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**The Political Economy of Voluntary Regulation:
An Empirical Examination of Cross-National Variations in ISO 14001 Adoption**

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Abstract

ISO 14001 is an international voluntary environmental code sponsored by the International Organization for Standardization. Firms that join ISO 14001 establish internal management systems that govern the environmental components of their operations. The objective of ISO 14001 is to ensure firms comply with government environmental regulations while encouraging them to go beyond the law's requirements. Although widely touted as beneficial to regulators, firms, and consumers, ISO 14001 adoption rates have varied across countries. This paper examines how country-level factors in firms' political and economic contexts influence firms' incentives to join ISO 14001. Analyses of ISO 14001 adoption rates across 67 countries indicate that firms are more likely to join ISO 14001 when governments flexibly enforce environmental regulations with a less adversarial and litigious stance towards firms, and when consumers want mechanisms for identifying environmentally progressive firms. In appropriate contexts, ISO 14001 provides an important information benefit for firms, regulators and consumers, one that helps each group solve transaction cost problems.

Key words: voluntary codes, ISO 14001, environmental policy

Introduction

A central aim of the new public management movement is to harness private motives to achieve public goals. In environmental policy, voluntary codes such as the International Standards Organization's (ISO) 14001 seek to improve environmental regulations by codifying management systems that improve business's environmental performance. A key promise of ISO 14001 is to transform conflictual regulatory enforcement between governments and firms into win-win cooperation. For firms, the considerable costs of subscribing to ISO 14001's onerous management principles, including third-party auditing of their environmental management systems, may be offset by the code's potential upside, including goodwill with consumers and better relationships with regulators. For regulators, expanding ISO 14001 subscriptions may reduce enforcement burdens while improving firms' compliance with mandatory regulations. For consumers, ISO 14001 identifies firms that are committed to environmentally progressive policies. In effect, ISO 14001 serves as a tool to reduce transaction costs for firms, regulators and consumers to identify and differentiate environmentally progressive firms.

Despite such promise, the rates of ISO 14001 certification across countries have been uneven. In the United Kingdom, for example, 2,534 firms have gained ISO 14001 certification, while only 1,042 have been certified in the US (ISO 2001), a considerable difference that becomes more pronounced if one factors in the relative sizes of the two economies. Such disparities suggest that not all countries are able to capture the promise of ISO 14001. Better understanding the root sources of such variations can lead to prescriptions for how voluntary codes can be more effectively designed and promoted.

This paper focuses on the political economy of voluntary regulation ~ how political and economic contexts influence firms' propensities to adopt ISO 14001.¹ Firms are more likely to join ISO 14001 in jurisdictions where regulations are flexibly enforced and where there is less adversarialness among firms, regulators, and environmental groups. Similarly, firms are more likely to join ISO 14001 when they sense a need to distinguish themselves along environmental grounds, such as when they are competing in export markets or when consumers demand stronger environmental performance. Together, these results suggest that ISO 14001 is potentially an important tool for firms, regulators and consumers, one that helps each group to reduce transaction costs of identifying environmentally progressive firms. However, the benefits of ISO 14001 are most realized when firms' political and economic contexts are supportive of such voluntary codes.

Environmental governance systems employ a mix of policy instruments, including command and control regulations, market-based instruments (OECD, 1989), mandatory information disclosures (Hamilton, 1995; Khanna and Damon, 1999), and voluntary codes (authors, 2002). Command and control regulations, though expensive to enforce (NAPA, 1995) and granting firms little operational flexibility, continue to provide the foundation for most systems of environmental governance. While market-based and mandatory information disclosure-based policies may offer firms more operational flexibility, they inadequately address, *inter alia*, 'regulatory inflation' inherent in the increasing scope, number, and complexity of mandatory regulations. Voluntary codes such as ISO 14001 seek to reverse such inflation and reduce governments' enforcement burdens — all without compromising environmental protection. ISO 14001 requires firms to establish policies, systems, and structures - in short,

¹ In a series of other papers we examine how firm-level and industry-level factors influence firms' propensities to join ISO 14001, and whether joining ISO 14001 improves firms' environmental and regulatory performance.

environmental management systems or EMS - to ensure they comply with government regulations and encourage them to go "beyond compliance."

Important debates surround why voluntary codes have emerged, what types of firms adopt them, what institutional and regulatory structures influence their adoption, and how such codes impact firms' environmental and economic performance (Gibson, 1999; King and Lenox, 2000; Haufler, 2001). Firms' enthusiasm for voluntary codes stems from the promise of obtaining greater operational flexibility than what governments might offer under command and control regulations. Regulators hope voluntary codes will reduce enforcement burdens- a positive development in the context of budgetary pressures and enforcement shortfalls (GAO, 1983; Hale, 1998). Many environmental groups remain quite suspicious, largely because private codes are often established and enforced outside adequate public scrutiny (Aman, 1999; also see Gregory, McDaniels, and Fields, 2001). For many environmental groups, voluntary codes vest excessive power with firms while offering little accountability in return (Steinzor, 1998). Needless to say, scandals such as the Enron meltdown (followed by revelations of serious accounting irregularities by several other high profile companies) provide little reassurance to the average citizen about the abilities of and incentives for firms to credibly self-govern themselves. Further, some environmental groups view voluntary codes as a component of a broader neoliberal paradigm and deregulatory trend that many of them ideologically oppose. Thus, while ISO 14001 promises stronger environmental protection at lower costs, it also risks diluting extant command and control regulatory systems that many influential stakeholder groups are comfortable with. The design and formulation of public laws and regulations are often more transparent due to multiple access points into policy processes.²

² While recognizing the debate between pluralists (Dahl, 1961) and elitists (Lindblom, 1977), we believe that the pluralist perspective holds in the field of environmental governance. We test hypotheses that in effect examine the

Clearly, firms' confront a complex calculus in deciding to subscribe to ISO 14001. This paper seeks to systematically examine how the contexts in which firms operate - both economic and political - structure firms' incentives for joining ISO 14001. Overall, our results show that ISO 14001 potentially plays an important informational role for firms, regulators and consumers. ISO 14001 signals firms' commitment to environmentally progressive policies. It reduces transaction costs for environmentally conscious consumers to identify 'green' firms. In the same way, it reduces costs for regulators to identify firms who may be less likely to evade compliance. Section one provides an overview to ISO 14001, how it functions and potentially influences firms' behavior. Section two lays out our theory and outlines hypotheses regarding cross-national variations in ISO 14001 adoption rates. We begin section three by describing our data. We then present our model, test hypotheses generated in the previous section, and discuss the results. The concluding section highlights how this paper contributes to debates on environmental governance and voluntary codes, and identifies issues for future research.

ISO 14001: An Overview

The International Standards Organization (ISO) launched ISO 14001 in 1996 (ISO, 1998). The Geneva based ISO is an international body comprised of national standards institutions such as Germany's Deutsche Institut Normen and the U.S. American National Standards Institute. Since its founding in 1947, the ISO has been at the forefront of establishing technical standards, over 12,000 to date, to facilitate international trade and commerce. In the 1980s, the ISO established the ISO 9000, a code of firm-level management practices for quality assurance. This code requires firms to set objectives, establish quality processes, identify resources and personnel necessary for meeting objectives, identifying whether the objectives

implications of pluralism (for example, reliance on litigation as a strategy to influence policy processes) on adoption

have been met, and if not, what process or system changes are required achieve them. ISO 9000 has been a big success with widespread adoption across countries (ISO 2001).

In the late 1980s, scholars began to argue that because pollution represents resource wastage (Porter, 1991), pollution control should fall under the aegis of quality assurance. In October 1996, ISO launched the ISO 14000 series based on principles similar to those inscribed in ISO 9000. ISO 14000 consists of a mandatory standard (ISO 14001), and several non-mandatory guidelines governing environmental labeling (14020 and 14021), environmental performance evaluations (14031), and life cycle assessment (14040-43, 14048-49). For the purpose of this paper, only ISO 14001 is relevant because it is the only mandatory standard in the ISO 14000 series. For firms to become ISO 14001 certified, they must demonstrate they are in compliance with the code's environmental management standards. Although firms can self-audit and declare themselves to be in compliance, ISO strongly encourages subscribing firms to receive third-party audits and certification. The cost of ISO 14001 certification - that is, establishing an EMS and having it audited by a third-party - can range from \$25,000 to \$100,000 per facility (Kolk, 2000).

Notwithstanding the considerable promise of ISO 14001, certification rates have varied considerably across countries. Table 1 indicates the number of ISO 14001 certified firms in 75 countries. The next section examines reasons for this by outlining our theory and hypotheses regarding why ISO 14001 certification varies across countries.

Table 1 here

of ISO 14001.

³ While the ISO develops standards, it does not oversee their implementation. Instead, it delegates registration and implementation authority to national-level accreditation bodies. These bodies set up procedures to accredit auditors who, in turn, assess and certify whether specific facilities are in compliance with ISO 14001 (NAPA, 2001).

Theory and Hypotheses

The general theory behind ISO 14001 is that if firms install appropriate internal environmental management systems, they will improve their environmental and regulatory performance. ISO 14001 may therefore serve as an important indicator of firms' commitment to progressive environmental policies and may thus help consumers and regulators discriminate among environmentally progressive and non-progressive firms. Business strategy scholars suggest that firms need to respond to both market and 'nonmarket' contexts in an integrated fashion (Baron, 1995, 2000). In general, the field of political economy recognizes that both the political and economic contexts have crucial bearings on firms' functioning and performance (Lindblom, 1977; Arora and Casson, 1996; Maxwell, Lyon, and Hackett, 2000). Following this line of argument, in explaining cross-country variations in ISO 14001 adoption rates, we focus on both the political (regulatory or nonmarket) and economic (market) contexts in which firms operate.

For regulators, the promise of ISO 14001 is that subscribing firms are more likely to comply with mandatory regulations. This should certainly reduce regulators' enforcement responsibilities, allowing them to target resources away from certified firms to more likely violators. For firms, the nature of government regulations and their enforcement affects their ISO 14001 calculus because voluntary codes operate in the shadow of public law and regulatory institutions. In most countries, command and control policies still provide the basic governance infrastructure and shape the regulatory culture. Firms may be more likely to join ISO 14001 if they believe regulators will respond by treating them more favorably, perhaps by offering flexible regulatory enforcement. Indeed, in the US, the EPA and many states have implemented "performance track" programs that offer more lenient regulatory enforcement for firms that adopt EMS (Crow 2000). However, regulators' do not have a carte blanche in rewarding firms

that join ISO 14001; in some cases suspicious environmental groups are quick to mount legal challenges to such 'deals.' Because regulatory approaches vary across countries (Kagan and Axelrad, 2000), this may constitute an important factor for why ISO 14001 adoption rates vary cross-nationally.

Firms' economic context also has a crucial bearing on their incentives to join any voluntary code. ISO 14001 can serve as a cost signal to help environmentally aware consumers identify progressive companies. Firms may be more likely to join ISO 14001 if the costs of joining are offset by the rewards from environmentally conscious consumers. However, because of variations in levels of consumers' willingness to reward participating firms (Charter and Polonsky, 1999) such goodwill for firms emanating from ISO 14001 adoption is likely to vary across national economic contexts. As an information signal, ISO 14001 competes with others that communicate corporate and product identities. The clarity and salience of the ISO 14001 signal may therefore be stronger in markets where products have weak brand identities. Another important feature of the economic context is competition from rival firms. Dynamic markets with low entry barriers for potential competitors and intense research and development (R&D) activities may push companies to adopt advanced management practices, including ISO 14001.

ISO 14001 lies at the intersection of economics and politics. With economic and political factors each having important consequences for firms' ISO 14001 calculus, ISO 14001 subscription rates are likely to differ across countries in ways we examine more specifically below. We first focus on country-level factors in the political context and then on factors in the economic context.

The Political Context

The political (or regulatory or nonmarket) context is important for any firm's operations and performance. From a firms' perspective, a country's regulatory context can be evaluated along two

dimensions: the stringency of regulations - that is, how much pollution is permissible under existing regulations - and how those regulations are enforced - that is, whether the regulations are enforced rigidly or flexibly (Scholz 1991; Winter and May, 2000). Each of these dimensions may critically influence national ISO 14001 adoption rates via firms' assessments of net the benefits of joining ISO 14001. Below we derive specific hypotheses about the role of the political context in firms' ISO 14001 certification decisions.

The enforcement of mandatory regulations is one the most direct and immediate forms of government-firm interactions. For firms and regulators, enforcement is an opportunity for either win-win cooperation or lose-lose conflict, with the final outcome hinging on the actions of both sides. Governments want firms to comply with regulations; firms that self-police significantly ease regulatory burdens (EPA, 1999; Coglianese and Nash, 2001; Kettl and Armacost, 2002). Firms want governments to offer regulatory relief for such self-policing. A win-win outcome is achieved when both sides opt for cooperation: firms cooperate by self-policing their environmental performance, and governments cooperate by offering regulatory relief (Orts, 1995; Harrison, 1995; Fiorino, 2000). ISO 14001 may potentially serve as a low cost device for firms to signal their cooperative intents and for regulators to differentiate the credible signals of cooperation from the not so credible ones.

Despite the attractiveness of such cooperation, both firms and governments may face powerful incentives and institutional constraints to choose adversarial conflict instead of cooperation. In command and control regulation, most governments adopt a rigid enforcement style that strives to discover and punish every violation (NAPA, 1995). In countries with a historically ingrained distrust of business (Chandler, 1980; Vogel, 1986), most environmental groups support, perhaps even demand, that regulators adopt such a tight-fisted enforcement style. Of course, such inflexible enforcement increases firms' compliance costs (Van Meter and Van Horn, 1975; Iyers and

Braithwaite, 1992; Majumdar and Marcus, 2001) and contributes to the adversarial relationships between regulators and firms, resulting in more lawsuits and larger societal costs (Reilly, 1999).

However, enforcing environmental laws is expensive and regulators cannot monitor every action of every firm. The promise of ISO 14001 is that it allows firms to credibly signal to government regulators that they are self-policing their environmental performance in good faith. To encourage firms to join ISO 14001, regulators can offer firms tangible incentives such as regulatory flexibility and regulatory relief. Thus, in this complicated signaling game, governments need to become first-movers by clearly signaling their intentions to encourage firms to adopt voluntary codes.

We, therefore, propose that:

H1: Firms are more likely to adopt ISO 14001 in countries where managers perceive that government more flexibly enforces environmental regulations.

ISO 14001 requires firms to establish EMS and have them audited by accredited external auditors, an expensive investment with no short run quantifiable benefits (Kolk, 2000). Because these audits may uncover regulatory violations (Pfaff and Sanchirico 2000), firms often want governments to promise immunity from sanctions (Kollman and Prakash, 2001). Importantly, firms may view governments' promises of immunity through the lens of their experiences with regulators' enforcement of command and control policies. Promises from regulators, who in the past have been tight-fisted and hostile, are perhaps not very credible.

Regulators' ability to grant such flexibility and firms' perception whether the flexibility is durable and effective crucially depends on the general legal and political context. In a regulatory culture steeped in litigation - one in which environmental groups sue governments and firms to enforce laws, governments file lawsuits against firms to enforce regulations, or firms challenge governments in the judicial arena over substantive and procedural issues - firms may be wary of joining a voluntary code. For reference, the U.S. regulatory culture is highly

litigious (Vogel, 1986; O'Leary, 1993), fraught with what Kagan (1991) has called 'adversarial legalism.' Former EPA Director William Reilly (1999) reports that more than 70 percent of EPA's rulings have faced judicial challenges.⁴ The bulk of Endangered Species Act listings, more than 92 percent in California, are achieved through citizen lawsuits (Grunwald, 2001). Of course, where private plaintiffs can sue governments to enforce laws and even collect fees for doing so (the private attorney general provisions), environmental groups' may be all the more litigious (Zywicki, 1999). In such a conflictual and litigious regulatory climate, regulators are less likely to grant regulatory flexibility lest environmental groups challenge their actions in courts. And even if they grant regulatory flexibility, firms may fear that this policy may not survive judicial challenges. Therefore,

H2: Firms are more likely to adopt ISO 14001 in countries with lower levels of environmental litigation.

Granting regulatory flexibility is not a free good. Firms may exploit flexibility by not making good faith efforts to self-police. As we discuss below, regulators may also lose political capital with environmental groups because they have become "soft" on polluters. Thus, regulatory flexibility needs to be granted with discretion in order to foster credibility and trust among firms, regulators and environmental groups. This requires, *inter alia*, that regulators have the competence to sagaciously judge whether granting regulatory flexibility creates non-trivial positive incentives for firms, and whether firms will indeed make good faith efforts to adopt the voluntary code and adhere to its self-policing requirements. Therefore,

H3: Firms are more likely to adopt ISO 14001 in countries where managers perceive public officials to be more competent.

⁴ Coglianese (1996) offers a different perspective. In his examination of the EPA's hazardous waste rules issued from 1988 to 1990, he reports that business groups, not environmental groups, filed most lawsuits. Regulators are not offended by such lawsuits because they have become a kind of a ritual. Coglianese speculates that regulators may, in fact, welcome lawsuits because it provides them an opportunity to negotiate with firms outside of the legislative oversight.

Regulatory flexibility may have a particularly strong impact on firms' incentives in cases where regulations are stringent: flexibility enforcing lax regulations may have fewer benefits for firms. Note that stringency and flexibility are two different dimensions of a regulatory system. The command and control mode is often viewed as being both stringent and inflexible. Scholars such as Porter and van der Linde (1995) argue for stringent but flexible regulations. In such regulatory systems, regulations stipulate demanding outcomes (low levels of pollution) while providing flexibility to firms (that is, no overbearing mandates to firms on manufacturing processes and technologies) to achieve them. In the light of this discussion, we propose that,

H4: Firms are more likely to adopt ISO 14001 in countries where managers perceive that environmental regulations to be more stringent.

In sum, this section identified crucial elements in firms' political context that may influence ISO 14001 adoption rates across countries. Specifically, we hypothesize that firms are more likely to adopt ISO 14001 in countries where environmental regulations, although stringent, are flexibly enforced, and where regulators are perceived to be competent to exercise regulatory discretion. Further, adoption rates are likely to be lower in countries with litigious legal contexts and regulators can more easily grant regulatory relief unimpeded by threats of lawsuits.

The Economic Context

With 22,897 registrants worldwide in 2000 (ISO, 2001), ISO 14001 clearly appeals to a large number of firms. In market-based economies, firms are expected to strive to increase shareholder value by pursuing strategies that markets reward, for example, by developing and marketing products that consumers demand. If there is a sustained (not fleeting) consumer demand for 'green products,' firms can be expected to alter their products accordingly and/or

tout their "greenness" through various marketing channels, including advertising, packaging, and communication. ISO 14001 certification may signal to consumers firms' environmental commitment. Firms' decisions on greening their products and processes may also be influenced by the availability of opportunities to do so: green products are expensive and can be technologically demanding. In short, firms' decisions about joining ISO 14001 are likely to vary depending on whether consumers demand "green products" and how well markets are structured to allow firms to supply them. Below we outline several ways in which economic factors can influence firms'ISO 14001 certification calculus.

If environmental amenities have positive income elasticity - the so-called Environmental Kuznet Curve argument - ISO 14001 adoption rates should be higher in wealthier countries.⁵ The logic is that as the country becomes richer and is increasingly able to meet citizens' basic needs, citizens begin focus on quality of life issues (or higher levels needs in Maslow's hierarchy).⁶ Environmental protection and pollution reduction is certainly on or near the top of such quality of life, post-material concerns (Inglehart, 1977). In wealthier "post industrial" countries, citizens often demand that governments step in and provide quality of life goods, the assumption being that such goods, particularly, environmental protection, are 'public goods' subject to market failures. In addition to pressurizing government, citizens as consumers and stakeholders begin to demand environmental stewardship directly from firms.⁷ Thus, we propose:

⁵ Grossman and Krueger (1995) report a negative relationship between environmental quality and per capita income in the initial stage of a country's economic growth. Once the per capita income reaches \$8,000, the relationship turns positive.

⁶ For a sophisticated analysis of how demographic and economic changes such as rising educational levels, growth in minority population, and aging population, and shifts in employment across sectors impact demand for environmental regulations, see Kahn, (2002)

⁷ Of course, citizens may suffer from a 'free rider' problem - while they may want environmental protection, they may be less than willing to pay for it (author, forthcoming). As a manifestation of this problem, markets for so-called green products remain under developed in many countries (Harrison, 1999). One way of mitigating such free-riding issues is to force governments and firms to provide these public goods.

H5: ISO 14001 adoption rates are likely to be higher in countries with higher per capita incomes.

Widespread adoption of ISO 14001 may preempt the proliferation of country-specific environmental laws. Some environmental activists and politicians often make the politically forceful argument that free trade and investment undermine environmental regulations, thereby abetting races-to-the-bottom (for a review see Drezner, 2001). Many multinational firms fear that such rhetoric may compel governments to enact new environmental laws. Such laws may differ across countries, primarily because protectionist interests may seek to establish non-tariff barriers under their guise. Firms that export products to these countries may join ISO 14001 to preempt new mandatory regulations in their export markets (Roht-Arriaza, 1997). Indeed, host governments may even actively promote ISO 14001 if their economies rely on exporting manufactured goods. First, because manufacturing is pollution-intensive, a preponderance of manufacturing exports in the export basket makes a country more vulnerable to non-tariff barriers under the guise of environmental regulations. As of the 10th cycle of ISO (2001) survey, the top five sectors in terms of ISO 14001 certifications are in electrical and optical equipment (3100 certifications), chemicals, chemical products & fibers (1737 certifications), basic metals and fabricated metal products (1105 certifications), machinery and equipment (1071 certifications), and construction (1035 certifications).⁸ Second, most of the research on impact of public policy on competitiveness has focused on the manufacturing sector (Jaffe, Peterson, Portney, and Stavins, 1995). Thus,

H6: ISO 14001 adoption rates are likely to be higher the more countries export manufactured products.

Porter (1990) argues that countries with highly competitive internally markets are strong competitors in international markets. What makes countries competitive? Without elaborating

⁸ For reference, top five sectors for ISO 9000 registrations were basic metals and fabricated metal products (40173), electrical an optical equipment (38148), construction (32389), machinery an equipment (23027), and rubber and plastic products (18036).

extensively on 'Porter's diamond,' we focus on one factor that is relevant for our research: countries where it is easy to establish new firms — low entry barriers — tend to have economies that are more competitive. Low entry barriers increase competition and force incumbents as well as new firms to differentiate themselves on a variety of counts, including environmental stewardship. Research and development (R&D) expenditures also provide a sound indicator of market competitiveness and technological sophistication. High R&D expenditures signal opportunities for firms to upgrade their technologies and management practices, and perhaps to adopt ones that are environmentally progressive. Therefore,

H7: ISO 14001 adoption rates are likely to be higher in countries with low market entry barriers.

H8: ISO 14001 adoption rates are likely to be higher in countries that have high levels of R & D expenditures.

Previous research on voluntary codes suggests that firms that are closer to the final consumer, and consequently spending a significant portion of their sales on advertising, are more likely to join such codes (Arora and Cason, 1996). We offer a slightly different argument. Branding can be interpreted as a signal from the firm to its stakeholders about its commitment to certain objectives and to provide them a low-transaction cost tool to differentiate the firm from its competitors. Because many firms often invest a significant proportion of their revenues in supporting the brand image, they are unlikely to undertake policies that conflict with the brand image. Thus, branding is a self-imposed constraint, an institutional device adopted by firms to curb their opportunistic behaviors.

For companies that lack brand identities, ISO 14001 certification may provide a "brand-like" differentiation for their products. What about firms which invest in branding? A firm can choose to brand at two levels - corporate and product. In corporate branding (as in Maytag, General Electric, Sony), the corporate image directly influences the marketing profile of their individual products.

Because ISO 14001 certification is provided at the facility level, it enhances corporate image. One can therefore expect such firms will be excited about joining ISO 14001. However, companies focusing on product branding such as Procter & Gamble, direct most of their marketing resources in enhancing brand names (say Tide, Pampers), not the corporate image. For such brand-focused companies, ISO 14001 is less helpful because consumers seldom link facilities (which receive ISO 14001 certification) to products (author, forthcoming). Therefore,

H9: ISO 14001 adoption rates will be higher in countries with low levels product branding.

In sum, we hypothesize that firms are more likely to adopt ISO 14001 in countries that are wealthy, whose export baskets have a high salience of the manufacturing sector, where the local economy is competitive with low entry barriers, whose businesses have high levels of R & D expenditures, and where there are low levels of product branding. Table 2 summarizes the hypotheses.

Table 2: Hypothesized Factors that Influence Cross-National ISO 14001 Adoption Rates

Summary of Hypotheses	Hypothesized Relationship with ISO 14001 adoption rates
<i>Political Context</i>	
H1: Regulatory flexibility	+
H2: Environmental litigation	-
H3: Competence of public officials	+
H4: Regulatory stringency	+
<i>Economic Context:</i>	
H5: Per capita income	+
H6: Manufacturing exports	+
H7: Entry barriers	-
H8: R&D expenditures	+
H9: Product branding	-

Data and Methods

Data: Operationalization and Sources

To investigate these political context and economic context hypotheses, we compare ISO certification rates across 67 countries. Thus, our dependent variable is the number of ISO 14001 certified facilities in each country, as reported in 10 cycle of the ISO 14001 census (ISO, 2001). Our independent variables measure countries' political and economic contexts, plus controls. These data are drawn for a variety of sources, as discussed below. Table 3 presents summary statistics for the independent and dependent variables.

The Political Context

Data on regulatory flexibility and stringency, and the competence of public officials are drawn from 2001-2002 Global Competitiveness Report (GCR) (WEF, 2002). This report presents data from key international institutions as well original survey data gathered from World Economic Forum's Annual Executive Opinion Survey. This survey was administered to 4801 managers in 75 countries representing 90 percent of the world's GDP and more than 80 percent its population.⁹ The questions posed to respondents regarding their perceptions of *regulatory flexibility, regulatory stringency, entry barriers, R&D expenditures, product branding, public sector competence* are listed in Appendix 1.

Regulators and firms can achieve win-win outcomes if firms self police their environmental performance (as ISO 14001 compels them to do) and regulators use flexible enforcement to forgive firms' voluntarily disclosed violations. We measure such flexible enforcement using managers' perceptions of how governments enforce environmental regulations as reported in the GCR survey. *Regulatory Flexibility* ranges from low perceived

flexibility (scored one) to high perceived flexibility (scored seven). We expect ISO 14001 adoption rates to be higher in countries where business managers perceive environmental regulations are flexibly enforced (H1).

We also expect that firms in litigious legal contexts should be less likely to join ISO 14001 (H2). Since we are aware of no direct measures of the number of environmental court cases per country, we turn instead to a simple proxy measure: the number of environmental law firms in each country (*environmental law firms*). Our logic here is that the propensity to litigate on environmental issues should be highly correlated with the number of agents of litigation, that is, the number of environmental law firms. While recognizing that our measure is not perfect, we believe that it adequately captures levels of environmental litigation.¹⁰ Data on number of environmental law firms was taken from Martindale-Hubbell International Law Directory (Martindale-Hubbell, 2001). This data source provides detailed profiles of more than 12,000 law firms and 124,000 lawyers in over 160 countries.

We have argued that regulators need to exercise care in granting regulatory flexibility. To do so, they must have the competence to judge whether granting regulatory flexibility will create positive incentives for firms to adopt the voluntary code and adhere to its requirements. Most importantly, regulators should be able to exercise such discretion free from charges of corruption or favoritism. To measure the competence of public officials, we looked at the survey data on perceptions of 'competence of public officials' as well as data on 'favoritism in decisions of public officials,' and judicial independence.' Because these measures are highly correlated, we retain only the competence measure. *Public sector competence* ranges from low perceived

¹⁰ To ensure that the survey is representative of every country, the World Economic Forum partners with local institutes who identify sample of firms across sectors reflecting the salience of labor force. The survey respondents are typically the CEOs or senior managers of such sampled companies.

¹¹ We recognize that a large number of law firms may well be associated with smaller number of cases litigated per law firm. Further, the average number of partners and associates – number of trained lawyers that handle cases — in

competences (scored one) to high perceived competences (scored seven). Our expectation is that firms are more likely join ISO 14001 in countries with competent public officials (H3).

In their day-to-day operations, managers encounter several types of environmental laws. For most firms, three categories of environmental laws pertaining to the three media — air, water, and land — are most important. Further, chemical waste regulations seem to affect many industries. Because managerial perceptions on these categories of laws are highly correlated, we constructed an index, *regulatory stringency*, by pooling regulatory stringency measures for the stringency of air pollution, water pollution, and toxic waste disposal regulations, as reported in the GCR.¹¹ The variable is scaled so that its mean is zero and standard deviation is one. We expect countries with more stringent environmental regulations to have more firms who have joined ISO 14001 (H4).

The Economic Context

Economic factors influence incentives for ISO 14001 certification in several ways. Consumers in wealthier countries may demand that firms adopt more environmentally progressive policies (H5). Our measure of national wealth, *GNP per capita*, is drawn from the 2002 World Development Report (World Bank, 2002). Governments in countries having high salience of manufacturing products in the export basket may encourage firms to get ISO 14001 certification as a strategy to preempt proliferation of environmental regulations (H6). Our measure *manufacturing exports* is the percent of each country's GDP in manufacturing exports.

ISO 14001 certification provides firms in highly competitive markets with means to distinguish themselves. Thus, countries with competitive markets should have more ISO 14001

law firms may vary across countries. We thank Germaine Leahy, environmental law reference librarian at our university, for suggesting that we look up Martindale-Hubbell directory for information on environmental law firms.

¹¹ The four measures are highly correlated.

certifications (H7). *Entry barriers* measures the degree to which new firms can join markets and is scored one for rare entry of new competitors into market and seven for common entry of new, as reported by managers in the GCR survey (see Appendix 1). Entry barriers is scaled from low barriers to market entry (scored one) to high barriers to market entry (scored seven). ISO 14001 certification requires sophisticated management systems - opportunities to upgrade such systems often arise when firms invest in new plant, machinery, and technology. Therefore, countries with more technological sophistication should have more ISO 14001 certifications than less sophisticated countries (H8). We gauge technological sophistication with the measure *R&D expenditures*, which is scored one for low R&D expenditures and seven for high R&D expenditures, as reported by managers in the GCR survey (see Appendix 1). Finally, because ISO 14001 serves as a signal of firms' commitment to progressive environmental policies, firms are more likely to join this code in countries where product branding is weak (H9). *Product branding* measures the extent to which companies in each country have developed their own international brands and is scored one for low branding and seven for strong branding (see Appendix 1).

Control Variables

In evaluating our hypotheses, we need to control for several factors that while not of central theoretical interest, may also influence cross-national ISO 14001 adoption rates. First, we use gross national product, *GNP*, to control for the size of the economy, and thus the number of firms that might adopt ISO 14001. Second, citizens' perceptions of environmental quality may be reflected in countries' pollution emissions and population density. When pollution levels are high, citizens may demand that governments and firms adopt policies to curb pollution. Citizens' perceptions of pollution levels are also influenced by a country's population density. Pollution

levels in each country are measured via *CO₂ emissions*, which is the amount of CO₂ emissions (in tons) per unit of GDP (in dollars), as reported in the 2002 World Development Report (World Bank, 2002). *Population density* is the number of residents per square mile, also reported in the World Development Report (World Bank 2002). Finally, because ISO 14001 and ISO 9000 share the management system-based approach, learning costs in adoption ISO 14001 could be lower for ISO 9000 certified firms (Christmann and Taylor, 2001). We therefore include the number of ISO 9000 certified firms in each country. Data on ISO 9000 certification, *ISO 9000*, was taken from 10th cycle of ISO (2000) survey that can be accessed on the internet.

Table 3 about here

Empirical Models

To gauge the affects of countries' political and economic contexts on ISO 14001 adoption, we estimate negative binomial event count models of the form $E[Y] = GNP^{\alpha(X\beta)} + \epsilon$ where Y is the number of ISO14001 certified firms, GNP is gross national product, X is a vector of independent and control variables affecting incidence rates, α and β are (vectors of) parameters to be estimated, and ϵ is the residual. The vector of independent variables includes measures of political context, economic context, and controls. Our choice of functional form is driven by the fact that we need to use an event count model to because the ISO 14001 certifications are discrete events with a non-normal distribution. We use the natural log of GNP to measure the size of the interval, and the other variables to model the rate at which events occur within that interval (see King 1989; Maddala 1983). In the models below, the estimated value of the parameter alpha is greater than zero for every equation, indicating that negative binomial regression is preferred to Poisson regression (Long 1997).

Interpreting coefficients in count models is complicated somewhat by the models' nonlinear functional form. Thus, following Long (1997), we interpret each coefficient by

calculating its "discrete change," where a discrete change is the difference in the number of predicted events associated with an increase in the independent variable from one standard deviation below its mean to one standard deviation above, holding all other independent variables at their means.

Results

Based on our theoretical discussion, our expectations are that countries' political and economic contexts influence firms' propensity to join ISO 14001. To recap, we hypothesized that firms are more likely to adopt ISO 14001 in countries with low levels of environmental litigation and where managers perceive environmental regulations are stringent but flexibly enforced, and where public managers are (perceived to be) competent. Likewise, firms are more likely join ISO 14001 when competition is intense, consumers demand environmental protection, and conditions favor new management practices. Table 4 presents the results of the event count analyses of the number of certified firms in 67 countries, including the discrete changes of statistically significant variables.

Table 4 about here

Turning first to the political context measures, the results indicate firms' ISO 14001 decisions respond more to the nature regulatory enforcement than the stringency of environmental regulations. The coefficients for *regulatory flexibility* and *environmental law firms* are statistically significant and in hypothesized directions. A two standard deviation increase in *regulatory flexibility* (from one standard deviation below its mean to one standard deviation above) increases the number of ISO 14001 certified facilities by 50.1, holding the effects of other variables constant at their means. As hypothesized (HI) firms are more likely to

join ISO 14000 when governments provide flexible regulatory enforcement. Likewise, firms are less likely to join ISO 14001 in highly litigious regulatory contexts, at least as indicated by the number of environmental law firms (H2). A two standard deviation increase in *environmental lawfirms* decreases the number of ISO 14001 certified firms by 26.9, holding the effects of other variables constant at their mean. The other two political context measures, *regulatory stringency* and *public sector competence*, are not statistically significant.

Together the political context results suggest that government can have direct influence on firms' ISO 14001 certification decisions through environmental policies. What matters to firms most is not so much the *stringency* of governments' environmental regulations, but rather nature of the regulatory interaction between government regulators and firms. When firms perceive that governments will offer enforcement flexibility and litigation threats are low, they are more likely to become ISO 14001 certified. These findings make sense: the cost of ISO 14001 certification is not simply the initial certification costs coupled with the added management costs. Certified firms risk higher compliance costs if governments fully punish violations that firms uncover during audits or if such violations risk lawsuits from environmental groups. ISO 14001 promises a win-win outcome for firms and regulators but requires flexible enforcement to realize this potential. Importantly, governments can capture these gains without sacrificing regulatory stringency; regulatory flexibility can credibly signal to firms regulators' cooperative intentions.

Countries' economic contexts also affect firms' propensities to join ISO 14001. To recap, we hypothesized that firms are more likely to adopt ISO 14001 in countries with higher per capita income, high salience of manufacturing exports in the export basket, low levels of market entry barriers, high levels of R & D expenditures, and low levels of product branding. The results

We also investigated reduced models of political context and economic context variables, plus controls. The

in Table 4 show that these market factors offer powerful explanations for firms' ISO 14001 decisions.

Citizen demands for environmental protection influence firms' ISO 14001 certification decisions (H5). Countries with wealthier citizens have more certified firms, perhaps a reflection of the Environmental Kuznet Curve argument that wealth promotes concerns for "post materialist" goods such as environmental protection. A two standard deviation increase in *GNP per capita* increases the number of certified firms by 85.6, holding the effects of other variables constant at their means. Our control variables, *population density* and *C02 emissions*, may also reflect citizens demands for environmental protection. Interestingly, neither achieves statistical significance in the expected directions; *population density*, in fact, is statistically significant and negative. Citizens, of course, can express preferences directly to firms through their market behaviors or indirectly by pressuring their government. Our analyses are unable to distinguish

* 13

among these venues of influence.

Our results also suggest that ISO 14001 can be an informational signal for firms looking to build an identity as an environmental leader. Countries with stronger and more developed product brands have fewer ISO 14001 registered firms (H9). A two standard deviation increase in *product branding* decreases the number of ISO 14001 registrants by -115.9, holding the effects of other variables at their mean. This suggests that in countries with weak brand identities, ISO 14001 can enable firms to distinguish themselves by signaling their commitment to environmental protection. Likewise, countries that have strong manufacturing export economies also have more ISO 14001 registrants (H6). A two standard deviation increase in *manufacturing exports* increases the number of ISO 14001 registered firms by 49.1, holding the effects of other variables at their means. Again, this suggests the important signaling role of ISO

results of each reduced model were consistent to the full model presented here.

14001: it can help firms in more pollution intensive (manufacturing) export industries signal their commitment to environmental protection.

Adopting ISO 14001 EMS is challenging; firms that invest heavily in R & D may have an easier time adopting EMS such as ISO 14001 (H8). Indeed, as our results show, countries where firms spend more on R & D have more ISO 14001 registrations. A two standard deviation increase in *R&D spending* increases the number of certified firms by 73.1, holding the effects of other variables constant at their means. Contrary to our expectations, local competition does not significantly influence the number of ISO 14001 firms (H7).

Together, these results suggest that wealthier countries, those with higher GNP per capita, and countries with more manufacturing export-based economies have more ISO 14001 registrants. Importantly, and somewhat contrary to Porter's argument, this suggests that external economic competition through export markets exert more influence on ISO 14001 registrations than local domestic competition. Further, unlike previous research that found that firms with highly developed brands are more likely to join voluntary programs (Arora and Cason 1996), our analysis suggests that ISO 14001 itself functions as a brand identity, allowing firms without well established brands to differentiate their products. Countries' technological sophistication and experience with international standards (ISO 9000) are also important factors in firms' ISO 14001 adoption. Countries with companies that invest more heavily in research and development have more ISO 14001 registered facilities.

Conclusion

All in all, this paper has shown both the economic and political contexts have crucial bearing on cross-national diffusion rates of voluntary codes. Specifically, firms' ISO 14001

^a **Indeed, population density and CO₂ Emissions are correlated with GNP per capita ($r = .61$ and $.25$, respectively).**

certification decisions are critically influenced by the economic and political contexts in which firms operate. Although ISO 14001 reduces transaction costs for firms, consumers, regulators of identifying environmentally progressive firms, the realization of its benefits crucially depends on factors in firms' economic and nonmarket environment. Thus, a mere supply of low transaction cost tool is not sufficient to ensure a wide spread adoption of voluntary codes; a demand should also exist. This paper demonstrated that firms' perceptions of such demands from a variety of stakeholders are influenced by both political and economic factors. For government regulators, consumers, and firms the extent to which ISO 14001 lives up to its promise depends on the structure of local political and economic contexts. In this regard, firms' respond more to the manner in which environmental regulations are enforced than the stringency of those regulations. Firms are more likely to join ISO 14001 when environmental regulations are flexibly enforced and in a non-litigious environment. As for economic contexts, ISO 14001 registration provides an important information signal about firms' environmental programs. Countries that export manufacturing goods and have weak brand identities have more ISO 14001 registered firms.

These results are not surprising because voluntary codes operate in the shadow of public law, regulatory institutions and regulatory culture. ISO 14001's attractiveness to firms crucially depends on its fit with extant regulatory infrastructure as reflected in the stringency of regulations, the flexibility with which they are implemented, the fear among both regulators as well as firm of lawsuits. An important policy implication then is that regulators looking to promote voluntary codes can do so via their regulatory culture and enforcement style. Voluntary codes are welcome precisely because existing mode of environmental regulation - especially, command and control - is perceived as being inflexible and generating an adversarial relationship between the regulators and the regulatees.

The policy implications of this research are also important. Clearly, if a country is wealthy, firms are more likely to adopt voluntary codes. The implication then is economic growth may be an important precondition for the new public management perspective to take roots. Economic growth and new ways of environmental protection seem to go together. It is also clear that firms fear a proliferation of environmental laws across countries and seek to preempt them by adoption international voluntary codes. This is a welcome development given the resistance to establishing yet another inter-governmental organization to govern environmental issues.¹⁴ This paper also demonstrates that fast pace of technological change may help the diffusion of voluntary codes. We offer some cautions about the prospects of marketing 'green' products. Firms differentiate themselves through a variety of strategies, advertising being one of them. Brand-focuses firms may not get extra mileage from adopting a voluntary code because they have already invested substantial sums in differentiating themselves. Firms lacking products with strong brand identities constitute the prime target audience for voluntary codes.

This paper raises important questions for future research. First, if the political and economic contexts matter for understanding variations in cross-country diffusion rates, they should be significant for explaining within countries why some firms adopt ISO 14001 and other do not. For example, ISO 14001 data indicate that there are significant variations in certifications rates across states in the U.S. Thus, future research could examine the robustness of our model in explaining such intra-country variations. The second critical issue pertains to the applicability of our model in understanding other voluntary codes. ISO 14001 has been established by a non-governmental organization - ISO — and may require regulatory relief for firms to eagerly adopt. What about codes that have been established by regulators - the EPA alone has sponsored more than forty voluntary codes — or by industry associations such as the Sustainable Forestry

¹⁴ For an argument in favor of establishing some form of world environment organization see, Esty (1994).

Initiative? Do their diffusion dynamics differ from ISO 14001? Finally, and perhaps most importantly, voluntary codes are useful for public policy only if they can improve firms' environmental and regulatory performance. Future research should focus on identifying conditions under which firms achieve superior environmental and regulatory performance through voluntary codes.

Table 1. Number of ISO 14001 Firms in 2000, by country

Country	ISO 14001	Country	ISO 14001
Argentina	114	Norway	227
Australia	1049	Panama	0
Austria	203	Paraguay	1
Bangladesh	0	Peru	13
Belgium	130	Philippines	46
Bolivia	1	Poland	66
Brazil	330	Portugal	47
Bulgaria	0	Romania	5
Canada	475	Russia	3
Chile	11	Singapore	100
China	510	Slovak Republic	36
Colombia	21	Slovenia	88
Costa Rica	20	South Africa	126
Czech Republic	116	Spain	2
Denmark	580	Sri Lank	0
Dominica	1	Sweden	1370
Ecuador	1	Switzerland	690
Egypt	2	Taiwan	421
El Salvador	0	Thailand	310
Estonia	18	Trinidad	1
Finland	508	Turkey	91
France	710	Ukraine	0
Germany	1260	United Kingdom	2534
Greece	42	United States	1042
Guatemala	2	Uruguay	22
Honduras	2	Venezuela	7
Hong Kong	105	Vietnam	9
Hungary	164	Zimbabwe	4
Iceland	2		
India	257		
Indonesia	77		
Ireland	163		
Israel	60		
Italy	521		
Jamaica	0		
Japan	5556		
Jordan	16		
Korea	544		
Latvia	4		
Lithuania	10		
Malaysia	4		
Mauritius	4		
Mexico	159		
Netherlands	784		
New Zealand	63		
Nicaragua	1		
Nigeria	1		

Source: ISO (2001)

Table 3: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ISO14000 registrations	307.87	776.40	0.00	5556.00
Log of Gross National Product	25.09	1.88	21.27	29.68
Regulatory Flexibility	3.97	0.59	2.60	5.40
Environmental Stringency	-0.01	0.59	-1.76	1.18
Public Sector Competence	2.77	0.59	1.70	4.70
Number of Environmental Law Firms	29.43	72.46	0.00	400.00
GNP per capita	10662.79	11519.22	346.67	42303.33
Manufacturing Exports	59.22	27.17	8.00	94.67
Entry Barriers	5.24	0.43	3.90	6.10
R&D Expenditures	3.87	1.03	2.30	6.10
Branding	4.25	1.05	2.50	6.40
CO ² Emissions/GDP	6.22	4.95	0.19	21.63
Population Density	294.57	997.97	2.41	6565.72
ISO 9000	5704.46	10921.07	1.00	63725.00

Sources: indicated in text

Table 4: Countrywide 14001 Registrations, Negative Binomial Analyses

Independent Variables	Coefficient	Discrete Change
<i>Political Context</i>		
Regulatory Flexibility	0.767** (0.319)	50.1
Environmental Law Firms	-0.003*** (0.001)	-26.1
Public Sector Competence	0.295 (0.230)	--
Regulatory Stringency	0.241 (0.334)	--
<i>Economic Context</i>		
GNP per capita	5.980E-05** (2.680E-05)	85.6
Manufacturing Exports	0.016*** (0.005)	49.1
Entry Barriers	-0.322 (0.350)	--
R&D Spending	0.611* (0.343)	73.1
Branding	-0.877*** (0.281)	-115.9
<i>Controls</i>		
Log of GNP	0.718*** (0.099)	192.5
ISO 9000	2.69E-05*** (9.70E-06)	31.1
CO ² Emissions/GDP	-0.041 (0.037)	--
Population Density	-4.07E-04*** (1.144E-04)	-45.4
Constant	-16.11*** (2.89)	
Alpha	0.762	
Chi ²	649.3***	
N	67	

Notes: standard errors in parentheses.

*** p < .01, ** p < .05, * p < .10; two tailed tests.

Appendix 1: Data from World Competitiveness Report

Flexibility of environmental regulations (Hypothesis 1)

Environmental regulations in your country: (1 = offer no option for achieving compliance, 7 = are flexible and offer many options for achieving compliance)

Competence of public officials (Hypothesis 3)

The competence of personnel in the public sector is (1 = lower than private sector, 7 = higher than the private sector)

Air pollution regulations (Hypothesis 4)

The stringency of air pollution regulation in your country is: (1 = lax compared with most countries, 7 = among the world's most stringent).

Water pollution regulations (Hypothesis 4)

The stringency of water pollution regulations in your country is: (1 = lax compared with most countries, 7 = among the world's most stringent).

Toxic waste disposal regulations (Hypothesis 4)

The stringency regulations concerning toxic waste disposal in your country is: (1 = lax compared with most countries, 7 = among the world's most stringent):

Chemical waste regulations (Hypothesis 4)

In your country, the stringency of regulations concerning chemicals used in manufacturing is: (1 = lax compared with most countries, 7 = among the world's most stringent).

Entry into local markets (Hypothesis 7)

Entry of new competitors: (1 = almost never occurs in local markets, 7 = is common in local market).

Company spending on research and development (Hypothesis 8)

Companies' spending on research and development in your country: (1 = is nonexistent, **I-** is heavy relative to international peers).

Extent of branding (Hypothesis 9)

Companies that sell internationally: (1 = sell commodities or market under foreign brands, 7 = have developed their own international brands).

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