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**Negotiating Group on the Multilateral Agreement on Investment (MAI)**

**FOREIGN DIRECT INVESTMENT AND THE ENVIRONMENT:  
AN OVERVIEW OF THE LITERATURE**

**(Note by the Secretariat)**

## FDI and the Environment -- An Overview of the Literature

(Note by the Secretariat)

### Introduction and context

This paper provides an overview of recent literature dealing with the relationship between foreign direct investment (FDI) and the environment.

The scale of global FDI has increased rapidly in recent years. In 1990, private investment in developing countries totalled US\$ 44 billion; by 1995, this had grown to more than US\$ 167 billion (World Bank, 1996). During the same period, Official Development Assistance (ODA) fell slightly, but remains a very significant financial flow toward the developing countries (US\$ 55 billion in 1996) (OECD DAC, 1996).

Most FDI is still occurring within the OECD area. Only 10% of total world capitalisation exists in the developing countries and emerging markets (IFC, 1996). Nearly 75% of global FDI flows in recent years have gone to industrialised countries. On the other hand, the developing world is receiving an increasing share of these investments. In 1995, developing countries took in approximately US\$ 90 billion (38%) of the US\$ 240 billion total of world-wide FDI (World Bank, 1996).

Only a few countries receive most of the capital flows going to the non-OECD countries. On a regional basis, 60% of the FDI going to developing countries between 1989 and 1994 went to Asia -- especially to China, India, and Indonesia (UNCTAD, 1995). Latin America received 27% of the total, 6% went to central and eastern Europe, and a mere 6% went to Africa. Similarly, the weight of ODA in total financial flows to developing countries differs widely by country (OECD DAC, 1996).

The key investors also vary from country to country. In Brazil, for example, the European Union has traditionally been the largest source of FDI. In Mexico, the US remains the dominant foreign investor. By far the largest source of FDI inflows to China is Hong Kong, although the US, Japan, and Taiwan also represent significant shares.

The structure of FDI is also changing. In the OECD countries, flows to the manufacturing sector have generally fallen, in favour of those aimed at the service industries. It is also useful to recall that, although the flow of international capital into countries like China and Brazil has been significant in recent years, a large portion of total investment in these countries still comes from domestic sources.

Four key aspects of the FDI-environment relationship have dominated much of the research effort to date:

***Environmental effects of private international finance.*** FDI may generate both risks and opportunities for the environment, depending on the circumstances. On the one hand, FDI can generate new growth and new structural efficiencies, making larger investments in environmental protection possible. But it may also lead to increased production and consumption of polluting goods, or to expanded industrial activity (and thus, to increased emissions).

***Environmental effects of FDI-based technology development and diffusion.*** Foreign investors may bring modern technologies that represent environmental improvements over what is currently available in the

country in which they are investing. Thus, FDI-based economic expansion may offer the prospect of significant technology-based environmental improvements.

***Impact of environmental standards on investment decisions by the firm.*** A key question is whether or not higher environmental standards lead firms located in “high-standard” countries to move to jurisdictions with “lower” environmental standards (i.e. to “pollution havens”). Plant relocations may be the result of the higher costs associated with more stringent environmental standards, or they may simply be the result of other cost/quality advantages offered by the host location.

***Environmental effects of international competition for FDI.*** A related fear is that some jurisdictions will use lower environmental standards as a way of attracting new FDI. Countries could either lower their standards intentionally, or they could resist increasing their standards, in order to gain a competitive advantage.

The following sections review some of the available literature surrounding each of these four themes. In broad terms, the literature reviewed here suggests that the technology effects of FDI are likely to be positive for the environment, and that multinational enterprises (MNEs) will have an important role to play in making sure that this positive effect actually materialises. Structural shifts in FDI flows may also result in a lessening of environmental pressures, to the extent that the service sector is less environmentally-intensive than manufacturing activities.

A significant gap in existing research relates to the scale effects of FDI on the environment, especially with regard to the potential influence of higher (FDI-induced) income levels on the demand for environmental quality. However, most empirical research suggests that firms will not generally move their operations to take advantage of lower environmental standards existing in the new location, and that efforts by national governments to compete for FDI by relying on lower environmental standards are unlikely to be very successful in the long-term.

This suggests that fears of a “race to the bottom” in environmental standards, based on the idea of “pollution havens”, may be generally unfounded. On the other hand, this conclusion may not hold in specific cases, especially where the firms involved produce undifferentiated products (and where small cost differences make a significant difference to their profitability), or where the countries involved are under-capitalised and fast-growing.

These issues are explored in more detail below.

## **Environmental effects of FDI and other financial flows**

Discussions about the environmental impacts of global private capital flows often centre on FDI. FDI is indeed an important dimension of private international finance (PIF), but it is not the only category of international financial flows. Portfolio equity investments, debt finance (commercial loans, bonds), and ODA also need to be considered. FDI represented only 54% of total private capital flows to emerging markets in 1995 (World Bank, 1996). Debt finance accounted for an additional 33% of the total. Portfolio equity investments made up the balance, or 13% of total international PIF going to the developing world. As noted earlier, ODA also makes a significant contribution to financial flows headed towards developing countries.

## *ODA*

ODA can play an important role in promoting better environmental management capacity in developing countries. This will usually involve assistance either in the formulation of environmental policies, in the monitoring of private sector compliance with these policies, or in the establishment of effective institutional mechanisms to implement the policies. The requirement that ODA projects be routinely subjected to environmental impact assessments also works in this direction (OECD, 1995c; 1996).

The three components of PIF vary with regard to the depth and character of their connection to environmental issues (Gentry *et al.*, 1996). The most direct and significant link lies with FDI (and any associated commercial loans), which often goes into facilities (power stations, mines, plants) which may pose clear pollution control, ecological protection, resource consumption, and public health issues.

## *Portfolio investments*

While the relationship between environmental issues and portfolio investments in overseas companies' shares is less obvious than it is for FDI, pressure for short-term profitability in these investments may also create incentives to reduce the environmental performance of host firms. In addition, financial analysts and investors may not fully understand the links between eco-efficiency (Schmidheiny, 1992) and improved competitiveness and financial performance (Schmidheiny and Zorraquin, 1996; Gentry and Fernandez, 1996). By failing to bid up the value of companies that are investing in environmental quality, investors may thereby create disincentives for increased environmental performance.

In contrast, where investors fear that poor environmental management creates a risk of future liability, they may bid down the value of shares. Companies which sell in markets with eco-sensitive consumers, or companies which have differentiated their products on the basis of "green" attributes, may find that foreign investors, concerned about the long-term value of their investments, will be increasingly attentive to environmental performance.

## *Debt*

The connection between debt and environmental performance is also important. Commercial lending to private companies gives banks a stake in the borrowers' financial successes (or, more precisely, in their failure) and provides banks with an incentive to consider environmental risks. Other debt holders will be more or less attentive to environmental performance, depending on the nature of the instruments they hold (which affects how insulated they are from variations in a company's value), or on the importance of environmental performance to the success of the enterprises in which they have invested. For example, investors in government-issued bonds are likely to be relatively uninterested in environmental concerns, because the connection between government environmental performance and the ability to repay is somewhat remote (Gentry *et al.*, 1996).

## *FDI*

The discussion which follows focuses on FDI, rather than on PIF or ODA more broadly. This is because the focus of the MAI is on private investment, and most of the available PIF literature deals with the FDI theme. However, it is noted that more attention will need to be paid over time to the environmental consequences of equity and debt portfolio flows, partly because these flows may represent potential sources of environmental problems in themselves, and partly because they could become

important new sources of funds for environmentally-friendly investments over time. Furthermore, it is worth remembering that analysing the environmental consequences of globalisation must be done over a longer time frame than is required for many economic issues. Opportunities to use ODA as “levers” for improved environmental management in developing countries will also need to be closely examined in the future.

It is not always easy to distinguish between the separate environmental effects of domestic economic activity and the activities of foreign affiliates. The marginal environmental effects of FDI, both positive and negative, will always be significant in some countries, but not in others.

Any discussion of the environmental effects of FDI should recognise that the time dimension is crucial. Some elements of FDI may initially seem benign for the environment, but the opposite may be true when these elements are viewed in a more dynamic context. Given the long-term nature of environmental problems, this is important. Similarly, there may be inherent limits to some of the environmental consequences of today’s FDI. As environmental constraints begin to operate, private economic costs could increase, making it more profitable for firms to reduce emissions on their own, even in the absence of effective environmental control policies by governments. Some of the apparent environmental effects of FDI (both positive and negative) could therefore be “choked off” by price changes over time (Jones, 1997).

One of the key issues involved in assessing the environmental effects of growth has to do with scale effects. Although the scale effects are usually assumed to be negative for the environment, the size of these effects is the subject of considerable debate. Some research has suggested (see Selden and Song, 1994) that the negative scale effects may be limited by the existence of “inverted-U” relationships between pollution and development. In this view, FDI-induced economic growth might initially lead to new environmental problems, but after a certain point, pollution would level off, and eventually decline, largely because there would be higher demands for environmental quality at higher levels of income.

Research at the World Bank (Dasgupta *et al.*, 1995) has indeed found that the amount of environmental regulation does increase steadily with the growth in per capita incomes. Other authors (e.g. Lucas *et al.*, 1992; Shafik, 1994; Grossman and Krueger, 1995; Seldon and Song, 1994) have also generally found that many indicators of environmental quality do tend to deteriorate with growth up to a certain level of income, but then level off, and begin to improve after a certain point.

Although these results may seem rather reassuring at first glance from an environmental perspective, it is useful to recall that:

- The “turning point” in many countries may be at quite high levels of income, suggesting that the environmental intensity of production would have to continue to rise for some time, perhaps to levels that imply significant environmental irreversibilities (Opschoor, 1995).
- The “inverted-U” relationship may not hold for all pollutants in all countries at all times, nor at the global level -- in particular, its influence may be limited (both in space and in time) by simultaneous changes in structural conditions (see Saint-Paul, 1994). The result may be that environmental problems worsen more slowly over time, but never actually decline in absolute terms, even as income levels rise (Esty and Gentry, 1997).
- Although there is some empirical research linking trade-induced economic growth with worsening environmental conditions (e.g. Dessus and Bussolo, 1996), these results are not necessarily applicable to FDI-induced growth.

Overall, therefore, it is difficult to draw any meaningful conclusions at this point about the influence that “inverted-U” curves may be having on the scale effects associated with FDI increases.

Privatisation (a major source of FDI in many countries) can yield significant environmental benefits in some cases (Gentry, 1996*b*). Privatised companies generally attract better management, which in turn results in reduced waste and lower pollution. Compared with public owners, foreign investors usually insist on greater efficiency in the operations in which they invest. Pressures for efficiency create an incentive to consume less energy (reducing emissions) and fewer inputs generally (reducing waste). On the other hand, privatisation can also mean less government control over environmental practices. This can mean reduced environmental performance in some circumstances (OECD, 1997*b*).

The institutional structure supporting pollution control efforts can be more important than the actual level at which environmental standards have been set. Environmental laws and requirements provide the goals, but whether there is really any environmental improvement associated with these laws depends heavily on the quality of the associated implementation effort (Esty and Gentry, 1997).

Another matter of particular importance is the potential FDI investor’s environmental liabilities. Excessive burdens on new enterprises for the clean-up of past contamination, or uncertainty about future liabilities, may serve to deter FDI flows. In Central and Eastern Europe, for example, liability rules appear to have played a major role in determining where FDI was directed, as investors avoided countries that tried to make new owners responsible for cleaning up past toxic contamination (Esty and Gentry, 1997).

In the case of domestic environmental problems, both developing and industrialised countries have an incentive to insist upon basic environmental performance goals on the part of all companies (including foreign-based ones) that operate within their territory, although developing countries obviously have more limited means of doing so (Cooper, 1994). In the long-run, standards which are lower than what the public desires will reduce social welfare, and will be self-defeating.

Where environmental problems are transboundary in nature, national governments may neglect these problems, because some of those who would enjoy the benefits of environmental quality improvements live outside their jurisdictions (“free-rider” problem). Similarly, sovereignty considerations prevent individual countries from influencing the environmental behaviour of other countries very much. Both of these problems point to the need for some type of international co-operation in the resolution of transboundary environmental issues (e.g. Zarsky, 1997). Because of the inherent linkages between economic activity (including FDI activity) and the environment, some authors have even argued that, unless collective action is forthcoming, the resulting “structural failure” in environmental policy could eventually threaten the long-run sustainability of the international economic regime (e.g. Esty, 1996; Esty and Geradin, 1997; and Esty, 1996; Zarsky, 1997).

### **Environmental effects of FDI-based technology development and diffusion**

The internationalisation of capital markets, the internationalisation of production processes through FDI, and the increasing importance of multinational corporations may each generate significant consequences for the environmental characteristics of production (i.e. for technologies). In particular, most studies hypothesise that international investment flows will result in less environmentally-damaging technologies being used (see Schmidheiny (1992) and OECD (1995*a*) for a general discussion of these issues).

Most commonly, it is argued that FDI undertaken by multinationals will result in some standardisation of technologies across countries (Pearson, 1987; Warhurst and Isnor, 1996; Birdsall and Wheeler, 1993; Levy, 1995). FDI-source firms might choose to apply a world-wide environmental standard to all of their operations for three basic reasons: (i) it may be more efficient to run a single set of environmental practices world-wide than it would be to scale back environmental practices at a single overseas location; (ii) the high visibility of MNEs can make them particularly attractive targets for local enforcement officials; and (iii) the memory of such events as the Bhopal disaster, and the ensuing legal difficulties suffered by Union Carbide, are encouraging MNEs to be especially conscious of their potential overseas environmental liabilities (Schmidheiny and Gentry, 1997).

The presence of multinationals can also have positive spillover effects on the technological characteristics of national firms. Local firms may try to imitate multinationals' technological practices ("reverse engineering"), depending on the stringency of the intellectual property rights regime (Blömstrom and Kokko, 1996; Jaffe *et al.*, 1994; Coe *et al.*, 1995; Coe and Helpman, 1995). Spillovers also arise as local firms employ staff previously employed by the multinationals, thereby gaining access to expertise which may not be readily available locally, particularly if the multinationals have strong training programmes for their staff. The presence of MNEs appears to generate technological spillovers amongst supplier industries as well. By demanding particular quality standards, and then providing the technical assistance needed to meet these standards, multinationals can help upstream industries improve their technological efficiency (Blömstrom and Kokko, 1996; Blömstrom and Wolff, 1994).

By giving firms access to foreign sources of savings, the internationalisation of capital flows could also ease financial constraints which prevent firms from investing in potentially more efficient, less environmentally-damaging capital equipment. Indeed, according to OECD (1995*b*), financial constraints are among the most important barriers to investment in environmentally-preferable technology. In some cases, these constraints have arisen from national policies towards foreign capital, such as foreign exchange restrictions and international credit controls (see OECD, 1992*a* and May *et al.*, 1996 for examples).

By subjecting firms to foreign shareholder pressure, cross-border capital flows may also give foreign investors some influence over the characteristics of production. As with the role of consumer pressure through international trade, this would have positive environmental consequences if foreign shareholders tended to demand a higher set of environmental standards. The results of Henriques and Sadorsky (1996) on the determinants of a firm's likelihood to adopt an environmental plan indicate that shareholder pressure does have a positive effect of this type, but that this effect is not very significant. It is also likely to be even less important if shareholders are either geographically or institutionally distant from the firm.

FDI can also promote the diffusion of environmentally-friendly technologies through the expansion of the environmental goods and services industry. World-wide sales of pollution abatement equipment and related services are estimated to total some US\$ 200 billion (Duchin *et al.*, 1995), with 90% of total output being accounted for by OECD countries. OECD (1992*b*) has estimated that this amount could grow by 50% during the 1990s.

Since multinationals establishing themselves in foreign markets have to overcome many hurdles, such as unfamiliarity with domestic markets, regulatory systems, and local customs, it is often thought that technological advantages are their most important competitive "edge" over domestic producers (Grossman and Helpman, 1995). Thus, their technology is likely to be relatively advanced. It has been estimated, for example, that 75% of industrial R&D is undertaken by MNEs (Archibugi and Michie, 1995). However, overseas multinational R&D is concentrated in only a few countries. There is little evidence that R&D is

being undertaken on a significant scale by MNEs in developing countries (Freeman and Hagedoorn, 1995).

On the other hand, some countervailing tendencies may result in multinationals applying relatively more damaging technologies. For example, if “pollution havens” exist, it is possible that capital could flow towards those regions with the weakest environmental regulations. This could provide an incentive to use cheaper (and perhaps, more environmentally-damaging) technologies in particular countries or sectors.

While the role of multinationals is clearly important as a vehicle for both technological change and diffusion, the more general effects of international capital flows may be more important determinants of the technologies of production. Thus, May *et al.* (1996) have argued that the higher returns demanded, coupled with the shorter planning horizons foreseen for speculative capital flows, relative to more direct forms of investment, may result in an investment bias towards projects which do not take into account the long-run economic effects of environmentally damaging production practices.

There are a few isolated examples of companies actually dismantling outdated production facilities in industrialised countries, and moving them to developing countries (Esty and Gentry, 1997). Anecdotal evidence suggests, furthermore, that certain kinds of enterprises, such as the town and village enterprises of rural China, are particularly likely to seek used (high-polluting) equipment from the industrialised world. They accept outdated equipment because they are undercapitalised, and because this equipment is cheap. However, the worst examples of this type of “technology dumping” appear to involve investors from the non-OECD countries (Esty and Mendelsohn, 1995). In addition, most of these cases actually involve sales of technology, rather than FDI itself.

The most comprehensive survey of multinationals’ environmental performance carried out thus far (UNCTAD, 1993) found that larger firms tend to be more likely to have well-established environmental management systems and better environmental performance, and it attributed this to economies of scale in production and administration. Significantly, it also found that environmental management practices were affected by conditions in the firm’s home country, particularly when the affiliates were located in developing countries.

## **Impact of environmental standards on investment decisions by the firm**

### *General research*

One of the liveliest debates about the environmental consequences of FDI focuses on “pollution havens” (Esty, 1994; GATT, 1992). However, data on whether or not FDI actually flows to “dirty” or “clean” industries are sparse. Foreign capital flows to a wide range of industries and companies — some of which are careful environmental stewards, some of which are not.

Nevertheless, the research that is available suggests that very few companies investing overseas seek to reduce environmental compliance costs as their primary goal (Gentry *et al.*, 1996). Although establishing a low-cost base of operations may be an important reason for setting up operations abroad, multinational enterprises generally seek consistent environmental enforcement, rather than lax enforcement. Moreover, companies are usually willing to make new investments that improve the environment, so long as their main competitors are also held to similar standards.



Operating costs (including environmental costs) therefore seem to be only one factor among many in location decisions, and the significance of environmental factors will vary significantly by industry. Regarding environmental issues, many operating costs will actually be lower where environmental quality is high (e.g. water filtration costs, risks of incurring clean-up costs for past environmental damage, and worker health problems).

But there is some evidence that in industries with higher than average pollution control costs, production may indeed seem to “migrate” overseas to areas with lower (and therefore cheaper) environmental requirements. (*Business Economics*, 1995). Which types of firm are most likely to do so? To answer this question, it is useful to distinguish among three basic types of FDI (Esty and Gentry, 1997):

**Market-seeking FDI.** Many foreign investors are seeking opportunities to sell in overseas markets. These investors are likely to be attracted by the potential for sales in the domestic markets of the countries in which they are investing. Markets that are large and growing will therefore be the most attractive (e.g. China). FDI that is seeking new access to local markets is not likely to be especially sensitive to increased environmental costs.

**Production-platform-seeking FDI.** Some investors set up overseas facilities specifically to serve regional export markets -- to provide a platform for production and sales. Japanese auto factories in the UK and Mexico, providing platforms for sales in the European and North American markets, are examples. This type of FDI will probably not be very sensitive to increased environmental costs either.

**Resource-seeking FDI.** Some investors’ overseas activities are aimed at obtaining access to critical resources not available in their own markets. In other cases, although the materials might be available at home, investors see the prospect of lower prices in setting up a facility abroad. Low-priced natural resources continue to be an attraction for a significant number of foreign investors of this type. For many investments in this category, outputs are relatively undifferentiated, so small price differences can translate into large changes in market share. Investment flows toward these industries may therefore be particularly susceptible to differences in environmental costs.

The ability of firms to move to new locations may also be effectively limited by other financial conditions. For example, environmental restrictions may be imposed by home governments on companies doing business abroad, if export finance programmes are involved (Esty, 1995; Gentry, 1997). The US Ex-Im Bank has a set of environmental guidelines that any US company taking advantage of its funding must meet (Ex-Im, 1995). Similarly, the US Overseas Private Investment Corporation (OPIC) requires environmental impact assessments from US companies seeking political risk insurance for overseas projects. OPIC also requires environmental management plans on all projects that it supports in developing countries, including annual reporting by the project developers on their environmental performance.

Another type of environmental performance requirement that is proving increasingly important relates to the conditions laid down by the International Finance Corporation (IFC), the World Bank, and other multilateral development banks for the projects they finance (World Bank, 1996; ADB, 1993). Although these standards apply officially only to funds provided by the multilateral agency, the agency’s standards can effectively become a *de facto* requirement for all participants in a project. This “halo effect” can also be extended to the private sector, involving firms who use compliance with the international benchmark as a way of avoiding questions about their own environmental performance (Gentry, 1996a).

How effective these requirements are is not yet clear, because the track record is not yet long enough to allow any serious conclusions to be drawn. However, some anecdotal evidence is available. In October 1995, for example, OPIC took steps to cancel the political risk insurance of Freeport McMoRan, a US-based mining company with a major gold mine in Irian Jaya, Indonesia. The initial OPIC decision was based on environmental shortcomings in Freeport McMoRan's operations, including "massive deposition of tailings" and activities that "degraded large areas of lowland rain forests" (Press, 1996).

Two basic methods have been used to examine whether or not FDI locations are actually influenced in practice by environmental costs. The first looks at overseas investment statistics, to see if patterns can be found linking offshore investments with environmental standards. The second examines how firms make their investment location decisions, and whether or not environmental factors play a large role in these processes. In most studies, the underlying hypothesis has been that stringent environmental standards have a "negative" impact on location decisions (in the sense that they induce firms to move towards "pollution havens"). The results of key elements of this research are summarised below.

### *Empirical research on FDI and environmental standards*

Repetto (1995) analysed 1992 data for US direct investment abroad (USDIA) by sector and by regional destination. He noted that, although developing and transitional economies received 45% of total USDIA in 1992,

... much *smaller* proportion of that direct investment went into the environmentally sensitive industries (petroleum and gas, chemicals and related problems, and primary or fabricated metals) than was the case for USDIA in the already-developed countries with relatively tight environmental standards. ... 24% of USDIA into the advanced countries went into pollution-intensive sectors, but only 5% of USDIA into the less developed economies went into those sectors. Of the total direct foreign investment in pollution-intensive industries, 84% went to other developed countries, compared to 49% of overseas investment in other industries. To the extent that the advanced countries seem to be exporting their "dirty" industries, they seem to be sending them to each other, not to the less developed economies [emphasis in original].

Where data was available for individual countries, Repetto continued, this conclusion was corroborated:

In Nigeria, Hong Kong, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Argentina, Brazil, Colombia and Venezuela together, and in each one individually except Venezuela, the stock of inward foreign direct investment in the pollution-intensive industries represents a smaller share of total foreign direct investment now than in the 1960s or 1970s, despite the fact that environmental regulations have tightened in the countries making the foreign investments.

These overall trends are confirmed by Olewiler (1994), who summarised and updated the work of Leonard (1988), who had assessed trade and investment data with respect to pollution-intensive industries in the US, and concluded that there was no pattern of investment in LDC "pollution havens". Even for the mineral processing sector, FDI averaged much higher in developed countries than in developing countries, with no correlation being found with the stringency of environmental policy.

Xing and Kolstad (1996) took a different approach to measuring the effect of stricter environmental regulations, and arrived at somewhat different results. They examined FDI between 1985

and 1990 in 22 countries (seven developing and 15 developed) by the US chemical industry, the US electrical machinery industry, and the US non-electrical machinery industry. Their analysis showed that more lax environmental regulations in a host country were significantly correlated with US chemical industry FDI, but not with other industries which pollute less than the chemical industry. Furthermore, their results indicated that the more “relaxed” the environmental regulations in the host country, the more likely that country was to attract the investment capital of US industry.

More ambiguous results were obtained by Bouman (1996) for Germany. This study found a significant, but small, negative effect of German compliance costs on capital outflows, although some of the regressions also found the reverse situation (increased compliance costs and reduced outward foreign investment). Also, the results varied according to whether the compliance cost measure concerned capital expenditures or current expenditures, raising some questions about the robustness of the results.

A different type of question was posed by Birdsall and Wheeler (1992). Their research investigated whether greater openness in trade and foreign investment was associated with pollution-intensive development. Their hypothesis was that if trade was encouraging the existence of pollution havens, the more open developing economies should experience relatively higher pollution-intensive development. The evidence (from Latin American countries) showed, however, that over the 1970s and 1980s, the more open economies actually ended up with cleaner industrial sectors. Although pollution intensity did grow more rapidly in Latin America as a whole after environmental regulations in OECD countries became stricter, anecdotal evidence suggested that openness to foreign technology and capital gave rise to pressure for more stringent environmental standards. The authors concluded “that pollution havens can be found, but not where they have generally been sought. They are in protectionist economies”. (Emphasis added).

Similar conclusions were reached by Lucas, Wheeler, and Hettige (1992). These authors, focusing on production, rather than on investment flows, examined changes in the relative output of various industrial sectors over 1960-1988, using time series estimates of the pollution intensity of manufacturing for a large sample of developed and developing countries. The results indicated that the pollution intensity of developing countries’ economies had indeed grown strongly. In addition:

Pollution intensity has grown most rapidly in developing countries that are relatively closed to world market forces. Relatively closed, fast-growing economies experienced very rapid structural transitions toward greater toxic intensity. The opposite seems to have been true, however, for more open economies. ... Restrictive trade policies imposed by the developing countries themselves may even have been the main stimulus to toxic industrial migration, rather than regulatory cost differences between the North and South. (Emphasis added.)

### ***Empirical research on FDI location decisions***

Most analyses of investment location decision-making processes point to the many factors involved in these decisions: political stability, size and growth potential of market, access to other markets, labour costs, ease of repatriation of profits, transparency and predictability of administrative and legal framework, cultural affinity, infrastructure, quality of life, etc. (e.g. Motta and Thisse, 1994). The level of environment regulations is usually portrayed as having a very small role in these decisions.

A World Bank study (Wheeler and Mody, 1992) examined data on manufacturing investments by US multinationals in the 1980s. This econometric analysis used official US statistics on outward investment, along with data from a private consultancy which provided corporate clients with country

ratings on various economic and non-economic factors pertinent to international investment decisions. Unfortunately, none of the 31 location factors mentioned “environmental regulations or costs”. “Overall quality of life for expatriates” was the only environment-related factor considered. The study showed that “agglomeration economies” (infrastructure quality, degree of industrialisation, and level of existing FDI) constituted the dominant influence on investor decisions, with labour costs and market size as the next most important factors. Corporate tax rates did not appear to play much of a role. Differentials in the stringency of environmental regulations would therefore seem unlikely to play a major part in location decisions, although “quality of the living environment” could be a more significant factor.

A more recent report, also from the World Bank (Dasgupta, Mody, and Sinha, 1995), found that the quality of local labour, rather than its cost, was the decisive factor in the choice of investment location for Japanese companies. This study was based on a survey by Japan’s Ministry of International Trade and Industry of FDI motivations for 173 Japanese companies. It showed that, although companies often complained of high production costs at home, this seldom drove decisions to invest overseas. Meeting overseas demands and following competitors to new markets were much more important factors. The study also showed that low-cost production sites were more important for small companies than for large ones. Environmental factors were not mentioned at all in the report.

Several studies have also been undertaken to try to assess the impact of differences in environmental standards on plant location decisions within the US. Given that there is generally less variation between US states than between countries in some of the relevant decision factors (such as macroeconomic policy or culture), this line of inquiry might be expected to yield some interesting results.

Intra-US location studies are summarised in Jaffe *et al.* (1995). These studies basically found either no significant effects, or very small effects in particular circumstances. One such study was conducted by Bartik (1988), on the location of new manufacturing branches of US Fortune 500 companies in the US between 1972-1978. None of the regression equations revealed a statistically significant impact on plant location of differences in environmental regulations across states. The strongest link found (but still not a statistically significant one) was a positive correlation between a state’s spending on environmental protection per employed manufacturing worker, and new manufacturing sites of the Fortune 500 companies. This result suggests that, rather than being attracted by low levels of environmental protection, firms may see location benefits from environmental quality, perhaps in terms of improved worker productivity, due to better health and quality of life.

Olewiler (1994) performed similar regression analyses for chemical industry investments in three Canadian provinces. Environmental regulation was found to have had no discernible impact on plant location.

Another result which suggests that low environmental standards can even discourage investment comes from Zamparutti and Klavens, 1993. This survey of 1 000 large corporations based in OECD countries found that environmental issues were an important concern of western investors, and could block or impede direct industrial investments in Central and Eastern Europe. However, the environmental issue of most concern was the fear of inheriting liability arising from past practices, including the costs of bringing host country facilities into compliance with environmental standards. Concerns about liability for future environmental practices, including uncertainty about how the rules for this liability would be established, were also of concern.

Nearly 70% of respondents claimed to follow relatively strict internal corporate environmental standards, where these were more stringent than the host country’s requirements. Since the bulk of international investment is undertaken by large multinational corporations, which frequently operate at a

corporate standard of environmental performance world-wide, rather than taking advantage of relatively lax local standards, this practice may explain much of the reason why generalised capital flights and/or “pollution havens” are not found in the literature.

Most authors do not find a significant negative relationship between the stringency of environmental regulation and trade-related variables either (i.e. total or net exports/imports) (e.g. Kalt (1988), Jaffe *et al.* (1993), Grossman and Krueger (1992), Tobey (1990, 1993), and Van Beers and Van den Bergh, 1997) There is evidence of a shift in the pollution-intensities of exports in some countries (Kalt, 1988), but as with FDI itself, these shifts are not easily attributable to the size of pollution control expenditures. In certain industries (e.g. chemicals), the relationship may even be positive (Kalt 1988, Tobey, 1993).

On the other hand, Han and Braden (1996) found that pollution abatement expenditures did have a statistically significant negative effect on net exports, but that this effect diminished over time. They also found that, although the net exports in some environmentally-sensitive industries were susceptible to higher level of environmental regulation (e.g. paper and allied products; chemicals; and primary metals), others were not (e.g. furniture, printing, leather and allied products, fabricated metals, petroleum, and coal products). In addition, this responsiveness actually declined in almost all industries.

Some studies have also approached the “pollution haven” hypothesis from the perspective of “revealed comparative advantage” (RCA). These studies have examined the question of whether or not individual countries (especially the developing countries) are becoming more specialised in the production of environmentally-sensitive products over time.

In this vein, Sorsa (1994) found that industrial countries had basically maintained their 1970 share of world exports in environmentally-sensitive products (at about 73%) in 1990. Major structural changes were seen specifically in the trade of manufactures, where the industrial countries’ share of world manufactures exports did fall (from 91% to 81%), but environmental compliance costs were not found to underlie this change. For example, Finland and Austria both maintained high environmental standards and a high share of environmentally-sensitive goods in their export compositions during the study period.

At a more disaggregated level, industrial countries both gained and lost comparative advantage in different environmentally-sensitive products, again suggesting that non-environmental factors were more important in explaining changing comparative advantage. For example, Germany maintained its comparative advantage in chemicals and metals industries, which have the highest compliance costs within the manufacturing sector, yet the RCA declined in other products.

Low and Yeats (1992) analysed trade flows in environmentally-sensitive industries along the same lines as Sorsa, using data from 1965 to 1988. They found that:

- The share of pollution-intensive industries in total world trade had fallen.
- While the industrial countries still supply around three-quarters of the exports of pollution-intensive industries, these industries represented smaller shares of industrial countries’ total exports than previously.

Work in progress at the World Bank is extending this research, using international data on industrial production, trade, and environmental regulation for 1960-1995. This research (see Mani and Wheeler, 1997) has found that, although pollution-intensive output did seem to be falling in the developed

countries and rising in the developing ones, “pollution haven” effects have not had much influence in these shifts.

### **Environmental effects of international competition for FDI**

There is clearly competition, both within and between countries, to obtain access to incoming FDI. This competition is particularly keen in the rapidly-industrialising countries. One view is that better environmental performance increases costs and reduces competitiveness. The opposite view is that better environmental performance might also reduce costs and improve product quality, thereby improving competitiveness. The latter view also asserts that increases in competitiveness are more likely to occur over time, due to the positive effects of technological development and innovation (see Porter, 1990; Porter and Van der Linde, 1995a and 1995b, Van der Linde, 1993; Schmidheiny, 1992; Business Council for Sustainable Development, 1993; Christie *et al.*, 1995, and Ekins, 1996).

When examining the logic of the competitiveness concern, it is important to differentiate the effects on a particular firm from those which are felt either industry-wide or economy-wide. “Competitiveness” will mean something different at each level. In particular, the static effects on a firm need to be distinguished from the dynamic, economy-wide, general equilibrium impact on society at large (see Adams, 1997).

In individual industries or countries, the pressures to lower environmental standards may be quite strong, and may come from either the investor or the investee, depending on market conditions. In China, for example, provinces compete intensely for foreign capital, and provincial leaders may be tempted to promise preferential treatment to potential foreign investors (Esty and Mendelsohn, 1995). This preferential treatment may include a tacit (or express) commitment to more lax enforcement of environmental standards (Esty and Gentry, 1997).

In “resource-seeking” industries, where products are relatively undifferentiated and small cost differences can translate into large market share gains and losses (i.e. where demand is relatively elastic), foreign investors can sometimes exert considerable pressure on recipient countries. In such industries, companies claim quite correctly that small differences in cost will dramatically affect their competitiveness, and may successfully argue for relief from “high” domestic environmental standards.

However, competitive pressures can also operate in the opposite direction. In some markets, overseas investors push for higher environmental standards. Foreign investors in Costa Rican banana production have been observed to insist upon environmental care, perceiving that their European customers want an environmentally-sound product (Gentry *et al.*, 1996). A number of Asian lumber products are similarly geared to the European market, where consumer sensitivity often demands that the product meet certain minimum environmental conditions.

Gentry *et al.*, 1996 have suggested that overall, countries which operate straightforward, transparent, efficient environmental programmes experience no resulting loss of FDI, and may in fact attract some industries which are looking for reliable overseas bases of operation. For example, while the Mexican government has significantly increased its environmental enforcement efforts over the past few years, FDI in the Mexico City area has expanded rapidly — and air quality has actually improved. Reflecting a similar spirit, a recent survey of multinational investors in Mexico found that most companies felt that reduced subsidies for power and water, along with more consistent enforcement of existing

pollution control requirements, were the most effective steps the Mexican government could take to affect industry's environmental performance (Gentry and Fernandez, 1996).

Repetto (1995) also found that:

Even when the age and scale of a plant and the amount of recent investment in plant and equipment are taken into account, there is no overall tendency for plants with superior environmental performance to be less profitable. Across the thousands of plants in the [study] sample, it is at least equally likely, and perhaps somewhat more likely, for plants with lower emissions — relative to production — to achieve higher operating margins and returns on invested capital. By and large, however, the associations are weak. In the last analysis, other factors influence profitability more strongly.

Hitchens *et al.* (1996) performed a highly intensive comparison of 67 firms in the dairy and meat processing industries in Germany, Northern Ireland and the Republic of Ireland, and Italy. The basic findings were:

- The sampled firms achieved international levels of competitiveness or above-average levels of national competitiveness, even without a relatively low level of regulatory costs.
- There was no clear evidence that firms with above-average productivities (either nationally or internationally) also had relatively low compliance costs (i.e. environmental costs as a percentage of turnover).
- Although sample firms faced strong competitive pressures, environmental costs were not an important factor influencing firms' survival or growth in most cases.
- The association between the achievement of above-average competitiveness and above-average use of environmental “initiatives” within firms is generally positive.

In other markets, competitive pressures translate into a desire to reduce waste and improve productivity, which can often lead to improved environmental performance (Schmidheiny, 1992). Dupont, for example, has set a “zero emissions” goal for its world-wide operations, not as a result of regulatory pressures, but to achieve maximum levels of eco-efficiency.

An ethic of eco-efficiency (or “clean production”), which seeks to design out pollution problems rather than deal with unwanted waste streams, is an increasingly-accepted business perspective. Viewed as a resource efficiency issue, minimising the environmental impact of production is likely to yield outcomes which reduces costs or improve product quality. A resource efficiency perspective views discharges of waste as evidence of the inefficient use of raw materials. Eliminating this inefficiency, up to a point, is therefore a way to increase productivity.

A recent study (Christie *et al.*, 1995) of 30 chemical and engineering companies using “clean production” techniques found several key reasons for investments in environmentally-beneficial systems: compliance with regulations, cost savings associated with greater process efficiency, increased competitiveness, commitment to corporate responsibility, pressure from customers, and anticipation of regulatory demands. More companies reported benefits from cleaner production than reported problems.

## Conclusions

FDI is an increasingly important “engine” for sustainable development in many countries. However, the potential environmental consequences of the other two elements of privately-supported capital flows (portfolio investments, and debt), as well of ODA, also need to be considered when examining these consequences.

Empirical evidence concerning the sign and the significance of the technology effects of increased FDI is rather limited. However, it is possible that the environmental performance of firms in many countries will be positively influenced by better access to foreign technologies associated with FDI, as well as by the increased exposure to foreign demand patterns that increased FDI implies.

Multinationals will be important vectors for both technological innovation and technology transfer. Not only is FDI undertaken by multinationals likely to result in some standardisation of “best practices” within the global operations of individual MNEs, it should also promote positive spillover effects on the technological characteristics of national firms and their suppliers.

The main environmental opportunities associated with FDI arise from the fact that FDI promotes higher incomes, which could lead to higher levels of investment in pollution prevention and control facilities. There is also the possibility of tapping into the better technologies, information, management systems, and training programmes that foreign investors often have at their disposal. Finally, FDI offers the potential to link the economic fates of the developing and developed countries on those environmental issues likely to affect both groups.

The main environmental risks associated with FDI arise from two areas. First, higher incomes associated with FDI-induced growth may not “pull” environmental quality along with it fast enough, implying reduced environmental quality in certain countries, for certain pollutants, over potentially long time periods. Even where the link between higher incomes and improved environmental quality is a positive one, this link may not turn out to be strong enough to prevent absolute degradations in environmental quality from occurring.

Second, there is the possibility that competitive pressures may tempt some companies or countries to engage in a “race to the bottom” in environmental standards. There will certainly be individual companies and sectors that will be “losers” in the economic restructuring likely to accompany expanded FDI flows. Firms whose economic position seems to have worsened may well blame FDI for this, and seek political intervention to protect the *status quo*. They may also cite lower environmental standards in host countries as one reason that their enterprises have become uncompetitive (Esty and Gentry, 1997).

Empirical evidence concerning the influence of the “inverted-U” curve on the scale effect of FDI-induced growth is lacking. However, available empirical evidence about the relationship between competitiveness, FDI, and the environment suggests that:

- Most investment location decisions are not made on the basis of environmental criteria. Environmental costs are typically a small element in these decisions.
- Most pollution-intensive FDI originating in industrialised countries is going to other developed countries, rather than to developing ones. Even in the developing countries, the amount of inward investment in pollution-intensive industries was a smaller proportion of total FDI receipts in 1992 than in 1972.



- There is no clear empirical evidence that high, or even relatively high, environmental standards have a systematic negative impact on competitiveness at either the macroeconomic or the microeconomic level. Most studies show insignificant relationships between stringent environmental regulations and competitiveness.
- Many firms are discovering that increased attention to environmental issues can actually increase their economic competitiveness (either via the reduced costs that “eco-efficiency” can bring, or via the increased revenues that selling to increasingly environmentally-conscious markets can bring).
- There is not much evidence of countries explicitly lowering their environmental standards in order to attract new FDI. Even where countries do react in this way, it is not obvious that they are being very successful.
- On the contrary, countries which operate transparent and efficient environmental programs are often quite successful in attracting new investment. Countries with high environmental standards are still the major producers and exporters of most environmentally-sensitive goods, and still have the highest living standards.
- Overall, therefore, there is not much empirical evidence of “pollution havens” affecting either FDI or trade flows on a systematic basis. In fact, “pollution havens” seem to be more often associated with protectionist economies than they are with environmentally-tolerant ones. If anything, the imposition of higher environmental standards seems more likely to generate a technological response, rather than leading to capital flights.

On the other hand, there is some tendency being observed to relax environmental standards in some countries, in order to attract certain types of FDI, or to promote particular trade policy objectives. This tendency will be most acute in those countries which are undercapitalised and fast-growing.

There is also some tendency for certain types of firms in specific industries to seek cost relief related to environmental parameters. This tendency will be highest in those industries whose products are undifferentiated, and which are most subject to small (and environment-based) cost differences. In assessing these claims, however, it is important to examine whether or not environmental costs are actually at the root of any competitiveness problems, or whether structural problems facing the firm/industry might be more to blame.

For all of the above reasons, the fear of a general “race to the bottom” in environmental standards, based on competitiveness concerns, may be somewhat exaggerated. There are some sectors of the economy in some countries where a “race to the bottom” may be occurring, but this does not seem to be the general case.

A more important question may be how international economic competition might be inhibiting a “race-to-the-top” (i.e. preventing countries from raising environmental standards). For example, there is some evidence that countries sometimes do not implement new environmental policies out of a fear that their domestic enterprises will lose competitiveness (e.g. European carbon tax; US BTU tax). Enhanced international co-operation is likely to be part of the optimum policy response to this problem (See Zarsky, 1997).

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