to take higher stakes. Their typical investment option shifted from the joint venture (JV) with foreign capital minority participation towards the wholly-owned subsidiary (WOS) with majority holding by the foreign partner. At the same time average FDI per firm rose from $94,000 in 1990 to $146,000 in 1991, to $245,000 in 1992, and to $387,000 in 1993. The parallel growth in the size of foreign interest and the scale of business operations point to an evolution in the role of FDI in the process of industrial restructuring, in terms of a growing concentration on large-scale industries, with all the implications that that holds for technology transfer.

Table 9 Ownership structure of FDI-based firms 1989-1993

Foreign participation in %	24.3	40.7	36.6	57.7	72.8
Average FDI per firm in $'000s		94	146	245	387

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995.

3.4 FDI performance and MNE strategies toward TT

A closer look at the performance of FDI-based firms may help us to identify prevailing MNE strategies. Tables 10 and 11 present sales, exports and profitability of these firms.

The share of FDI-based firms in total sales rose significantly between 1991 and 1992 - the watershed between Ricardian and Keynesian adjustment. Exactly the opposite is true of the ratio of exports to sales for FDI-based firms, which shows a long-term decreasing trend, with a deep decline in 1991, once again reinforcing the argument for a turning point in that year. This may be interpreted in terms of a market-seeking strategy, with foreign investor firms concentrating more and more on supply to the domestic, rather than international market. That strategy in turn clearly implies direct acquisition as the most suitable mode for technology transfer, and a general level of putative transferred technology corresponding to domestic rather than foreign demand.

From Table 11 we can observe that there was a continuous decline in the profitability of sales and the rate of return on equity, exactly parallel to the growth in sales, with again the sharpest decrease in the rate of return occurring 1990-1991 (from about 80% to less than 30%). Thus the conditions favouring a cost-efficiency-seeking strategy seem to have ceased to hold precisely as the market-seeking strategy began to become more attractive. Note, however, that the export share of sales by enterprises with foreign participation was above the average for the entire economy throughout the period. Also, despite the sharp decline in profitability

Table 10 Sales and exports of FDI-based firms, 1989-1992

	1989	1990	1991	1992	1993
Sales in $m	492.3	2,184.1	4,950.2	10,663.0	15,200.0
Sales as % of total sales	1.8	2.7	5.4	8.3	10.8
Exports in $m	105.7	855.9	786.7	1,300.2	2,280.0
Exports as % of sales	21.5	39.2	15.9	12.2	15.0
Exports as % of total exports	1.4	7.9	6.2	9.3	16.4
Total exports as % of total sales	12.4	13.6	13.8	10.9	9.9

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995.

Table 11 Rates of return and profits of FDI-based firms, 1989-1993

	1989	1990	1991	1992	1993
Net profits in trn zl	0.84	3.25	3.94	6.51	9.22
Profits as % of total gross profits	1.6	1.9	5.8	17.4	14.2
Net profits (economy-wide) in trn zl	34.3	80	-19.8	-29.2	-10.7
Gross profit (economy-wide) in trn zl	53.4	175.1	67.4	37.4	65.0
Profit rate on sales in %	31.1	15.7	7.5	4.5	
Economy-wide average rate	22.3	10.6	-1.3	-1.6	-0.5
Return on equity in %	105.1	78.6	29.8	19.6	15.2

Source: *Foreign Investments in Poland*, Foreign Trade Research Institute, Warsaw 1991, 1992, 1994, 1995.

and returns to more moderate levels over time, the profitability on turnover of FDI-based enterprises remained much higher than the average for the economy as a whole. Thus the share of the FDI-based sector in the economy's total gross profits increased steadily from 1.6% in 1989 to more than 17% in 1992, while its share in total exports increased from 1.4% to 9.3%. This confirms the competitive advantage of the FDI-based sector in relation to home enterprises - and this may be partly the result of ownership advantages, in terms of the technologies made available for adoption, in addition to internalisation advantages embedded in marketing, organisational and financial capabilities. It would be expected that relative growth in the FDI-based sector, with its clear-cut ownership advantages, would have a

significant impact on the pattern of structural adjustment and specialisation in the economy, and that the strength of this impact in particular sectors would be a function of the extent of FDI in those sectors. This is the subject of the final part of our analysis.

3.5 Sectoral patterns of FDI and trends in revealed comparative advantage

We are now in a position to reflect on the relationships between the sectoral distribution of FDI, and the patterns of technology transfer, structural adjustment and change in revealed comparative advantage of the given host country. FDI can be attracted by the locational advantages of a specific sector in the host country, or by the ownership advantages of MNE vis-à-vis host country firms. In the first case, we have a typically Ricardian adjustment pattern, which will normally be reflected in an increasing level of revealed comparative advantage (RCA) of the host country in Ricardian industries (resource-based or traditional). If the extent of ownership advantages (the technology gap between foreign and local firms) is the main driving force of FDI inflow, by contrast, it is most probably market share that matters, and Keynesian, or even Schumpeterian (if combined with employment of advanced factors of production), structural adjustment may be expected to dominate.

Let us assume that the array of locational advantages are given by the pattern of RCA at the starting point, and that the change in the pattern of RCA between the beginning and the end of the period is a result of the restructuring effect consequent on FDI inflow. If the pattern of FDI inflow corresponds to locational advantages, it is Ricardian adjustment, which should be revealed through a reinforcement of the revealed comparative advantage of Ricardian industries. If the FDI inflow runs contrary to locational advantages, a Keynesian adjustment process based on market-seeking strategies is most plausible. Furthermore, changes in RCA ratios within particular industries allow us to distinguish between domestic and export-oriented market strategies on the part of MNEs, and to assess the level of technology transfer associated with these strategies. We can then, on this basis, make a distinction between a first (domestic) and second (export-oriented) type of Keynesian adjustment - though only where

the second is combined with extensive employment of advanced factors of production can we talk about movement towards the most advanced, Schumpeterian type of adjustment.

Let us look, then, at sectoral patterns of FDI and changes in RCA in cross-sectional perspective, combining Pavitt's technological ranking with factor intensity analysis.

The data in Table 12 show the sectoral distribution of the stock of FDI in manufacturing industries in 1989 and 1993. It is clear that the food industry has attracted the largest share of foreign investment of all the sectors of manufacturing, rising from 9.4% in 1989 to 14.3% of total, economy-wide investment in 1993. The second position in 1993 was taken by motor and transport equipment industry, which started from the lower level of 4% in 1989, but

Table 12 Sectoral pattern of FDI, 1989 and 1993

% of total FDI stock	XII 1989	XII 1993
Food	9.4	14.3
Textiles & apparel	5.9	8.1
Wood & paper	7.2	6.5
Chemicals & plastics	8.4	8.3
Metals	4.8	4.0
Machinery & equipment	4.9	1.4
Electrical & electronics	1.9	5.8
Precision instruments	0.8	1.1
Motor & transport equipment	4.0	14.0
Furniture	3.8	1.4

Source: As for Table 11

reached 14% in the latter benchmark year. The shares of these two branches, taken together, in the total stock of FDI, amounted to about 40% of all the capital invested in the secondary sector at the end of the period. The chemical industry's share is rather stable at about 8%, as is that of wood and paper at about 7%. A gradual increase is observable for the electrical and electronics industry - from a share of 1.9% in 1989 to one of 5.8% in 1993, while there was a

marked decline from 4.9% to 1.4% in machinery and equipment. Textiles and apparel maintained a stable share of 6-8%. Small portions of direct foreign investment went in other directions - primarily to lower- or medium-technology industries with relatively high capital-intensity, most probably seeking to taking advantage of natural resource endowment rather than cheap and well educated labour.

Despite the rapid increase in FDI in terms of numbers of establishments and value of committed investment, the average level of employment in enterprises with foreign participation remained stagnant, or rose only slightly, over the period under review. FDI-based companies absorbed about 1% of total employment (an average of around 145,000) 1989-1991, and no significant increase in employment was observed until 1992, when it suddenly shot up to 230,000. It then rose gently again to 310,000 in 1994, an increase of 130% in relation to 1989. If we contrast this moderate upward trend with the rapid growth in sales by the same entities, it seems clear that the exploitation of putatively cheap labour was not the main strategy of foreign investors.

To compare sectoral patterns of FDI with changes in RCA, we apply the industrial classification of Neven (1994), who identifies five groups of industries according to their factor intensities in terms of three factors - unskilled labour, human capital and physical capital. Various combinations of these factors produce the classification as shown below in Table 13. A particular feature of this system of classification is that it generally corresponds to that of Pavitt, with sector 1 resembling Pavitt's science-based industries, sector 2 - his specialised suppliers, sector 3 - traditional industries, and sector 4 - scale-intensive industries; the only difference is in relation to sector 5, which covers some resource-based industries - but only those of high human capital and physical capital intensity - while other resource-based industries are classified, depending on their physical capital intensity, under sector 3 or sector 4. There is no explicitly resource-based group in this classification, as natural resources as such play little or no role in the technological ranking of input mix. The Neven

Table 13 Industrial sectors by factor mix

1	very high human capital	chemicals, electronics, office machinery
2	high human capital, low physical capital	mechanical, electrical & instrument engineering
3	low human capital, low physical capital	footwear, clothing, metal, furniture
4	low human capital, high physical capital	motor vehicles, textiles
5	high human capital, high physical capital	food processing, pulp & paper

Source: Neven (1994)

classification is particularly useful for us, in that it captures both the technological dynamism of industries (implicitly, through its correspondence to Pavitt's taxonomy) and the qualitative aspect of factor mix.

Table 14 presents a comparison of the sectoral pattern of FDI flows and the changes in revealed comparative advantage of technological clusters of industries over the period studied in selected countries. It is evident from the table that the two highest ranked (in technological terms) sectors (1 and 2) exhibit relatively stable negative RCAs in the Polish case, and receive low and declining shares of FDI. Foreign investment has neither been attracted by locational advantages nor contributed much to technological improvement in these industries - and sector 1 is precisely the one which has been the main vehicle of technological catching up for the Asian tigers.

Sector 3 - the only one with a positive and improving RCA, attracted quite large amounts of FDI - but relatively less as the period went on. What is really puzzling is that a falling FDI share corresponds to a rising RCA index. One can conclude that FDI was attracted by locational advantages here, but was not the most important mode of technology transfer into the sectors concerned, with structural adjustment in these traditional industries occurring in a more Ricardian way, without major capital and technology flows. Table 15, below, helps to resolve this conundrum, showing that traditional sector 3 branches (clothing, furniture etc)

Table 14 Sectoral patterns in FDI and trends in revealed comparative advantage

A FDI

Sector	% dist in 89	% dist in 93	% change	Total inflow 89-93 $m	% dist of total inflow
1	16.5	12.8	-3.7	381.9	12.7
2	14.8	12.8	-2.0	383.0	12.8
3	28.4	20.8	-7.6	619.6	20.6
4	7.8	21.6	+13.8	658.0	21.9
5	32.5	32.0	0.0	960.7	32.0

B RCA

Country/year	Sector 1	2	3	4	5
Poland					
1988	**-0.17**	**-0.21**	**0.17**	**0.19**	**0.03**
1993	**-0.14**	**-0.15**	**0.25**	**-0.01**	**0.04**
Czechoslovakia					
1988	-0.12	-0.32	-0.08	0.30	0.06
1993	-0.08	-0.20	0.13	0.12	0.04
Hungary					
1988	-0.14	-0.18	0.16	0.12	0.04
1993	-0.10	-0.08	0.20	-0.02	0.0
Singapore/1993	0.42	-0.19	0.0	-0.20	-0.03
S Korea/1993	0.07	-0.18	0.17	-0.03	-0.03
Taiwan/1993	0.21	-0.14	0.04	-0.05	-0.07

Source: FDI as above; RCA from Z Drabek and A Smith (1995) based on Eurostat COMEXT databank.

constitute the largest and most rapidly growing category of Polish subcontracting exports to Germany. Outward processing was, therefore, the main factor in this pattern of Ricardian adjustment in traditional sectors, based on technology transfer modes like licencing and subcontracting. Sector 4 increased its share of total Polish FDI most strikingly over the

Table 15 German imports outward processed in CEECs, 1989 and 1992

	Poland		CSFR		Hungary		CEE countries	
	1989	1992	1989	1992	1989	1992	1989	1992
Machinery & electrical engin	7	35	5	140	47	107	60	285
Road vehicles	1	20	3	48	4	19	8	87
Furniture	38	74	9	14	13	14	154	134
Clothing & footwear	205	616	35	219	227	383	649	1504
Total	264	814	59	494	317	570	924	2222

Source: Naujoks and Schmidt (1994)
CEE: ex-Soviet Union, Poland, ex-CSFR, Hungary, Romania, Bulgaria, Albania.

period studied, starting from small amounts of capital inflow, and in the end exceeding the share of sector 3 (traditional). One may infer that this was due to a high initial RCA and high initial labour intensity - to be complemented by capital inflow to create the required factor conditions. However, if we look at trends in RCA over the period 1988-93, we find that it was probably not the factor conditions that mattered so much as the quest for a share in the domestic market. Thus foreign investment into these scale-based industries was attracted less by cost efficiency considerations than by technological ownership leads over indigenous firms and ease of domestic market penetration on account of lagged demand for these standardised mass consumption products. This would explain the dramatic decline of RCA for this sector. FDI inflow was here driven mainly by the first type of Keynesian adjustment mechanism. Table 16 shows that predominantly export-oriented foreign investments (contributing to the second Keynesian type of adjustment) in the sense of sourcing factories or world product mandates are still in the minority in the CEE countries. This would suggest modest rate of technology transfer in sector 4.

Sector 5, finally, has absorbed a large and stable share of FDI inflow (roughly one third). This is a sector which combines high human capital intensity with high physical capital intensity, but draws also on proximity to natural resources (not explicit in Neven's classification). Here, the complementarity of locational factor conditions (abundant human

Table 16 Export-oriented foreign investments in selected CEECs

Hungary	*Czech Republic*	*Slovakia*	*Slovenia*	*Poland*
Suzuki	Volkswagen	Volkswagen	Black & Decker	Fiat
Ford	Robert Bosch	Chemlon		Thompson
Volkswagen	Asahi Glass	Fermas	Henkel	Lucchini
GE	Rockwell	Hendek	Siemens	Pilkington
GEA	GE	Samsung	Hoechst	ABB
IBM	Hamilton	Siemens	Iveco	International
Caterpilar			Bayer	Paper
Phillips	T&N			
Loranger			Kloecker-Humbold	
MET	Daimler Benz			
GM-Audi	ABB		Deutz	
David Brown				
69% in FDI	73% in FDI	28% in FDI	43% in FDI	46% in FDI

Source: Bellas *et al* (1995)

capital and resources) and the inflow of physical capital embodying advanced technology have created the most favourable conditions for foreign investment to take place. Sector 5 has absorbed a large and steady flow of FDI despite its relative unattractiveness in terms of RCA at the starting point. Not surprisingly, comparative advantage could not reveal itself in conditions of missing technology and financial distress, in the spite of abundant human capital and natural resources. Though this is not a sector of high technological dynamism, its upgrading through technology transfer by means of FDI may be viewed as an important factor or restructuring in an economy abundant in human capital. Creating employment opportunities for resources that would otherwise be left idle, but without technology transfer, is very much a Keynesian type of adjustment. When the rate of absorption of human capital is very high, however, it may generate broad spillover effects leading to virtuous Schumpeterian growth circles across the whole economy.

A first glance at the sectoral distribution of FDI in Poland suggests an interpretation not altogether consistent with the prevailing opinions on cheap and unqualified labour in Poland.

The data point towards industries identified as scale- or capital- and human-capital intensive being the leading targets for foreign direct investment in Poland, rather than the traditional labour-intensive sectors. This suggests that Polish unqualified labour is rather expensive in relation to other possible host countries, as measured by its relative productivity, and that, by contrast, skilled labour reveals some comparative advantage as expressed in terms of its relative cost. Factor price conditions of this kind may prove to be a key link leading from the Ricardian, factor-price-driven adjustment mechanism to the Schumpeterian adjustment mechanism driven by the creativity of human capital.

4 CONCLUDING REMARKS

1 Analysis of the legacy of central planning, and of the characteristics of the global economic environment, suggest a special role for FDI in the context of the industrial restructuring of the new market economies of Central and Eastern Europe. This is evident from consideration of technological and distributional distortions, financial distress, globalisation of world finance and technology flows, and especially of new sourcing modes of technology transfer.

2 If the impact of FDI on restructuring is to be maximised, a massive reconstruction model of FDI inflow is most appropriate. However, conflicting goals of policies aiming at differing types of structural adjustment mechanism (primarily Ricardian and Keynesian, with the Schumpeterian largely neglected) have stood in the way of more large-scale FDI inflows. This was clearly apparent in the first wave of FDI inflow into the Polish economy, which followed mainly Ricardian lines of adjustment.

3 The second wave of FDI inflow after 1991 followed the broader liberalisation of the FDI regime in that year, combined with a higher degree of trade protectionism, which enhanced Keynesian-type adjustment. This was reflected in a change in the mode of technology transfer from licencing and joint ventures to direct acquisitions and greenfield

investments, in a rising share of FDI in GCF, and in a shift in MNE strategies from cost efficiency to market-seeking.

4 Applying industrial sectoral taxonomy based on technological criteria to the comparison of sectoral patterns of FDI with changes in revealed comparative advantage indices, we found that FDI inflow contributed mainly to the industrial adjustment of the first Keynesian type (based on the domestic market rather than export-oriented). It was visibly concentrated on sectors exhibiting relatively high human capital, physical capital and resource intensities, rather than unskilled labour intensity. This is a pattern which can lead to the absorption of idle assets, in particular human capital, which may result in positive spillover effects in the future. Other modes of technology transfer were also found to be gaining in importance in Ricardian industries, eg subcontracting, leading to technology transfer through sourcing arrangements.

5 No clear signs of Schumpeterian restructuring could be found. This is not surprising, since Schumpeterian restructuring would require a fundamental reorganisation of the national innovation system, and of its core R&D sector, which has suffered particularly badly under transformation, both financially and in terms of the profound technological shock caused by the sudden opening-up of the economy. It will surely take time before enterprises, supported by the R&D infrastructure, can develop indigenous products and processes that will be competitive in world markets on account of high productivity and quality. Any impact on the trade structure may be visible only after a very substantial time lag indeed. The first signs of this process may be detected on the basis of careful observation of changes in sectoral productivity patterns and increases in value added within export lines. This, however, opens up a new research agenda, one that we will be able to pursue only on the basis of a highly detailed and disaggregated sectoral database.

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