

The environmental regulation of privatized industry in Poland

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Abstract. The authors examine the operation of the environmental protection system in Poland. Drawing upon the results of a mailed questionnaire survey of privatized manufacturing firms, they investigate the degree to which Poland has been successful in strengthening its environmental regulatory system. In general, the survey data reveal an operational system of environmental protection that is an amalgam of traditional command-and-control regulation and flexible enforcement that is well suited to the current political and economic conditions of Poland. Among the features of this regulatory system, which supports improved environmental performance for privatized firms, are a tough system of facility licensing, a flexible approach to compliance, good information availability at the local level, and broad agreement as to the legitimacy of environmental protection among firms in Poland. The authors stress the importance of matching regulatory strategy to societal context.

Introduction

In this paper we examine efforts to reform the environmental regulatory system for industry in Poland. After the collapse of the communist regime in 1989, Poland faced the difficult challenge of strengthening an environmental regulatory system that had allowed some of the worst pollution in Europe, and that had been characterized by chronic underperformance in meeting environmental standards. Regulatory reform was pursued at a time of profound political and economic change, and with the government under considerable pressure to meet other societal goals, such as enhancing the competitiveness of Polish industry in international markets, and improving wages and living conditions (Cruz et al, 1996; Jasinski, 1996; Karaczun, 1995; Novak, 1996; Pawlowski and Dudzinska, 1994; Toman et al, 1994). Although the process of transition to democracy and a privatized market economy is still in its early stages, there is now growing evidence that Poland has been successful in improving both the economic competitiveness and the environmental performance of industry. Of all the major economies of Central and Eastern Europe, Poland achieved the highest rate of growth in GDP during the 1990s whilst also achieving substantial reductions in unemployment and price inflation. After an initial period of economic dislocation, real GDP in Poland surpassed pretransition levels in 1994 and grew at an annual rate of close to 7% in 1997 (OECD, 1998). Industrial production, which represents approximately 40% of Poland's GDP, grew at more than 10% in 1997. Although direct information on environmental performance is more limited, there is growing evidence of improvement here as well (GUS, 1998a; Schnoor et al, 1997; Stodulski, 1999). If this progress is confirmed and can be maintained, then Poland is likely to emerge as an important success story of regulatory reform, and as a potential model for other

industrializing economies, including those countries of Eastern and Central Europe seeking entry to the European Union.

Environmental concerns featured prominently in the political platform of the Solidarity opposition in Poland, and in the roundtable discussions that preceded the collapse of the Jaruselski government in 1989 (Jendroska, 1998). The task facing the Polish reformers included both diagnosis of the sources of past failures in environmental protection, and identification of regulatory strategies that would improve the environmental performance of industry. After a period of debate, the Polish government adopted a strategy of incremental reform in the administrative structure and policy instruments of environmental protection. Regulatory enforcement was substantially strengthened, the licensing process was codified, and fees and fines were increased. But the primary tools of environmental protection remained those of traditional command-and-control regulation, including risk-based exposure standards issued by the central government, inspections by regional enforcement authorities, penalties for noncompliance, and a comprehensive system of facility-operating licenses and permits. Incremental reform was predicated on a belief that the structure of the environmental protection system was fundamentally sound. Past failures derived not from inherent weaknesses in regulations or policies, but from a lack of enforcement of regulatory policies, and from an externally imposed development strategy focused on meeting output goals in energy-intensive and materials-intensive industrial production.

Even with the removal of external structural constraints, there were still substantial challenges to effective environmental protection in 1989. These obstacles included a history of weak enforcement of environmental regulations, pervasive shortages of capital for investment in pollution-control equipment and new process technologies, and the difficulty of balancing sometimes competing demands for improved socio-economic welfare and improved environmental performance. Regulators have also had to contend with additional challenges, including the emergence of a new entrepreneurial class, the involvement of international investors, pressure to comply with European Union standards, and the fragile economic condition of many enterprises exposed for the first time to international market competition. With all of these challenges, in 1989 many observers were openly skeptical of the likely outcome of the reform process, and suggested that decades of disregard for law and other legacies of the communist past would undermine the implementation of regulatory reform (Letowska and Letowski, 1996; Obloj and Kostera, 1993; Sztompka, 1991; Tarkowska, 1993; Tarkowska and Tarkowski, 1991).⁽¹⁾ Other observers called for the more rapid adoption of market-based instruments, information disclosure, public participation, and other 'next generation' approaches to environmental regulation (Adamson et al, 1996; Toman et al, 1994; Zyllicz, 1994).

The effectiveness of environmental regulatory reform efforts in Poland can be assessed in various ways. The aggregate data on industrial pollution for the country as a whole are one source of information. Total emissions of sulfur dioxide, nitrogen dioxide, and untreated industrial discharges into water have all fallen significantly in Poland during the 1990s (Brown et al, 1998; Cole, 1997; GUS, 1996; 1998b). Some of this decline is certainly the consequence of economic restructuring, including the closure of antiquated and inefficient factories. But there is also evidence from case-study research that the regulatory reform process is taking hold in Poland and generating improvements in environmental performance (Brown et al, 1998). Detailed case studies of five recently privatized manufacturing firms lead us to hypothesize that Poland may now

⁽¹⁾ Recent research suggests that the economic, social, and environmental outcomes of political-economic transition in Central and Eastern Europe have been quite varied (Pickles and Smith, 1998).

have an effective system for environmental protection, as measured by such indices as the successful implementation of a tough system of facility licensing, collection of pollution fees, payment of fines for noncompliance, and the acceptance among factory managers of the legitimacy and indeed the appropriateness of environmental regulation of industry. These findings must be treated with appropriate caution, however, as the case studies report the experience of only a small number of firms and may not be representative of industry as a whole. In addition, other researchers cite significant continuing weaknesses in the environmental regulatory system, including a high proportion of firms operating without the required environmental permits (Sleszynski, 1998; Warner, 1996), and a shortage of inspection and enforcement personnel (Millard, 1998).

In this paper, we examine empirically whether the generally positive results of our case studies hold for a wider range of firms and industries in Poland. We seek to establish whether Poland has an operational system of environmental regulation for private firms. By 'operational' we mean a system of regulation that defines explicit expectations and administrative procedures to be met by firms, accurately monitors performance, identifies those firms that are out of compliance with official standards, achieves improvements in performance, and protects public health and the environment by eliminating high-risk production processes. Whereas previous studies of environmental reform in Poland have depended largely on aggregate data from government agencies and other sources, the findings reported here are based upon plant-level data collected through a cross-sectional, size-stratified survey of privatized manufacturing firms. The analysis focuses on private firms only, and does not include older state-owned enterprises. Note that environmental regulation is likely to be more effective in influencing the behavior of private firms than of the older state-owned firms which lack the capital and capability to respond to regulatory pressure. But it is precisely these emerging private enterprises that represent the future of Poland's economy.

In general, our survey data reveal an operational system of environmental protection that is an amalgam of quite traditional command-and-control regulation and flexible enforcement that is well suited to the political and economic conditions of Poland. A comprehensive system of environmental permitting is in place, involving technical evaluation of air, water, and solid waste emissions. Importantly, the system has legitimacy among manufacturing firms and demonstrates a flexibility in adjudicating between environmental protection and other societal concerns that is not fully captured in formal legislation. We argue that Poland is an important example of how industrializing economies can design systems of environmental protection that are well suited to existing political and economic conditions, and thereby enhance their ability to meet the multiple goals of improved socioeconomic welfare and enhanced environmental performance. Environmental standards in Poland are generally on a par with those in other OECD countries. Although some environmental advocates argued for a more ambitious reform program, oriented toward sustainable development, significant improvements in ambient environmental conditions have been achieved.

Approaches to environmental regulation

The discussions taking place in Poland concerning regulatory reform occurred in the context of a lively international debate within the academic and policy literature concerning different approaches to the environmental regulation of industry (Clark and Canter, 1997; Davies and Mazurek, 1997; Roome, 1998; Vig and Kraft, 1997; Welford, 1996). In the first instance, this debate concerns the relative merits of alternative regulatory approaches, such as traditional command-and-control regulation, market-based instruments (Lotspeich, 1998; Opschoor and Turner, 1994), and various forms of 'soft' or 'civic' regulation (DeWitt, 1994). Although some researchers claim that

reform will lower the cost of regulation (Davies and Mazurek, 1997; Kopp et al, 1990) and stimulate greater technological and organizational innovation (Ashford, 1991; Heaton, 1997), others warn against reducing the pressure on firms to improve environmental performance (Steinzor, 1998). Much attention is focused in this regard on market-based instruments, information disclosure, and various 'private-law' models of environmental regulation, such as ISO 14001 and other international environmental standards. To date, the debate about regulatory reform has focused on OECD economies (OECD, 1997). We know less about the efficacy of various regulatory approaches within industrial economies that lack a recent history of rigorous regulatory enforcement, or within developing countries that are undergoing rapid industrialization.

Of particular interest here is the significance of the political, social, and economic context of effective environmental regulation. Much economic policy implicitly supports convergence around a kind of global 'best practice' in environmental regulatory policy, typically modeled on the approaches of OECD economies. The development agencies of OECD countries, as well as the World Bank and other multilateral organizations, commit considerable resources to the transfer of a portfolio of proven environmental protection approaches to developing economies. The resultant tendency toward policy convergence on an international scale is further intensified by the activities of large multinational corporations, many of which choose to adopt company-wide policies on pollution control, and by the increased popularity of international industry standards. Other researchers and policymakers, however, stress the impacts of local and national context on policy outcomes (Gibbs and Jonas, 2000; John, 1994; May et al, 1996). As Peck (1999, page 133) suggests, "for all this international 'policy trade', it has become increasingly clear that many policies do not travel well: while underlying principles and specific design features may be 'cloned', the outcomes of policy are rarely replicable". Arguably, the effectiveness of regulatory approaches depends in part on matching regulatory strategies to the resources, constraints, challenges, and opportunities existing in particular places. To take but one example, traditional command-and-control approaches to environmental regulation may be too costly to implement in countries that lack a well-developed institutional infrastructure for regulatory enforcement (Asian Development Bank, 1997).

In the research presented here we examine approaches to environmental regulation in Poland, and the possible significance for regulatory success of a 'good fit' between policy approach and societal context. Clearly in Poland, and in many other 'economies in transition', the shift to democracy and a private market economy are central elements of the context within which environmental policy reform takes place. Following the work of Sztompka (1991), the process of transition carries with it both legacies of the past, such as limited investments in environmental protection and widespread noncompliance with environmental standards, as well as shadows of the future, such as overly optimistic views of the likely impacts of economic and political reform on socioeconomic welfare. Other important elements of the economic and political context of environmental policy reform in Poland include the limited financial resources of many newly privatized manufacturing firms, the strengths and weaknesses of existing regulatory institutions, and attitudes toward the environment among industry and society at large. We anticipate that these and other aspects of the societal context will determine in part the future success of any environmental regulatory policy. Arguably, for example, flexibility in regulatory enforcement is likely to be of particular importance on account of the need to balance multiple goals for economically fragile firms and industries. On the other hand, such regulatory flexibility might be interpreted by firms as a lack of commitment by governments to aggressive environmental improvements, and as an opportunity to disregard and circumvent new environmental standards and procedures.

The environmental protection system in Poland

In previous work (Broszkiewicz et al, 1998; Brown et al, 1998), we have described the emerging structure of the environmental, health, and safety regulatory systems in Poland, their strengths and weaknesses, and the direction taken in the reform process. The environmental protection system has its roots in turn-of-the-century nature-conservation movements. Soon after the communists took power in Poland, parliament passed the 1949 Nature Conservation Act, the first of many new environmental laws that were in many ways highly progressive for the time and included such provisions as environmental impact assessment and the creation of a centralized environmental regulatory authority. The next four decades brought a plethora of environmental laws and administrative initiatives that were both broad in scope and sometimes innovative in approach. These included the creation, in the 1960s, of a civil and penal code on pollution and the introduction, in 1974, of pollution charges for the use and disposal of water (arguably the first such system of environmental fees in the world). Much of this legislation was initiated by top echelons of the state and by intellectual elites within the Polish National Academy of Sciences (Cole, 1997). A comprehensive environmental protection act was passed in 1980 that created a separate environmental enforcement agent (PIOS) and extended the system of environmental fees and fines to other environmental media.

Paradoxically, the highly developed legislation failed to prevent some of the worst environmental degradation in Europe (Carter, 1996; Cole and Clark, 1998; Ember, 1990; Fischhoff, 1991; IEP, 1990; Kabala, 1985; Timberlake, 1981; World Resources Institute, 1992). Emissions of SO₂ per unit of GDP, for example, were approximately eight times the average for OECD countries in 1989 (Adamson et al, 1996). In the late 1980s, as much as one third of industrial sewage was discharged untreated into surface water (Nowicki, 1997; Zechenter, 1993). Cole (1995a; 1997) argues persuasively that the seeming contradiction in the state's actions towards the environment—simultaneously developing institutions and policies for its protection and not enforcing them—was not a simple act of cynical deception. Environmental concerns were overridden by insurmountable economic constraints and nonnegotiable political considerations. These included an economic development plan emphasizing energy-intensive and materials-intensive heavy industry; a dependence on highly polluting coal as the primary energy source; a political system that suppressed access to information about the state of the environment and which made environmental protection subsidiary to industrial growth, output quotas, and employment; and a weak resource-poor enforcement regime (Cole, 1995a; 1995b; French, 1990; Hicks, 1996; Hubbell and Selden, 1994; Jendroska, 1996a; 1996b; Schmidt and Thompson, 1993; Toman, 1993; Zyllicz, 1993). Environmental protection also suffered from a chronic shortage of capital for pollution control and abatement. Investments in environmental protection were no more than 0.5% of GDP during the late 1970s and early 1980s (Prufer, 1997).

The regulatory reforms implemented during the 1990s focused upon improving enforcement, increasing the capability for environmental monitoring, allowing greater use of economic instruments of regulation, increasing penalties for noncompliance, and providing greater flexibility to authorities in negotiating with industrial enterprises. All environmental protection responsibilities were consolidated in a single ministry. Procedures for issuing permits were standardized and strengthened, resulting in an extensive and detailed permitting system for air, water, and solid waste emissions (EPA, 1995). Pollution fees and fines were increased at rates exceeding inflation. With the revenues from fees and fines placed in an 'environmental fund', expenditures on environmental protection increased to approximately 1.4% of GDP in the mid-1990s (Anderson and Fiedor, 1997), and 1.6% in 1997 (GUS, 1998b). In 1994, the fund provided approximately 40% of all investments in environmental protection in

Poland (Sleszynski, 1998). The authority of the environmental regulatory enforcement agency, PIOS, was strengthened. Enforcement is now carried out by an independent organization with substantial resources and broad regulatory powers. Regional inspectors have the power to impose noncompliance fines, halt activities and production processes that endanger the environment, and close factories that represent a substantial and immediate threat to the environment. According to government statistics, over the period 1993 to 1997 the number of inspections carried out by PIOS increased by 5%, and the number of fines imposed increased by 32% (Stodulski, 1999).⁽²⁾

The reform initiatives of the 1990s notwithstanding, the fundamental orientation of the environmental protection system remained that of command-and-control regulation. All industrial enterprises must obtain from regional environmental administrators renewable permits for water use, discharge of wastewater or sewage into ground or surface waters, air emissions, and disposal of solid and hazardous waste. The standardized permit application for air emissions (known as an *Operat*), water use, and waste disposal must include detailed information on the types of sources of pollutants, an analysis of environmental impacts, and a plan for meeting applicable environmental standards. In the case of water, for example, the permit must describe technologies in use, and must include a water-mass-balance analysis, a hydrogeological analysis, and a description of how 57 different water-quality standards will be met. Air permits are based on 44 ambient air-quality standards and commonly include requirements for improvements in process design and for the adoption of pollution-control technology. Permit applications must contain technical analysis of incremental allowable emissions based on dispersion models that account for background ambient conditions. Regional and local authorities have limited discretion in setting the terms of air permits, which are based on ambient air-quality standards set by the Ministry of Environment. Ambient air and water standards are typically on a par with those of the European Union. As part of the 1991 codification of the environmental permitting process, private government-certified experts and specialized firms prepare these permit applications, including calculation of emissions rates. Environmental regulation fees are imposed for emissions and resource use, and pollution fines for emissions that exceed allowable levels (Poskrobko, 1991; Zyllicz, 1994).

The licensing system is tough, highly regulated, and quite traditional in its focus on media-specific pollution standards. Overall, the formal structure for managing the environmental impacts of industrial enterprises in Poland is knowledge intensive and resource intensive, and places a substantial compliance burden on firms. In subsequent sections of this paper we examine empirically the actual operation of this system of environmental regulation. How have newly privatized industrial firms responded to the regulatory system and to the enhanced regime of enforcement? Have firms complied with regulation or resisted the process of enforcement? Have regulators demonstrated rigidity or flexibility in pursuing environmental goals in the face of difficult economic and social conditions?

Research design

Our empirical research draws upon the results of a questionnaire survey mailed in 1997 to a random sample of privatized manufacturing firms. The questionnaire survey was targeted at privatized firms and excluded state-owned manufacturing facilities. Although many of the state-owned firms are in practice the heaviest polluters, the

⁽²⁾ The regulatory structure described here was in effect until 31 December 1998. As of 1 January 1999, the organization of government was changed. The number of *voivodships* was reduced from 49 to 16, and many decisions (including facility licensing) are now delegated to 373 county governments (*poviat*). The effects of these most recent changes on regulatory performance are beyond the scope of the empirical analysis reported in this paper, and will not become clear for several years.

majority are economically uncompetitive, technologically backward, and destined for closure or restructuring. The Polish government has demonstrated a strong commitment to privatization and this commitment is reinforced by the legislative requirements of accession to the European Union. Our focus is on the private economy, which already constitutes more than 60% of total employment and an estimated 70% of GDP (US Department of Commerce, 1998). Efforts to privatize and restructure heavy industry, mining, and the energy sector are progressing slowly, but the slow pace of this effort has been offset by rapidly expanding output, employment, and exports by private firms engaged in light manufacturing, including clothing manufacture and metal working (Pond, 1998; Poznanski, 1994; Rondinelli and Yurkiewicz, 1996). In general, private firms represent the future industrial base of the country.

The State Ministry of Privatization (now within the Ministry of the Treasury) in Poland maintains a complete registry of privatized firms. From this register, we were able to obtain a random national sample of 300 manufacturing firms. The sample included firms in 47 of the 49 administrative districts (*voivoda*) in Poland. Previous research has demonstrated that the regulatory process often operates differently for large and small firms (see, for example, Brehm and Hamilton, 1996). Small firms often receive less attention than the large firms, even though, collectively, small firms are often responsible for substantial air, water, and waste emissions. For this reason, we chose to stratify the sample by three size categories: fewer than 100 employees, 100–250 employees, and more than 250 employees. The questionnaire survey was written in Polish and was approximately eight pages in length. The survey was pre-tested on a small number of manufacturing firms. Standard survey procedures were used to maximize the response to the survey. The survey was addressed to the president or general manager of the firm, together with a request that it be completed either by that person or by another knowledgeable employee. From the 300 firms contacted, we received a total of 109 completed questionnaires—a response rate of 36.3%. There were no statistically significant differences in response rates by size of firm. The sample includes firms in 37 different voivoda. The administrative districts not represented by the sample were among the least industrialized regions in Poland.

Table 1 provides summary information on the 109 sample firms who completed the questionnaire. The mean size of the firms in the sample survey was 257 employees. On average, 22.4% of output was exported to the European Union and 4.9% to other foreign markets; the remaining 62.7% of output was sold within Poland. Larger firms, with more than 250 employees, had a significantly higher level of exports (a total of 41.1% of output was exported). This export orientation of manufacturing firms is of importance in that the environmental standards of the European Union are thought to be a significant driver of improvements in environmental performance in Poland. We also hypothesize that the relative importance of a firm to its local economy will influence the attitude of regulatory authorities. Where a firm is the largest and dominant employer in

Table 1. Summary statistics on sample firms (source: survey data).

| | Size class | | | |
|-------------------------------|----------------|-------------------|-------------------------|-----------|
| | 0–99 employees | 100–250 employees | more than 250 employees | all firms |
| Number of firms | 34 | 40 | 35 | 109 |
| Mean number of employees | 60.8 | 166.7 | 561.6 | 257.2 |
| Sales to European Union (%) | 18.2 | 17.4 | 34.6 | 22.4 |
| Sales exported (%) | 22.0 | 22.1 | 41.1 | 27.3 |
| Largest employer in gmina (%) | 2.9 | 7.5 | 17.1 | 9.2 |

a community (*gmina*), regulatory authorities are likely to come under greater pressure to consider employment impacts when making decisions. Of the 109 firms in the survey sample, 9.2% were the largest employer in their *gmina*, 36.4% were one of the ten largest employers, and the remaining 54.4% were one of many employers in their *gmina*.

In general, in the survey questionnaire we sought to document the operation of the environmental protection system in Poland. Detailed information was obtained about the licensing process, whether firms were in compliance with environmental standards, the response of authorities to firms that were out of compliance, the pattern of fees and fines paid by firms, the role of key participants (for example, regulatory officials, unions, employers) in the regulatory process, as well as the firm's overall views on the regulatory system. Our focus was upon the regulatory process, rather than upon environmental performance and environmental quality per se. Although we did not collect data on actual emissions, we did document whether firms were in compliance with environmental regulations. Where firms were out of compliance and were required by regulators to change their operating procedures, we documented whether the necessary changes were being implemented. Note that via the survey we also obtained parallel information on the operation of the occupational health and safety system in Poland. Because there are significant differences in the structure of environmental protection and occupational health and safety regulation in Poland, we limit our discussion in this paper to environmental protection. Our comments on the health-and-safety system are limited to those specific areas where the two systems intersect (for example, in the use of health offices to calculate local ambient environmental conditions).

Because the survey respondents represented a random sample of manufacturing firms drawn from all sectors of industrial production and all parts of the country, the level and type of air, water, and waste emissions varied widely among participating firms. Some firms were engaged in manufacturing processes that were intensive in their use of energy and materials, and were also waste intensive (for example, leather tanning and metal finishing); other participating firms (such as furniture assembly) had more modest environmental impacts but significant health-and-safety concerns. Figure 1 shows the percentage of participating firms whose emissions were sufficient to require permits for air emissions (54.1% of firms), industrial waste water (30.3% of firms), and solid waste (43.7% of firms). As we might expect, large firms were more likely to have emissions that required permits than were small firms. In the case of air emissions, for example, 80.0% of firms with more than 250 employees required air permits, as compared with only 26.5% of firms with 100 or fewer employees (difference significant at the 0.01 level of confidence).

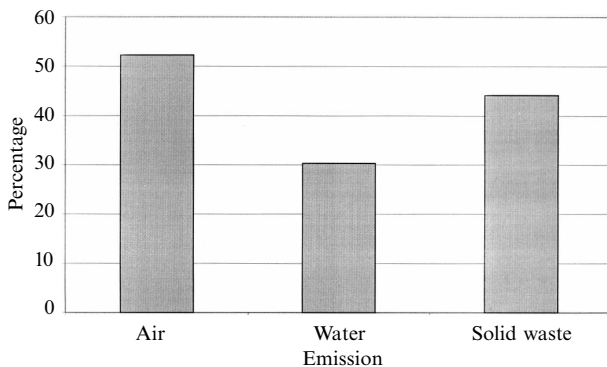


Figure 1. Percentage of firms requiring emissions permits.

Research findings

We begin with the operation of the permit and licensing system. Effective monitoring and assessment of air and waste-water emissions, and solid-waste disposal is the bed-rock of an effective regulatory system. As written in the law, the licensing system in Poland is a challenging, rigid, and comprehensive process that holds manufacturing firms to detailed emissions limits that are based upon ambient environmental standards set by the central government. The environmental standards generally are stringent, and the process of assessment is resource intensive. The level of emissions authorized for a particular firm is derived via calculations based upon national ambient environmental standards, local ambient environmental quality, and the incremental contribution of that firm to total emissions (based on air-dispersion models, hydrogeological analysis, and other techniques).

The permit process

Our first test is whether firms actually participate in the permit process. Would firms comply with the process, or simply operate without permits, as often occurred prior to 1989, or would they seek to overturn the process in the courts, parliament, or other venues? The survey data reveal that, with few exceptions, firms complete the permit process for air and waste-water emissions and solid-waste disposal. In the case of air emissions, for example, a total of 63 of the sample firms submitted to regulators the completed technical assessment (*Operat*) required for obtaining an air permit. But this total includes *all* of the 59 firms that had air emissions subject to regulation; the remaining firms did not have air emissions that required a permit. Among the participating firms, only 4 reported that in the past five years they had operated without the legally required air permits. This result holds both for large and for small firms. Previous studies had suggested a large proportion of firms in Poland were operating without legally required permits (Sleszynski, 1998), although the existence of a 'grey economy' and other problems means that few reliable data were available. Although our focus upon privatized firms limits comparability, the survey results reported here suggest that the actual number of firms operating without permits is likely much lower than was previously estimated.

Note that the permit process sets the allowable level of air and waste-water emissions and solid waste for a firm at a particular location. Completing the process does not in itself imply that firms meet the relevant emissions limits. The legal process for setting allowable air emissions is a technical assessment that generally makes little allowance for the economic feasibility of meeting emissions limits (regulators can issue temporary permits to firms that submit a plan for bringing the facility into compliance). In the case of waste water, licensing authorities have somewhat greater flexibility. Firms are allowed to exceed water-quality parameters where this is found to be in the public interest and where the application of best-available technology would not solve the problem. Given the recent history of limited investment in environmental protection and the general shortage of capital of many firms, we anticipate that many firms would fail to meet the emissions limits established in their air, waste-water, and solid-waste disposal permits. Of the 63 firms who had submitted an air-permit application, 18 (28.6%) reported that the operation of their factory would result in emissions that exceeded limits set in their air permits. Of 92 firms, 15 (16.3%) reported that their waste-water emissions exceeded levels set in their operating permits (the terms of waste-water permits are negotiated direct with state-owned or municipally owned sewage works). The percentage of firms out of compliance with their waste-water permits was much higher among larger firms with more than 250 employees (30.0% of large firms exceeded allowable levels).

Table 2. Numbers of firms needing to make changes in order to meet emissions limits set in permits (source: survey data).

| | Air permit | Waste-water permit |
|--|------------|--------------------|
| Small changes in operating procedures | 11 | 4 |
| Minor investment in equipment and/or materials | 17 | 4 |
| Major changes or major investment | 7 | 7 |
| Standards could never be met | 1 | 1 |

Table 2 provides information on the scale of investment and changes in operating procedure required to bring firms into compliance with environmental standards. In many cases, minor changes in operating procedures or small investments in technology would bring firms into compliance with their air, waste-water, and solid-waste permits. But major changes would be required by 7 of the sample firms to comply with air-emission limits, and by 7 sample firms to meet waste-water emissions requirements. Several firms indicated that it would never be possible for them to meet current regulatory requirements. Among small firms, or firms that are only marginally profitable or worse, even modest investment in technology or equipment is a major expense.

And yet, despite the tough ambient standards and associated emission requirements, and the sometimes major investments required to meet these standards, we find broad acceptance of the licensing process among the sample firms. When asked in the questionnaire survey about their overall views on the regulatory process, only 17 (15.9%) of 107 firms stated that they found existing environmental regulations and regulatory procedures too strict. The remaining firms reported that these regulations and procedures were about correct (68.2% of firms), or too lenient (15.9%).

Thus our survey data indicate that the permit process is operational and is widely regarded as legitimate by the firms involved. In the context of a recent history of widespread disregard for environmental standards and procedures, this is no small achievement. At the same time, many firms fail to meet the emissions limits established in their operating permits. The pattern of broad acceptance of standards and of the rigorous permit process is consistent with the findings of our case studies. In those case studies, firms identified the professional and flexible response of regulators to environmental concerns, as well as the independence of the environmental assessment process as important factors in their acceptance of the regulatory process.

The response to noncompliance

Our second test concerns the response of firms and of regulators to noncompliance with environmental permits. As indicated above, a high percentage of firms fail to meet the emissions limits set in their air, waste-water, and solid-waste permits. Would regulators enforce standards and secure the required improvements in performance? Would firms make the necessary investments to achieve these standards? In statutory terms, environmental protection laws in Poland allow regulators somewhat greater (though still limited) flexibility in enforcement than in the licensing process.⁽³⁾ For example, the enforcement branch, PIOS, can defer fines imposed for exceeding emissions set in an air permit if the firm commits to a plan for achieving compliance. Fines are subsequently waived if the plan is implemented and compliance achieved. What we find in practice is a set of varied and flexible responses that are apparently closely tied to the financial and technical capabilities of the firms involved.

⁽³⁾ The recently introduced compliance-schedule program allows regulators greater flexibility in negotiating the terms of environmental permits. However, this approach has to date only been applied to major point-source polluters.

Table 3. Response of regulators to noncompliance (source: survey data).

| Response | Number of firms |
|---|-----------------|
| Allowed to operate with no changes | 8 |
| Specific changes required | 17 |
| Worked with firm to find a solution | 3 |
| Imposed a deadline to make changes | 14 |
| Required closure of process/workstation | 0 |
| Imposed fines | 6 |
| Imposed fees | 0 |
| Required a plan to solve the problem | 8 |

In the questionnaire survey we asked firms to report on the response of authorities to noncompliance with environmental standards. Table 3 shows the results for noncompliance with air-emissions limits. Note that the participating firms were invited to select all the responses that applied to them. In the case of noncompliance with air permits, a minority of firms were allowed to continue operation with no changes. Most firms were either required to make specific changes, and/or required to submit a plan with a specific timetable of when the required changes would be made. Thus the dominant response is to secure a timetable for achieving compliance, and to look for evidence of progress towards this goal in the form of investments and actual changes in operating procedure. We found no significant difference across size of firm, or relative importance within the community, in the pattern of response by regulatory authorities. These results are fully consistent with the findings of our case studies. In the case studies we observed a striking pattern of regulatory authorities searching for ways to secure environmental improvements within the limits of the financial and technological resources of individual firms. Regulators pressed hard where a firm could reasonably be expected to meet, and even exceed, standards. Where firms showed evidence of good faith efforts to meet standards, they allowed them an extended timetable within which to meet these commitments.

The format of the questionnaire survey did not allow for the detailed technical analysis required to establish the actual effects on pollution of these enforcement activities by regulators. But firms out of compliance were asked to record whether they had implemented the changes required by regulatory authorities. Of 31 firms responding to this question, 19 (61.2%) reported that they had already made the requisite changes; 10 (32.2%) reported that they were working on making the changes. The remaining 2 (6.4%) firms challenged the finding of the regulators in the courts. One firm appealed to regional authorities on the basis that meeting the requirements would create economic hardship and substantial unemployment. A second firm argued that the environmental statutes had been incorrectly applied in their case. Both appeals were successful and reflect adept strategy on the part of the firms involved—a feature that was also observed in our earlier case studies (Brown et al, 1998). In the remaining cases, survey firms responded that they had already made the required changes in technology and operating procedures, or were currently implementing the changes.

Thus regulators have responded to widespread noncompliance with considerable flexibility and sensitivity to local technical and economic circumstances. Although we are not in a position to assess fully the results of this flexible firm-specific approach, our case-study research indicates that regulators and firms both view the approach as a sensible and successful strategy for securing improvements in environmental performance within existing socioeconomic constraints. Regulators display a high level of sensitivity to the financial and technical capabilities of firms: pushing hard where firms

have the capability to meet high standards, and showing flexibility where financial and technological resources are limited (see also Brown et al, 1998).

Fees and fines

Fees and fines are another category of policy tool available to regulatory authorities seeking to ensure compliance with environmental permits and, more generally, improve the environmental performance of firms. Environmental fees are applied to a wide range of industrial activities, including air emissions, waste discharges, and water use. According to government statistics, the collection rate for environmental fees is quite high (80% and 94% for air emissions and waste water, respectively), though these rates have declined somewhat as the level of fees has increased during the 1990s (GUS, 1998a). Fines are imposed on firms whose emissions exceed those allowed under their environmental permits. Collection rates for environmental fines are quite low (GUS, 1998b).⁽⁴⁾

A survey of 112 of the heaviest polluters in Poland found that pollution charges constituted 4.9% of the total expenditures of these firms (Sleszynski, 1998). But among the random sample of privatized firms completing our survey, fees and fines remain a modest part of operating costs. In the case of air emissions, for example, of the 6 firms receiving fines, the fine totaled on average just 0.19% (that is, less than 1%) of total operating costs. Among all the sample firms, environmental fees were on average 0.5% of total operating costs. Bluffstone and Larson (1997) and Toman et al (1994) suggest that environmental fees and fines are in most cases too low to create significant incentives for pollution prevention. Our results support this conclusion.

Information availability

Case-specific decisionmaking is predicated upon the ability of regulators to obtain detailed information on the operation of factories. Without such information, regulators have little basis on which to make decisions as to the economic and technical feasibility of improving environmental performance, or the likelihood that firms will act in good faith and follow through on plans submitted for bringing facilities into compliance with standards. In practice, information availability has many relevant dimensions, including the resources available to permitting and enforcement authorities, the technical expertise of regulators, the level of access to facilities, the willingness of firms to release relevant data, and the degree of cooperation among local, regional, and national regulatory authorities across different regulatory areas. Several researchers have suggested that a continuing shortage of well-trained regulatory personnel would limit the effectiveness of the traditional resource-intensive regulatory approach retained in Poland during the 1990s (see, for example, Millard, 1998). In this context our case studies revealed a surprisingly high degree of familiarity on the part of regulators with the operations of the firms for which they were responsible.

The research design of the postal questionnaire used in this study did not allow for an evaluation of all the different dimensions of information availability relevant to environmental regulation. We were able, however, to collect data on the frequency with which firms were inspected by environmental regulatory authorities in the previous year. Inspectors from the environmental enforcement branch (PIOS) visited on average 0.55 times. Inspections by enforcement regulators were more frequent at large firms with more than 250 employees (an average of 0.88 visits per annum), compared with firms with fewer than 100 employees (0.13 visits). These differences are statistically significant at the 0.01 level of confidence. Among the sample firms, 39 (36.4%) were

⁽⁴⁾ The reported collection rate for environmental fees is 13%. However, for two reasons this statistic may not be representative of the population of privatized firms. First, fines are heavily clustered on the mining industry and older state-owned enterprises. Second, fines that are legally deferred and subsequently not imposed are recorded as 'uncollected' in GUS statistics.

visited on at least one occasion by PIOS inspectors that year. But among larger firms with more than 250 employees, as many as 54.3% of sample firms were visited on at least one occasion by PIOS inspectors that year. The corresponding percentage of firms receiving at least one visit by PIOS in the year was 12.5% for firms with fewer than 100 employees, and 40.0% for firms employing between 100 and 250 workers. By international standards, these data suggest a surprisingly high frequency of visits to the sample firms. Recall, in addition, that the enforcement personnel are only one branch of environmental regulation. Representatives of the regional licensing authorities (WWOS) also visit firms as part of the permit process (environmental permits are typically issued for a 2–3-year period).

Discussions with individual firms confirm that in Poland regulators at the regional and local level are familiar with many of the factories under their authority, and their knowledge includes the extent of any environmental problems as well as the scope for achieving performance improvement within a given time frame. The general pattern is that of a regulatory system that maintains a presence in many factories (especially larger employers), and has a reputation for providing assistance as well as for pushing for improvements in environmental performance.

Discussion and conclusion

In the period following the collapse of communist rule in 1989, Poland committed itself to a process of incremental reform in the system of environmental protection. Alternative proposals for more radical reform were rejected. The implicit assumption underlying this decision was that the weak performance of the regulatory system built up over previous decades derived not from any fundamental flaw in regulatory approach or policy instruments, but from the presence of nonnegotiable obstacles to implementation. Once these obstacles were removed, and enforcement of the existing regulatory system was tightened, it was anticipated that firms would accept the legitimacy of the environmental protection system, and work with regulators to improve performance. By and large, this assumption has proven correct. Our survey data reveal an operational system of environmental protection the goals of which are broadly accepted by industrial firms, and that is working at securing improvements in environmental performance within existing technical and economic constraints. Although the survey results refer to private firms, there is also evidence from government data that regulatory reform is improving the environmental performance of state-owned firms as well (OECD, 1999).⁽⁵⁾

We can identify a number of features of environmental protection in Poland that have supported this outcome. First, the goals of improved environmental performance are generally accepted by the firms involved. To some degree this results from the structure of the regulatory system, including the use of independent certified technical experts to prepare environmental assessments, and the longstanding role of regulators as advisors to firms—rather than simply arms-length monitors of environmental performance. In addition, we suspect that the acceptance of the need for improved performance may well reflect more general commitments to protecting the environment in Poland. However, the history and scope of such value commitments, and their relation to environmental protection, are beyond the scope of the current analysis.

Second, the particular approach that Poland has taken to environmental regulations has been important to its success. On the surface, the system of environmental protection displays many aspects of traditional command-and-control regulation. Air, water,

⁽⁵⁾ In the iron and steel industry, for example, where state-owned firms are still responsible for the largest share of output, pollution has fallen even as output has increased. Over the period 1992–96, steel production in Poland increased by 13%, SO_x emissions declined by 38% and particulate emissions declined by 53% (OECD, 1999, page 171).

and waste standards are set by central government which has little opportunity to take account of local conditions. Detailed and tough environmental standards place a considerable burden of compliance on firms. And yet, on detailed inspection, it is clear that the approach to environmental protection in Poland exhibits considerable flexibility and sensitivity to the economic and technical circumstances of individual firms (see also Brown et al, 1998). Importantly, this flexibility rests upon the knowledge that regulators have of the firms involved. Frequent visits to factories and a surprising familiarity with the opportunities for and barriers to improvements in environmental performance at the level of the individual firm, as well as the likelihood that firms will follow through on plans and commitments made, is the basis for such case-specific decisionmaking. The flexibility demonstrated by regulatory officials familiar with individual factories, in turn, contributes to the broad acceptance of the regulatory system by most private firms.

In the near term, the regulatory system in Poland is likely to move further in the direction of more flexible regulation. Permitting officials who we interviewed were openly critical of their lack of discretion in determining the condition of permits. Representatives of the environmental enforcement branch were pleased with the flexibility they enjoyed in applying or postponing penalties for noncompliance. The director of one regional office commented that "we have never had a firm default on us in implementing an improvement plan we have negotiated." The recently announced decision to transfer permitting authority from the regional offices of the central ministry to the county level is, in principle, consistent with this practice of local case-specific decisionmaking. The effects of this latest policy reform will depend significantly on the staff resources and the level of technical capability of the authorities at the county level.

Challenges to the emergent regulatory system remain. As we have seen, many firms are not in compliance with environmental standards. Our survey results, as well as interviews with regulatory authorities, suggest that in many cases the firms out of compliance simply lack the financial resources to make the requisite investments in new process technologies, and protection and abatement equipment. Implicitly, the flexible approach that regulators have taken towards firms that are out of compliance is predicated on a premise that economic competitiveness and environmental protection within the privatized economy are correlated. Over time, economically successful private firms will invest in environmental protection and improve environmental performance; economically unsuccessful firms with poor environmental records will eventually go out of business. In this way, economic growth and environmental protection are constituted as complementary, rather than mutually exclusive, goals. To the extent that the private economy continues to grow, and that prosperous firms do indeed improve their environmental performance, this strategy represents something of a 'win-win' for Poland. But the strategy remains untested under conditions of economic recession, and the level of commitment of private firms to continuous environmental improvement remains to be determined.

The environmental protection system that has emerged in Poland is a composite of different regulatory approaches. It combines some quite traditional forms of command-and-control regulation, along with levels of flexible and decentralized decisionmaking that anticipate discussions of regulatory reform in the USA and elsewhere. It is also a particular combination of past and present, maintaining considerable continuity with institutions and technical resources built up during the communist period, while adopting selective new market-based instruments. Our survey research suggests that this eclectic approach provides for an effective system of environmental regulation, at least within the economic and political context of Poland in the 1990s. And herein lies the most important implication for other rapidly industrializing economies. Although

we have no basis on which to suppose that the specifics of the regulatory approach adopted in Poland would be successful elsewhere, the careful matching of regulatory strategy to political and economic conditions, and well-established practices for resolving conflicts, are features of Poland's experience which are of broad relevance. Whether Poland actually emerges as a success story of environmental regulation will depend on the ability of the country to sustain the initial achievements of the 1990s, and adapt to new regulatory challenges in the face of continuing rapid political and economic change.

Looking forward, one of the key challenges is accession to the European Union, and bringing Poland's environmental protection system into alignment with the European Union *acquis*. Progress in the transposition of Poland's environmental protection system to meet the requirements of the European Union has been slow (European Union, 1999). Some have also warned that accession might lead Eastern European countries to abandon some innovative aspects of their regulatory approach, such as the extensive use of pollution charges (OECD, 1999). In general, however, our analysis suggests that Poland is well placed to meet the demands of the European Union *acquis* within the area of environmental protection. Over the past two decades, Poland has demonstrated considerable skill in adopting proven regulatory approaches from other countries, including those of the OECD. Even prior to the legislative transposition initiative, the environmental protection system in Poland was already in moderate alignment with European Union practice. Much of the flexibility that Poland has pursued within its regulatory system is focused on implementation and does not imply inconsistency with tough ambient environmental standards and other European Union requirements. Indeed, given the anticipated high cost of meeting European Union environmental requirements, flexibility in implementation is likely to be of particular importance in ensuring continued progress toward accession (OECD, 1999).

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