

“Corporate Environmental Strategies in Developing and Transition Economies”

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Abstract:

In developed countries, businesses are adopting environmentally friendly management practices, possibly because they are proving profitable. However, the benefits of a corporate environmental strategy are less clear in developing and transition economies, where environmental regulations are poorly enforced and social pressures are weak. Given this lack of clarity, understanding the causes and consequences of corporate environmental strategy in these economies is important for business leaders, policymakers, and environmental activists. Drawing from both theoretical and empirical research, we explore a broad array of drivers behind corporate environmental strategies: internal characteristics, market pressures, government, and civil society. The empirical findings for developing economies suggest that ineffective regulatory agencies, limited law enforcement capacity, and underdeveloped green pressure groups provide weak incentives for environmental compliance, but foreign ownership and foreign customer pressure improve environmental management practices, and information disclosure schemes offer some promise for improved performance. The empirical findings for transition economies also suggest a positive role, albeit weaker, for foreign ownership and foreign customer pressure, but additionally reveal that government factors – greater enforcement, permit issuance, and higher emission charge rates – are more effective than in developing economies.

1. Introduction

Many firms in developed countries have decided that integrating sustainability into their business strategy is profitable (Esty and Winston, 2006; Nidumolu et al., 2010). The business benefits of a pro-active sustainability strategy are less clear in emerging markets, which include both developing and transition economies, where environmental and social regulations may be lacking or poorly enforced, and demand for greener products may be virtually non-existent (Arya and Zhang, 2009; Blackman, 2010). Ironically, these weak governance institutions mean that the actions of forward-looking business leaders may be the most powerful force for environmental improvement in some countries. Understanding the causes and consequences of corporate environmental strategy in emerging markets is critical for executives as well as policymakers and environmental activists.

In this paper, we explore the drivers behind corporate environmental strategies in developing and transition economies and the heterogeneity in the responsiveness of firms to these drivers. Nations differ widely in their fundamental mode of economic organization, from democratic capitalism to socialism to communism, with many variants of state capitalism in between. The literature on transition economies has paid special attention to the process of market-oriented reforms. Greater private ownership, a stronger orientation towards profit maximization, harder budget constraints, market competition, openness to trade – all create powerful incentives for cost-reduction and innovation. The transition literature generally shows that market-oriented reforms give firms stronger incentives to minimize costs, but whether these incentives should improve environmental performance is unclear. On one hand, some efficiency improvements cut costs and improve environmental performance simultaneously; on the other hand, cost-minimization may involve a trade-off between abatement costs and pollution-related costs, e.g., emission charges (Earnhart and Lizal, 2006a). There is no comparable literature for

developing economies on how the building blocks of functioning markets affect corporate environmental performance.

We define corporate environmental strategy broadly to encompass a range of decisions: plant location, technology adoption, R&D, human resource management, product quality, and pricing – all of which should influence environmental performance, e.g., emissions, waste generation, and resource use. Although some empirical studies explore performance measures, most studies examine the adoption of environmental management practices, e.g., protocol for regularly scheduled audits. We thus focus on these practices, which should improve environmental performance, while acknowledging the risk of “greenwash” since firms can implement practices with varying degrees of commitment and effectiveness.

In the case of developing economies, our perspective is complementary to that of Blackman (2010), who emphasizes the policies that developing countries can enact to improve environmental quality. In contrast, we emphasize the strategies of firms, rather than the policies of governments, and analyze the differential motivations for multinational companies (MNCs), domestic private enterprises, and state-owned enterprises to undertake environmental management.

In the case of transition economies, our analysis remains relevant even though much of the transition in Central and Eastern Europe and the former Soviet Union is complete. Insight from this analysis yields important lessons for other countries, such as China, undergoing a transition away from reliance on the government’s allocation of economic resources (Bluffstone and Sterner, 2006). As important, this analysis offers a special opportunity to examine more fundamental drivers of firm behavior because major economic transition generates dramatic changes in fundamental firm-level behavioral parameters, such as production technology, customer base, regulatory pressure, and motivations for production (Garcia et al., 2009).

Moreover, this analysis permits an assessment of environmental success as firms in transition economies strongly invested in pollution control equipment and methods contributing to substantial environmental improvement (OECD, 1999).

Unlike any previous study, we explore both developing and transition economies, which is very fruitful because they share common elements. Both aspire to economic growth and integration into the world economy, face financial constraints, and face rapid transformation that should facilitate systemic changes. Yet strong differences distinguish the two types of economies in the realm of environmental protection, such as the government's capacity to monitor ambient conditions and pollution and historical use of emission charges, both of which are markedly more prevalent in transition economies.

2. Theoretical Framework: Drivers of Corporate Environmental Strategy

To guide our analysis, this section presents a simple theoretical framework for understanding the forces driving corporate environmental strategy. As illustrated in Figure 1, we identify and examine five main drivers of corporate environmental strategy: firm's internal characteristics, output market pressures, input market pressures, government pressure, and civil society pressure.

2.1. Internal Characteristics

The firm's internal characteristics – technology, size, structure, and culture, as well as its overall business strategy, may strongly influence its environmental strategy. In the long run, of course, all of these factors are choice variables, the values of which must be explained by the firm's optimizing behavior within a given setting. In the short run, however, these factors are fixed and may significantly constrain a firm's environmental management choices.

Technology and size obviously influence environmental performance. A firm's current capital stock greatly constrains or enables its abatement efforts. Older equipment generally does

not embody the latest technological improvements and is less efficient than newer equipment. Pollution abatement technologies often involve large fixed costs, which are hard to justify for small firms. Access to external financing, usually easier for larger firms, allows firms to take advantage of profitable pollution-reduction opportunities. Size also facilitates division of labor and specialization so larger firms' employees are better able to understand relevant environmental regulations and how to capitalize on environmental opportunities. Lastly, scale brings visibility, which spawns external pressure for improved performance.

Internal productive efficiency also varies substantially across companies. Firms seeking to maximize profits should adopt any "win-win" production practices that are both cheaper and cleaner. Yet many firms appear to ignore for too long "low-hanging fruit" in the form of untapped "win-win" opportunities. Porter and van der Linde (1995) provide numerous examples of firms that only after a delay seized opportunities that increased their resource efficiency, reducing pollution and costs simultaneously.

Leadership is also important. Corporate environmental initiatives commonly flounder without CEO support. Ray Anderson (Interface), Jeffrey Immelt (GE), and Lee Scott (Walmart) all led their companies' sustainability efforts.

We also analyze the effects of firm ownership structure by distinguishing between domestic and foreign ownership and between private and state ownership. Foreign-owned firms may face more or less regulatory pressure than domestically owned firms depending on agencies' desires to attract foreign direct investment (FDI) relative to their desires to protect domestic companies. Foreign-owned firms may also possess better access to external financing, state-of-the-art technologies, and cutting edge practices. Multinational corporations (MNCs) operating in developing or transition economies face more complex incentives. While they may be able to get away with weaker environmental performance in these countries, they face

countervailing incentives to maintain a common environmental protocol across facilities so as to achieve global economies of scale and scope. The latter effect can facilitate technology transfer to emerging economies and lead foreign-owned MNCs to lobby for higher environmental standards in emerging economies. For all of these reasons, we expect foreign-owned MNCs to implement better environmental management than their domestic rivals.

State-owned enterprises (SOEs) involve other complexities. They possess unusual political access and status, so regulatory agencies, environmental NGOs, and local communities may possess less leverage over them. On the other, such external bodies may also expect better environmental protection from public entities. SOEs generally hold objectives that diverge from profit maximization; these objectives may reduce production efficiency and increase pollution. SOEs are more likely to face “soft” budget constraints, which enable inefficient behavior since firms can always cover their losses with infusions of state funds. At the same time, SOEs’ access to low-cost capital facilitates investment in efficient new technologies, and SOEs may be showcased as flagships for their home countries, leading to better environmental performance than privately owned firms.

2.2. Markets

Markets also may influence corporate environmental strategies. We first assess the role of output markets. Production and sale of environmentally-friendly products is a growth business, from organic food to organic cotton shirts to hybrid cars and ethanol fuel. However, assuming green products are normal goods, they will have limited demand in emerging markets. Thus, emerging-market firms that export to developed countries are likely to pay more attention to the environment than firms that sell only domestically.

In the context of international trade, an important concern is that heavily polluting industries may relocate to emerging economies with weak environmental enforcement, creating

“pollution havens” that exacerbate global pollution (Taylor and Copeland 1995). The problem is mitigated when consumers in developed countries are willing to pay a premium for environmentally-friendly goods produced in emerging economies. However, the ability of developed-world governments to require abatement above market-driven levels is likely to decline as emerging economies become more transparent, strengthening global green markets. Furthermore, market-driven levels of abatement are unlikely to approach socially optimal ones.

Customer pressure may extend through the supply chain. Downstream retailers selling in developed countries may require their suppliers in developing countries to adopt environmental management practices in a visible fashion (Vandenbergh, 2007). For example, retailers may require their suppliers to achieve ISO 14001 certification, which is an environmental management system created by the International Organization of Standards (ISO) [see Prakash and Potoski (2006) for details]. This requirement can positively influence environmental performance upstream. Still, to the extent such improvements are driven by win-win pollution prevention opportunities, rather than consumer-led price premia, they should not be expected to produce solutions to environmental problems that require costly responses.

These internal characteristics may also influence the effect of adopted environmental management practices on environmental performance. Which ownership structures facilitate fuller use of environmental management practices: private ownership or state ownership? Which type of private owner seizes this opportunity better: domestic owners or foreign owners? Conversely, what internal characteristics may prompt a firm to adopt environmental management practices as a form of greenwash, attempting to signal their greenness to buyers without expending the effort to make adoption truly substantive?

We next assess the role of input markets, beginning with financial markets. There has been much popular discussion of the role of green investors in driving companies to adopt

greener practices, but theoretical work is only beginning to explore these questions (Graff Zivin and Small, 2005; Baron, 2007). In these papers, investors allocate their wealth between savings, charitable donations or shares of a socially responsible firm. If some investors prefer to make their social donations through investing in socially responsible companies (perhaps in order to avoid taxation of corporate profits), then firms can increase their value by attracting these investors with better environmental management. Empirical work shows clearly that investors respond to information disclosure but has not been able to establish the channels through which disclosure operates. More important, when disclosure is done voluntarily by firms, users of the information must filter out the possibility that the disclosure was strategic and designed to greenwash the firm's public image (Lyon and Maxwell, 2011).

Financial markets can also constrain environmental improvement. Countries with underdeveloped financial markets may lack the liquidity to allow firms to invest in profitable green opportunities. At the firm level, some firms may lack access to external financing that would allow them to capitalize on their best new green ideas.

Other types of input markets, such as the labor market, can also provide incentives for environmental improvement. Most employees want to feel good, if not brag, about the company where they work. One way companies try to attract and retain the best employees is by making environmental commitments that align with these employees' environmental values. If such morally-motivated employees are also less likely to shirk their job responsibilities, then companies can profitably screen for them by adopting socially responsible practices (Brekke and Nyborg, 2008). Energy markets can also influence corporate environmental strategies. While energy taxes motivate innovation and the substitution of labor and capital for energy, energy subsidies motivate excessive reliance on the subsidized forms of energy and discourage substitution. Fossil fuel subsidies are particularly perverse since they increase pollution.

Subsidies for the development of new, renewable forms of energy are more likely to produce socially beneficial results, but they can lead to overinvestment in the favored energy forms and distort international competition.

2.3. Government

Government regulation, or the threat of it, drives many corporate environmental strategies. In countries with well-enforced environmental laws, compliance is a critical part of environmental management. For countries to reach this state requires the creation of a modern regulatory infrastructure, beginning with clear and comprehensive environmental laws. Simply having laws on the book is not enough, however. There needs to be regulatory capacity, in the form of educated public employees and adequate monitoring and recording of information about emissions and ambient environmental conditions. Just as importantly, corruption and cronyism need to be held in check. Regulators must be willing to impose sanctions when inspectors find environmental violations. If any of these components is missing, environmental enforcement loses its effectiveness.

Corporate environmental strategies are also shaped by the structure of environmental regulations. An emissions charge is often considered the best solution to an externality problem. Charges allow society's environmental goals to be met more cheaply than by limits since a charge induces more abatement from firms with the lowest costs of emissions reduction. For a similar reason, charges provide stronger incentives for innovation than do effluent limits since limits offer no regulatory reward for going beyond compliance. A tradable emissions permit system also interests regulators because this quantity-based instrument allows firms to trade abatement burdens until marginal abatement costs are equalized across emitters, thereby minimizing aggregate abatement costs.

Over the past two decades, developed countries have increased reliance on voluntary

approaches and information disclosure programs to target environmental problems ignored by mandatory regulations. Many developing countries have also established voluntary programs and piloted information disclosure programs, which are often aimed to substitute for weak regulatory capacity and improve environmental compliance (van Rooij, 2010).

Most voluntary approaches fall into one of two categories: negotiated agreements and public voluntary programs. In a negotiated agreement, the regulator and a firm or industry group jointly set environmental goals and the means of achieving them; such agreements consequently tend to be heterogeneous in nature. Under public voluntary programs, participating firms agree to make good faith efforts to meet program goals established by the regulatory agency; in return, they may receive technical assistance, reduced inspection priority, and/or favorable publicity from the government. Mexico's *Industria Limpia* program offers an excellent example of a public voluntary program (Foster et al. 2009).

Environmental disclosure schemes have proliferated rapidly over the past two decades. Firm-level environmental scorecards – such as Indonesia's PROPER, India's Green Ratings Program, and China's Greenwatch – are increasingly popular, in part because they do not require a full regulatory infrastructure. Disclosure works through all of the non-governmental pressure channels discussed here: output markets, input markets, and civil society (Powers et al., 2011). These channels are likely more powerful for large pollution-intensive, consumer-oriented firms than small informal sector firms or SOEs.

Companies may also undertake voluntary action in order to alter future government regulation. First, firms may voluntarily engage in pollution abatement to preempt stricter and more costly regulations (Maxwell et al., 2000). Second, a firm (or subset of firms) may voluntarily abate to gain a cost advantage over its rivals by prompting implementation of a regulatory standard with which the firm is better able to comply. Third, firms may voluntarily

adopt an abatement technology to constrain the regulator's ability to impose stricter regulation because premature technology abandonment would be too costly.

(Like regulatory pressure, the threat of third-party lawsuits may influence corporate environmental strategies; we do not explore this factor because it appears unimportant in developing and transition economies.)

2.2.4. Civil Society

Finally, civil society pressure, also labeled as “private politics” or “civil regulation”, is increasingly important. With the rise of the Internet, NGOs have gained considerable clout in shaping firms' environmental strategies. Sometimes NGOs can be useful partners of firms, allowing firms to convey credibly the quality of their environmentally friendly products to consumers willing to pay more for green products. Often, however, NGOs attempt to punish firms they see as environmentally irresponsible. In this setting, corporate environmental management can be profitable if it serves to deflect a costly NGO campaign towards another firm. In this way the firm is able to preempt or perhaps shape “civil regulation” in much the same way it uses corporate environmentalism to deal with traditional government regulation (Lyon, 2010). Independent of NGOs, local communities may also exert pressure on firms.

The power of civil society pressure depends upon various underlying factors: freedom of speech, an independent press, and access to environmental information. Civil society's strength also varies depending upon the citizenry's level of education, average income, and the extent of urbanization (which influences the cost of collective action).

3. Presence of Potentially Influential Factors in Developing and Transition Economies

This section depicts the presence of potentially influential factors in developing and transition economies. We base our depiction on evidence as much as possible while relying on others' and our own impressions to complete the picture.

3.1. Developing Economies

We first depict developing economies. Market-based pressure from consumers is likely to be weak. The vast majority of firms are small (often operating in the informal sector) or state-owned. For these firms, the differentiation of products based on environmental attributes is not as common as in developed countries. Moreover, consumer pressure to be environmentally responsible is often weak due to low levels of awareness within the population about the effects of environmental violations on health and relatively low demand for environmental quality due to low levels of education and income.

In contrast, evidence suggests that MNCs in the form of customers are transmitting their pressures for environmental responsibility through their supply chains and creating incentives for suppliers in developing countries to improve their environmental conduct (Christmann and Taylor, 2002). The emergence of international certification schemes such as the Forest Stewardship Council (FSC) and ISO, that provide information about a firm's environmental practices to its customers has facilitated the potential for MNCs to use environmental criteria to select suppliers worldwide. The ISO 14001 certification scheme sets out the minimum requirements for an effective environmental management system and requires third party audits and periodic reviews to ensure continuous improvement (Neumayer and Perkins, 2004). Arimura et al. (2011) find that ISO certified facilities in Japan were 40 percent more likely to assess their suppliers' environmental performance and 50 percent more likely to require that their suppliers undertake specific environmental practices.

While there is evidence that capital markets respond to information disclosure and affect corporate environmental strategies in developed countries (Khanna, 2001), these links be more tenuous in developing countries. With limited capacity for ambient and emissions monitoring, information may not be credible. Moreover, with a weak threat of penalties, third-party

liabilities, and negative reputational effects, if poor performance or non-compliance with regulations is disclosed, investors and firms may not pay significant attention to it. Capital markets in developing economies, where growth is a priority, can also be expected to care more about economic performance news than environmental performance news relative to capital markets in developed countries. Despite these issues, studies examining the extent to which capital markets in developing countries respond to environmental news (Dasgupta et al., 2001) and environmental rating of firms (Gupta and Goldar, 2005) generally find that capital markets react to both negative and positive environmental news.

Most important, regulatory institutions are typically weak with limited capacity to monitor firms for compliance, enforce laws and sanction violators; as a result environmental regulation in industrializing countries has been inadequate. Regulatory agencies are also subject to capture by industry lobbies and corruption or rent seeking is more widespread in developing economies than in developed countries. There is anecdotal evidence from large developing countries, such as India, Indonesia and Thailand, to suggest that corruption and lobbying have stalled the drafting of environmental legislation and prevented effective implementation of pollution control laws that do exist (Lopez and Mitra, 2000).

Civil society pressure is also weak. Concerns that environmental actions against firms could have negative economic and employment implications can create disincentives for community action against polluting firms. The potential for NGOs and citizen protests in improving environmental action is limited because regulatory capacity to take the enforcement actions that communities seek is constrained (van Rooij, 2010).

3.2. Transition Economies

We next depict the presence of factors in transition economies, along with their presence under central planning prior to transition. [For brevity, we do not distinguish between advanced

reform countries, such as Poland and Latvia, and slower-reformer countries, such as Albania and Russia, such as defined by the European Bank for Reconstruction and Development (EBRD, 1996).]

Under central planning: enterprises used outdated production methods and worked to meet centrally dictated output targets, state ownership was extremely prevalent and foreign ownership was minimal, most enterprises faced soft budgets, domestic and import competition were severely limited, domestic and foreign consumers exerted little pressure, and energy prices were substantially subsidized (OECD, 1999; Earnhart, 1999; Bluffstone and Larson, 1997; Hughes and Magda, 1999). Regarding government factors, environmental protection efforts were woven into the economic-based ministerial fabric or environmental ministries lacked power, capacity to monitor ambient conditions and pollution was reasonable, legal frameworks were extensively developed yet “weak”, the relationship between regulators and polluters was sympathetic since nearly all enterprises were state-owned, regulatory agencies did not regularly monitor polluters and take enforcement actions against violations, governments imposed effluent limits as their primary policy tool but superimposed emission charges within a two-tier system (lower charge rate imposed on pollution below the limit and a higher charge rate imposed on pollution above the limit), and emission charge rates were low and severely constrained by soft budget constraints (OECD, 1999; Hughes and Magda, 1999; Bluffstone and Larson, 1997; Earnhart, 2000). Regarding civil society, communist regimes placed limitations on civic activities and information dissemination, environmental NGOs were few, and local communities were inactive (Hughes and Magda, 1999).

During the transition: firms improved their efficiency but most did not exploit “win-win” investment opportunities, firms re-oriented towards profit maximization, most state-owned enterprises were privatized, foreign companies purchased state-owned enterprises and started

businesses, budgets hardened as direct subsidies and finance subsidies were eliminated and bankruptcy laws were developed, firms lacked meaningful access to external financing due to slowly and incompletely developing financial markets, domestic and import competition grew quickly, domestic consumer pressure grew yet remained weaker than in developed economies, pressure exerted by foreign consumers (especially those in Western Europe) rose dramatically, investor pressure exploded as savvy foreign investors entered the financial market, and energy subsidies were curtailed (OECD, 1999; Hughes and Magda, 1999; Earnhart and Lizal, 2006; Henriques and Sadorsky, 2006; Garcia et al., 2009; Vikuna et al., 1999; OECD, 2005). Regarding government factors, environmental ministries were established or replaced with Western-style agencies, monitoring capacity grew as many countries created or strengthened national institutions, governments strengthened environmental laws (many eventually approximated their laws with EU standards), agencies eventually established adversarial relationships with polluters, the frequency of inspections and enforcement against violations grew substantially as governments strengthened inspectorates and introduced new enforcement tools, and governments improved their emission charge systems and raised rates (Garcia et al., 2009; OECD, 1999; Bluffstone, 1999; Bluffstone and Sterner, 2006; OECD, 2005). Regarding civil society, civil liberties and information availability expanded, many environmental NGOs formed (already 3,000 by 1997), and local communities activated, yet public support for environmental protection flagged as post-Communist economic realities arose (OECD, 1999; Garcia et al., 2009; Henriques and Sadorsky, 2006; OECD, 2005).

4. Empirical Evidence of Firms' Responsiveness to Factors

This section explores the empirical evidence of firms' responsiveness to the potentially influential factors in developing and transition economies.

4.1. Developing Economies

Many firms in developing economies have been adopting environmentally sound technologies, seeking ISO 14001 certification, implementing environmental initiatives, and improving compliance (Luken et al., 2008; Cushing et al., 2005). The growth in the number of enterprises with ISO 14001 certification in developing countries since 1997 has been exponential. Between 1997 and 2000, the number of annual certifications in Singapore and South Korea increased over six times while in Thailand the increase was elevenfold (Cushing et al., 2005). In 2009, the Far Eastern countries (China, South Korea, Thailand and Singapore) accounted for 48 percent of all ISO certifications worldwide (Tambunlertchai et al., forthcoming). However, there is considerable variation in the environmental management strategies adopted by firms within and across developing countries.

4.1.1. Internal Characteristics

We next explore the empirical evidence about factors motivating firms' environmental strategies, starting with firms' internal characteristics. Larger facilities appear more likely to obtain ISO 14001 certifications in Thailand (Tambunlertchai et al., forthcoming), Hong Kong (Chan and Li, 2001) and Mexico (Dasgupta et al., 2000). Adoption of ISO 14001 has generally not permeated to small and mid-sized enterprises (SMEs), which typically account for the majority of enterprises in developing economies and primarily serve domestic markets. This outcome may be due to economies of scale stemming from the high fixed costs of seeking ISO certification and the greater availability of trained manpower and capital in larger firms. Larger firms are also more visible and more easily targeted by environmentalists and regulators; such firms may therefore benefit more from using ISO certification to deflect negative publicity.

Obtaining ISO certification involves significant implementation costs in the form of training staff, collecting information on past activities and current applicable environmental

regulations, and consultant and certification fees. These costs are often higher for domestic firms in developing countries as compared to MNCs since they typically have to start from zero. Studies show that firms that had adopted ISO 9000 were more likely to obtain ISO certification since they had accumulated some experience in the certification process and thus their costs of certification were likely to be lower (Tambunlertchai et al., forthcoming; Delmas and Montiel, 2009; Potoski and Prakash, 2004). Firms with certain characteristics, such as an “environmental commitment” and technical, managerial, or organizational capabilities, were more likely to adopt environmentally sound technologies (Luken et al., 2008).

Ownership of the firm, particularly by foreign investors, has also been found to have an impact on the environmental management practices of firms. Foreign investors can transfer some of their technical and organizational capabilities to subsidiaries and suppliers in countries with lower levels of regulation. This transfer could lead to spillover effects into the local economy leading to a pollution halo effect that causes other firms in the domestic economy to become more environmentally responsible. Several studies have analyzed this issue by examining the impact of economic openness and foreign direct investment on environmental performance of firms in developing countries and found mixed evidence. Perkins and Neumayer (2008) find that the effect of FDI on pollution efficiency (GDP per unit of CO₂ or SO₂) across countries is mixed. In contrast, Luken et al. (2008) find strong support for the effect of foreign involvement in the firm in inducing the adoption of not only pollution abatement technologies but also the more technologically complex pollution prevention/cleaner technologies by firms in 8 developing countries in 2001/2002. Country-specific studies also provide mixed findings of the effects of foreign ownership on firm-level environmental performance. While studies by Pargal and Wheeler (1996) and Dasgupta et al. (2000) using data for the early to mid 1990s do not find a significant influence of foreign ownership on environmental management by firms in Indonesia

and Mexico, respectively, Garcia et al. (2009) find that firms with foreign investors were more likely to improve their environmental ratings following public disclosure. However, they did not find firms' environmental performance to differ depending on whether or not the firm exported its output.

Studies also show that countries with a higher cumulative amount of foreign direct investment (FDI) relative to GDP had a higher number of ISO 14001 certifications (Neumayer and Perkins, 2004). Moreover, FDI originating in home countries that themselves have high levels of ISO 14001 adoption was more likely to create incentives for firms in the host country to ratchet up their environmental practices and seek ISO certification (Prakash and Potoski, 2007; Christmann and Taylor, 2001; Tambunlertchai et al., forthcoming).

As one component of MNCs' environmental strategies, these companies must choose the location of their facilities. While much debated, the "pollution haven" hypothesis is not supported by empirical evidence (Christmann and Taylor, 2002; Eskeland and Harris, 2003). Instead, empirical studies show that many MNCs are self-regulating their environmental conduct, participating in global voluntary initiatives and proactively adopting internal environmental standards that are more stringent than those mandated by national governments (Dowell et al., 2000). These MNCs are being motivated by regulatory and market pressures from consumers, investors and NGOs in the countries where their major markets are located. Increased economic integration among countries has reduced the importance of national regulations and institutions and increased the influence of regulations and customers in countries from which MNCs are originating or the destinations of exports from developing countries.

Another factor motivating the adoption of environmental practices is the potential for obtaining competitive advantage through improvements in operating performance. To the extent that ISO 14001 can lead to cost savings by enhancing operational efficiency, firms with already

high levels of efficiency are less likely to adopt the standard. Neumayer and Perkins (2004) support this conjecture. Firms with weaker product brand identity were more likely to seek ISO certification, possibly to distinguish themselves by signaling their commitment to environmental protection (Potoski and Prakash, 2004).

4.1.2. Markets

We next explore market factors. Empirical evidence strongly suggests that pressures from consumers and firms in export markets in developed countries has a significantly positive effect on the number of ISO certifications in their developing country trade partners. Countries that export a higher share of their output to countries like Japan and EU with higher rates of ISO certification are likely to also have a higher number of ISO certifications (Neumayer and Perkins, 2004; Potoski and Prakash, 2004). In contrast, developing countries exporting a higher share of their output to the US, which has a lower ISO rate, are found to have fewer ISO certifications. This link is also supported by evidence from firm-level studies. Firms in China and Taiwan have a higher likelihood of adoption of ISO certification if they export a larger proportion of their output to developed countries, particularly Japan and the EU, or to MNCs in China (Christmann and Taylor, 2001; Wu et al., 2007). While being an exporter did not increase the likelihood of ISO 14001 certification in Thailand, supply chain pressures were found to motivate ISO adoption among firms that produce intermediate goods but not motivate adoption among firms that produce final goods (Tambunlertchai et al., forthcoming).

4.1.3. Government

Next we explore government-based factors. Potoski and Prakash (2004) find that countries with more stringent but flexibly implemented regulatory regimes have higher rates of ISO certifications. Such regulations could result in firms achieving a higher level of compliance and environmental management that lead to lower costs of ISO certification. Regulatory

flexibility to offer firms tangible incentives, such as immunity from sanctions for regulatory violations uncovered during external audits that accompany the certification process also reduced barriers to adoption of ISO 14001. Anecdotal evidence from Thailand suggests that regulators were less likely to inspect firms with ISO 14001 certification since such firms had already undergone third party auditing. This link may explain these findings: firms that emit a larger number of pollutants or faced more regulatory scrutiny were more likely to obtain ISO 14001 certification in Thailand (Tambunlerchai et al., forthcoming). Many countries encourage ISO 14001 certification by creating training and demonstration programs, disseminating information about the benefits of certification, and, in some regions, providing financial awards to certified companies (Cushing et al., 2005). The government in Taiwan encouraged firms to pair with registered technical assistance providers and apply for subsidies which could cover 40 percent to 60 percent of the cost of preparing ISO certification; the maximum subsidy allowed decreased after 2001. Wu et al., (2007) find that firms that received a subsidy payment were significantly more likely to be ISO certified in Taiwan.

A number of developing countries have launched pilot public disclosure programs, established by regulatory agencies, the World Bank and NGOs (see review in Blackman, 2010). Examples include the Green Watch Program in China (Wang et al., 2004), Eco Watch in Philippines (Wang et al., 2004), the Green Ratings Program in India (Powers et al., 2011; Gupta and Goldar, 2005), and PROPER in Indonesia (Garcia et al., 2007). Studies show that public disclosure programs did reduce the percentage of firms that are non-compliant, and in many cases the improvement occurred in response to the prospect/threat of public disclosure, even before the program was implemented. There was a significant increase in the percentage of compliant firms, across programs in several developing countries, ranging from 10 percent to 50 percent within the first year (see review in Wang et al., 2004). These improvements cannot be

attributed completely to information disclosure since they could have been caused by contemporaneous changes in regulations, market prices or technology.

Powers et al. (2011) controls for other factors that could affect a firm's ratings and analyze the effects of the Green Rating Program on emissions of water pollutants from large Indian paper and pulp plants. They find that the ratings were effective in leading plants with the worst initial performance to reduce emissions of certain pollutants, with reductions in these pollutants ranging between 9 and 19 percent. Similarly, Garcia et al. (2007) found that Indonesia's PROPER program led to as much as a 33 percent reduction in emissions by firms that were initially noncompliant and those that were initially compliant. These results suggest that firms do change their environmental management in response to embarrassing news, particularly if they have previously made little abatement effort and have low marginal costs of abatement.

Many developing countries, such as Chile, Mexico, Colombia, and Costa Rica, have also encouraged voluntary approaches to improve environmental performance of firms (Blackman, 2010). Notable among these have been the voluntary agreements among firms and regulators in Chile that established clear targets and timetables, firm-specific commitments and a mechanism for monitoring performance. Jimenez (2007) finds that these agreements did increase regulatory compliance among participants relative to non-participants, lead to greater process innovation, adoption of environmental management systems and organizational changes. They did not however lead to significant adoption of preventive waste management systems. The design of these agreements relies on the provision of information by firms and might allow for strategic behavior by firms and regulatory capture. Jimenez (2007) finds some evidence that firms were able to negotiate targets for waste management that were not too ambitious.

Other voluntary approaches in Mexico and Columbia were not found to be effective in

achieving the initial commitments, in large part because they were not accompanied by well-established regulations, political and community pressure for environmental improvements, clear commitments for voluntary improvements and provisions for monitoring (Blackman, 2010). Firms in these countries did not fulfill their agreements and achieve incremental improvements. Similarly, analysis of the effectiveness of the Sustainable Tourism certification program in Costa Rica shows that the program did not lead to higher environmental scores for participants and that there was no statistically significant difference between the performance of participants and non-participants (Rivera, 2002). These studies suggest that firms in developing countries (similar to those in developed countries) are likely to voluntarily improve environmental performance only if there are formal or informal pressures for emissions reduction, quantified baselines and targets, monitoring and sanctions for non-compliance (Blackman, 2010; Khanna and Brouhle, 2009).

4.1.4. Civil Society

Lastly, we explore civil society. Using per capita income and per capita number of environmental NGOs as civil society pressure proxies, Neumayer and Perkins (2004) find that greater pressure increases country-level ISO certifications. Similarly, Potoski and Prakash (2004) find that countries with a higher rate of international NGO membership have a higher rate of ISO certifications. Pargal and Wheeler (1996) reveal that water pollution is lower in areas with higher incomes or more educated citizens. Similarly, Powers et al. (2011) demonstrate that India's Green Ratings Program was more effective in wealthier areas.

4.2. Transition Economies

We next explore the empirical evidence in transition economies.

4.2.1. Internal Characteristics

We first consider internal characteristics. Moderate evidence indicates that greater internal pressure applied by Hungarian firms' management improves environmental management

(Henriques and Sadorsky, 2006). Similarly, internal pressure to reduce energy and material use increases the likelihood that firms adopt three of six examined environmental management practices: internal air pollution monitoring, ISO 14001 certification, and wastewater treatment (Bluffstone and Sterner, 2006).

Empirical evidence indicates that private ownership may not be influential and may even undermine corporate environmental success. Greater private ownership does not influence the likelihood of firms adopting any of eight examined environmental management practices (Bluffstone and Sterner, 2006; Garcia et al., 2009). Greater private ownership also does not influence Lithuanian companies' ratios of actual to permitted pollutant emissions in the case of sulfur dioxide and carbon monoxide; more important, greater private ownership actually increases nitrous oxide emission ratios; only in the case of particulate matter and magnesium emissions does greater private ownership lower emission ratios (Bluffstone, 1999). Furthermore, greater private ownership leads to higher air pollutant emissions from Czech companies; in particular, greater state ownership lowers emissions relative to all types of private ownership especially investment funds and strategic investors (Earnhart and Lizal, 2006a; Earnhart and Lizal, 2007). One study examines the indirect effect of state versus private ownership on air pollutant emission via the combination of ownership's direct effect on profitability and profitability's direct effect on emissions; results reveal that the indirect effect greatly exceeds the direct effect (Earnhart and Lizal, 2007).

Within the category of private ownership, domestic and foreign ownership may or may not influence environmental strategies differently. Mixed evidence suggests that the presence of foreign ownership may improve the likelihood of firms adopting environmental management practices (Garcia et al., 2009; Henriques and Sadorsky, 2006). Yet no evidence suggests that the extent of private foreign ownership (with private domestic investors as the benchmark)

influences the likelihood of firms adopting environmental management practices (Bluffstone and Sterner, 2006). However, using the same dataset, Andonova (2003) demonstrates that foreign ownership improves the likelihood of firms implementing environmental management practices. Still, this latter study demonstrates that foreign ownership does not influence “clean production” investment. Also, increased foreign ownership does not affect air pollutant emissions differently than domestic private ownership (Earnhart and Lizal, 2006a).

Strong evidence reveals that scale of operation influences corporate environmental management. Based on two studies of Czech firms, the average firm enjoyed economies of scale regarding control of air pollutant emissions [i.e., as production rises, the effect of production on emissions falls] (Earnhart and Lizal, 2006b; Lizal and Earnhart, 2011). Yet, the relationship between production and air pollutant emissions changed as the transition proceeded and air protection laws tightened: up to 1996, the average firm enjoyed economies of scale, but after 1996, the average firm enjoyed economies of scale only at lower production levels while facing diseconomies of scale at higher production levels (Lizal and Earnhart, 2011).

Moderate evidence suggests that profitability influences corporate environmental management, which indicates a role for liquidity constraints given transition firms’ reliance on internally generated funds (Earnhart and Lizal, 2010). Greater profitability leads to lower air pollutant emissions (Earnhart and Lizal, 2006a; Earnhart and Lizal, 2007). However, greater profitability improves the likelihood of Hungarian firms adopting only one of eight environmental management practices (Henriques and Sadorsky, 2006).

Evidence demonstrates that the firm’s physical capital endowment may not influence corporate environmental strategies. The vintage of firm capital equipment does not influence the likelihood of firms adopting an environmental plan and the likelihood of establishing an environmental department (Garcia et al., 2009). Other evidence suggests that “win-win”

investments did not influence air pollutant emission reductions in the transition (Earnhart and Lizal, 2008).

4.2.2. Markets

We next explore market-based factors. Customer pressure in general, as measured by businesses' self-reported perceptions, does not influence the likelihood of Hungarian firms adopting any of eight environmental management practices (Henriques and Sadorsky, 2006). Moreover, evidence supporting the role of foreign customer pressure is mixed. Greater export orientation, as measured by the proportion of exports to total production, increases the likelihood of firms adopting an environmental plan and the likelihood of establishing an environmental department (Garcia et al., 2009). However, only mixed evidence supports a link from export orientation to "clean production" investment and no evidence supports a link from export orientation to environmental management practices (Andonova, 2003). As additional contrary evidence, greater export orientation improves the likelihood of firms adopting only two of eight examined environmental management practices and actually reduces the likelihood of firms using environmental criteria to evaluate employees (Henriques and Sadorsky, 2006). Furthermore, greater export orientation, as measured by the exported percent of main product, improves the likelihood of firms adopting only one of six environmental management practices examined by Bluffstone and Sterner (2006), and greater export orientation, as measured by the EU percent of total exports, actually undermines the likelihood of firms adopting one practice (which deserves further research).

Investor pressure, as measured by businesses' self-reported perceptions, does not influence the likelihood of firms adopting any of several environmental management practices (Henriques and Sadorsky, 2006).

4.2.3. Government

We next assess government' role. While no study explicitly explores the usefulness of environmental protection laws, one study explores firms' self-reported perceived importance of expected future regulations for motivating improved environmental management. Greater importance improves the likelihoods of firms adopting three of six environmental management practices examined by Bluffstone and Sterner (2006). Weak evidence suggests that inspections influence corporate environmental strategies. The frequency of monitoring lowers the ratio of actual to permitted emissions for only one of five air pollutants examined by Bluffstone (1999). Similarly, greater inspection frequency improves the likelihoods of firms adopting only two of eight environmental management practices examined by Henriques and Sadorsky (2006) and the likelihoods of firms adopting four of seven pollution control practices examined by Bluffstone and Sterner (2006).

More so than inspections, enforcement appears quite influential. Greater enforcement – as measured by warnings, orders to reduce pollution or close a plant, and noncompliance fines – improves the likelihoods of firms adopting all environmental management practices examined by Garcia et al., (2009) and Andonova (2003). Greater enforcement also improves “clean production” investment (Andonova, 2003).

Evidence suggests that the imposition of permits with effluent limits appears moderately influential. The requirement for a firm to hold a pollution permit for some or all of its facilities improves the likelihoods of firms adopting half of the environmental management practices examined by two studies (Bluffstone and Sterner, 2006; Andonova, 2003). Yet, a requirement to hold a formal permit does not influence “clean production” investment (Andonova, 2003). Limited evidence suggests that tighter emissions limits, in combination with higher emission charge rates, reinforced with the threat of inspections, fines, and plant closures, led to lower air

pollutant emissions (Earnhart and Lizal, 2008). Emission charges appear to improve corporate environmental management. In particular, higher charge rates lower the ratio of actual emissions to permitted emissions for five key air pollutants (Bluffstone, 1999).

4.2.4. Civil Society

Finally, we explore civil society. Empirical evidence about environmental NGOs and local community pressure is mixed. Environmental NGOs played no meaningful role in the Czech Republic and Hungary (Earnhart and Lizal, 2008; Henriques and Sadorsky, 2006). Similarly, as measured by businesses' self-reported perceptions, local community pressure does not influence environmental management adoption (Henriques and Sadorsky, 2006). However, greater broad-based community pressure, which measures pressure exerted by NGOs, consumer groups, media, and other community action, improves environmental management adoption but does not influence "clean production" investment (Andonova, 2003). Greater civic groups pressure, as measured by the self-reported importance of this pressure for motivating improved environmental management, improves the likelihood of firms adopting only one of seven pollution control practices yet undermines the likelihoods of firms adopting two of these practices (Bluffstone and Sterner, 2006). Greater public disclosure, as measured by [1] whether the public is informed about pollutant emissions or [2] whether a firm's pollution appeared in media reports, improves a firm's likelihood of adopting all of eight environmental management practices (Bluffstone and Sterner, 2006; Garcia et al., 2009).

5. Special Case of China

China is a special case since it represents a mix of a market-based economy, especially in the coastal export zones; a developing economy, especially in the rural regions; and a transition economy, especially the privatization of state-owned enterprises. In contrast to most developing economies, the Chinese capital stock is growing and modernizing quickly as the economy

transitions from a centrally planned economy to a more market-based economy, and the Chinese workforce is relatively well educated. Like most transition economies, China imposes emission charges, yet like most developing countries its enforcement of regulations is often spotty.

China has been instituting environmental legislation to control pollution since 1978 while continuing to suffer from worsening environmental problems. These problems stem largely from insufficient enforcement, which is controlled by local governments, who manage environmental enforcement authorities and place a greater priority on protecting local economic interests than environmental quality. Considerable evidence suggests that local environmental agencies lack authority, organizational capacity and resources, and support from local communities and they face powerful business interests that try to undermine enforcement actions. Differences in community pressure, local government support, enforcement capacity, and economic conditions lead to considerable variation in the enforcement of pollution laws (van Rooij and Lo, 2010).

Additionally, enterprises use their bargaining power to negotiate the stringency of enforcement actions. State-owned and collectively owned enterprises have traditionally been closely connected with the government and had considerable bargaining power. With increasing privatization of these enterprises and an increasing number of smaller enterprises, law enforcement has improved as the local dependence on and influence of large enterprises has decreased. A survey of managerial attitudes towards the environment indicates that managers profess to have strong environmental ethics; these ethical values are stronger among managers in state-owned and collective enterprises than managers in private sector firms and joint ventures (Fryxell and Lo, 2001). SOEs have been among the most polluting firms, but they primarily operate in the most heavily polluting industries (steel, petroleum, chemicals, and paper).

There is little empirical evidence on the effects of internal factors, output markets, input markets, or civil society on Chinese corporate environmental performance. Most insight comes

from studies of ISO 14001 certification. Between 1997 and 2000, the number of annual ISO 14001 certifications in China grew by 170 percent (Cushing et al., 2005). Like in other developing economies, Chinese firms are more likely to achieve ISO certification if they are larger (Cushing et al., 2005) or if they export a larger proportion of their output to developed countries, particularly Japan and the EU, or to MNCs in China (Christmann and Taylor, 2001; Qi et al. 2011). Qi et al. (2011) finds that community pressure did not affect firms' adoption of ISO 14001. Finally, Chinese firms choose more substantive implementation, as opposed to symbolic implementation, if (1) their customers place greater importance on it, (2) there is direct and frequent monitoring by their customers, and (3) the costs to customers of switching suppliers is low (Christmann and Taylor, 2006).

China, like nearly all transition economies, has a system of pollution fees. It imposes national emissions standards for air and water pollution and historically a pollution levy on emissions above the standard on a scale that escalates with the deviation from the standard and with the duration of non-compliance. More recently, even emissions below the standard are subject to a levy, similar to other transition economies. However, if an enterprise is emitting multiple pollutants at rates above the standard, it is only required to pay a fee for the pollutant with the largest deviation from the standard. Although the Chinese system does not give firms the right to contest the government's compliance rulings in court, firms have the option of either paying for non-compliance or taking measures to reduce pollution. Additionally, firms are universally required to self-report their emissions, subject to verification. Therefore, firms must decide whether to report truthfully or face legal penalties for detected misreporting. In practice, the likelihood of detection and penalties for misreporting are quite low (Blackman and Harrington, 2000).

The total levy paid by a facility depends on various factors: total emissions, actual

pollutant concentration, pollutant concentration standard, and the levy rate. Concentration standards are set by local and national regulators. Local levies can vary for otherwise identical industries and pollutants and be reduced or eliminated at the discretion of local regulators (Wang and Wheeler, 2005). The levy operates as a deposit refund system; 80 percent of the cumulative levy payments could be obtained as a rebate or a loan to cover the costs of documented pollution abatement investments. The remaining 20 percent of levy funds can be used by local governments for environmental clean-up projects and operating local environmental institutions.

Studies show that firms influence the effective levy rate (levy paid per unit of wastewater discharged). Larger enterprises pay a higher effective levy, yet SOEs pay a lower effective levy. Facilities that employed more workers, were less profitable, demonstrated significant effort to abate pollution, or had a positive environmental image negotiated lower levy payments due to higher political power or unemployment concerns. On the other hand, facilities that were successful in getting a refund of the levy paid in previous years exerted less effort to bargain for lower levy payments and paid a higher levy (Wang et al., 2004; Wang and Wheeler, 2003; Wang and Wheeler, 2005).

Yet levies are not necessarily effective in deterring pollution since enterprises are predominantly state-owned and possibly face “soft” budget constraints. Indeed, over 90 percent of water polluters and 50 percent of air polluters were non-compliant in 1993 (Wang and Wheeler, 2005). Nevertheless, Wang and Wheeler (2003, 2005) find that levies deter non-compliance regarding air and water emissions and lead to reductions in emissions primarily by inducing process change rather than end-of-pipe treatment. While enterprise-level analysis shows no differences in emissions regarding ownership, age, or location (Wang and Wheeler, 2005), province-level analysis shows that provinces with higher shares of state-owned factories in industrial output have a higher COD discharge per industrial output. Larger facilities emit

more air and water pollution.

Other studies question the analysis showing that the levy influenced Chinese firm behavior. Blackman and Harrington (2000) argue that since the fee system and the emissions standards were established at the same time, it is difficult to separate effects of the two instruments. They also argue that the levy's impact may have been small because until recently plants only paid for above-standard discharges and because the levy was small relative to production costs and pollution abatement costs. Van Rooij (2010) questions the accuracy of the analyzed data, which are provided by Chinese government agencies interested in showing environmental improvements. Additionally, the levy could create perverse incentives for regulators to maintain non-compliance for tax revenues. The deterrent effect of the levy was also limited by the potential for enterprises to write off fee payments as production costs for reducing taxes. The possibility of recouping the fee payments as a rebate, with weak monitoring to ensure their use for investment in pollution control equipment, also reduced the levy's deterrent effect. The system could simply be viewed as one where enterprises deposit funds to recover through refunds later while lowering their immediate tax liabilities.

China has also begun to experiment with other instruments for environmental protection. Beginning in 1998, China's State Environmental Protection Agency (SEPA) began working with the World Bank to create the information disclosure program Green Watch (Wang et al., 2004), which rates firms' performance according to five colors, much like Indonesia's PROPER scheme. In 2000, after the first year of pilot programs, compliance had increased significantly (Wang et al., 2004), though further work should control for other possible explanations. Bu et al. (2011) find that firms in China with foreign investors were more likely to have a higher Green Watch rating in 2005.

6. Summary, Future Research

Based on our conceptual assessment, we explored a wide variety of factors that theoretically may influence corporate environmental strategies. We then identified the factors that are present in developing and transition economies and depicted the extent of their presence. We find that the mix of environmental policies differs sharply between developing and transition economies. In developing economies, the prevalent policy is to issue facility-specific permits imposing pollutant-specific effluent limits; however, this policy is weakly supported with ineffectual legislation and minimal implementation. Several developing countries have added voluntary programs and information disclosure programs to their policy mix. As a stark contrast, in transition economies, the policy mix focuses on the imposition of effluent limits that are effectively reinforced with inspections and enforcement, along with charges imposed on emissions below and above these limits.

Finally, we assess the empirical evidence of firms' responsiveness to the considered factors including environmental protection policies. The empirical findings for developing economies suggest that firms differ considerably in their adoption of environmental management strategies, driven largely by the level of engagement with foreign customers and international NGOs and the stringency of domestic regulations. For many locally owned firms, whose products are domestically consumed or exported to other less green countries, the market incentive for incurring the costs of strengthening their environmental standards are weak. Ineffective regulatory agencies, limited law enforcement capacity and weak green pressure groups have also limited the incentives for environmental compliance by these firms. However, for firms that are supplying customers in developed economies or other downstream firms that care about the environmental practices of their suppliers, market pressures influence the adoption of environmental management practices. MNCs are more likely to be ISO 14001 certified and to

require their supplier firms to be the same. While this requirement has a spillover effect and leads to some diffusion of environmental management across firms in developing economies, the extent to which this occurs may be limited to larger export oriented firms.

The empirical findings for transition economies support different conclusions. The greater presence of certain internal characteristics spurs better environmental management: enterprise management leadership, profit orientation, and production scale. Greater private ownership may improve or undermine environmental management and greater foreign ownership may improve environmental management. While customer pressure in general does not appear influential, greater foreign customer pressure may improve environmental management. Greater civic group pressure may improve environmental management. Investor pressure too does not appear influential. In stark contrast, government factors – more useful laws, greater enforcement, permit issuance, and higher emission charge rates – meaningfully improve environmental management.

Our assessment of corporate environmental strategies is limited by the available literature, which in the case of developing and transition economies focuses mainly on the motivations behind environmental management practice adoption, especially ISO 14001 certification. Information on the adoption of pollution control methods, strategic decisions regarding environmental compliance, efforts to exploit emerging “green” markets, and attempts to preempt or influence emerging regulations is limited if not non-existent. Much more research is needed to provide a comprehensive understanding of corporate environmental behavior in these countries.

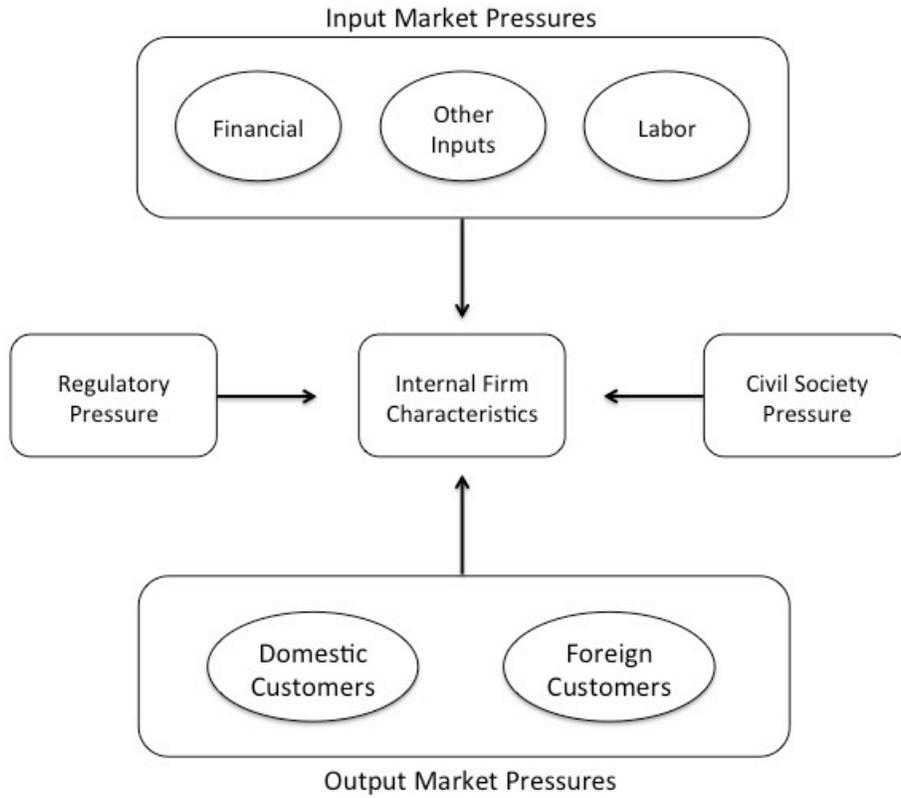


Figure 1: Drivers of Corporate Environment Strategy

References

- Andonova, L. 2003. Openness and the Environment in Central and Eastern Europe: Can Trade and Foreign Investment Stimulate Better Environmental Management in Enterprises? *Journal of Environment and Development*. 12, no.2: 177-204.
- Arimura, Toshi H., et. al. 2011. Is ISO 14001 a gateway to more advanced voluntary action? The case of green supply chain management, *Journal of Environmental Economics and Management*. 61, no. 2: 170-182.
- Arya, B. and G. Zhang. 2009. Institutional Reforms and Investor Reactions to CSR Announcements: Evidence from an Emerging Economy, *Journal of Management Studies*, 46(7), 1089-1112.
- Baron, David P. 2007. Corporate Social Responsibility and Social Entrepreneurship. *Journal of Economics and Management Strategy*. 16:683-718.
- Blackman, A. 2010. Alternative Pollution Control Policies in Developing Countries. *Review of Environmental Economics and Policy* 4, no. 2: 234-253
- Blackman, A and W. Harrington. 2000. The Use of Economic Incentives in Development Countries: Lessons from International Experience with Industrial Air Pollution. *The Journal of Environment and Development*. 9: 5-44.
- Bluffstone, Randall, and Thomas Sterner. 2006. Explaining Environmental Management in Central and Eastern Europe. *Comparative Economic Studies*. 48, no. 4: 619-40.
- Bluffstone, R. 1999. Are the Costs of Pollution Abatement Lower in Central and Eastern Europe? Evidence from Lithuania. *Environment and Development Economics*. 4, no. 4:449-70.
- Bluffstone, R. and B. Larson, eds. 1997. *Controlling Pollution in Transition Economies: Theories and Methods*. Cheltenham, U.K. and Lyme, N.H.: Elgar.

- Brekke, Kjell Arne and Karine Nyborg. 2008. Attracting Responsible Employees: Green Production as Labor Market Screening. *Resource and Energy Economics*. 30, no. 4:509-526.
- Bu, M.,Z. Liu and Y. Gao. 2011. Influence of International Openness on Corporate Environmental Performance in China. *China and World Economy*. 19, no. 2:77 92.
- Chan, Ka-Yee, and Xiang-Dong Li. 2001. A Study of the Implementation of ISO 14001 Environmental Management Systems in Hong Kong. *Journal of Environmental Planning and Management* 44 (September): 589-601. doi:10.1080/09640560120079920.
- Christmann, Petra, and Glen Taylor. 2006. Firm self-regulation through international certifiable standards: determinants of symbolic versus substantive implementation. *Journal of International Business Studies*. 37: 863-878. doi:10.1057/palgrave.jibs.8400231.
- Christmann, Petra, and Glen Taylor. 2002. Globalization and the environment: Strategies for international voluntary environmental initiatives. *Academy of Management Executive* 16, no. 3:121-135. doi:10.5465/AME.2002.8540373.
- Christmann, P. and G. Taylor. 2001. Globalization and the Environment: Determinants of Firm Self-Regulation in China. *Journal of International Business Studies*. 32, no. 3:439-58.
- Cushing, K., H. McGray and H. Lu. 2005. Understanding ISO 14001 Adoption and Implementation in China. *International Journal of Environment and Sustainable Development*. 4:246–68
- Dasgupta, S., Laplante, B., & Mamingi, N. 2001. Pollution and Capital Markets in Developing Countries. *Journal of Environmental Economics and Management*. 42:310– 335.
- Dasgupta, Susmita, Hemamala Hettige, and David Wheeler. 2000. What Improves Environmental Compliance? Evidence from Mexican Industry. *Journal of Environmental Economics and Management* 39, no. 1:39-66. doi:10.1006/jeem.1999.1090.

- Dowell, G. A., S. Hart and B. Yeung. 2000. Do corporate global environmental standards create or destroy market value? *Management Science*. 46: 1059–74.
- Earnhart, Dietrich. 2000. Optimal Mix of Penalties in a Principal-Agent Model under Different Institutional Arrangements.” *Review of Economics and Statistics*. 82, no. 4: 634-645.
- Earnhart, Dietrich. 1999. Multiple Penalty Mechanisms in a Principal-Agent Model Under Different Institutional Arrangements. *Journal of Comparative Economics*. 27: 168-189.
- Earnhart, Dietrich, and Lubomir Lizal. 2010. Effect of Corporate Economic Performance on Firm Level Environmental Performance in a Transition Economy. *Environmental and Resource Economics*, 46, no. 3:303-29.
- Earnhart, Dietrich, and Lubomir Lizal. 2008. Pollution Reductions in the Czech Republic. *Post-Communist Economies*. 20, no. 2:231-52.
- Earnhart, Dietrich, and Lubomir Lizal. 2007. Direct and Indirect Effects of Ownership on Firm Level Environmental Performance. *Eastern European Economics*, 45, no. 4:66-87.
- Earnhart, Dietrich, and Lubomir Lizal. 2006a. Effects of Ownership and Financial Performance on Corporate Environmental Performance. *Journal of Comparative Economics*, 34, no. 1:111-29.
- Earnhart, Dietrich and Lubomir Lizal. 2006b. Pollution, Production, and Sectoral Differences in a Transition Economy. *Comparative Economic Studies*, 48, no. 4:662-81.
- European Bank for Reconstruction and Development (EBRD) 1995. *Transition Report Update: Economic Transition in Eastern Europe and the former Soviet Union*. London: European Bank for Reconstruction and Development.
- European Bank for Reconstruction and Development (EBRD) 1996. *Transition Report 1996*. London: European Bank for Reconstruction and Development.

- Eskeland, Gunnar S., and Ann E. Harrison. 2003. Moving to greener pastures? Multinationals and the pollution haven hypothesis. *Journal of Development Economics*. 70, no. 1:1-23. doi:10.1016/S0304-3878(02)00084-6.
- Esty, D. C. and Winston, A. S. 2006. *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage*. New Haven, Connecticut: Yale University Press.
- Foster, Andrew, Emilio Gutierrez, and Naresh Kumar. 2009. Voluntary Compliance, Pollution Levels, and Infant Mortality in Mexico. *American Economic Review* 99: 191-197.
- Fryxell, G. and C. Lo. 2001. Organizational Membership and Environmental Ethics: A Comparison of Managers in State-Owned Firms, Collectives, Private Firms and Joint Ventures in China. *World Development*, 29, no. 11:1941-56.
- Garcia, J., R. Bluffstone and T. Sterner. 2009. Corporate Environmental Management in Transition Economies: The Case of Central and Eastern Europe. *Finance a Uver/Czech Journal of Economics and Finance*, 59, no. 5:410-25.
- Garcia, Jorge H., Thomas Sterner, and Shakeb Afsah. 2007a. Public disclosure of industrial pollution: the PROPER approach for Indonesia? *Environment and Development Economics*.12: 739-756. doi:10.1017/S1355770X07003920.
- Garcia, Jorge H., Thomas Sterner, and Shakeb Afsah. 2007b. Which firms are more sensitive to public disclosure schemes for pollution control: Evidence from Indonesia's PROPER program? *Environmental and Resource Economics*. 42, no. 2: 151-68.
- Gupta, S, & Goldar, B. 2005. Do stock markets penalize environment-unfriendly behavior? Evidence from India. *Ecological Economics*. 52: 81-95.
- Henriques, Irene, and Perry Sadosky. 2006. The Adoption of Environmental Management Practices in a Transition Economy. *Comparative Economic Studies*. 48, no. 4: 641-661.

- Hughes, Gordon, and Magda Lovei. 1999. *Economic Reform and Environmental Performance in Transition Economies*. Washington DC: World Bank.
- Jimenez, O. 2007. Voluntary agreements in environmental policy: an empirical evaluation for the Chile case. *Journal of Cleaner Production*. 15, no. 7: 620-637.
- Khanna, M. and K. Brouhle. 2009. "Effectiveness of Voluntary Environmental Initiatives," in *Governing the Environment: Interdisciplinary Perspectives* ed. M. Delmas and O. Young. Cambridge, United Kingdom: Cambridge University Press.
- Khanna, Madhu. 2001. Economic Analysis of Non-Mandatory Approaches to Environmental Protection. *Journal of Economic Surveys*. 15, no. 3: 291-324.
- King A. A. and Lenox, M. J. 2000. Industry self-regulation without sanctions: the chemical industry's responsible care program. *Academy of Management Journal*. 43, no. 4: 698-716.
- Lizal, Lubomir and Dietrich Earnhart. 2011. Pollution Control in a Transition Economy: Do Firms Face Economies and/or Diseconomies of Scale. *Transformations in Business and Economics*. 10, no.2: 18-41.
- Lopez, R. and S. Mitra. 2000. Corruption, Pollution, and the Kuznets Environment Curve. *Journal of Environmental Economics and Management*. 40, no. 2:137-150.
- Luken, Ralph, Frank Van Rompaey, and Katarina Zigova. 2008. The determinants of EST adoption by manufacturing plants in developing countries. *Ecological Economics*. 66, no. 1:141-152. doi:10.1016/j.ecolecon.2007.08.015.
- Lyon, Tom. 2009. "Governance of Sustainable Development Economics," in *Governing the Environment: Interdisciplinary Perspectives* ed. M. Delmas and O. Young. Cambridge, United Kingdom: Cambridge University Press.

- Lyon, Thomas P. ed. 2010. *Good Cop/Bad Cop: Environmental NGOs and Their Strategies towards Business*, Washington, DC: Resources for the Future Press.
- Lyon, Thomas P. and John W. Maxwell. 2011. Greenwash: Corporate Environmental Disclosure under Threat of Audit. *Journal of Economics and Management Strategy*. 20: 3-41.
- Maxwell, John W., Thomas P. Lyon and Steven C. Hackett. 2000. Self-Regulation and Social Welfare: The Political Economy of Corporate Environmentalism. *Journal of Law and Economics*. 43, no. 2:583-618.
- Neumayer E, and Perkins R. 2004. What Explains the Uneven Take-up of ISO 14001 at the Global Level? A Panel-Data Analysis. *Environment and Planning A* 36: 823-39.
- Nidumolu, R., Prahalad, C.K. and Rangaswami, M. R. 2009. Why Sustainability is Now the Key Driver of Innovation. *Harvard Business Review*. September.
- Organisation for Economic Co-operation and Development (OECD) 2005. *Environmental Management in Eastern Europe, Caucasus and Central Asia*, Paris: OECD.
- Organisation for Economic Co-operation and Development (OECD) 1999. *Environment in the Transition to a Market Economy: Progress in Central and Eastern Europe and the New Independent States*, Paris: OECD.
- Pargal, Sheoli and David Wheeler. 1996. Informal Regulation of Industrial Pollution in Developing Countries: Evidence from Indonesia. *Journal of Political Economy*. 104, no. 6: 1314-1327.
- Perkins, Richard and Neumayer, Eric. 2008. Fostering Environment-Efficiency Through Transnational Linkages? Trajectories of CO₂ and SO₂, 1980-2000. *Environment and Planning A*. 40, no. 12.

- Porter, Michael E. and Claas van der Linde. 1995. Towards a New Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*. 9: 97-118.
- Potoski, Matthew, and Aseem Prakash. 2004. Regulatory Convergence in Nongovernmental Regimes? Cross-National Adoption of ISO 14001 Certifications. *Journal of Politics* 66, no. 3: 885-905.
- Powers, Nicholas, Allen Blackman, Thomas P. Lyon, and Urvashi Narain. 2011. Does Disclosure Reduce Pollution? Evidence from India's Green Rating Project. *Environmental and Resource Economics*. 50: 131-155. doi:10.1007/s10640-011-9465-y.
- Prakash, Aseem, and Matthew Potoski. 2007. Investing Up: FDI and the Cross-Country Diffusion of ISO 14001 Management Systems. *International Studies Quarterly*. 51: 723-744.
- Prakash, Aseem, and Matthew Potoski. 2006. *The Voluntary Environmentalists: Green Clubs, ISO 14001, and Voluntary Environmental Regulations*. Cambridge: Cambridge University Press
- Qi, G.Y., S.X. Zeng, C.M. Tam, H.T. Yin, J.F. Wu, and Z.H. Dai. 2011. Diffusion of ISO 14001 environmental management systems in China: rethinking on stakeholders' roles. *Journal of Cleaner Production* 19, no. 11:1250-1256. doi:10.1016/j.jclepro.2011.03.006.
- Rivera, Jorge. 2002. Assessing a Voluntary Environmental Initiative in the Developing World: The Costa Rican Certification for Sustainable Tourism. *Policy Sciences* 35, no. 4: 333-360.
- Tambunlertchai, K., A. Kontoleon, M. Khanna, 2010. Assessing Participation In Voluntary Environmental Programs In The Developing World: The role of FDI and export orientation on ISO14001 adoption in Thailand, *Applied Economics* (in press).

- Taylor, M. Scott and Brian R. Copeland. Trade and Transboundary Pollution. *American Economic Review*. 85, no. 4: 716-737.
- Van Rooij, Benjamin. 2010. Greening Industry Without Enforcement? An Assessment of the World Bank's Pollution Regulation Model for Developing Countries. *Law & Policy* 32, no. 1: 127-152. doi:10.1111/j.1467-9930.2009.00311.x.
- Van Rooij, Benjamin, and Carlos H.W. Lo. 2010. A Fragile Convergence, Understanding Variation in the Enforcement of China's Industrial Pollution Law. *Law & Policy*. 32: 14-37.
- Vandenbergh, Michael P. 2007. The New Wal-Mart Effect: The Role of Private Contracting in Global Governance. *UCLA Law Review*. 54:913.
- Vikuna, Tomislav, John C. Beghin and Ebru G. Solakoglu. 1999. Transition to markets and the environment: Effects of the change in the composition of manufacturing output. *Environment and Development Economics*. 4, no. 4: 582-598.
- Wang, Hua, Jun Bi, David Wheeler, Jinnan Wang, Dong Cao, Genfa Lu, and Yuan Wang. 2004. Environmental performance rating and disclosure: China's GreenWatch program. *Journal of Environmental Management*. 71, no. 2: 123-133.
- Wang, H., and D. Wheeler. 2005. Financial Incentives and Endogenous Enforcement in China's pollution levy system. *Journal of Environmental Economics and Management*. 49: 174-196.
- Wang, H, and D. Wheeler. 2003. Equilibrium pollution and economic development in China. *Environment and Development Economics*. 8: 451-466.
- Wu, S.Y., P.Y. Chu, and T.Y. Liu. 2007. Determinants of a Firm's ISO 14001 Certification: An Empirical Study of Taiwan. *Pacific Economic Review*. 12, no. 4: 467-487.

Zivin, Joshua Graff and Arthur Small. 2005. A Modigliani-Miller Theory of Altruistic Corporate Social Responsibility. *Topics in Economic Analysis and Policy*, 5, no. 1.