

INTERNATIONAL MARKETS, INDUSTRIES, AND THE ENVIRONMENT. A BENEFITIAL INFLUENCE IN EASTERN EUROPE?

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ABSTRACT

In an era of globalization, the relation between international markets and the environment emerges as an important policy and analytic problem. This paper explores the impact of regional and global integration on the environmental performance of East European industries. It advances the hypothesis that export-orientation and international capital will have a beneficial impact on firm environmental management. The hypothesis is tested in a sample of 2394 firms from six East European countries. The empirical analysis confirms that export-oriented firms in Eastern Europe are likely to adopt better environmental management practices, a finding that is counter intuitive from the perspective of the conventional wisdom. To account for these results, the discussion emphasizes the importance of reputational, normative, and regulatory pressures associated with participation in international markets. A case study of the changing environmental profile of the export-oriented chemical industry in Bulgaria, Poland, and the Czech Republic provides further detail on the mechanisms through which integration affects the environmental interests of industrial actors. These findings have important implications for policy making and for environmental management in emerging market economies across the globe.

Key words: trade, environment, environmental management, Eastern Europe, emerging markets, business networks, environmental norms.

1. INTRODUCTION

After the democratic changes in Eastern Europe at the end of the 1980s, the economic activities of post-communist states oriented sharply towards trade and integration with West European and global markets. For the formerly closed socialist economies, the process of international integration can be compared to an external shock, which sends powerful waves of influence on all aspects of their socio-economic life. This paper explores the impact of regional and global integration on the environmental performance of East European industries. In pursuing this theme, the paper engages a broader set of questions related to the impact of globalization on the environment in emerging markets.

With growing economic interdependence, the relation between international markets and environmental protection emerges as an important policy and analytic problem. The advance of regional and global integration is accompanied by vocal environmental concerns. Public advocates fear that both the higher level of development and the competitive pressures associated with free trade will have an adverse effect on the environment, especially in low-income countries. At the same time, empirical analyses of the relation between economic openness and environmental performance of developing states have not provided strong evidence of deteriorating environmental performance as a consequence of liberalization. On the contrary, several studies demonstrate that the pollution intensity in open economies and in sectors open to free trade tend to be lower than in closed economies or sectors of production. Can international integration have a positive influence on the environmental performance of emerging markets and through what mechanisms? Would such influence materialize in Eastern Europe?

To illuminate this question, the paper focuses on the impact of international markets and investment on the environmental performance of industrial firms in Eastern Europe. The first section establishes the theoretical basis of the hypothesis that export-orientation and international capital will tend to have a beneficial impact on firm environmental management. The hypothesis is tested in a sample of 2394 firms from six East European countries. The empirical analysis confirms that export-oriented firms in Eastern Europe are likely to adopt better environmental management practices, a finding that is counter intuitive from the perspective of the conventional wisdom. To account for these results, the discussion emphasizes the importance of reputational, normative, and regulatory pressures associated with participation in international markets. A case study of the changing environmental profile of the export-oriented chemical industry in Bulgaria, Poland, and the Czech Republic provide further detail on the mechanisms through which integration affects the environmental interests of industrial actors. The conclusion draws implications for policy making and for environmental management in emerging market economies across the globe.

2. INTERNATIONAL MARKETS, INDUSTRIAL FIRMS, AND ENVIRONMENTAL INCENTIVES

Environmental advocates have expressed a number of concerns about the spread of international trade and finance. A fundamental fear of environmental groups relates to the level and nature of development associated with economic liberalization, and the environmental artifacts of increased infrastructure, transportation, intensified production, and higher level of consumption. These objections, while often targeted at trade agreements, have to do more broadly with the process of economic development, expected to accompany trade liberalization.

Another central concern of the environmentalist perspective emphasizes the incentives, or rather the disincentives, that international competition provides for environmental performance of industrial firms and for domestic environmental regulations. This perspective anticipates deterioration of the environment in low income countries through two processes associated with international markets. First, the easier movement of goods and investment

finance would facilitate the migration of dirty industries to countries with more lenient regulations, creating pollution havens. At the same time, in response to international competition, firms in poor countries would seek to avoid environmental costs, and would lobby governments to maintain lax environmental regulations.

In sum, markets would create competitive pressure on developing countries to reduce their environmental standards in order to attract international investment and to boost the position of their tradable sectors. This view has been expressed widely by environmental advocates and in a number of policy papers¹. Economic analyses have also anticipated the strategic use of environmental regulations in the context of free trade, including "ecological dumping," by setting environmental standard at a lower level than implied by the marginal damage².

Following the heated public debate of the environmental implications of the North America Free Trade Agreement (NAFTA), a number of empirical studies have been undertaken to test the relationship between economic integration and environmental performance in developing states³. The evidence presented so far is mixed. Low and Yeats (1992), for example, examine whether the stringency of environmental standards induce investors to shift production to countries with more lenient regulations by looking at the share of pollution-intensive products in the trade flows originating from North America and South Asia in the period from 1965 to 1988. The study concludes that "...dirty industries account for a growing share of exports in some developing countries. This has occurred against the background of a reduction in the share of dirty industry exports in the total exports of industrial countries, and overall reduction of such exports in world trade"(102). Although this finding seems to support the pollution displacement hypothesis, the authors point out that the observed trend could be indicative of a greater demand for pollution intensive goods in newly industrialized countries, and not a shift in pollution intensive production to less developed states.

An often quoted study by Hettage, Lucas and Wheeler (1992) also finds that that toxic intensity of production grew rapidly in advanced industrialized countries during the 1960s, but after the introduction of strict environmental regulations in the 1970s and 1980s, this trend was reversed. Toxic intensity grew more quickly in less developed countries after the 1970s, compared to industrialized economies. The study again emphasizes that while this finding is consistent with the displacement hypotheses, it does not establish with any certainty a causal connection between the two concurrent patterns. The authors point out that other sources of comparative advantage can contribute to the observed trends, as well as the natural process of development and the oil shock accompanied by sharp increase of energy prices in industrialized states. Paradoxically, the same study also indicates that toxic intensity has increased more rapidly in protected developing economies, in comparison with open, high-growth developing states, implying that free trade might have a positive impact on the environment.

Several sector specific analyses speak more directly of the possibility of a beneficial effect of trade on environmental protection. Eliste and Fredriksson (1998) examine the environmental performance of the agricultural sector across states, and find that there is a robust positive relationship between trade openness and the stringency of environmental regulations in the area of agriculture. Birdsall and Wheeler (1992) present evidence from case studies of the

pulp and paper, and of the petrochemical sectors in Chile. These case studies indicate that greater economic openness has provided positive incentives for firms in these sectors to improve their environmental performance. Wheeler and Martin (1992) also use data from the pulp and paper industry, to demonstrate that “firms adopt low-pollution technologies much faster when national policies promote internationally competitive industrial growth.”(197).

While empirical findings of the tendency of cleaner growth in open economies indicate that contrary to the pollution havens intuition, economic integration may have a beneficial impact on the environmental performance of selected sectors, there is a need of a more systematic examination and testing of the mechanisms through which such positive influence might materialize. Researchers need to address more explicitly the question of the sources and scope of the hypothesized positive impact of integration on environmental performance. This paper seeks to advance the trade and the environment literature by focusing on the performance of industrial producers, by specifying the scope of a possible positive impact of trade on firm-level environmental management, and by providing systematic evidence of such impact in the context of Eastern Europe.

There are several mechanisms through which free trade and investment can facilitate improved environmental performance. At the macro-economic level, the effect of income generation and increased welfare in open economies can provide resources for better environmental management by the state and the society as a whole. At the level of industrial production, international trade and investment can facilitate the spread of cleaner technologies and can provide incentives for better environmental management. Producers of tradable products, it has been argued, under pressure to achieve higher competitiveness, would tend to rationalize production and to introduce new technology, which is also cleaner. Moreover, free trade will reduce the barriers and the cost for the introduction of more efficient production processes⁴. Finally, international markets can induce improved environmental performance by exerting strong reputational, normative and regulatory pressure on market participants from consumers, from share-holders and subcontractors, as well as from a set of organizations that embody formal and informal rules of behavior.

The significance of normative and regulatory pressures on the international market place is less recognized by the current literature as a plausible mechanism of a positive influence on environmental management. The literature emphasizes the commercial incentives associated with green consumerism and concern among investors⁵, but discounts the importance of formal and informal rules and standards of behavior. It is important to acknowledge, however, that environmental concerns and awareness are increasingly embodied in a set of transnational environmental norms and institutions. In addition to the environmental standards endorsed by governments and intergovernmental institutions, there are a growing number of informal or "private" rules of conduct that relate directly to the behavior of firms and industries engaged in international transactions.

Since the late 1980s, transnational business organizations have developed and adopted a set of voluntary standards, and endorsed them through the establishment of international standard setting bodies. The most recognized of these standards is the ISO 14000 series for environmental management, embedded in the framework of the International Standardization

Organization (ISO) and recognized by the World Trade Organization as a legitimate standard in international trade. Other voluntary environmental norms that affect business entities internationally include the principles of the Business Charter for Sustainable Development of the International Chamber of Commerce, the Responsible Care (RC) program of the International Council of Chemical Associations, and the activities of the World Business Council for Sustainable Development. Such voluntary norms and principles are spread, administered, and monitored through a network of business associations, which function both internationally and locally. Business networks have been instrumental in establishing branch organizations in low-income countries, and for the introduction of environmental management systems and waste minimization programs in states where industries have lower capacity to undertake such activities. Thus, economic integration has been accompanied by the spread of environmental norms, business, consumer, and advocacy organizations that provide pressure and resources for improved environmental profile of business entities. Such pressures can be an important source of influence in emerging market economies, working in conjunction with technological and financial incentives.

By specifying the distinct types of international incentives for improved environmental performance among industries in open economies, we can better predict the extent and scope of such influence. The expectation that competitive pressures lead to faster introduction of cleaner technologies implies that tradable sectors as a whole will be cleaner and will drive environmental improvements in open markets. On the other hand, if international consumer preferences and transnational environmental norms are also important, they are likely to influence primarily the behavior of firms that are most directly subject to the scrutiny of international consumers and organizations: export-oriented and multinational enterprises. For exporters, improved environmental management and adherence to international standards can be associated with better access and performance in international markets. Multinational firms, being a visible target for transnational organization and advocacy groups, may also be more strongly susceptible to reputational pressures. Thus, if we take into account all possible incentives for improved environmental performance associated with international markets, we can rationally predict a positive influence of integration on the environmental behavior of export-oriented and multinational firms. It is possible to advance the following hypothesis:

Central Hypothesis: Everything else equal, trade liberalization will have positive impact on the environmental performance of export-oriented and multinational firms. Exporters and multinational will tend to adopt practices of better environmental management than import-competing and domestic firms.

The prediction of better environmental management by export-oriented and multinational firms in open economies runs contrary to conventional expectations that firms in the tradable sectors will seek to avoid environmental investments and compliance with stricter standards to gain a competitive advantage. The next question we need to ask is whether the anticipated positive effect of integration on the environmental performance of industry has materialized in emerging markets across the world? This paper provides a test of the above-specified hypothesis in a study of 2394 firms from the region of Eastern and Central Europe. Establishing the empirical validity of the hypothesis that export-orientation and international

capital exerts a beneficial impact on firm environmental performance will have important implications for policy choices and environmental management in the context of globalization.

3. DATA AND MODEL SPECIFICATION

3.1 Data

The analysis of the impact of international trade and investment on the environmental performance of industrial enterprises in Eastern Europe uses firm-level data compiled by the *Determinants of Environmental Performance* survey. The survey was undertaken by the former Harvard Institute for International Development (HIID) in 1998. Questionnaires were distributed to approximately 750 firms in each of six East European states: Bulgaria, Hungary, Lithuania, Poland, Romania, and Slovakia. The sample of firms in each country was selected so as to be representative of the structure of industrial production and to include a set of highly polluting industries such as pulp and paper, chemicals, metallurgy, textiles, food, etc. The identity of participating enterprises was kept confidential, and is not revealed under any form in survey instruments and data products.

The survey was implemented by local researchers or representatives of industry associations, who discussed in person the completed questionnaires with firm officials. Of the entire sample, 2,394 firms agreed to complete the questionnaires. The survey provides 1990 and 1997 data on firm-level environmental management and investment, on international trade, on monitoring and enforcement of governmental regulations, on societal pressures, as well as on other firm-specific and country specific characteristics. While some values in the final data are missing as a result of lack of information or the unwillingness of some firms to reveal what they consider "sensitive information" even in a confidential survey, the *Determinants of Environmental Performance* data set provides a good instrument to examine the impact of market transformation and trade liberalization on the environmental management and behavior of firms in Eastern Europe.

3.2 Dependent variable

In a study of the impact of international trade and investment on the environmental behavior of firms, the dependent variable can be operationalized in a number of different ways. The change of pollution intensity of production or the change in the volume of pollution discharge over time provides probably the best measure of environmental performance. However, such data is considered sensitive and rarely made available by firms. That is why this analysis uses indicators of environmental management as the dependent variable, rather than measures of the magnitude of environmental pressures by industrial production. The regression analysis considers three different specification of the dependent variable, which reflect somewhat different aspects of firm environmental management: *Clean Tech*, *ISO 14,000*, and *Env.Employees*.

Clean Tech: measures the percent of plant and equipment replaced by cleaner technology in the period 1993-1997. It provides the most direct indicator of improved environmental

management, likely to have a strong impact on the level of pollution discharge and on the pollution intensity of production. This indicator is also particularly well suited for testing the anticipated positive impact of economic openness on the environmental performance of firms. The literature posits that one of the main mechanisms through which liberalization enhances environmental performance is through incentives for faster diffusion of cleaner technologies. We should expect, therefore, to observe a strong positive relation between the level of international trade and multinational production and the introduction of cleaner technological processes.

ISO 14,000: is a binary variable that indicates whether or not a firm has taken specific steps towards ISO 14000 certification. By using this measure the study captures two aspects of environmental management. First, it examines whether international trade and capital tend to raise the environmental awareness and concern among the management of the firm. Second, the analysis can establish whether export oriented and multinational firms are more likely to adopt international standards and undertake voluntary measures such as the introduction of environmental management systems, waste minimization, and independent auditing.

Env. Employees: is a variable that measures the size of the environmental department in number of employees in 1997. In the early 1990s, when the process of market transformation was beginning in Eastern Europe, few firms had environmental departments or even information about the existence of environmental departments. This changed for many companies in the course of structural transformation and market orientation. The size of the firm's environmental department in 1997 thus provides us with a more general proxy of the change in environmental awareness and the significance of environmental objectives in management decisions. By using this variable, the analysis will seek to establish the extent to which international trade and finance have a positive impact on the overall level of environmental management of firms.

3.3 Explanatory variables

The objective of the analysis is to establish the impact of international trade orientation and multinational investment on the environmental management of firms. The explanatory variables of main interests thus are *EXPORT*, which measures the percentage of main product exported in 1997 and *MULTINATIONAL*, which measures the percent of foreign ownership of the company in 1997. The analysis also controls for other variables that can influence environmental management including the level of regulatory and community pressure, the size of the firm, and the industrial sector it belongs to. The control variables are specified as follows:

SIZE: measures the number of employees in 1997.

PERMIT: indicates whether a company is required or not obtain formal written permit for its facilities.

ENFORCEMENT: measures the number of enforcement actions applied to the company in the period 1993-1997, including warnings for water and air pollution,

orders to reduce emissions of water and air pollutants, non-compliance fines for water and air emissions, orders for plant closure, and other enforcement action.

COMMUNITY: measures the number of instances when environmental pressure was exerted on the company in the period 1990-1997 by NGOs, consumer groups, the media, and other community action.

The regression analysis uses also the following dummy variables for industrial sectors: *METAL, PULP, CHEMICAL, FOOD, STONE, TEXTILE, WOOD, and REFINE*.

The dependent variables *CLEAN TECH* and *ENV. EMPLOYEES* are estimated using a multivariate least square analysis. The dependent variable *CLEAN TECH* is estimated with a logit regression procedure.

The above-specified model of environmental management in Eastern Europe will first of all provide a test of the hypothesis of the positive impact of trade orientation and multinational investment on firm environmental performance. It will also present an insight of the importance of other societal and regulatory factors for enhancing environmental management in the context of Eastern Europe. By including variables that capture the role of international markets, community pressure, government regulations, and sectoral characteristics, the analysis here moves away from a narrow economic understanding of the determinants of firm-level environmental management and performance. The model reflects the new thinking in pollution management and control, which recognizes the tripartite role of the role of community, markets, and governments in influencing industrial practices and pollution reductions strategies⁶.

4. DISCUSSION OF RESULTS

The results of the regression analyses, presented in tables 1 and 2, confirm the hypothesis that participation in international markets has a positive impact on firm-level environmental management decisions. In all three specifications of the model, the coefficients of the variable *EXPORT* are positive and statistically significant at the 5 percent confidence level. This implies that East European firms characterized with higher level of export-orientation are more likely to introduce cleaner technologies, to strengthen their environmental departments, and to take steps towards ISO 14,000 certification. The positive effect of export-orientation on environmental management is sustained even after controlling for other important factors such as regulatory and community pressure. As stipulated in the theoretical discussion, these results speak of the significance of environmental pressures associated with participation in the international market place, which is increasing governed by a set of international environmental standards, greener consumer preferences, and transnational organizations.

In the context of Eastern Europe, the pressure of international markets for improved environmental performance may be especially pronounced as a result of the strong reliance of East European exporters on European Union (EU) markets, which tend to be more highly regulated and environmentally sensitive than the world average. Indeed the finding of positive

impact of export-orientation on industrial environmental management is different from the conclusions of a recent World Bank study on industrial pollution in open economies. The World Bank report indicates that open developing economies tend to introduce cleaner technologies faster than protected economies, but the study also points out that export-oriented firms do not exhibit better environmental performance than other industrial actors. This conclusion was based on firm-level research in India, Indonesia, and Mexico. The apparent discrepancy between the results of the empirical analysis presented here and the conclusion of the World Bank study may be a result of somewhat weaker normative, reputational and regulatory pressure associated with trade in non-EU markets. However, as environmental consumerism, voluntary standards and transnational networks spread around the globe such impact is going to be more pronounced in other parts of the World. Systematic testing of the effect of export-orientation on firm-level environmental performance across regions of the world and across time will further increase our confidence in anticipating and managing the effect of trade on industrial pollution.

While the regression analysis presented in this paper provides strong support for the hypothesis that export-oriented firms in Eastern Europe will tend to be better environmental performers, it offers mixed evidence on the hypothesized positive impact of international capital on environmental management decisions. The coefficient of the variable *MULTINATIONAL* is positive and statistically significant at the five percent confidence level only in the model that uses the size of environmental staff (*ENV. EMPLOYEES*) as the dependent variable and as a proxy for level of environmental concern and management. The impact of *MULTINATIONAL* on firms' decisions to introduce clean technology is also estimated as positive but significant only at the 10 percent confidence level. Finally, and most surprisingly, the coefficient of *MULTINATIONAL* is statistically insignificant in the regression which uses *ISO 14000* as the dependent variable, indicating that multinational firms are neither more nor less likely to adopt voluntary international standards.

These results suggest that multinational firms may bring to host countries some of the formal aspects of environmental management (such as strong environmental departments) and may introduce cleaner technologies, but they are not more likely than domestic firms to adopt internationally recognized standards for improved environmental performance. This can be explained if we assume that multinational firms would face strong international pressure to introduce specific environmental standards only to the extent that they are engaged in trade. Once the effect of trade is controlled for, international capital in itself provides little additional incentive for the adoption of transnational environmental standards. The finding of the differential impact of export-orientation and multinational ownership on firm-level environmental management in Eastern Europe helps us distinguish better between the different mechanism of international influence on firm environmental performance in open economies. While both international trade and finance may contribute to the faster introduction of cleaner technology in emerging markets, international markets also influence the behavior of exporters by exerting stronger reputational and normative pressure for the adoption of higher standards and practices.

The results of the regression analyses reveal also interesting information about the influence of other factors such as regulatory enforcement and community pressure on different aspect of

environmental management in East European enterprises. The requirement to obtain formal pollution permit for production facilities, captured by the variable *PERMIT*, seems to increase the likelihood of implementation of international environmental standards and less polluting technologies, but does not affect the formal elements of environmental management such as the appointment of environmental staff. The variable *ENFORCEMENT*, which provides another measure of regulatory pressure, appears to be significant across all regression specifications, indicating that regulatory pressure is at least as important as market pressure in shaping firms' environmental behavior. Paradoxically, however, the sign of *ENFORCEMENT* is negative in the regression estimating the determinants of adoption of *ISO 14,000*. While it hardly makes sense that firms that face stronger regulatory enforcement are less likely to adopt international environmental standards, it may be the case that firms that are least prepared to adopt ISO 14,000, and therefore, are probably most pollution intensive, tend to be subject to greater enforcement scrutiny and more frequent enforcement action.

The pressure exerted by NGOs, the media, and local action is captured by the *COMMUNITY* variable, which appears as significant and positive only in the estimation of *CLEAN TECH*. The level of community pressure thus has little influence on formal aspects of environmental management or the introduction of international environmental standards, but exerts a strong positive influence on decisions to implement cleaner technologies in the production process. This finding is logical since community action is usually targeted primarily at the performance of enterprises and is rarely concerned with formal elements of environmental management such as a strong environmental unit, or with the adoption of voluntary environmental codes.

The empirical analysis of the determinants of firm-level environmental performance in Eastern Europe demonstrates that trade openness can be associated with a positive impact on the environment. While other studies have presented anecdotal evidence on the positive relationship between international markets and environmental decision-making at the firm level⁷, this analysis makes an important step in providing a more robust test of such assertions in the context of Eastern Europe. The regression results demonstrate that the influence of international markets varies across firms depending on the level of their trade orientation. If everything else is held constant, export-oriented firms are likely to be better environmental performers in Central and Eastern Europe in comparison to other firms in the tradable and non-tradable sectors, and even in comparison to multinational enterprises. The strong positive impact of openness on the environmental performance of export-oriented firms is attributed not only to the introduction of more advanced technology and increased efficiency in open economies, but also to specific commercial and normative pressures associated with international markets. The next section of the paper uses the case study method to reveal in greater detail the importance of distinctive commercial and non-commercial mechanism of international influence on the environmental strategies of the highly export-oriented chemical sector in three East European state: Bulgaria, Poland and the Czech Republic.

5. INTERNATIONAL MARKETS, ENVIRONMENTAL NORMS, AND THE CHEMICAL INDUSTRY IN EASTERN EUROPE

The chemical industry in the Czech Republic, Poland and Bulgaria is a concentrated, export-oriented, and increasingly multinational sector. Chemical plants are also visible environmental polluters in the formerly communist states. These characteristics of the sector and its interest to participate in highly regulated international markets for chemical products influenced greatly the environmental strategies of chemical firms in the aftermath of the democratic changes and market liberalization.

In the Czech Republic, the production of chemicals is the third largest industry in the country and the fourth most important exporter in the structure of trade. Since the beginning of the economic and political changes in 1989, this industry has experienced a trend of growing openness and internationalization of production. The greater share of Czech chemical exports is oriented to member states of the Organization of Economic Cooperation and Development (OECD), with close to 50% of all chemical exports being directed to the EU. In Poland, chemical production is also one of the most important industrial sectors, characterized with high export-orientation and increasing share of foreign investment. According to 1996 data, chemical enterprises account for 10% of total industrial sales, for 7% of industrial employment, and for 11% of the country's industrial exports. In Bulgaria, the chemical industry developed, since its very foundation, as a highly concentrated and export-oriented sector. The main part of the production capacity in the industry (about 70% of today's fixed assets) was established by the communist state in the period 1970-1985, and on average 70% of chemical production was exported, mainly within the framework of the Council for Mutual Economic Assistance (CMEA). The reorientation of chemical exports to new markets, and the recovery of chemical production after the slump of the early transition period, proceeded more slowly in Bulgaria than in the Czech Republic and Poland as a result of delays in the overall economic reforms. After the industry regained a path of growth in the second half of the 1990s, its share in total Bulgarian industrial production increased from 9% in 1985 to 27% in 1996. In 1996, chemical products accounted for 30% of Bulgaria's total exports.

The process of market liberalization of East European economies that followed the democratic changes of the early 1990s, affected profoundly the economic position and the environmental interests of the chemical industry in the Czech Republic, Poland, and Bulgaria. Chemical enterprises were among the worst polluters in communist countries, where regulations and control in the field of chemical production and safety were weakly developed⁸. Chemical safety and pollution became an issue only after the democratic changes in Eastern Europe. Concern about the deterioration of environment as a consequence of state led industrialization was high immediately after the democratic transitions. Chemical enterprises were targeted as some of the worst offenders. In Poland, for example, a number of chemical plants were included in the governmental list of the 80 enterprises "most arduous to the environment". In Bulgaria, local protests were often addressed directly against the health impacts of chemical production and other industrial sites. The environmental impact of the chemical industry became a problem that the sector had to deal with not only domestically but also internationally. Its battered environmental image had strong repercussions for the ability of

chemical exports to gain a position in the environmentally sensitive regional and world markets for chemicals.

As East European economies opened to regional and global integration, the chemical industry of these states entered a highly regulated international market. In response to high consumer and environmental concerns in the 1970s and 1980s, industrialized states adopted a comprehensive set of laws governing the preparation, use, and transportation of hazardous substances. A truly global and environmentally sensitive industry, the chemical sector had strong commercial incentives to support the internationalization of these regulations within the framework of regional and international organizations such as the European Community and the OECD⁹. More recently, the chemical industry has also embraced a range of informal environmental codes such as the RC program and the ISO14000 series¹⁰.

The environmental rules for participation in Western markets had a direct impact on the environmental behavior of the chemical industry in the Czech Republic, Poland, and Bulgaria. This influence materialized both through price incentives for improved environmental performance as well as through the pressure and resource transfer by transnational organizations. The chemical industry is highly organized at the regional and global level. Organizations such as the ICCA and the European Association of Chemical Industry (CEFIC) have taken an active interest in the process of trade liberalization in Eastern Europe and in the growing presence of East European chemical firms on OECD markets. While the representatives of the EU chemical industry have expressed their support for trade liberalization with Central and Eastern Europe, they also insist on the application of social, environmental, and competition laws in transition states, and the participation of East European chemical industries in voluntary initiatives such as the RC program¹¹. To assure the spread and application of environmental and chemical safety practices in emerging markets, CEFIC and other transnational organizations have undertaken numerous projects and initiatives that provide informational, technical, financial, and organizational assistance to chemical associations in Eastern Europe¹².

A strategy for improved environmental image and performance of East European chemical enterprises became crucial for their successful presence in European and global markets. In the Czech Republic, the chemical industry was forced very early in the transition period to address environmental and safety concerns associated with chemical production. The recovery of the sector depended on its ability to orient a major share of its exports to EU and OECD countries. The close link between environmental image and improved access and performance in these markets provided a direct incentive for environmental improvements. As one representative of the Chemical Association explained, chemical enterprises in the Czech Republic undertook measures to improve their environmental standing as a result of “their own interest in the successful conduct of business internationally.”¹³ The strategy of Czech chemical enterprises to improve their environmental image includes increasing environmental investments, the publication of information on the environmental performance of the sector and of individual enterprises, as well as the implementation international standards such as the RC and ISO 14000.

Reports of the Czech Association of Chemical Industry publicize the fact that the chemical sector has reduced its emissions into the air and water, as well as its generation of waste in a more dynamic way than the Czech industry as whole. These achievements were made despite the better performance of chemical production in comparison with other industries, and its continued growth since 1993 (see graph 3.1). By 1997, more than 50 enterprises in the Czech Republic, representing 95% of chemical industry turnover, had joined the RC program¹⁴. Not surprisingly, chemical exporters, which constitute the larger part of the Czech chemical companies, took the lead in the establishing programs for improved environmental performance. The environmental activism of the Czech chemical industry reflects closely the interests of big export-oriented firms such as Chemicke Zavody Sokolov, Chemopetrol, DEZA, Kauchuk, Precheza, Spolana, Spolchemie, and Synthezia.¹⁵

Similarly to the case of the Czech Republic, environmental pressures associated with regional and global markets provide a powerful incentive for the chemical industry in Poland to adjust its environmental performance. The adoption of adequate environmental standards is perceived as vital for the survival and improved position of Polish chemical companies in international markets. Very early in the transition process, the Polish Chamber of Chemical Industry (PCCI) included the introduction of higher environmental standards among the priorities of the industry, on a par with the goals of privatization and restructuring, improved industrial productivity, and overcoming recession. While the cost of environmental improvements raise concern among smaller chemical enterprises, the broader sectoral position emphasizes that the implementation of international standards "after the first period of increased costs, should have positive influence on the competitiveness of the Polish chemical enterprises on the international market."¹⁶ Chemical enterprises in Poland have invested resources in pollution reduction equipment and the application of formal environmental management standards. Since the beginning of the 1990s the trend of harmful emissions from the sector has been on the decline, despite the growth of production after 1991 (see graph 3.2). The adoption of voluntary international standards such as ISO 14000 and the RC program is another element of an industry-wide, exporter-led strategy to enhance the standing of Polish chemicals in international markets.

In Bulgaria, as a result of the slower pace of economic reforms and international integration, the interest of the chemical industry in issues of related to EU and global chemical safety norms developed later than in Poland and the Czech Republic. In the Bulgarian case, even to a greater extent than in the Czech Republic and Poland, international networks in cooperation with the Bulgaria Chamber of Chemical Industry (BCCI) played a central role in raising the interest among industrial enterprises in improved environmental performance¹⁷. The speeding up of the process of economic restructuring, trade liberalization, and regional integration after the election of a reform-oriented government in 1997, created conditions for further efforts at enhanced environmental management. A governmental official, involved in the regulation and monitoring of chemical safety, explained this trend very concisely: "many chemical enterprises realized that it is virtually impossible to export without adopting international industry norms."¹⁸ Thus, the Bulgarian chemical sector reveals a similar trend of exporter-led adjustment of environmental practices and sectoral strategies, although with a slower pace than in the Czech Republic and Poland.

The change in the environmental interests and strategies of chemical firms in the Czech Republic, Poland, and Bulgaria, under the influence of international market and non-market incentives, enhanced greatly the reform of chemical safety regulations in these states. In all three cases, chemical policies have undergone dramatic changes, very much under the influence of EU and OECD regulations, and with the active support of the industry. The support of West European chemical associations strengthened the formal and informal channels of communications between industry and governmental institutions. Under international influence, the structural relations between industrial actors and the state developed towards closer collaboration in the area of chemical safety, speeding up regulatory reforms and the implementation of higher environmental standards.

5. CONCLUSIONS

The statistical analysis and case studies presented in this paper provide strong evidence of the positive impact of trade liberalization on the environmental performance of export-oriented firms and industries in Central and Eastern Europe. The paper also reveals that multinational firms in the region are more likely than domestic firms to introduce cleaner technology and formal environmental management practices, although the study does not establish with any certainty that multinationals are likely to adopt higher standards for environmental performance. This evidence suggests that contrary to conventional expectation for ecological dumping and transfer of polluting facilities in less regulated states, free trade and investment can have a positive impact on the environment in emerging market economies. The positive effect is likely to materialize through two related mechanisms: through easier and faster introduction of cleaner technology, and through strong reputational and normative pressures associated with the institutionalization of international environmental standards and rules of conduct. The case studies of the changing environmental strategy of the chemical industry in East European states present in detail the importance of transnational ideological and institutional pressure and assistance, which work in conjunction with commercial incentive to promote better environmental practices among export-oriented sectors.

The strong orientation of East European exports to highly regulated and environmentally sensitive EU and OECD markets has clearly enhanced incentives for improved environmental performance in post-communist states. As environmental standards, norms, and transnational organizations spread across the globe such positive influence is likely to be visible in other emerging markets as well. Further cross-regional studies of the hypothesized positive relationship between export-orientation and environmental performance are necessary to enhance our confidence in predicting and managing better the consequences of globalization.

By establishing the conditions for a positive impact of integration on the environmental performance of industry, the analysis speaks also of the limits of such impact. While export-oriented and multinational enterprises may promote better environmental practices in open economies, such effect would not necessarily materialize among other sectors and firms. Even in the case of East European integration in the highly regulated EU trading area, international markets and standards do not exert equally beneficial influence across economic entities. Many domestic and import-competing industries do not have an interest to adopt stricter

international standards and to improve their environmental management, despite increasing levels of integration and political pressure for regulatory harmonization. International market integration has not provided a direct incentive for environmental improvement in the power sector, for example, an important polluter in Eastern Europe, which produces primarily for the domestic market. Where this industry has improved its performance, as in the case of the Czech Republic and more recently in Poland, this has been under direct regulatory pressure from national authorities and with the support of significant compensation through governmental policies or financial transfers.

The anticipation of differential impact of integration on the incentives for improved environmental management across industrial firms and sectors has important implications for managing the domestic effects of interdependence. Policy makers can seek to magnify the positive link between the market and normative aspects of globalization through institutional capacity building, improved provision of information, and better access to credits for technology innovation. Such policies would strengthen the conditions for a beneficial influence of openness on the environment. At the same time, understanding of the limits of the positive environmental effects associated with global integration also implies that trade in itself is unlikely to work an environmental miracle, making open economies cleaner. Governments of emerging markets will need to put a considerable regulatory effort in all areas of environmental protection, while emphasizing different types of compliance incentives across environmental issues and economic sectors. The question that policy makers and academics have to address is not whether integration is good or bad for the environment, but how states and institutions can manage its differential effects.

TABLES AND GRAPHS

Table 1. Multivariate Least Squares Regression of Firm Environmental Management: Clean Technology and Environment Employees

Variable Name	<i>CLEAN TECH</i>		<i>ENV EMPLOYEES</i>	
	Coefficient	T-Statistic	Coefficient	T-Statistic
Intercept	-0.19813	-0.24	0.79221	2.55
<i>EXPORT</i>	0.02513**	1.94	0.00957**	1.92
<i>MULTINATIONAL</i>	0.0358*	1.76	0.01579**	2.06
<i>ENFORCEMENT</i>	0.2024**	3.65	0.08122**	4.04
<i>SIZE</i>	5.173E-05	0.21	0.00064297	8.86
<i>PERMIT</i>	1.05746**	2.15	-0.25864	-1.38
<i>COMMUNITY</i>	0.08136*	1.76	0.01714	0.66
<i>METAL</i>	0.82777	0.43	0.81765	1.17
<i>PULP</i>	3.47255	1.29	2.84439**	2.87
<i>CHEMICAL</i>	3.4996**	2.89	2.12874**	4.79
<i>FOOD</i>	1.4199	1.33	-0.16101	-0.4
<i>STONE</i>	-0.08506	-0.06	-0.3413	-0.59
<i>TEXTILE</i>	2.86992**	1.86	-0.32661	-0.55
<i>WOOD</i>	-1.30951	-0.55	-0.71951	-0.73
<i>REFINE</i>	6.32852**	1.82	2.01768*	1.78
	R-square: 0.07		R-square: 0.22	

** Significant at 5 percent level

* Significant at 10 percent level

Table 2. Logit Regression of Firm Environmental Management: *ISO 14,000*

	<i>ISO 14000</i>		
Variable Name	Coefficient	Chi-Square	Pr > ChiSq
Intercept	0.7074	20.5718	<.0001
<i>EXPORT</i>	0.00648**	5.8197	0.0158
<i>MULTINATIONAL</i>	-0.00283	0.5373	0.4636
<i>ENFORCEMENT</i>	-0.0316**	4.7652	0.029
<i>SIZE</i>	0.00024**	16.5229	<.0001
<i>PERMIT</i>	0.1929**	4.0332	0.0446
<i>COMMUNITY</i>	-0.00205	0.0525	0.8187
<i>METAL</i>	-0.2259	0.3632	0.5468
<i>PULP</i>	-0.4887	1.012	0.3144
<i>CHEMICAL</i>	0.0814	0.1163	0.7331
<i>FOOD</i>	0.0979	0.2263	0.6343
<i>STONE</i>	0.6156*	3.5991	0.0578
<i>TEXTILE</i>	0.00182	0	0.9952
<i>WOOD</i>	1.2491*	2.7446	0.0976
<i>REFINE</i>	-0.5179	0.772	0.3796
R-Square: 0.06			

** Significant at the 5 percent level

* Significant at the 10 percent level

Figure 3.1 Changes in production and environmental pollution in the chemical industry of the Czech Republic 1991-1995

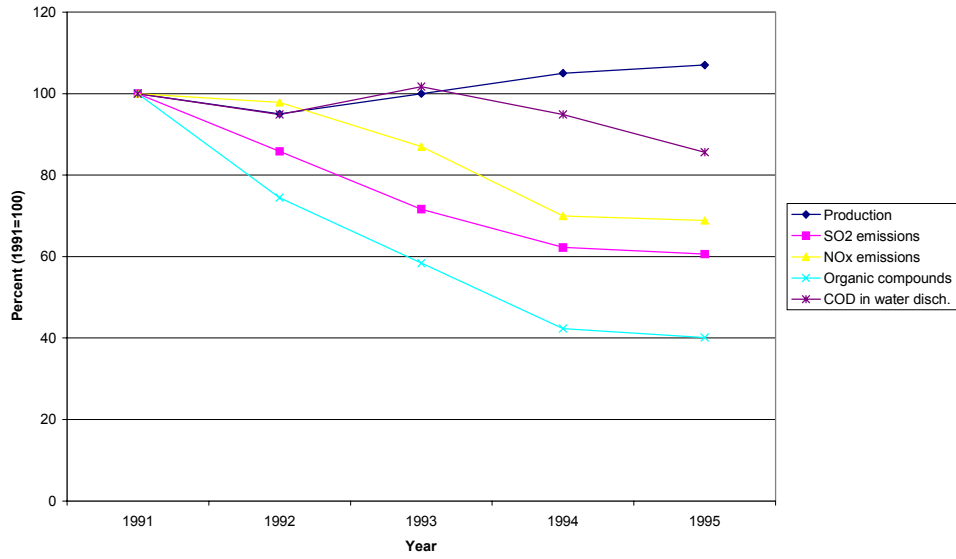
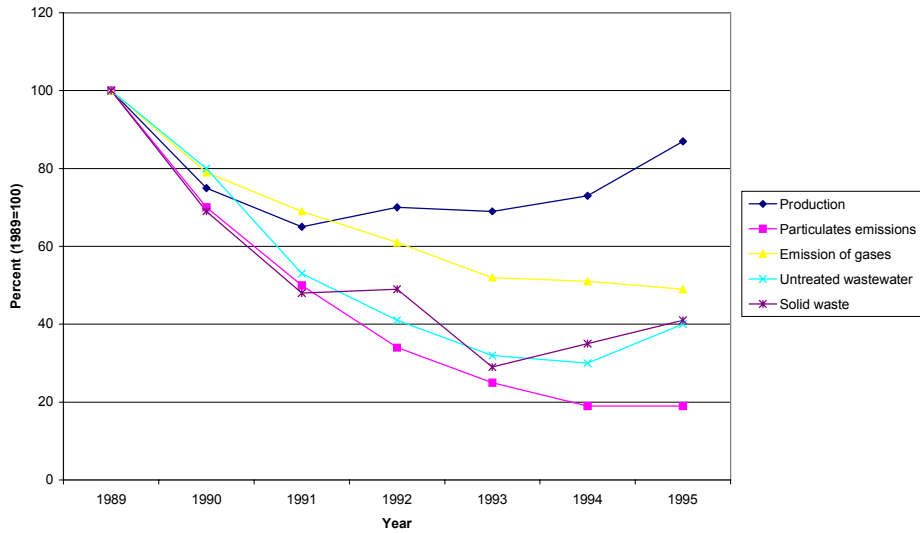


Figure 3.2. Changes in production and environmental pollution in the chemical industry of Poland 1989-1995.



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END NOTES

¹ See, for example, Esty 1994, Conca 1995, Costanza 1995, Daly 1995.

² Ulp 1996, Kennedy 1994, Barrett 1994.

³ For a reviews of the economic studies on trade and the environment see Dean 1992, Ulp 1994, Panayotou and Vincent 1997, Jaffe et al. 1995.

⁴ Eliste and Fredriksson 1998, Birdsall and Wheeler 1992, Wheeler and Martin 1992, World Bank 2000.

⁵ World Bank 2000.

⁶ World Bank 2000.

⁷ Garcia-Johnson 2000, Birdsall and Wheeler 1992, Wheeler and Martin 1992.

⁸ REC 1996.

⁹ Brickman et al. 1985, Vogel 1995, Victor, 1998.

¹⁰ CEFIC 1996, CEFIC 1997, ICCA 1996.

¹¹ CEFIC 1996, CEFIC 1992, ICCA 1996.

¹² CEFIC 1996 and CEFIC 1997.

¹³ ACICR 1998 and interviews at the Czech Association of the Chemical Industry.

¹⁴ ACICR 1995, ACICR 1996 and ACICR 1997.

¹⁵ ACICR 1995, ACICR 1998, interviews at the Czech Association of the Chemical Industry, the Czech Business Council for Sustainable Development, and the Czech Environmental Management Center.

¹⁶ PCCI 1998.

¹⁷ BCCI 1999 and interviews at the BCCI, CEFIC, the Clean Industry Center, and the Ministry of the Environment.

¹⁸ Interview at the Ministry of the Environment 1998.