When do developing countries follow international regulatory benchmarks? Evidence from Latin America[1]

Andreas Fuchs[2] and Jale Tosun[3]

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Why do developing states choose to adopt the standards recommended by international organizations? Why do developing states rather adopt standards that are in line with those of a hegemonic country? These are the two research questions that guide this analysis in which we examine the adoption of air quality standards for ground-level ozone in 18 Latin American states between 1987 and 2010. By addressing these research questions we seek to bring together the literature on power politics and cross-national policy diffusion. Since 1987, the World Health Organization (WHO) publishes recommendations for the definition of air quality standards. Since 1973, the United States has air quality standards in place, which are, however, different from those recommended by the WHO. We employ a multinomial logit model and estimate the factors that drive the government decision to either adopt WHO standards, take over US standards, or introduce its own standards. Our results show that the degree to which a country is integrated in the globalized world is a good predictor for adopting ozone standards that are in line with the WHO recommendations. Also, Latin American states with foreign policy preferences close to the United States and those with a large export dependence are more likely to implement US standards rather than to develop own regulations.

Keywords: air quality standards; diffusion; Latin America; power politics; World Health Organization; United States.

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[2] Alfred-Weber-Institute for Economics, Heidelberg University, Bergheimer Strasse 58, 69115 Heidelberg, Germany, mail@andreas-fuchs.net

[3] Institute for Political Science, Heidelberg University, Bergheimer Straße 58, 69115 Heidelberg, Germany, jale.tosun@ipw.uni-heidelberg.de

1. Introduction

The definition of environmental standards in developing countries has received burgeoning scholarly attention (see, e.g., Desai 1998; Andonova, Milner and Mansfield 2007; Spatareanu 2007; Blackman et al. 2010; Coria and Sterner 2010; Caffera 2011; Spilker 2012). The literature has paid noticeable attention to the impact of competition for trade and investment for the stringency of environmental regulation, thereby producing some intriguing insights (see, e.g., Porter 1999; Neumayer 2001; Wheeler 2001; Andonova, Milner and Mansfield 2007; Bechtel and Tosun 2009; Rudra 2011; Perkins and Neumayer 2012; Baccini and Urpelainen 2013; Schulze and Tosun 2013). This prominent research perspective is based on the concept of regulatory competition and its further development by Vogel (1995), usually known as the trading-up effect. The overarching finding in this literature is that while the increase in trade volume leads to a reduction of environmental protection standards (see, e.g., Andonova, Milner and Mansfield 2007), trade with high-regulating countries and investment from these countries help to tighten the regulatory standards in developing countries (see, e.g., Prakash and Potoski 2006; Perkins and Neumayer 2012; Tosun 2013; Schulze and Tosun 2013).

Less attention has been paid to the design of environmental protection standards adopted by the governments of developing countries. There is good reason to expect that developing countries follow international models when defining their own standards. Often these countries lack the technical knowledge necessary for the development of regulation. As a result, developing countries tend to adopt two strategies. The first strategy is that they adopt guidelines promoted by international organizations directly as national standards (von Sperling and Chernicharo 2002: 108). Many international organizations provide detailed recommendations for the design of such standards. The World Bank Group, for instance, publishes the Environmental, Health, and Safety Guidelines, which are technical reference documents with general and industry-specific examples of Good International Industry Practice. The second strategy is that governments of developing countries directly copy developed countries' standards (von Sperling and Chernicharo 2002: 108). In preparation of the NAFTA, the Mexican government has, for instance, adopted many environmental protection standards which corresponded to the US standards (see, e.g., Bechtel and Tosun 2009; Heichel, Pape and Tosun 2013). These two strategies are acknowledged by the literature on cross-national policy diffusion, which stresses

that international organizations are only one of many different sources of policy templates. This strand of literature also emphasizes the role of peer countries, high-status countries, and hegemonic countries (see, e.g., Jordana and Levi-Faur 2005; Meseguer 2005).

Why do developing states choose to adopt the standards recommended by international organizations? Why do developing states rather adopt standards that are in line with those of a hegemonic state? These are the two research questions that guide this study on the adoption of air quality standards for ground-level ozone in 18 Latin American states between 1971 and 2010.[4] Limit values for ground-level ozone concentrations were chosen since there exist recommendations by the World Health Organization (WHO) for the level at which they should ideally be defined. Apart from the fact that it has served as an ideal laboratory for the analysis of policy diffusion (see, e.g., Meseguer 2004; Jordana and Levi-Faur 2005; Weyland 2005), the empirical focus of this study lies on Latin America since we can easily identify one developed country, which we expect to have served as a model for definition of ozone standards: the United States. Several influential studies in the field of international relations and international political economy have highlighted the role of the United States for developing and promoting rules and standards that then affect other states' behaviour (see, e.g., Simmons and Elkins 2004). In the more specific case of Latin America, the United States has been an import economic and political power in the entire region (see, e.g., Phillips 2005; Gallagher 2009).

Our theoretical model aims to bring together two strands of literature. The first one is the body of research on policy diffusion (see, e.g., Meseguer 2005; Braun and Gilardi 2006; Dobbin, Simmons and Garrett 2007; Meseguer and Gilardi 2009; Gilardi 2012), which is mostly concerned with different types of diffusion mechanisms. The second literature concentrates on international power politics and the role powerful states play for influencing the behaviour of other states (see, e.g., Ikenberry 2000; Drezner 2007; Simmons and Elkins 2004; Elkins 2010; Schneider and Urpelainen 2013). We are interested in understanding to what extent developing

[4] In line with the literature (see, e.g., Jordana and Levi-Faur 2005) we excluded Guyana, Suriname, and French Guiana due to their very low population density, and, in the case of French Guiana, because of its status as a French overseas department. We also had to exclude many countries in the Caribbean since they are not sovereign (e.g. Puerto Rico) or sovereign but still very much affected by the former colonial powers (e.g. Dominica). Finally, Cuba is not taken into account because of its difficult relationship with the United States, which is obviously problematic given the research interest of this study.

states follow regulatory recommendations by international organizations or powerful states. Which 'source of external inspiration' (Elkins 2010: 987) is more effective?

The remainder of this study is structured as follows. In the next section we provide some background knowledge about the recommendations of the WHO for ground-level ozone concentrations as well as the standards defined by the US Environmental Protection Agency (EPA). We then proceed in outlining the theoretical argument, which results in the formulation of our hypotheses. Subsequently, we introduce the data and explain the empirical strategy. In the following section we present and discuss our estimation results. The final part summarizes our findings, explains how this study contributes to the state of research and draws some more general conclusions.

2. World Health Organization and the United States: Two benchmarks for developing countries

This study is interested in how developing countries design regulatory standards in general and air quality standards in particular. More precisely, the dependent variable of this study refers to the the definition of limit values for ground-level concentrations of ozone in ambient air. Limit values represent a typical example of 'command and control' instruments used in environmental policy. The 'command' aspect inherent to this type of instrument relates to the setting of limit values, i.e., the maximum level of permissible pollution, whereas the 'control' aspect is about monitoring and enforcing them.

There are two principal types of environmental command and control instruments, namely emission standards and ambient standards. An emission standard specifies the maximum level of permitted emissions, whereas ambient standards set the minimum desired level of air or water quality, or the maximum level of a pollutant, that must be maintained. In terms of measurement, emission and quality standards yield the advantage that they provide interval-scaled numerical values, which facilitates their quantification and the subsequent analysis. However, in contrast to emission standards, the ambient standards possess the additional advantage that they do not differentiate between sources of pollution, which turn them into an ideal subject for cross-country comparison (Tosun 2013).

Ozone is a naturally occurring greenhouse gas formed as a product of photochemical reactions with the following precursors: nitrogen oxides, methane, carbon dioxide, and volatile organic compounds. Ozone is hence not emitted directly into the air, but is formed by the reaction with other substances in the presence of heat and sunlight. These substances are emitted by a variety of sources, including motor vehicles, electric power plants, chemical plants, and refineries. Together with the other greenhouse gases, ozone in various ways contributes to climate change.

In addition to the implications for climate change, high ozone concentrations have some directly noticeable harmful impacts on human health. In response to the serious impact of ozone on human health, the WHO in 1987 started to issue recommendations for ground-level ozone concentrations. Following the first comprehensive publication of a compendium of quality standards for selected air pollutants – i.e. the *WHO Air Quality Guidelines for Europe* –, the international organization has repeatedly subjected its recommendations to scrutiny by adapting the guidelines to progress and empirical evidence in health sciences (in 1997, 2000 and 2005). The WHO Air Quality Guidelines are explicitly designed to provide valid and reliable data on the effects of different air pollutants on human and public health and to derive universally applicable limit values. It is the provision of continuously updated, scientifically sound information that should render the adoption of the WHO recommendations, in principle, attractive for both developed and developing countries. The European Union, for example, bases its own standards on the WHO recommendations, even though the European standards do not always match exactly with those prescribed by the WHO (Wettestad 2002; Tosun 2013).

Internationally, the United States was a pioneer in establishing air quality standards with the adoption of Clean Air Act in 1970, predating regulatory efforts taken, for example, by the European states (Vogel 2003: 559-560). The corresponding National Ambient Air Quality Standards establish standards for pollutants considered harmful to public health and the environment. Standards for ground-level ozone concentrations were defined in the National Ambient Air Quality Standards of 1971, 1979, 1997, and 2008. Many states have followed the US EPA standards (see, e.g., Vogel 2003; Kochtcheeva 2009), especially in the back in the 1970s and 1980s.

What should be noted, however, it that the recommendations of the WHO and the standards of the US EPA do not concur. In 2013, the WHO recommendation for ground-level ozone concentrations (8-hour average) was 100 $\mu g/m^3$, while the US standard was 147 $\mu g/m^3$. And for the sake of completeness, it should be added that the European standards was 120 $\mu g/m^3$. Facing two models of air quality regulations, what are the factors driving the government decision to follow one of these benchmarks? When do countries decide to implement their own standards?

3. Theoretical argument and hypotheses

The starting point of our theoretical model is the literature on policy diffusion, which highlights the importance of four mechanisms: learning, emulation, coercion, and economic competition (see, e.g., Dobbin, Simmons, and Garrett 2007).[5] Learning is conceived as the process of changing preferences due to the availability of social knowledge (see Haas 1980). Put more directly, a government may adopt a policy in place elsewhere because it regards it as an appropriate solution to a given problem (Gilardi 2010, 2012). Thus, instead of embarking on a costly search for appropriate solutions at the national level, governments can rely on the solutions recommended by other jurisdictions or international organizations.

The second mechanism is based on the idea that policy diffusion is related to the notion of social acceptance (Dobbin, Simmons and Garrett 2007: 452). There exist different ways in which a policy innovation can become socially accepted. We here focus on the process of emulation, which is about policy makers in one country who follow the behaviour of policy makers in another country because they are peers or because they are regarded as "high-status countries that are considered to know best" (Meseguer 2005: 73). The drive behind emulation is the search for social acceptance by demonstrating conformity with the behaviour of other states (see, e.g., Meyer et al. 1997; Braun and Gilardi 2006).

The next mechanism is coercion, which can basically be defined as a situation in which policy choices of countries are constrained. Dobbin, Simmons and Garrett (2007: 454-457) discuss

[5] It should be noted that there is disagreement in the literature as to whether coercion constitutes a diffusion mechanisms since some authors argue that diffusion is restricted to voluntary behaviour (see, e.g., Gilardi 2012).

coercion by referring to the concepts of conditionality, policy leadership, and hegemonic ideas. Powerful countries may require third states to adopt certain rules directly or indirectly by acting through international institutions (conditionality). In this context, Schneider and Urpelainen (2013: 14) argue that the United Nations, the Bretton Woods institutions, the General Agreement on Tariffs and Trade, and North Atlantic Treaty Organization among others have been established and promoted by the United States in an effort to spread its liberal economic and political ideas. According to Gruber (2000; cited in Dobbin, Simmons and Garrett 2007) powerful states may influence decisions taken by weak ones even without an intention to do so (policy leadership). This is achieved by altering the nature of the status quo face. The example given is that United States' decision to engage in free trade with Canada stimulated the Mexican government to engage in free trade as well. Finally, hegemonic ideas are about the prevalence of certain policy ideas. Powerful countries can influence the framing of policy discussions because they have a better research infrastructure (Dobbin, Simmons, and Garrett 2007: 456).

The fourth mechanism highlights the importance of economic competition for the diffusion of policy innovations. The logic underlying this mechanism is that the competition for trade and investment affects the incentives for policy makers for whether or not to adopt policy prescriptions (see, e.g., Bechtel and Tosun 2009). Several empirical studies point to the relevance of economic competition for policy diffusion (see, e.g., Prakash and Potoski 2006; Cao and Prakash 2012; Schulze and Tosun 2013).

The literature on international power politics places heavy emphasis on the role of a hegemon or a powerful state in global governance (see, e.g., Simmons and Elkins 2004). Yet this perspective can be integrated in the policy diffusion framework through two mechanisms: emulation and coercion. The emulation perspective captures the potential impact of powerful states to the extent that they tend to be regarded as legitimate points of reference. The coercion perspective – unsurprisingly – highlights the power asymmetries between the states and how powerful states shape the behaviour of the less-powerful ones. In this context, it should be noted that a widely held diffusion assumption is that the spread of policies operates in a top-down direction, that is, that powerful states are not particularly influenced by the experiences of the less-powerful ones (Elkins 2010: 981-982). Essentially, what the perspective of international power politics and the

two diffusion mechanisms of emulation and coercion in essence convey is that the direction of interdependencies matter for the explaining which external source of policy inspiration is chosen. This also holds true for the diffusion mechanism of economic competition, which also argues that it is the key export market or investors that matter for selection among different types of policy prescriptions (see, e.g., Vogel 1995; Prakash and Potoski 2006). Seen from this perspective, the concept of policy diffusion can be seminally integrated with the idea of competing powerful states in a multipolar world (see, e.g., Drezner 2007; Schneider and Urpelainen 2013). The mechanism of learning is different from the previous ones to the extent that it does not presupposed any type of directionality or asymmetry in the relationships between states.

With the case at hand we have two sources of external policy inspiration that offer different prescriptions. Which source of external inspiration matters when there are competing regulatory points of reference? We argue that developing states are more likely to follow the WHO recommendations if they are integrated in the international system in such a way that they do not depend economically or politically too much on the United States. By the same token, the more developing states depend on the United States, the more likely they will adopt ozone standards that are in line with the US standards. The underlying reason for this is that the adoption of such standards is a comparatively cheap signal that states can send to the United States to demonstrate their conformity in anticipation of economic or political advantages (Bechtel and Tosun 2009). Based on this reasoning we put forward the following two hypotheses.

Hypothesis 1: The more a state depends on the United States, the higher the probability that it adopts air quality standards that are in line with those of the United States, ceteris paribus.

Hypothesis 2: The more a state is integrated with the international system, the higher the probability that it adopts air quality standards that are in line with the recommendations of the WHO, ceteris paribus.

In light of the empirical challenges to disentangling the different mechanisms of policy diffusion, regarding hypothesis 1 we only contend that this behaviour might be due to emulation, coercion

or economic competition, or even learning. As concerns hypothesis 2, we conceive the adoption of the WHO standards as an indicator for either learning or emulation. The WHO cannot be seen as an institution that possesses specific political or economic powers. Also, in marked contrast to the Bretton Woods institutions, the WHO does not represent an international organization that is regarded to promote the political ideas of the United States or any other state or group of states. Therefore, we assume that the WHO serves as a basis for learning processes. At the same time, the WHO recommendations are perceived globally and followed by a many states, which turn them into socially accepted standards, which developing states might want to adopt in an effort not to be left behind.

4. Research design

Dependent variable

Ozone standards represent an ideal policy item to test our hypotheses since the regulatory approaches are very similar across countries, thus increasing the comparability of the empirical data. Generally, limit values for ozone concentrations in ambient air are averaged over a specific time period. The standards for ozone concentrations in ambient air are averaged over a specific time period. For our purpose, all standards are converted in order to reflect the values for the 8-hour average.[6] As concerns the unit of measurement, the maximum 8-hour average ozone concentrations as defined by the US EPA are given by parts per billion (ppb) by volume. Again this entails the necessity of further transformation since some legal acts define standards by using micrograms per cubic meter of air ($\mu g/m^3$) as their measurement unit.[7] Based on these transformations, the standards are finally inverted (and multiplied by 1000) to allow for a more plausible interpretation of the ordering of values (i.e., higher values indicating stricter regulation) and as well as to be able to assign absent MPLs the value 0. This procedure produces a variable that ranges from 0 to 8.82 regulatory units. Since the values of the ozone standards once adopted do not vary much other time, we decided to work with a categorically distributed dependent variable.

[6] Based on the WHO guidelines the standards referring to 1-hour or 24-hour averages are converted into 8-hour averages by using the following formula: 8-hour average = 1-hour average / 1.5 and 8-hour average = 24-hour average / 1.5.

[7] The standards given in µg/m3 are converted in ppb by using the following formula: 1 ppb = 1.995 µg/m3.

We contrast the standards in place in the individual Latin American states with the WHO recommendations and the standards adopted by the US EPA. In this way, we generate our dependent variable:

$$adoption_{i,t} = \begin{cases} 0 \text{ if country has no limit values for ozone concentrations (" − ")} \\ 1 \text{ if country adopts own limit values for ozone concentrations ("other")} \\ 2 \text{ if country adopts US limit values for ozone concentrations ("USA")} \\ 3 \text{ if country adopts WHO limit values for ozone concentrations ("WHO")} \end{cases}$$

Where *i* denotes one of 18 Latin American countries and *t* refers to a particular year in the 1987-2010 period. While our observation begins in 1971 with the adoption of the US EPA standards, we narrow down the time frame to make sure that we cover the period in which the WHO recommendations are also available. Table 1 displays the respective value for each country under analysis of the 1987-2010 period. Figure 1 displays a map of the mode, i.e., the standard occurring the most frequently over this period of time. Figure 2 compares the evolution of the exact limits adopted by each country with those implemented by the US and the WHO since 1970.

Insert Table 1 about here

Insert Figure 1 about here

Insert Figure 2 about here

Variables of interest

We employ three variables to test whether dependence on the United States translates into a higher probability that a country adopts air quality standards that are in line with those of the US (Hypothesis 1). First, as a measure of political alignment, we use the (logged) distance to the US of a country's foreign policy preferences based on voting behaviour in the UN General Assembly (Bailey, Strezhnev and Voeten 2013). Ideal point distances have the advantage over usual measures of voting alignment that they capture a country's position vis-à-vis the United States along a single dimension: the US-led liberal order. This allows distinguishing between noise and meaningful shifts in foreign policy preferences. Second, to account for economic dependence, we use the United States's share in a country's total exports (data from UN Comtrade). We expect countries to be more likely to adopt US standards if the United States is one of their key

export markets. Third, we use net inflows of Official Development Assistance (ODA) from the US as a share of the recipient's GDP as an indicator of aid penetration (data from OECD-DAC).

In order to test Hypothesis 2, we use the KOF Index of Globalization as a measure of a country's integration with the international system (Dreher 2006; Dreher, Gaston and Martens 2008). The index is a composite indicator of three dimensions of globalization: Economic globalization captures actual economic flows and economic restrictions; social globalization is measured using data on information flows, personal contact and cultural proximity; and political globalization accounts for the number of embassies in a country and a country's participation in international organizations, UN Security Council missions and international treaties.

To get a better impression of our variables of interest, Table 2 ranks all countries under analysis by how close they are to the United States according to our three measures of US dependence over the 1986-2009 period. Moreover, countries are listed by their degree of globalization according to the KOF Index.

Insert Table 2 about here

Control variables

We control for a couple of variable to isolate the effects of US dependence and international integration. First, we control for a country's per-capita income and population size. Richer and larger countries possess research infrastructure and technical capacities to develop their own standards and are thus expected to be less likely to either follow US or WHO guidelines. Second, we control for a country's share of people living in urban areas and the per-capita CO2 concentration. Air quality standards should be more likely to be introduced in urban environments and countries suffering from environmental problems. Third, we control for trade openness, defined as the sum of a country's exports and imports over GDP. All these variables come from the World Development Indicators (World Bank 2014).

Fourth, we control for regime type using data from the Polity IV Project (Marshall, Gurr and Jaggers 2014). Polity is a 21-point index, where the largest value refers to a fully institutionalized democracy. Democracies are more likely to implement air quality legislation

since policymakers in such polities are constantly kept on his or her toes to work for re-election (Dai 2006: 697). When re-election concerns drive policy making, parties that form the government must be certain that their policy choices will maximize their electoral advantage. Given that environmental protection is a salient issue to the voters not addressing it could reduce the electoral advantage (see also, e.g., Desai 1998; Neumayer 2002). Fifth, we need take into account the rise of the left in Latin America, which has important implications for how the United States is perceived in those countries. With the shift of the ideological center of gravity to the left, some Latin American states have become anti-American (see, for example, Seligson 2007), which we expect to yield a negative effect on the likelihood of adopting US-style ozone standards.

Appendix 1 lists all variables employed, their exact definitions and sources. Appendix 2 provides the corresponding descriptive statistics.

Estimation method

Even though the ozone standards do not vary much other time, it is still plausible to hypothesize that states are, in principle, open to adopt standards of different levels over time, thus corresponding to those of the United States or the recommendations of the WHO or neither of the two. From this it follows that the likelihood of choosing either standard varies across the different types of regulatory models, which entails that there is situation in which governments face 'competing risks'. There are three different approaches to modeling competing risks: first, the stratified Cox model; second, the latent survivor time approach; third, the multinomial logit regression model. We here estimate *adoption* using a multinomial logit model since it is suited to explain heterogeneity across different types of outcomes in terms of covariates.

The adoption of limit values for ozone concentrations (*adoption*=1) that neither correspond those of the WHO or the US EPA represents our base outcome. We follow Carter and Signorino (2010) and add t, t^2 and t^3 as regressors to account for time dependence.[8] Standard errors are clustered at the country level. All explanatory variables are lagged by one year.

[8] Carter and Signorino (2010) show for a logit model that this simplistic approach outperforms time dummies and is not inferior to the usage of splined time.

5. Results

Table 3 presents our results. Before turning to the variables of interest, we analyse the results of our control variables. Compared to the base outcome of adopting own ozone limits, richer and larger countries appear to be less likely to follow US benchmarks, as suggested by the negative coefficients on *GDP p.c.* and *population* in column 2 (both significant at the one-percent level). This is in line with expectations: these countries possess better and more technical capabilities to develop their own standards and it may thus appear less attractive to rely on US standards. Moreover, the results show that richer and smaller countries are more likely not to introduce air quality legislation at all (significant coefficients at conventional levels in column 1). One explanation for this is that these countries are usually not that much affected by air pollution (lower population density) and therefore refrain from adopting any air quality standards. While income does not seem to affect adoption of WHO regulation, larger countries are more likely to apply international standards at the ten-percent level of significance (column 3). One possible explanation is that these countries are usually also more visible internationally and therefore might feel the need to legitimize the regulatory behaviour.

Insert Table 3 about here

Countries with a larger share of their population living in urban areas are more likely to follow US guidelines. The coefficient on *urban population* is positive and statistically significant in column 2. Countries that are more open to trade are more likely to not introduce any ozone limits, as suggested by the results on *openness* in column 1. This finding resonates well with the theoretical argument put forward by Andonova, Milner and Mansfield (2007), who adapt the logic of regulatory competition to the situation of developing countries. They argue that both the demand side and the supply side of politics can produce a negative relationship between enhanced exposure to competition and environmental policy. On the demand side, import-competing firms may lose market share to cheaper imports due to more stringent environmental policies, which should intensify the opposition to more costly environmental standards. On the supply side, governments that are trying to build coalitions for facilitating structural changes cannot afford to alienate key industrial interests. Hence, governments in emerging market

democracies might be reluctant to tighten their protection standards in order to preserve their comparative advantage, producing a 'stuck at the bottom' scenario (Porter 1999). Compared to the base outcome of own ozone limits, more pollutant countries in terms of CO2 emissions are less likely to not introduce air quality legislation and to adopt WHO standards but more likely to follow US guidelines, as shown by the significant coefficients on *CO2 p.c.*

As can be seen from the results for *polity*, more democratic regimes are more likely to develop their own regulatory standards. Compared to the base outcome of adopting own ozone limits, we find a negative coefficient for all three alternative outcomes. It seems that democratic governments invest resources to choose the regulatory standard that maximises voter satisfaction rather than simply adopting US or WHO benchmarks. In line with our expectations, *left* governments are less likely to adopt US standards (negative significant coefficient in column 2) and rather adopt WHO regulation (positive significant coefficient in column 3). This seems to reflect the internationalist stance of many left governments and the spread of anti-Americanism among left governments in Latin America. However, political orientation does not appear to affect the decision to introduce air quality legislation, as evidenced by the insignificant coefficient in column 1.

We now turn to our variables of interest. According to the insignificant coefficients on *political distance USA*, *export share USA* and *aid/GDP USA* in column 1, ties to the United States in terms of foreign policy preference, export dependency or aid penetration are not affecting the likelihood to not introduce aid quality legislation compared to the base outcome of adopting own standards. On the contrary, countries with foreign policy preferences close to the United States and those with a large export dependence are more likely to implement US standards rather than to develop own regulations. The respective coefficients show the expected signs and are significant at the one-percent level in column 2. This confirms Hypothesis 1. US aid penetration, however, does not appear to be associated with the adoption of US regulation (insignificant coefficient on *aid/GDP USA* in column 2). Ties with the United States seem to barely affect the likelihood to adopt WHO standards. Only the negative coefficient on *export share USA* reaches statistical significance but only at the ten-percent level.

Our results also support Hypothesis 2. More globalized countries are more likely to adopt WHO regulation rather than to rely on their own standards. The coefficient on *globalization* is positive as hypothesized and statistically significant at the one-percent level. This finding suggests that more globalized countries are more likely to engage in policy learning. Figure 3 presents the predictive margins of the coefficient of *globalization* (with all other coefficients at their mean) for probability of adopting ozone standards that are in line with the WHO recommendations. The probability increases notably once the mean value of *globalization* is surpassed.

Insert Figure 3 about here

Finally, we introduce two alternative sources of inspiration to test for the robustness of our results: the European Union and China. This approach is inspired by Drezner (2007), who argues that there are several economic super-powers that must be taken into account when explaining international regulatory politics. The European Union is one of the economic super-powers acknowledged by Drezner himself. We add China since in the last decade in particular it has become an important trading partner of the Latin American states, especially in the area of agricultural commodities.

Over the 1986-2009 period, joint exports to the three large EU countries (France, Germany and United Kingdom) outperformed US exports in Uruguay; EU aid penetration is larger than US aid penetration in 16 of 18 countries (all except Colombia and Panama); and distances in terms of foreign policy preferences from all Latin American countries are smaller to both the three large EU countries and China than to the US (see Appendix 3 for details). To test for the influence of these two alternative potential sources of inspiration, we extend our previous model of Table 3 with *political distance EU3*, *export share EU3* and *aid/GDP EU* (results in specification A in Table 4), and with *political distance China* and *export share China* (results in specification B in the same table).[9]

Insert Table 4 about here

[9] See Appendix 1 for exact definitions and sources of these variables. We cannot include a variable capturing Chinese aid penetration as China does not publish official aid statistics (see Strange et al. 2014 for discussion).

No consistent picture emerges. While high export dependency on the big three EU countries and China makes it less likely that US standards are adopted, high EU aid penetration increases the likelihood of such an outcome. The results of for other variables remain very similar. Most importantly, the positive coefficients on *export share USA* in column 2 (Hypothesis 1) and on *globalization* in column 3 (Hypothesis 2) retain their statistical significance at the one-percent level. *Political distance USA*, however, does not appear to be robust to the inclusion of the EU variables. This may be due to the high correlation of political distance USA and political distance EU (78.4%). A test for joint significance of both variables supports the idea that political closeness to the "West" makes it more likely that countries adopt US standards (p-value: 0.000).

6. Conclusions

In this study we analyse the conditions under which the WHO or the United States serve as models for regulatory standards adopted by the governments of Latin American states. Specifically, we examine the adoption of air quality standards for ground-level ozone in 18 Latin American states between 1987 and 2010. We test two hypotheses. First, we hypothesise that countries that are more dependent on the United States are more likely to adopt air quality standards that are in line with those of the United States, all else being equal. Measures of close foreign policy preferences, export shares and aid penetration are used to capture dependence on the United States. Second, we hypothesise that countries that are more integrated with the international system are more likely to adopt air quality standards that are in line with the recommendations of the WHO, ceteris paribus. Ozone limits represent an ideal policy item to test our hypotheses since the regulatory approaches are very similar across countries, thus increasing the comparability of the empirical data. We employ a multinomial regression model to test our predictions.

All in all, Latin American countries indeed take into account international models. Our estimation models showed that the degree to which a country is integrated in the globalized world is a good predictor for adopting ozone standards that are in line with the WHO recommendations, which lends support to our theoretical reasoning underlying Hypothesis 2. Remarkably, Latin American states with foreign policy preferences close to the United States

and those with a large export dependence are more likely to implement US standards rather than to develop own regulations. This lends support to Hypothesis 1. All in all, we found evidence that directionality of economic and political integration matters for which model is chosen.

Of course, this analysis is just a first step in addressing the questions raised in this study. We invite future studies to replicate our analysis by broadening the database. Another promising avenue for future research is to repeat this analysis for another issue that is regulated by a powerful state and an international organization. What we have also not taken into account is to what extent there are Latin American states that themselves serve as model for policy diffusion. Here, the focus was exclusively on the situation of top-down or vertical diffusion since we pursed to goal of integrating the literature on policy diffusion with that on international power politics. We advocate bridging the gap between these two strands of literature since their combination can help to develop more refined hypotheses and therefore enhance cumulative knowledge. In fact, we believe that question about how countries choose among different models for adopting policies is a very promising research perspective, which to our knowledge has been addressed by few studies only (Elkins 2010; Gilardi 2012; Schneider and Urpelainen 2013). Thus, we regard this study as one of the very initial steps in developing this emerging research agenda.

References

Baccini, Leonardo and Johannes Urpelainen (2013). Before ratification: Understanding the timing of international treaty effects on domestic policies. *International Studies Quarterly,* 58(1): 29-43.

Bailey, Michael, Anton Strezhnev and Erik Voeten (2013). *Estimating Dynamic State Preferences from United Nations Voting Data*. Available at: http://ssrn.com/abstract=2330913.

Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer and Patrick Walsh (2001). New Tools in Comparative Political Economy: The Database of Political Institutions. *World Bank Economic Review, 15*(1): 165-176.

Baumgartner, Frank R. and Bryan D. Jones (1993). *Agendas and Instability in American Politics*. Chicago: University of Chicago Press.

Baumgartner, F. R., Green-Pedersen, C., & Jones, B. D. (2006). Comparative studies of policy agendas. *Journal of European Public Policy*, *13*(7), 959-974.

Bechtel, Michael M. and Jale Tosun (2009). Changing economic openness for policy convergence: When can trade agreements induce convergence of environmental regulation? *International Studies Quarterly, 53*(4): 931-953.

Blackman, A., Lahiri, B., Pizer, W., Rivera Planter, M., & Muñoz Piña, C. (2010). Voluntary environmental regulation in developing countries: Mexico's Clean Industry Program. *Journal of Environmental Economics and Management*, *60*(3), 182-192.

Blossfeld, H., Golsch, K. and Rohwer, G (2007). *Techniques of event history modeling using Stata. New approaches to causal analysis*. Erlbaum, Mahwah.

Box-Steffensmeier, J. and Jones, B. (2004). *Event History Modeling*. Cambridge: Cambridge University Press.

Braun, D. and Gilardi, F. (2006). Taking `Galton's Problem' Seriously: Towards a Theory of Policy Diffusion. *Journal of Theoretical Politics, 18*(3): 298-322.

Cao, X. and Prakash, A. (2012). Trade competition and environmental regulations: Domestic political constraints and issue visibility. *Journal of Politics* 74, 66-82.

Carter, David B. and Curtis S. Signorino (2010). Back to the Future: Modeling Time Dependence in Binary Data. *Political Analysis, 18*(3): 271-292.

Caffera, M. (2011). The use of economic instruments for pollution control in Latin America: lessons for future policy design. *Environment and Development Economics*, *16*(3), 247-273.

Coria, J., & Sterner, T. (2010). Tradable permits in developing countries: Evidence from air pollution in Chile. *Journal of Environment & Development*, *19*(2), 145-170.

Damon, M., & Sterner, T. (2012). Policy Instruments for sustainable development at Rio+ 20. *Journal of Environment & Development*, *21*(2), 143-151.

Dai, X. 2006, 'The Conditional Nature of Democratic Compliance', *Journal of Conflict Resolution,* vol. 50, no. 5, pp. 690-713.

Desai, U. (Ed.). (1998). *Ecological policy and politics in developing countries: Economic growth, democracy, and environment*. Albany, NY: SUNY Press.

Dobbin, F., Simmons, B. and Garrett, G. (2007). The global diffusion of public policies: Social construction, coercion, competition, or learning? *Annual Review of Sociology* 33, 449-472.

Dreher, Axel (2006). Does globalization affect growth? Evidence from a new index of globalization. *Applied Economics, 38*(10): 1091-1110.

Dreher, Axel, Noel Gaston and Pim Martens (2008). Measuring Globalisation – Gauging its Consequences. New York, NY: Springer.
Drezner, D. W. (2007). *All politics is global*. Princeton University Press.
Elkins, Z. (2010). Diffusion and the Constitutionalization of Europe. *Comparative Political Studies*, *43*(8-9), 969-999.
Elliott, David C. (2002). TKNZ: Stata module to tokenize string into named macros, Statistical Software Components S426302, Boston College Department of Economics, revised 17 Oct 2006.
Gallagher, K. P. (2008). Trading away the ladder? Trade politics and economic development in the Americas. *New Political Economy*, *13*(1), 37-59.
Gilardi, F. (2010). Who learns from what in policy diffusion processes?. *American Journal of Political Science*, *54*(3), 650-666.
Gilardi, F. (2012) Transnational Diffusion: Norms, Ideas, and Policies. In: W. Carlsnaes, T. Risse and B. Simmons (Eds), Handbook of International Relations. Los Angeles: Sage.
Gruber L. 2000. *Ruling the World: Power Politics and the Rise of Supranational Institutions*. Princeton, NJ: Princeton Univ. Press
Heichel, Stephan, Jessica Pape und Jale Tosun (2013). Regulation of Industrial Discharges into Surface Water. In: Helge Jörgens, Andrea Lenschow und Duncan Liefferink (Hrsg.), *Understanding Environmental Policy Convergence: The Power of Words, Rules and Money*. Cambridge: Cambridge University Press, 64-103.
Howlett, M. and B. Cashore (2009). The Dependent Variable Problem in the Study of Policy Change: Understanding Policy Change as a Methodological Problem. *Journal of Comparative Policy Analysis* 11/1: 33-46.
Ikenberry, G. John. (2000) After Victory. Princeton, NJ: Princeton University Press.
Jordana, J., & Levi-Faur, D. (2005). The diffusion of regulatory capitalism in Latin America: Sectoral and national channels in the making of a new order. *The Annals of the American Academy of Political and Social Science*, *598*(1), 102-124.
Kingdon, J.W. (2002). *Agendas, alternatives, and public policies*. New York: Longman.
Knill, C., Schulze, K., & Tosun, J. (2012). Regulatory policy outputs and impacts: Exploring a complex relationship. *Regulation & Governance*, *6*(4), 427-444.
Kochtcheeva, L. 2009. Comparative Environmental Regulation in the United States and Russia: Institutions, Flexible Instruments, and Governance, Albany, NY: SUNY Press.
Neumayer, E. (2001). Pollution havens: An analysis of policy options for dealing with an elusive phenomenon. *The Journal of Environment & Development*, *10*(2), 147-177.
Neumayer, E. (2002). Do Democracies Exhibit Stronger International Environmental Commitment? A Cross-country Analysis. *Journal of Peace Research* 39/2: 139-64.
Magnani, E. (2001). The Environmental Kuznets Curve: development path or policy result? *Environmental Modelling & Software* 16/2: 157-65.
Majone, Giandomenico (2008). Agenda Setting. In M. Moran, M. Rein and R.E. Goodin (eds), *The Oxford Handbook of Public Policy*, Oxford: Oxford.
Marshall, Monty G., Ted Robert Gurr and Keith Jaggers, 2014, Polity IV Project: Political Regime Characteristics and Transitions, 1800-2013. Vienna, VA: Center for Systemic Peace.
Meseguer, C. (2004). What role for learning? The diffusion of privatisation in OECD and Latin American countries. *Journal of Public Policy*, *24*(3), 299-325.

Meseguer, C. (2005). Policy learning, policy diffusion, and the making of a new order. *The Annals of the American Academy of Political and Social Science*, *598*(1), 67-82.

Meseguer, C., & Gilardi, F. (2009). What is new in the study of policy diffusion?. *Review of International Political Economy*, *16*(3), 527-543.

Meyer, J.W., Frank, D.J., Hironaka, A., Schofer, E. and Brandon-Tuma, N. (1997) The structuring of a world environmental regime, 1870–1990. International Organization 51, 623-561.

Neumayer, E. 2001, 'Improvements without Convergence: Pressure on the Environment in European Union Countries', *Journal of Common Market Studies,* vol. 39, no. 5, pp. 927-937.

Neumayer, E. 2002, 'Do Democracies Exhibit Stronger International Environmental Commitment? A Cross-country Analysis', *Journal of Peace Research,* vol. 39, no. 2, pp. 139-164.

Perkins, R., & Neumayer, E. (2012). Does the 'California effect'operate across borders? Trading-and investing-up in automobile emission standards. *Journal of European public policy*, *19*(2), 217-237.

Phillips, N. (2005). US Power and the Politics of Economic Governance in the Americas. *Latin American Politics and Society*, *47*(4), 1-25.

Porter, G. (1999). Trade competition and pollution standards:"race to the bottom" or "stuck at the bottom". *The Journal of Environment & Development*, *8*(2), 133-151.

Prakash, A., & Potoski, M. (2006). Racing to the bottom? Trade, environmental governance, and ISO 14001. *American Journal of Political Science*, *50*(2), 350-364.

Rudra, N. (2011). Openness and the politics of potable water. *Comparative Political Studies*, *44*(6), 771-803.

Sabatier, P.A. and C.M. Weible (2007). 'The Advocacy Coalition Framework: Innovations and Clarifications', in: *Theories of the Policy Process,* ed. P.A. Sabatier. Boulder: Westview Press, pp. 189-220.

Schneider, Christina J., and Johannes Urpelainen. 2013. Distributional conflict between powerful states and international treaty ratification. *International Studies Quarterly* 57 (1):13–27.

Schulze, K. and Tosun, J. (2013) External dimensions of European environmental policy: An analysis of environmental treaty ratification by third states. European Journal of Political Research, DOI: 10.1111/1475-6765.12011.

Simmons, Beth A., and Zachary Elkins. (2004) The Globalization of Liberalization: Policy Diffusion in the International Political Economy. American Political Science Review 98 (1): 171–189.

Seligson, M. A. (2007). The rise of populism and the left in Latin America. *journal of Democracy*, *18*(3), 81-95.

Spatareanu, M. (2007), Searching for the Pollution Havens – The Impact of Environmental Regulations on Foreign Direct Investment, *The Journal of Environment and Development*, 16 (2), 161–182.

Spilker, Gabriele 2012. Helpful Organizations: Membership in Inter-Governmental Organizations and Environmental Quality in Developing Countries. British Journal of Political Science 42(2): 345-370.

Strange, Austin, Bradley Parks, Michael Tierney, Andreas Fuchs and Axel Dreher (2014). Tracking under-reported financial flows: China's development finance and the aid-

conflict nexus revisited. University of Heidelberg Department of Economics Discussion Paper Series No. 553. Heidelberg, Germany: Heidelberg University.
Tosun, Jale (2013). *Risk Regulation in Europe: Assessing the Application of the Precautionary Principle*. New York: Springer.
Vogel, D. (1995). *Trading Up: Consumer and Environmental Regulation in the Global Economy*. Cambridge, M.A: Harvard University Press.
Vogel, D. (2003). The hare and the tortoise revisited: The new politics of consumer and environmental regulation in Europe. *British Journal of Political Science*, *33*(4), 557-580.
Volden, Craig and Charles R. Shipan (2008). The Mechanisms of Policy Diffusion. *American Journal of Political Science* 52(4): 840-857.
von Sperling, M., & Augusto de Lemos Chernicharo, C. (2002). Urban wastewater treatment technologies and the implementation of discharge standards in developing countries. *Urban Water*, *4*(1), 105-114.
Wettestad, Jørgen (2002). Clearing the Air - European advances in tackling acid rain and atmospheric pollution. Aldershot: Ashgate.
Weyland, K. G. (2005). Theories of policy diffusion: lessons from Latin American pension reform. *World politics*, *57*(2), 262-295.
Wheeler, D. (2001). Racing to the bottom? Foreign investment and air pollution in developing countries. *The Journal of Environment & Development*, *10*(3), 225-245.
WHO (1987). *Air quality guidelines for Europe*. Copenhagen: WHO Regional Office for Europe.
WHO (2000). *Air quality guidelines for Europe (2n ed.)*. Copenhagen: WHO Regional Office for Europe.
WHO (2005). *Air quality guidelines: Global update.* Copenhagen: WHO Regional Office for Europe.
World Bank, 2014, *World Development Indicators*, Washington, DC: The World Bank.

Table 1: Ozone standards by country (1987-2010)

Year	ARG	BOL	BRA	CHL	COL	CRI	DOM	ECU	GTM	HND	MEX	NIC	PAN	PER	PRY	SLV	URY	VEN
1987	other	-	-	WHO	other	-	-	-	-	-	-	-	-	-	-	-	-	-
1988	other	-	-	WHO	other	-	-	-	-	-	-	-	-	-	-	-	-	-
1989	other	-	-	WHO	other	-	-	-	-	-	-	-	-	-	-	-	-	-
1990	other	-	WHO	WHO	other	-	-	-	-	-	-	-	-	-	-	-	-	-
1991	other	-	WHO	WHO	other	-	-	other	-	-	-	-	-	-	-	-	-	-
1992	other	-	WHO	WHO	other	-	-	other	-	-	-	-	-	-	-	-	-	USA
1993	other	-	WHO	WHO	other	-	-	other	-	-	-	-	-	-	-	-	-	USA
1994	other	-	WHO	WHO	other	-	-	other	-	-	other	-	-	-	-	-	-	USA
1995	other	other	WHO	WHO	other	-	-	other	-	-	other	-	-	-	-	-	-	USA
1996	other	other	WHO	WHO	other	WHO	-	other	-	-	other	-	-	-	-	-	-	USA
1997	other	other	WHO	WHO	other	WHO	-	other	-	-	other	-	-	-	-	-	-	USA
1998	other	other	WHO	WHO	other	WHO	-	other	-	-	other	-	-	-	-	-	-	USA
1999	other	other	WHO	WHO	other	WHO	-	other	-	-	other	-	-	-	-	-	-	USA
2000	other	other	WHO	WHO	other	WHO	-	other	-	-	other	-	-	-	-	WHO	-	USA
2001	other	other	WHO	WHO	other	WHO	-	other	-	-	other	-	-	WHO	-	WHO	-	USA
2002	other	other	WHO	WHO	other	WHO	-	other	-	-	other	USA	-	WHO	-	WHO	-	USA
2003	other	other	WHO	WHO	other	WHO	USA	WHO	-	-	other	USA	-	WHO	-	WHO	-	USA
2004	other	other	WHO	WHO	other	WHO	USA	WHO	-	-	other	USA	-	WHO	-	WHO	-	USA
2005	other	other	other	other	other	other	USA	other	-	-	other	USA	-	other	-	other	-	USA
2006	other	other	other	other	other	other	USA	other	-	-	other	USA	-	other	-	other	-	USA
2007	other	other	other	other	other	other	USA	other	-	-	other	USA	-	other	-	other	-	USA
2008	other	other	other	other	other	other	other	other	-	-	other	other	-	other	-	other	-	other
2009	other	other	other	other	other	other	other	other	-	-	other	other	-	other	-	other	-	other
2010	other	other	other	other	other	other	other	other	-	-	other	other	-	other	-	other	-	other

Table 2: Closest ties to US and degree of globalization by country (1986-2009)

Rank	Lowest political distance to US	Largest US export share	Largest US ODA-to-GDP ratio	Highest value on the globalization index
1	Argentina	Mexico	Nicaragua	Chile
2	Uruguay	Dominican Republic	El Salvador	Panama
3	Chile	Honduras	Honduras	Uruguay
4	Paraguay	Venezuela, RB	Bolivia	Argentina
5	Costa Rica	Panama	Guatemala	Costa Rica
6	Honduras	Ecuador	Costa Rica	Mexico
7	El Salvador	Costa Rica	Panama	Venezuela, RB
8	Panama	Colombia	Peru	Brazil
9	Dominican Republic	Guatemala	Colombia	El Salvador
10	Guatemala	Nicaragua	Ecuador	Peru
11	Peru	El Salvador	Dominican Republic	Guatemala
12	Brazil	Peru	Paraguay	Honduras
13	Bolivia	Brazil	Mexico	Colombia
14	Nicaragua	Bolivia	Venezuela, RB	Bolivia
15	Ecuador	Chile	Uruguay	Nicaragua
16	Colombia	Argentina	Argentina	Ecuador
17	Mexico	Uruguay	Brazil	Dominican Republic
18	Venezuela, RB	Paraguay	Chile	Paraguay

Table 3: Main results (multinomial logit, 1987-2010)

	(1) No limit *adoption*=0	(2) US limit *adoption*=2	(3) WHO limit adoption=3
GDP p.c.	3.672**	-7.923***	2.413
	(0.048)	(0.009)	(0.255)
Population	-1.126*	-4.382***	0.825*
	(0.071)	(0.000)	(0.069)
Urban	0.057	0.326***	-0.013
	(0.622)	(0.000)	(0.876)
Openness	0.079**	-0.008	0.074**
	(0.037)	(0.792)	(0.030)
CO2 p.c.	-5.875***	4.661**	-7.875***
	(0.008)	(0.035)	(0.000)
Polity	-0.594**	-0.777***	-0.551**
	(0.029)	(0.000)	(0.024)
Left	0.793	-1.780*	1.989**
	(0.423)	(0.092)	(0.027)
Political distance USA	-3.091	-9.179***	-3.442
	(0.301)	(0.004)	(0.209)
Export share USA	-0.029	0.246***	-0.083*
	(0.316)	(0.000)	(0.055)
Aid/GDP USA	0.180	0.820	-4.952
	(0.862)	(0.409)	(0.133)
Globalization	-0.056	0.168	0.408***
	(0.656)	(0.275)	(0.001)
t	-0.709	-0.575	-1.828**
	(0.207)	(0.532)	(0.019)
t^2	0.028	0.074	0.152**
	(0.523)	(0.331)	(0.031)
t^3	-0.001	-0.002	-0.005***
	(0.511)	(0.233)	(0.005)
Constant	7.414	110.499***	-29.324
	(0.641)	(0.000)	(0.185)
Pseudo R^2		0.656	
Observations		413	

Notes: We estimate *adoption* using a multinomial logit model. The adoption of own limit values for ozone concentrations (*adoption*=1) is taken as our base outcome. Robust p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Robustness checks (multinomial logit, 1987-2010)

	(A) Controlled for ties with EU			(B) Controlled for ties with China		
	(1) *adoption*=0	(2) *adoption*=2	(3) adoption=3	(1) *adoption*=0	(2) *adoption*=2	(3) *adoption*=3
GDP p.c.	3.026*	-8.736***	1.781	3.709**	-6.725**	2.642
	(0.097)	(0.001)	(0.425)	(0.026)	(0.011)	(0.306)
Population	-1.316**	-5.413***	1.055*	-0.993*	-6.310***	0.779*
	(0.031)	(0.000)	(0.061)	(0.086)	(0.000)	(0.065)
Urban	0.078	0.376***	-0.082	0.052	0.559***	-0.019
	(0.490)	(0.000)	(0.317)	(0.605)	(0.000)	(0.819)
Openness	0.081**	-0.015	0.062	0.075**	-0.015	0.066**
	(0.034)	(0.685)	(0.123)	(0.021)	(0.704)	(0.034)
CO2 p.c.	-6.207***	6.482**	-7.611**	-5.992***	3.801*	-7.987***
	(0.003)	(0.024)	(0.026)	(0.004)	(0.085)	(0.000)
Polity	-0.627**	-0.785***	-0.669**	-0.526**	-0.625	-0.549**
	(0.024)	(0.000)	(0.019)	(0.023)	(0.103)	(0.011)
Left	0.501	-1.976*	1.780*	0.936	-2.718	2.383***
	(0.624)	(0.092)	(0.078)	(0.373)	(0.213)	(0.010)
Political distance USA	-11.248	-11.348	-37.115***	-2.735	-21.293***	-4.048
	(0.129)	(0.169)	(0.000)	(0.356)	(0.000)	(0.173)
Export share USA	-0.029	0.291***	-0.101**	-0.037	0.280***	-0.095*
	(0.340)	(0.000)	(0.030)	(0.233)	(0.000)	(0.081)
Aid/GDP USA	0.037	0.535	-5.462**	0.308	1.008	-5.243
	(0.973)	(0.608)	(0.013)	(0.770)	(0.328)	(0.101)
Political distance EU-3	3.918	-0.942	22.480***			
	(0.364)	(0.851)	(0.000)			
Export share EU-3	-0.149	-0.383***	0.237			
	(0.373)	(0.007)	(0.127)			
Aid/GDP EU	0.098	0.865***	-0.326			
	(0.711)	(0.006)	(0.500)			
Political distance China				0.236	-0.031	-0.472
				(0.555)	(0.971)	(0.271)
Export share China				-0.134	-2.735***	-0.165
				(0.528)	(0.000)	(0.519)
Globalization	-0.013	0.271*	0.587***	-0.019	-0.157	0.427***
	(0.920)	(0.090)	(0.000)	(0.863)	(0.474)	(0.000)
t	-0.473	-0.598	-0.997	-0.926*	-0.594	-1.652*
	(0.393)	(0.569)	(0.343)	(0.063)	(0.792)	(0.054)
t^2	-0.003	0.056	0.099	0.043	0.121	0.142*
	(0.951)	(0.509)	(0.313)	(0.297)	(0.471)	(0.059)
t^3	0.000	-0.002	-0.003	-0.001	-0.004	-0.005**
	(0.889)	(0.459)	(0.146)	(0.311)	(0.317)	(0.013)
Constant	20.834	126.656***	-12.865	3.551	140.002***	-30.693
	(0.230)	(0.000)	(0.602)	(0.777)	(0.000)	(0.127)
Pseudo R^2		0.713			0.667	
Observations		413			400	

Notes: We estimate *adoption* using a multinomial logit model. The adoption of own limit values for ozone concentrations (*adoption*=1) is taken as our base outcome. Robust p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: Map of standard occurring the most frequently (1987-2010)

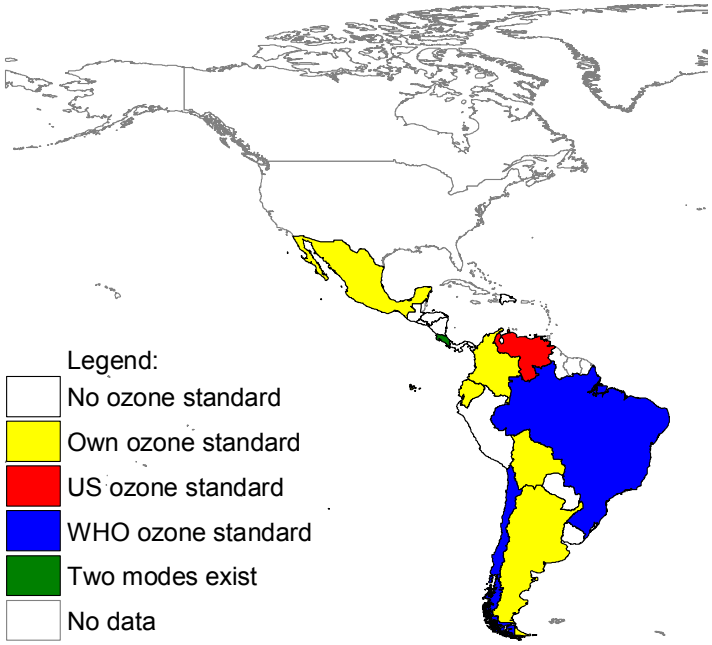


Figure 2: Ozone standards by country (1970-2010)

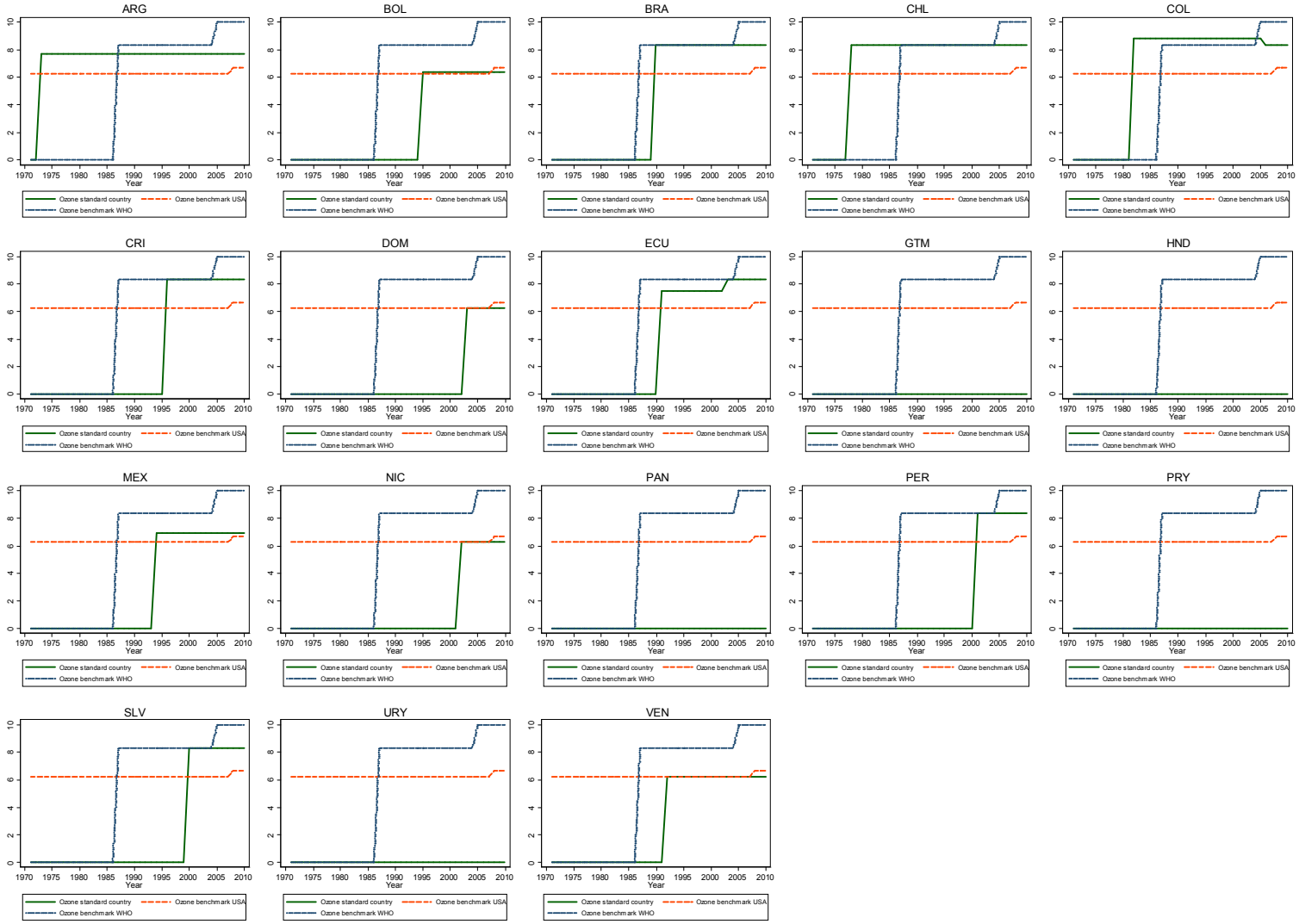
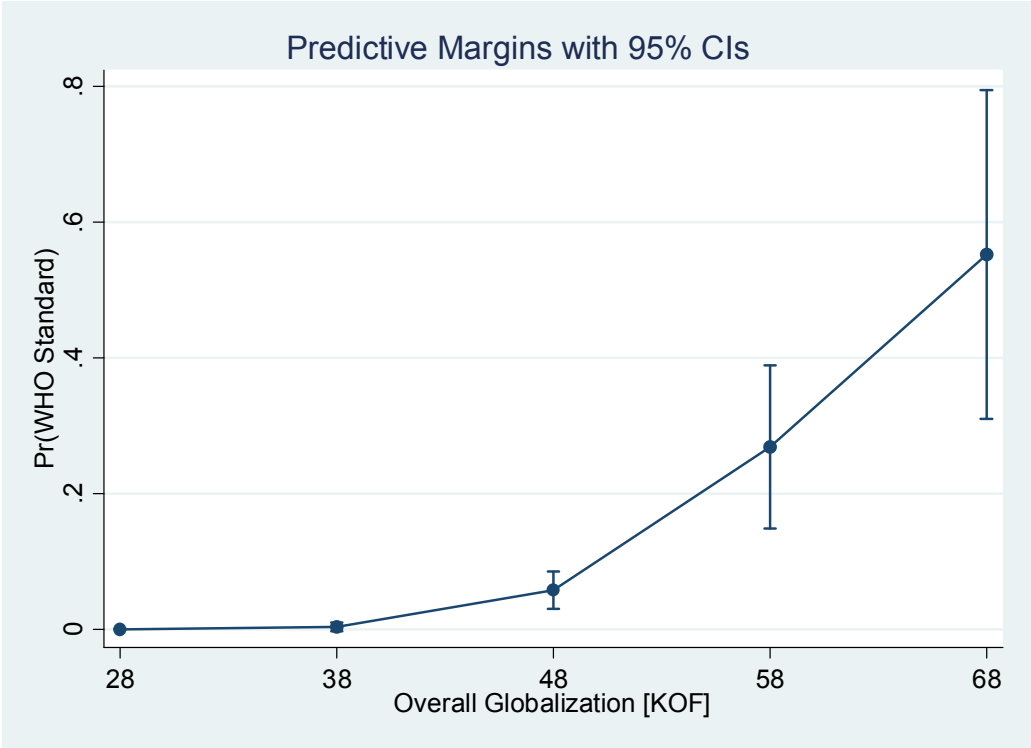


Figure 3: Predictive margins for the effect of globalization on the adoption of WHO standards



Appendix 1: Variables, definitions and sources

Variable	Definition	Source
Dependent variable		
Ozone standard	0 if country has no limit values for ground-level ozone concentrations; 1 if country adopts own limit values for ground-level ozone concentrations; 2 if country adopts US limit values for ground-level ozone concentrations; 3 if country adopts WHO limit values for ground-level ozone concentrations	Own construction
Explanatory variables		
(log) GDP p. c.	Logged GDP per capita (constant 2005 US$), lag	World Bank (2014) (using Elliott 2002)
(log) Population	Logged population size, lag	World Bank (2014) (using Elliott 2002)
Urban population	Urban population (% of total), lag	World Bank (2014) (using Elliott 2002)
Openness	Trade (% of GDP), lag	World Bank (2014) (using Elliott 2002)
(log) CO2 p.c.	Logged CO2 emissions (metric tons per capita), lag	World Bank (2014) (using Elliott 2002)
Polity	Revised Combined Polity Score ranging from +10 (strongly democratic) to -10 (strongly autocratic), lag	Polity IV (Marshall, Gurr and Jaggers (2014)
(log) Political distance USA	Logged distance between the foreign policy preferences of the particular country and the United States based on voting in the UN General Assembly, lag	Bailey, Strezhnev and Voeten (2013)
(log) Political distance EU-3	Logged average distance between the foreign policy preferences of the particular country and the EU-3 (France, Germany and United Kingdom) based on voting in the UN General Assembly, lag	Bailey, Strezhnev and Voeten (2013)
(log) Political distance China	Logged distance between the foreign policy preferences of the particular country and China based on voting in the UN General Assembly, lag	Bailey, Strezhnev and Voeten (2013)
Export share USA	Exports to USA (% of total exports), lag	UN Comtrade (https://wits.worldbank.org/)
Export share EU-3	Exports to France, Germany and United Kingdom (% of total exports), lag	UN Comtrade (https://wits.worldbank.org/)
Export share USA	Exports to USA (% of total exports), lag	UN Comtrade (https://wits.worldbank.org/)
Aid/GDP USA	Total net ODA from United States (% of GDP), lag	OECD CRS (http://stats.oecd.org/)
Aid/GDP EU	Total net ODA from EU and EU DAC member countries (% of GDP), lag	OECD CRS (http://stats.oecd.org/)
Globalization	KOF Index of Globalization based on three dimensions of globalization (economic, social and political), lag	KOF 2013 (Dreher 2006; Dreher, Gaston and Martens 2011)
Left	1 if government is socialist, lag	DPI 2012 (Beck et al. 2000)

Appendix 2: Descriptive statistics

Variable	Mean	Mean	Std. Dev.	Min	Max
Adoption	413	0.84	1.02	0.00	3.00
(log) GDP p.c.	413	7.97	0.61	6.68	9.03
(log) Population	413	16.34	1.15	14.64	19.08
Urban population	413	66.87	15.02	38.28	93.03
Openness	413	60.73	33.94	13.75	198.77
(log) CO2 p.c.	413	0.43	0.66	-1.01	2.03
Polity	413	17.21	2.83	2.00	20.00
Left	413	0.28	0.45	0.00	1.00
(log) Political distance	413	1.09	0.11	0.53	1.39
Export share	413	34.22	20.96	0.00	88.60
Aid/GDP	413	0.61	1.76	-0.59	25.46
(log) Political distance EU-3	413	0.56	0.20	-0.69	1.14
Export share EU-3	413	8.22	5.62	0.13	28.97
Aid/GDP EU	413	1.00	2.30	-0.74	18.34
(log) Political distance China	413	-0.81	0.93	-7.15	0.99
Export share China	400	1.93	3.19	0.00	23.87
Globalization	413	52.64	9.08	32.00	74.30
t	413	12.57	6.86	1.00	24.00
t^2	413	205.06	176.74	1.00	576.00
t^3	413	3752.70	4130.71	1.00	13824.00

Note: Descriptive statistics based on estimation sample of regression presented in Table 3.