

Regulatory Convergence in Nongovernmental Regimes? Cross-National Adoption of ISO 14001 Certifications

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Recent globalization discussions have revived the issue of regulatory convergence. Convergence advocates point to the structural pressures of the global economy on countries, while the divergence school points to the embeddedness of domestic regulatory institutions. This paper examines cross-national divergence in adoption rates of ISO 14001, an important international nongovernmental environmental regime developed with the cooperation of multinational firms. ISO 14001 offers a process-based system of voluntary regulation instead of an outcome-based system of public regulation that many firms find cumbersome. Our analysis of data from 59 countries suggests that ISO 14001 adoption rates are likely to be higher in countries whose trading partners have adopted this nongovernmental regime, which are embedded in international networks of nongovernmental organizations, whose governments flexibly enforce stringent environmental regulations with a less adversarial and litigious stance towards firms, and where consumers want mechanisms for identifying environmentally progressive firms.

Does globalization create incentives across countries, and for actors within countries, to adopt similar approaches to environmental regulation? Do embedded national institutions, cultures, and practices impede such “convergence”? Convergence research has a long history (Berger and Dore 1996; Di Maggio and Powell 1983). This paper examines the “convergence hypothesis” (Bennett 1991) in the context of a well-recognized nongovernmental environmental regime: ISO 14001. Regimes are one of the most intensively studied concepts in international political economy (Haggard and Simmons 1987; Krasner 1983; Martin and Simmons 1998; Young 1989). In our view, regimes, whether intergovernmental or nongovernmental, are rule systems that prescribe, permit, or prohibit certain actions (Koremenos, Lipson and Snidal 2001).

Globalization has economic (Berger and Dore 1996) and sociological dimensions (Boli and Thomas 1999). Economic globalization pertains to the processes that are leading to the increased integration of factor, intermediate, and final

product markets, along with the increasing salience of multinational corporations' (MNCs) value chains in cross-border economic flows (Prakash and Hart 1999). Sociological globalization pertains to the diffusion of common norms and the emergence of a world society. Transnational networks of governmental and nongovernmental organizations are key channels for norm diffusion, but only to the extent that governments and citizens join them. Both types of globalization can be expected to encourage ISO 14001 adoption.

Because variations in government regulatory systems are costly for MNCs and can potentially serve as nontariff barriers, many MNCs favor regulatory harmonization across countries (Prakash and Kollman 2003). In many ways, ISO 14001 may be a preemptive step by MNCs towards regulatory harmonization. Indeed, the World Trade Organization (WTO), whose mission is to promote foreign trade, has been an important advocate for the ISO 14000 series. With globalization, MNCs appear to be structurally advantaged in influencing convergence of domestic regulations. In attempting to reduce regulatory costs and remain competitive in global markets, MNCs can be expected to threaten and sometimes actually exit a country with stringent regulations. Because of increased capital mobility,¹ such threats may be more credible, and may therefore lead to regulatory races-to-the-bottom (Potoski 2001; for a review see Drezner 2001). However, as Vogel (1995) argues, economic integration could result in the "trading up" of regulatory standards to those of the dominant regional economy, such as Germany in the EU and California in the US.² Globalization may lead to convergence to lower or higher standards.

ISO 14001 has been actively promoted by leading MNCs, many of which also participated in its development (Clapp 1998). This regime seeks to refocus environmental governance from the inflexible outcome-based mode—the so-called command and control regulatory system—to flexible process or management systems-based regulation. Given the business clamor for reforms in command and control regulations (Walley and Whitehead 1994), one would expect that firms across countries would embrace ISO 14001. This has not consistently been the case as ISO 14001 adoption rates vary across countries. These diverging responses become even more puzzling because the United States, perceived as being the key beneficiary of globalization and the epitome of command and

¹The mobility of multinationals should not be confused with mobility of capital in financial markets. Several scholars have examined policy implications stemming from the mobility of multinationals (for a review, see Caves 1996). Vernon's (1971) Obsolescence Bargaining model examined variations in bargaining power (a function of mobility) of multinationals vis-à-vis governments. Because Levy and Prakash (2003) have proposed a revised version of the bargaining model elsewhere, we do not survey this literature here.

²Firms with specific technological, political, or marketing competencies may view stringent regulations or idiosyncratic regulations as entry barriers that enable them to harvest rents (Maxwell, Lyon, and Hackett 2000). Firms may vary in their support for regulatory harmonization, and some firms may want convergence to more stringent standards.

control environmental regulation system, is one of the laggards in ISO 14001 adoption (ISO 2001).

Our paper builds on the arguments outlined by Kollman and Prakash (2001) regarding the divergent adoption rates of ISO 14001 in the United States, Germany, and the United Kingdom. Our findings support their argument regarding the critical role of domestic regulatory institutions in influencing the adoption of nongovernmental regimes. Using cross-sectional data from 59 countries, we identify factors in the international environment as well as domestic political and economic contexts that have influenced firms' adoption of ISO 14001. Our conclusion is that convergence theory needs to take into account both international as well as domestic factors. While increased levels of economic and sociological globalization encourage ISO 14001 adoption, the influence of domestic institutions is mixed. Contrary to the "continued divergence hypothesis" (Berger and Dore 1996; Boyer and Drache 1996), our paper suggests that some types of domestic institutions may support convergence.

Voluntary Environmental Governance

As an endeavor of scholarly inquiry, most political scientists examine governments and public regulatory systems (exceptions include Cornes and Sandler 1996; Lipson 1985; Ostrom 1990; Putnam 1995). IPE scholars, in particular, have focused on intergovernmental regimes to the neglect of nongovernmental regimes. Strange (1996) had alerted IPE scholars about the retreat of the state and devolution of authority from public authorities to private actors. Nevertheless, as Mattli correctly notes, regime theorists have "failed to examine the extent to which international market players themselves can remedy 'market failures' by creating private institutional arrangements" (2001, 923). While governments certainly remain key actors in supplying governance services deregulation, privatization and economic liberalization have opened opportunities for the emergence of nongovernmental regimes (Cutler, Haufler, and Porter 1999; Hall and Biersteker 2002).³ Our paper contributes to this important burgeoning literature by focusing on perhaps the most widely adopted nongovernmental regime in environmental governance: ISO 14001.

Arguably, while governments can require domestic actors to respond to intergovernmental regimes, their influence may be weaker for nongovernmental vol-

³ NGOs have also contributed to the spread of nongovernmental regimes and have proposed several regimes such as the Forest Stewardship Council's (FSC) regime for the forestry sector. NGOs often rely on direct action and supply-chain pressures to create incentives for regime adoption. Nongovernmental regimes can provide legitimacy to actions of governments as well as firms. It is well known that governments rely on private regimes for rating their debt (Sinclair 1994). Importantly, governments are also relying on the FSC regime to certify their management of public forests (Meidinger 2000). Thus, both governments and firms increasingly view nongovernmental regimes as "authoritative" (Hall and Biersteker 2002) across issue areas.

untary regimes such as ISO 14000. Private actors engage in nongovernmental regimes in response to market and stakeholder pressures (Gereffi, Garcia-Johnson, and Sasser 2001; Prakash 2000). Yet, this “public-private” distinction can be overblown; as this paper demonstrates nongovernmental regimes operate in the shadow of public law. Governments often influence, directly or indirectly, the contours of nongovernmental regimes (Hall and Biersteker 2002; Haufler 2001), and this was certainly true for ISO 14001 (Kollman and Prakash 2001). Similarly, domestic politics—including lobbying by firms and other regulatees—crucially influences a government’s position on intergovernmental regimes (Rausiala 1997; see also *International Organization* 2001, special issue on “Rational Design of Institutions”). Policy makers are well aware that with inadequate monitoring and enforcement of public law—for example, barely, 1% of large regulated facilities were inspected during 1996–98 for all three media under U.S. federal environmental statutes (Hale 1998)—legal mandates by themselves insufficiently influence compliance by private actors (Fiorino 1999). Thus, a study of responses to nongovernmental regimes can provide useful insights on domestic responses to intergovernmental regimes.

Founded in 1947, the International Standards Organization (ISO) has been at the forefront of establishing technical standards. In the 1980s, the ISO established the ISO 9000, a code of firm-level management practices for quality assurance. 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. Given the ISO’s expertise in this subject, in October 1996, the ISO launched the ISO 14000 series of voluntary environmental regulations. For this paper, only ISO 14001 is relevant because it is the only standard in the ISO 14000 series for which firms (more precisely, their facilities) receive certification. ISO 14001 does not require firms to demonstrate improvements in environmental performance; it only seeks their commitment to do so and views the establishment of management systems as evidence of such commitment. Although firms can self-audit and declare themselves to be in compliance, ISO strongly encourages firms to receive third-party audits and certification.

With 22,897 registrants worldwide in year 2000 (ISO 2001), ISO 14001 clearly appeals to a large number of firms. Yet, contrary to the convergence hypothesis, rates of ISO 14001 certification across countries have been uneven. As of December 2001, 5,556 facilities have been certified in Japan, 2,534 in the United Kingdom, 1,260 in Germany, and only 1,042 in the United States. These differences become more pronounced after factoring in the relative sizes of the national economies. Over time, the divergence in adoption rates across countries has increased. Using a simple measure, the standard deviation divided by the mean of country level ISO 14001 certifications, cross-national divergence has increased from 2.57 in 1997 to 2.63 in 1998, 2.71 in 1999, and 2.91 in 2000. The same pattern holds among OECD countries: 1.36 in 1997, to 1.38 in 1998, 1.41 in 1999, and 1.58 in 2000. What explains variations in country-level adoption is an issue we examine below.

Global and Domestic Sources of Diffusion

Globalization as a structural force can influence how countries and actors within these countries develop and respond to regulatory policies. Globalization pressures can flow through multiple venues: trade among nations, state-to-state ties generated from common membership in intergovernmental organizations, and nongovernmental ties from citizen involvement in international networks. Trade linkages are perhaps the most commonly understood manifestation of globalization. Lowering trade and investment barriers has created a surge in foreign direct investment over the last two decades (UNCTAD 2002). In fact, since the mid-1990s intracompany trade (trade within the value chains of companies) has exceeded arm's length trade. The influence of external markets on domestic policy may stem from the policies of the dominant trading partner. If country A absorbs a significant proportion of country B's exports, then country B can be expected to mimic or respond to the policies of country A. In other words, some type of Vogel's (1995) "California Effect" can be expected to work for ISO 14001 through dyadic trade linkages. Governments may actively promote ISO 14001 if their economies rely on exporting to countries with high levels of ISO 14001 adoption rates (Roht-Arriaza 1997). Further, many claim that adopting ISO 14001 will become a de facto condition of doing business: firms that outsource their operations sometimes require that their suppliers adopt ISO 14001: Ford and GM have announced that they will require their first-tier suppliers to receive ISO 14001 certification by 2003/2004 (Coglianese and Nash 2001).⁴ Thus, we propose that:

H1a: ISO 14001 adoption rates will be higher in countries whose major trading partners have adopted ISO 14001.

Globalization convergence pressures may also flow through the channels of the governmental and nongovernmental ties that countries hold. Governments can join a range of intergovernmental organizations and regimes such as the European Union and the World Trade Organization. Citizens can join likewise international nongovernmental organizations ranging from Greenpeace to the

⁴ There is an empirically limited (Jaffe et al. 1995) but powerful argument that firms increase foreign investment to avoid stringent domestic environmental laws. The policy implication of such "industry flight" and "pollution haven" hypotheses is that to retain jobs, governments may come under pressure to create a "level playing field." And creating barriers to outward foreign investment and foreign trade could achieve this objective. Widespread adoption of ISO 14001 may preempt the proliferation of such nontariff barriers under the guise of environmental protection. Such races to the bottom are rare because MNCs seldom base their foreign investment decisions on environmental costs alone. As Dunning's (1993) Organization-Location-Internalization framework demonstrates, foreign investment decisions are fairly complex. Firms consider costs of adopting different business models across countries and the liability issues stemming from industrial disasters in subsidiaries operating in developing countries (Bhopal being a case in point). Further, most of the foreign investment in the last decade is within the "triad" of developed countries (UNCTAD 2002) that have comparable levels of environmental regulations.

International Political Science Association. Networks of international organizations, governmental or nongovernmental, can serve as the conduit through which countries and their citizens exchange ideas, develop common understanding, and perhaps even pressure each other to adopt common practices. Consequently, we propose that

H1b: ISO 14001 adoption rates will be higher in countries whose governments have joined more intergovernmental international organizations.

H1c: ISO 14001 adoption rates will be higher in countries whose citizens have joined more nongovernmental international organizations.

Domestic Political Context

Many scholars skeptical of the convergence hypothesis point to the stickiness and durability of extant domestic regulatory institutions. Regulatory institutions are outcomes of long-drawn policy struggles and represent domestic compromises (Berger and Dore 1996) and domestic groups are unlikely to easily agree to costly changes in regulatory systems. Bureaucratic actors may have incentives to preserve their organizations whose mandates are tied to specific regulatory approaches. The domestic political context may influence country-level responses to both intergovernmental and nongovernmental regimes. After all, such regimes are implemented in domestic contexts where governmental regulatory systems set the rules of the game.

Raustiala's (1997) analysis of the Convention of Biodiversity Protocol identifies the crucial role of domestic regulatory institutions and politics in influencing varying U.S. and British responses to this regime. Kollman and Prakash (2001) extended this argument to nongovernmental regimes by arguing that domestic regulatory styles crucially influence their adoption rates. Because nongovernmental regimes operate in the shadow of public institutions, their adoption depends on their fit with extant regulatory institutions. As we describe below, in the context of ISO 14001, three aspects of the domestic regulatory context are of importance: regulatory stringency, regulatory flexibility (Scholz 1991; Winter and May 2001), and levels of litigiousness (Kagan and Axelrad 2000).

Regulatory stringency refers to the severity of pollution limits that mandatory government regulations place on firms. When government regulations are stringent the relative cost of joining ISO 14001 is lower because firms may already have strong environmental management systems (EMS) in place to adhere to government regulations. Regulatory flexibility refers to the degree to which governments refrain from fully sanctioning discovered violations, including those that firms voluntarily self-report. Governments want firms to comply with regulations; firms that self-police through nongovernmental regimes such as ISO 14001 significantly ease regulatory burdens (Coglianese and Nash 2001; Environmental Protection Agency 1999; Potoski and Prakash 2004a). To encourage firms to join ISO 14001, regulators can offer deserving firms tangible incentives such as for-

giving regulatory violations and offering other forms of regulatory assistance. ISO 14001 may serve firms as a low-cost signal of their cooperative intents that allows regulators to differentiate the credible cooperative signals from the not so credible ones (Potoski and Prakash, 2004b).⁵ We therefore propose that:

H2: ISO 14001 adoption rates will be higher in countries where regulations are stringent.

H3: ISO 14001 adoption rates will be higher in countries where regulators flexibly enforce these regulations.

The external audits that accompany ISO 14001 certification may uncover regulatory violations (Pfaff and Sanchirico 2000) so that subscribing firms may want governments to promise immunity from sanctions (Kollman and Prakash 2001). Regulators' ability to grant such flexibility and firms' perceptions about whether the flexibility is durable and effective crucially depends on the legal and political contexts. In a regulatory culture steeped in litigation, firms may be wary of joining a nongovernmental regime. For reference, unlike the United Kingdom, the U.S. regulatory culture is highly litigious (Vogel 1986), fraught with what Kagan (1991) has called "adversarial legalism." Former EPA Director William Reilly (1999) reports that more than 70% of EPA's rulings have faced judicial challenges (but see Coglianesse 1996). In such a litigious regulatory climate, regulators may be 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,

H4: ISO 14001 adoption rates are likely to be higher in countries with lower levels of environmental litigation.

Domestic Economic Context

As with the political context, the economic contexts may influence country-level convergence to regulatory mode. This is especially important in our case because ISO 14001 is a nongovernmental regime whose adoption is not backed by legal sanction. Firms must find (and communicate) reasons in the economic environment to justify their adoption of a new regulation.

A key attribute of the economic environment is countries' level of affluence. ISO 14001 signals firms' commitment to safeguarding the environment. If environmental amenities have positive income elasticity (Grossman and Kreuger 1995), ISO 14001 adoption rates should be higher in wealthier countries. Thus, we propose:

⁵The effects of flexibility and stringency on ISO 14001 certifications may be related; flexibility may have a stronger influence when regulations are stringent. In our analyses below, we ideally would include an interaction term between these two measures. However, this is not feasible, given the high correlation between them ($r = .75$).

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

We expect ISO 14001 adoption rates to be influenced strongly by levels of competition. Countries where it is easy to establish new firms—those with 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 (Porter and van der Linde 1995). Therefore,

H6: ISO 14001 adoption rates are likely to be higher in countries with low market-entry barriers.

In market economies, firms seek to develop and market products that consumers want. Competition creates the need for product differentiation. Previous research suggests that firms that are closer to the final consumer and spend a significant portion of their sales on advertising are more likely to join nongovernmental environmental regimes (Arora and Casson 1996). Such firms want to take advantage of their superior environmental attributes. 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 while providing 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. For such brand-focused companies, ISO 14001 is less helpful because consumers seldom link facilities (which receive ISO 14001 certification) to products (Prakash 2002). For companies that lack brand identities, ISO 14001 certification may provide a brand-like differentiation for their products. 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 a corporation's products. Because ISO 14001 certification is provided at the facility level, it enhances corporate image. In short, ISO 14001 functions as a corporate-level brand; when product level branding is strong, corporate-level branding is less valuable. One can therefore expect that in countries where product branding levels are high, ISO 14001 adoption rates will be low. Therefore,

H7: ISO 14001 adoption rates will be higher in countries with low levels of product branding.

Data and Methods

To investigate these hypotheses about factors influencing country-specific ISO 14001 adoption rates, we compare ISO certification rates across 59 countries. Our sample is smaller than ideal because to test the wide range of variables we had to cull data from many sources, and countries listed in these sources did not

entirely overlap. We believe, however, that our sample is representative because it includes countries at different levels of development and from across continents. Our dependent variable is the number of ISO 14001 certified facilities in each country as reported in the 10th cycle of the ISO 14001 census (ISO 2001).⁶ Our independent variables measure countries' dependence on exports, their integration with networks of international governmental and nongovernmental organizations, their domestic political and economic contexts, plus controls. These data are drawn from a variety of sources, as discussed below.

Ideally, we would conduct a dynamic panel analysis of ISO 14001 certifications over time. Unfortunately, data limitations preclude such an analysis at this time. Nevertheless, we strongly believe that this cross-sectional analysis provides valuable insights on factors that influence cross-national convergences. Also, sometimes diffusion patterns reflect an S-shaped curve, with an initial slow rate of adoption, followed by a period of rapid adoption and concluded with a period of slow adoption (Rogers 1995). Because ISO 14001 was launched in 1996, data for only six years are available. We have examined the growth rates of ISO 14001 for all countries together, individual countries and subsets of countries. We do not find an S-curve pattern. Although diffusion rates seem to be picking up, it is difficult to assume that these are following an S-shaped pattern.⁷ In sum, our cross-sectional study of ISO 14001 adoption provides useful empirical and theoretical insights on factors influencing convergence in a key nongovernmental regime. There is no *a priori* reason to believe that ISO 14001 adoption will follow

⁶ Arguably, our dependent variable might be the number of certified facilities as a proportion of total number of certifiable facilities. Data on total number of certifiable facilities are not available. Hence, we take GNP adjusted for purchasing power parity (PPP) as a proxy. PPP adjusted GNP is not a perfect proxy for total number of certifiable facilities because the number of facilities per dollar of GNP may vary across countries. Variations in value chain organization imply that number of facilities per dollar of GDP vary. In response to this issue, we have taken PPP adjusted GNP, and not GNP per se, as a control variable. The reason is that a consumption basket that a dollar can purchase varies across countries. We are assuming that this variation in selling prices reflects variations in ways in which the value chains and the production systems are organized.

⁷ Diffusion rates can be viewed as a function of the "demand" for the new innovation in terms of the fit of the innovation with the characteristics of the target audience, the "supply" of the new innovation in terms of the attributes of innovator and the characteristics of the channels through which the information on the innovation is communicated. Conscious strategies and policy choices can alter both the demand and supply side of the innovation. For example, instead of relying on advertisements to generate interest in the new product in the early adoption stage, some firms seek to speed up the process by distributing free samples (AOL and Procter and Gamble are two examples). In this scenario, unlike the predictions of an S-shaped curve, diffusion rates accelerate in the early adoption phase but decelerate in subsequent stages. The issue of diffusion growth patterns gets more complicated where the innovation creates network externalities and when there are competing innovations vying to satisfy the same needs. The nondiffusion of the Dvorak keyboard and the successful diffusion of the inefficient QWERTY keyboard suggest that the diffusion story is very complex with no clear pattern. The tapering off of ATM(s) users at about 30% of the target audience (Rogers 1995) clearly indicates that even "efficient" innovations may not get widely adopted (the same holds for the use of seat-belts where significant demographic variations persist).

an S curve. Instead, diffusion politics vary across countries and are crucially influenced by both international and domestic factors.

International Context

We use three measures of the international context. First, our measure of a country's international trade context is based on the export value of its foreign trade, weighted by the partners' level of ISO14001 certification. If convergence pressures operate via trade relations, countries whose major export partners have higher ISO 14001 adoption rates should in turn have higher certification levels. Following Guler, Guillen, and MacPherson (2002), we calculate each country's international trade context as:

$$\text{International trade}_{it} = \sum_j \text{ISO}_{jt-1} \times (\text{Exports}_{ij} / \text{Exports}_i)^2$$

Where ISO_{jt-1} is the number of ISO certifications in country j at time $t - 1$, Exports_{ij} is country i 's exports to country j , Exports_i is country i 's total exports. Trade data are from Feenstra (2000). If convergence pressures flow via trade relations, then countries with higher trade linkages should have higher levels of ISO 14001 adoptions (H1a).

Globalization convergence pressures may also operate through networks of intergovernmental and nongovernmental organizations. Convergence pressures are likely to be stronger in countries whose government (H1b) and citizens (H1c) join more international organizations. *Governmental international membership* measures the number of intergovernmental international organizations a country's government has joined, as recorded in the 1997 *Yearbook of International Organizations* (Union of International Associations 1997).⁸ *Citizen international membership* measures the number of nongovernmental international organizations a country's citizens have joined, as reported in the 1997 *Yearbook of International Organizations* (Union of International Associations 1997).

Domestic Political Context

Data on regulatory flexibility and stringency are drawn from the Global Competitiveness Report (GCR; World Economic Forum, 2002). This report presents data from key international institutions as well as original survey data gathered from the World Economic Forum's Annual Executive Opinion Survey. This survey was administered to 4801 managers in 75 countries representing 90% of the world's GDP and more than 80% of its population. The questions posed to

⁸As another way of measuring political integration into global communities, we also examined whether or not a country is a member of the European Union. This measure was not statistically significant and did not change our results presented here. We omit this measure to conserve space.

respondents regarding their perceptions of *regulatory flexibility*, *regulatory stringency*, *entry barriers*, and *product branding*, are listed in the appendix.

We measure 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 that firms in litigious legal contexts should be less likely to join ISO 14001 (H2). Since we are aware of no direct measures of levels of environmental litigation per country, we turn instead to a simple proxy measure: the number of environmental law firms in each country (*environmental law firms*). Our argument 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—a large number of law firms may well be associated with a smaller number of cases litigated per law firm, the average number of partners and associates in law firms may vary across countries, lawyers may perform different task in some countries—we believe that it adequately captures levels of environmental litigation. Data on number of environmental law firms was taken from the Martindale-Hubbell International Law Directory, which provides detailed profiles of more than 12,000 law firms and 124,000 lawyers in over 160 countries (Martindale-Hubbell 2001).

In their day-to-day operations, managers encounter several types of environmental regulations. For most firms, three categories of environmental regulations pertaining to the three media (air, water, and land) are most important. 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. The variable is scaled so that its mean is zero and standard deviation is one.

Domestic Economic Context

Domestic economic factors influence ISO 14001 adoption rates in several ways. Consumers in wealthier countries may demand that firms adopt more environmentally progressive policies (H5). Our measure of national wealth, *GDP per capita* (adjusted for purchasing power parity), is drawn from the 2002 World Development Report (World Bank, 2002). ISO 14001 certification provides firms in highly competitive markets with means to differentiate themselves (H6). *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 competitors, as reported by managers in the GCR survey (see the appendix). Finally, because ISO 14001 can signal firms' commitment to progressive environmental policies, firms are more likely to join this regime in countries where product branding is weak (H8). *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 the appendix).

Control Variables

In examining country-level variations in the adoption of ISO 14001 regime, we need to control for the total number of facilities that can potentially adopt this regime. We use gross domestic product adjusted for purchasing power parity, *GDP*, as a proxy for total number of certifiable facilities. Second, citizens' perceptions of environmental quality may be reflected in countries' pollution emissions. When pollution levels are high, citizens may demand that governments and firms adopt policies to curb pollution. 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). 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 control for the number of ISO 9000-certified firms in each country. Data on ISO 9000 certification, *ISO 9000*, was taken from the 10th cycle of the ISO (2000) survey.

Empirical Model

To gauge the effects of countries' international environment and domestic political and economic contexts on ISO 14001 adoption, we estimate a negative binomial event-count model of ISO14001 certifications. The independent variables include measures of the international context, domestic political and economic contexts, and controls. Our choice of functional form is driven by the fact that we need to use an event-count model because the ISO 14001 certifications are discrete events with a nonnormal distribution (King 1989; Maddala 1983). In the analysis below, the estimated value of the parameter alpha is greater than zero, 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. 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

This paper examines an important case for expected convergence; ISO 14001 is a nongovernmental regime that has been actively sponsored by firms and that outlines a regulatory approach that firms favor. Yet, firms' responses to ISO 14001 have varied across countries. Based on our theoretical discussion, our expecta-

tions are that countries' international contexts as well as domestic political and economic contexts influence the overall ISO 14001 adoption rates. Table 1 presents the results of the event count analyses of the number of certified firms in 59 countries, including the discrete changes of statistically significant variables.

Turning first to the international context, convergence pressures can work through trade linkages as well as through networks of intergovernmental and nongovernmental organizations. Countries whose export trading partners have higher

TABLE 1
Countrywide 14001 Registrations, Negative Binomial Analyses

Independent Variables	Coefficient	Discrete Change
<i>International Context</i>		
International Trade	.304** (.101)	28.5
Governmental International Membership	-.703 (.250)	
Citizen International Membership	.928** (.420)	71.0
<i>Political Context</i>		
Regulatory Flexibility	.993** (.303)	73.3
Environmental Law Firms	-.005** (.001)	-42.7
Regulatory Stringency	.976** (.337)	142.2
<i>Economic Context</i>		
GNP per capita	2.20E-05 (2.75E-05)	
Entry Barriers	-.225 (.204)	
Branding	-.923** (.334)	-28.6
<i>Controls</i>		
Log of GNP	9.18** (.102)	239.1
ISO 9000	1.36E-04** 6.87E-06	17.1
CO ₂ Emissions	-.069** (.034)	-40.5
Constant	-21.7** (3.63)	
Alpha	.702	
Chi ²	780.79**	
N	59	

Notes: standard errors in parentheses.

** $p < .05$, two-tailed tests.

levels of ISO 14001 certifications themselves have higher certification levels. A two-standard-deviation increase in international trade (from one standard deviation below its mean to one standard deviation above) increases the number of ISO 14001 certified facilities by 28.5, holding the effects of other variables constant at their means. Very similar to Vogel's (1995) "California Effect," our analysis suggests that globalization pressures through trade linkages create incentives for ISO 14001 adoption, if the key export destinations have adopted this regime. Likewise, countries whose citizens join nongovernmental international organizations have more ISO 14001 certifications. A two-standard-deviation increase in citizen international membership increases the number of ISO 14001 certified facilities by 71.0, holding the effects of other variables constant at their means. Contrary to our expectations, *governmental international membership* was not significant. This makes sense because ISO being a nongovernmental regime, intergovernmental networks would perhaps play a smaller role in its diffusion.⁹

With regard to the political context measures, the results indicate that ISO 14001 adoption rates respond to the nature of regulatory enforcement as well as the stringency of environmental regulations. The coefficients for *regulatory flexibility*, *regulatory stringency*, and *environmental law firms* are statistically significant and in their hypothesized directions. A two-standard-deviation increase in *regulatory flexibility* increases the number of ISO 14001 certified facilities by 73.3, holding the effects of other variables constant at their means. A two-standard-deviation increase in *environmental law firms* decreases the number of ISO 14001 certified firms by 42.7, holding the effects of other variables constant at their mean.¹⁰ Likewise, a two-standard-deviation increase in *regulatory stringency* increases the number of ISO 14001 certified firms by 142.2. Thus, both the stringency of governments' environmental regulations and the nature of firms-regulators interactions matter. When governmental regulations are stringent but enforced flexibly and litigation threats are low, ISO 14001 adoption rates are higher. 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.

The results in Table 1 also show that economic and market factors offer powerful explanations for firms' ISO 14001 decisions. Citizens in wealthier countries

⁹ While membership to INGOs and IGOs are highly correlated ($r = .61$), IGO membership remains insignificant even after dropping the former from the model. IGO membership may not be significant because of its small variance. Most countries are now members of several IGOs. For governments, this is a way to gain legitimacy both externally and internally. We are grateful for John Boli's suggestions on these issues.

¹⁰ Arguably, in countries where there is a constant threat of lawsuits, regulators will be inclined to be less flexible and "go by the book" (Bardach and Kagan 1982). However, flexibility and environmental law firms are only moderately correlated (.30).

may demand more environmental protection and thus influence ISO 14001 certification rates (H5). However, controlling for other factors, countries with wealthier citizens do not have more certified firms. This may be due to the fact that our control variable, *CO₂ emissions*, is strongly correlated with GNP per capita ($r = .73$). Countries with more pollution emissions have fewer ISO 14001 certifications, perhaps an indication of lower pollution concerns among citizens in these countries. A two-standard-deviation increase in *CO₂ emissions* reduces the number of ISO 14001 certifications by 40.5, holding constant the effects of other variables. 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 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 environmental leaders. Countries with stronger and more developed product brands have fewer ISO 14001 registered firms (H7). A two-standard-deviation increase in *product branding* decreases the number of ISO 14001 registrants by -43.7 , holding the effects of other variables at their mean. This suggests that in countries with weak product brand identities, ISO 14001 may help firms distinguish themselves by signaling their commitment to environmental protection. Contrary to theoretical expectations (H6), access to local markets did not significantly affect numbers of ISO 14001 certified firms.

One way to shed light on our analyses is to compare two countries, one high in ISO 14001 certifications and the other with fewer certifications. Germany has many ISO 14001 certifications, 1,260, a large number even controlling for the size of its economy. Its environmental regulations are among the most stringent in our sample, and it has relatively few environmental law firms. Germany is highly integrated into global society with the second most nongovernmental organization memberships. Nicaragua, in contrast, has only one ISO 14001 certification and is among the countries with the least trade and organizational membership globalization and least stringent environmental regulations.

Overall, these results suggest a mixed view on the convergence hypothesis. As the convergence hypothesis suggests, countries have more ISO 14001 certifications when they are more heavily embedded in the international context via strong export ties with heavily ISO 14001 certified countries and membership in nongovernmental international organizations. Yet, contrary to the convergence hypothesis, certification patterns have become more varied across countries over time. In fact, domestic factors have important bearing on countries' ISO 14001 adoption rates. The regulatory context, as captured in the stringency, litigiousness, and enforcement flexibility of environmental regulations affects ISO 14001 certification levels. Countries' domestic economic contexts matter as well. Unlike previous research that found that firms with highly developed brands are more likely to join nongovernmental regimes (Arora and Casson 1996), our analysis suggests that ISO 14001 itself functions as a brand, allowing firms lacking established brands to differentiate their products.

Conclusion

This paper explored globalization's convergence hypothesis in the context of an important nongovernmental regime. Notwithstanding ISO 14001's active promotion by firms and that the regime encourages a business-friendly process-based regulatory system, ISO 14001 certification rates across countries vary greatly, a variance that has increased over time. The paper demonstrated that levels of embeddedness in trade networks and nongovernmental organization networks as well as domestic contexts (varieties of capitalism) in which firms operate have a crucial bearing on country-level responses to nongovernmental regimes.

Our paper has implication for the "varieties of capitalism" literature (Hall and Soskice 2001). Some claim that enduring domestic institutions can impede convergence (Berger and Dore 1996; Kitschelt et al. 1999). Our paper found that while some institutions discourage ISO 14001 adoption, others do not. Hence, the role of domestic institutions in impeding or facilitating convergence is uneven and not amenable to generalizations.

Studying the influence of domestic institutions in the diffusion of nongovernmental regimes can provide valuable insights for the study of intergovernmental regimes. After all, nongovernmental regimes operate in the shadow of public law and institutions; their attractiveness for firms is crucially dependent on their fit with the extant public systems of regulations. Arguably, as nongovernmental regimes grow and perhaps even displace public regulation, the issue of fit may assume lower salience. In the foreseeable future, this seems unlikely. Whether "freer markets more rules" (Vogel 1996), especially more public regulation, will hold across issue areas remains to be seen; the prophets of the "borderless world" (Ohmae 1991) are not entirely convincing either.

Because most IPE regime scholars study the emergence and the efficacy of intergovernmental regimes agreed upon by states modeled as unitary actors—a common complaint against neorealists and neoliberal institutionalists—the issue of regime diffusion within countries has remained relatively understudied (exceptions include Sprinz and Helm 2000; Victor, Raustiala, and Sholnikoff 1998; Young 1999). This issue is especially important for nongovernmental regimes because their efficacy is contingent on being voluntarily accepted by domestic actors. On this count, our paper contributes by focusing on regime diffusion within countries and linking it to factors in the international as well as domestic political and economic contexts.

Merely asserting that domestic factors matter in regime efficacy does not tell much about which factors matter and why. This paper identifies important domestic factors by offering a theoretical logic for how they influence the diffusion of a nongovernmental regime. The importance of domestic regulatory institutions, their stringency, enforcement flexibility, and litigiousness suggests that nongovernmental regimes may not compromise environmental protection and abet "races to the bottom." Clearly, countries with stringent laws can remain attractive for firms if enforcement is flexible—of course, there could be "races"

(leading to some form of convergence) among countries in terms of offering greater regulatory flexibility.

This paper raises important questions for future research. First, if political and economic contexts influence variations in cross-country convergence rates, they influence variations within countries as well. For example, ISO 14001 data indicate that there are significant variations in certifications rates across states in the United States. Thus, future research could examine the robustness of our model in explaining such intracountry convergence.

A second critical issue pertains to the applicability of our model for understanding the diffusion of other types of nongovernmental regimes. Nongovernmental regimes vary on several characteristics such as which actor sponsors them, what incentives are provided to adopt them, who can join them, what they require of their members, and what sanctions are imposed on noncompliers (Cutler, Haufler, and Porter 1999). ISO 14001 has been established by a nongovernmental organization—ISO—and may require regulatory flexibility for firms to eagerly adopt. What about codes that have been established by industry associations such as the Sustainable Forestry Initiative? Do their diffusion dynamics differ from ISO 14001? Third, nongovernmental regimes 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 nongovernmental regimes.

Finally, this paper has sought to focus on firms in the study of IPE. While IPE scholars seek to study the interaction between politics and economics and how it impacts world politics, firms as an object of study have been relatively neglected. This is surprising on two counts. Along with states and markets, firms are important governance mechanisms for resource allocation and resource use (Williamson 1985). Second, the relative salience of firms vis-à-vis other governance structures in domestic economic activity as well as international trade and investment has increased in the last two decades (UNCTAD 2002). Why this neglect? This, in part, is because the great debates among neorealists, neoliberal institutionalists, and constructivists have (predominantly) focused on state behavior and viewed states as unitary actors. Of course, some scholars have examined the role of firms in domestic politics in shaping state preferences and strategies and examined the role of private authority in international affairs. Nevertheless, scholarly attention bestowed on firms as key actors in world politics remains inadequate, and this paper makes a modest attempt to refocus attention on firms in IPE research.

Appendix

Data from World Competitiveness Report

Flexibility of environmental regulations (Hypothesis 3)

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

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).

Entry into local markets (Hypothesis 6)

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

Extent of product branding (Hypothesis 7)

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

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