Title
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ENVIRONMENT OR ACCOUNTABILITY? DISENTANGLING INTERNATIONAL INFLUENCES OVER STATES' EFFORTS TO COMBAT POLIO

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INTRODUCTION

Over the past several decades, countless studies of the state within the neo-institutionalist tradition have shown the influence international organizations and global culture, called "world society", over state-level policies and practices. Studies have shown that international forces play a key role in many aspects of state-level politics. Such influences are at work not only in the prevalence of the modern state form itself (Boli 1987; Meyer 1980; Meyer 1999; Meyer et al. 1997) but also in many aspects of state policy, from education (Boli and Ramirez 1987; Meyer et al. 1992; Ramirez and Meyer 1980; Schofer and Meyer 2005) to the economy (Henisz et al. 2005), from human rights (Cole 2005; Hafner-Burton and Tsutsui 2005) to science (Drori et al. 2003).

Despite countless studies documenting this influence, debate rages about its nature. John Meyer and his associates (1997) argue that the astonishing isomorphism of state form and policy in the 20th century is an example of the normative sway of "world culture" in an international scene where states seek legitimacy through conformity. Ultimately, world society theory is a phenomenological theory of subject-formation (see esp. Meyer 2008; Meyer et al. 1997; Meyer and Jepperson 2000): states and individuals come to understand who they are and their proper role through a socialization process involving the diffusion of norms through associational ties with international organizations. But this narrative has recently been called into question. Michael Barnett and Martha Finnemore (2004) propose that international organizations, as (semi-) autonomous bureaucracies, wield power and influence state practice through bureaucratic means.

As Schneiberg and Clemens (2006) note in their review of research strategies used in world society studies, much of the research could support either hypothesis. While commending world society theorists for the innovations in devising models that allow them to test the effect of higher-order factors, like international influences, on lower-order phenomena, like state policy, they are more critical of the conclusions often drawn from such studies. They note:

> The research literature amply documents higher-order effects, but these effects cannot be taken as conclusive evidence of the cultural or cognitive models of action that figure prominently in programmatic statements of institutionalist theory. (196)

This begs the question: how do international-level factors influence state policy and practice? Is this a phenomenological story of socialization, as Meyer and his associates suggest? Or is this a Weberian story of bureaucratic power, as suggest by Barrett and Finnemore?

Given the array of issues espoused by "world culture" these questions are especially important. For those promoting human rights, environmentalism, education, economic development, health, science or any other issue held dear by world culture, better knowledge of the way this international scene influences states lends insight into how it could better exert this influence (or how this influence could be better combatted). On the one hand, the world society literature theorizes about environmental effects. In this perspective, international organizations, as central nodes in the diffusion of world-cultural norms, are a key part of the global environment influencing states' and individuals' sense of self. If this is the case than little other than the importance placed on such norms, as indicated both by world culture as represented by these organizations and by the sheer number of states adhering to them, should influence the likelihood of a

state adopting such norms. On the other hand, Barnett and Finnemore argue that international organizations act very concretely in this world and that these actions themselves influence states. If this perspective is right and international organizations are (semi-) autonomous actors in their own right, than the tactics they adopt should influence the likelihood of states adhering to the norms and practices they espouse.

Here I use the unique case of the global campaign to eradicate polio, known as the Polio Eradication Initiative (PEI), to distinguish between the cultural effects of the international environment and the political effects of international organizations' actions. This case provides a unique opportunity to separate these two sources of influence over state-level immunization and disease surveillance practices, enabling a better test of these two alternative explanations than provided by previous studies.

Below I briefly review key features of world society theory. I then use two recent studies of human rights to illustrate the difficulties arising when attempting to distinguish between different ways international forces influence state policy and practice. Finally, I discuss how studying global efforts to control and ultimately eradicate polio enables me to overcome these difficulties.

GLOBAL CULTURE, INTERNATIONAL POLITICS

In their foundational article, "World Society and the Nation-State", John Meyer and his associates (1997) argue that state policy and form are heavily influenced by world cultural scripts. They suggest that the high level of isomorphism we observe in the modern state form worldwide derives from the spread of particular global norms diffused worldwide by the associational ties between states. This is a theory of cognition and the construction of actors taking its inspiration from the phenomenological tradition (Meyer

2008; Meyer et al. 1997; Meyer and Jepperson 2000). Widely available global level norms influence both states' and individuals' sense of self, diffusing in large part through associational ties established with international organizations.

This perspective sees the international environment as a socializing force, and the institutions they spread as part of a taken-for-granted institutional reality, as described by the phenomenological tradition (see esp. Berger and Luckmann 1966). However, world society theory does break with this tradition in one important way: it predicts both a general isomorphism in state form and official policy, and wide-spread decoupling between official policy and actual practice (Meyer et al. 1997 154-6). In essence, decoupling arises from states' Janus-faced existence. They are both actors enmeshed in a global geopolitical order and governing organizations with various capacities, resources and populations constraining their action. Thus, the identity developed in the geopolitical sphere, along with actions undertaken in search of prestige and legitimacy there, often diverge from their capacity and interest in undertaking such policies on the state level.

Following from this important aspect of world society theory, early studies focused primarily on policy adoption, ignoring the question of how well (or if) such policies were implemented. However, recent studies have begun to look at how international factors influence state practice itself (see esp. Hafner-Burton and Tsutsui 2005; Schofer and Hironaka 2005). These studies suggest that international forces commonly discussed in studies of policy adoption also help explain state practice. As I review the implications of recent studies below, I consider implications both for policy and practice, with due consideration for the complexities arising from decoupling's place in world society theory.

Two recent studies of human rights stand on opposites sides of the decoupling divide. Cole's "Sovereignty Relinquished?" (2005) asks what influences the likelihood of states signing onto different human rights treaties. By focusing on treaties, he skirts the problem of decoupling: he doesn't ask whether or not states' abide by the commitments they make in signing treaties. However, as I show below, his findings on how differences in the treaties themselves influenced states' decisions have implications for how widespread decoupling may be. Hafner-Burton and Tsutsui's "Human Rights in a Globalizing World" (2005) tackles the problem of decoupling straight-on by looking at how international forces influence human rights practices themselves. Their findings suggest that the international forces identified by world society theory may be as applicable to practice as policy.

In his article, "Sovereignty Relinquished?" (2005) Cole looks at treaty ratification itself to explore how "cost of commitment" affects states' patterns of ratifying human rights covenants. Cost of commitment refers to the formal accountability measures states agree to in ratifying treaties. Treaties with little accountability have a low cost of commitment, whereas those with more stringent accountability procedures have a high cost of commitment. Cole exploits differences in treaties' cost of commitment to assess their impact on factors explaining treaty ratification. His findings have several important implications; I quote at length below:

> The costs associated with treaty ratification appear to be much more consequential for commitment than a treaty's content. As long as enforcement of a human rights treaty remains relatively weak, countries with egregious human rights records will join it purely for the symbolic benefits ratification incurs. Exogenous rather than endogenous characteristics, such as number of previous ratifications and global conferences, tend to promote ratification of weakly enforced and monitored treaties. As the monitoring and implementation provisions of covenants grow stronger, the internal political, but not the external

> cultural or ideological, characteristics of states become correspondingly more salient predictors of ratification. (492)

By showing that, as international organizations – in this case the organizations' monitoring country's compliance with human rights treaties – power increases, states' willingness to subject themselves to them decreases, Cole's findings suggests that *states* believe that international organizations can exert a direct political influence on state policy and practice. This role contrasts sharply with the indirect role of diffusing norms assigned to such organizations by world society theory.

However, this suggestion remains untested in Cole's paper. Indeed, his very finding negates the ability to test the question. As states that are less willing and able to respect human rights opt out of more binding conventions, selection bias would prevent a true test of the effects of this monitoring itself. The selectivity Cole finds suggests that states may not submit themselves to treaties or organizations able to more actively intervene in or influence their practices. If this is true, than international organizations' political role would remain atrophied, and the symbolic role assigned them by world society theory should be the most prevalent.

In contrast to Cole, Hafner-Burton and Tsutsui (2005) examine world cultural influences on states' human rights *practices*. In so doing, they complicate the world society model by differentiating between the two levels on which world culture diffuses: the individual and the state levels. They include two measures of associational ties in their study: states' ties to international norms, as demonstrated by the ratification of human rights treaties, and resident individuals' ties to international non-governmental organizations (INGOs). By disaggregating the effects of states' ratification of human rights from the effects of resident individuals' links to "international civil society", they

show that, although the former has a negative effective on human rights practices, the later has a positive one. This suggests that states' residents, by mobilizing in INGOs can help make the "empty promises" of human rights treaty ratification less empty by pressuring states to comply with those treaties (Hafner-Burton and Tsutsui 2005).

These findings have important implications for decoupling. When looking at outcomes, environmental effects are still very important, but we must distinguish between their effects on states and residents. While the *states'* associational environments don't seem to matter for decoupling (and may even exacerbate it), the effects of *individuals'* associational environments do counteract decoupling. This makes intuitive sense: presumably the disconnect between values and actions represented by decoupling is easier for an organization to maintain than for an individual. In the case of human rights, while states' may happily ignore the commitments they make in signing treaties, their residents do actively seek to promote human rights when they join international human rights organizations. This activity, in turn, puts pressure on states.

IMPLICATIONS FOR POLIO

Taken alone, Hafner-Burton and Tsutsui's findings suggest little role for International governmental organizations (IGOs) or international treaties in influencing state action. Instead, their findings suggest that we should focus more on the influence of INGOs and international civil society more generally on state practices. Applied to my case, this leads to my first and second hypotheses:

> *H1A: Increasing participation in INGOs by countries' citizens improves state-level immunization programs and disease surveillance programs.*
>
> *H1B: Countries' membership in IGOs has no positive effect on state-level immunization and disease surveillance programs.*

However, Cole's findings suggest that we should not write off IGO influence so quickly. Perhaps IGOs and the treaties they attempt to enforce have more influence through bureaucratic means. But to test this, we must overcome problems of selection bias. Below I discuss how an examination of international efforts to combat polio can overcome this obstacle.

COST OF COMMITMENT IN POLIO CAMPAIGNS

The first truly international effort to combat polio began in 1974 when the World Health Organization (WHO) began the Expanded Programme on Immunization (EPI), hoping to expand routine immunization against vaccine-preventable disease worldwide. From its inception, the EPI targeted polio – along with five other vaccine-preventable diseases: measles, diptheria, tetanus, petrussis (whopping cough) and tuberculosis. This campaign touted the benefits of vaccination as a means of disease control, urging all countries to improve routine vaccine administration. In 1988 the battle against polio intensified with the passage of the Polio Eradication Initiative (PEI), which initially sought to eradicate polio by the year 2000 and continues to fight for eradication to this day. The PEI both intensified immunization efforts and increased the emphasis on disease surveillance.

Both campaigns were started when the World Health Assembly, the governing body of the WHO made up of representatives of all member states, unanimously passed resolutions inaugurating them. For this reason, we can avoid selection bias here: all countries included in this analysis called for both campaigns[1]. However, in analyzing immunization coverage, I can exploit differences between the EPI and the PEI to

[1] My dependent variables are drawn from WHO data, which is only available for WHO member-states.

distinguish different costs of commitment. For disease surveillance indicators, I can use differences in the pressures states are subjected to at different stages of the process to the same end.

IMMUNIZATION AND COST OF COMMITMENT IN THE EPI VERSUS THE PEI

The PEI transformed the campaign against polio from one of control to one of eradication. This transformation increased the "cost of commitment" to polio-fighting measures. Unlike the human rights covenants studied by Cole (2005), the difference between these two campaigns does not lie in formal oversight provisions. However, a significant difference in the cost of commitment remains between the two. This difference arises from the different nature of a campaign to control versus a campaign to eradicate disease.

Disease control campaigns seek to reduce incidence of disease through preventative measures, such as vaccination. However, the scope of such a campaign can vary. One can seek to control disease in a household, a town, a locality, a state, a world region or globally. The only difference arises from how widely disease-control strategies are deployed. This possibility means that the costs of noncompliance in any given areas are relatively low for other areas. Although uncontrolled disease in one area can increase the need for other areas to take on disease prevention measures, it does not create this need. Disease control campaigns are inherently ongoing and require a perpetual commitment to the control measures in order to keep the disease in check.

Eradication campaigns have a very different goal. Rather than seeking to reduce the incidence of a disease, they seek to entirely eliminate the disease-causing agent, and in so doing to eliminate all incidences of the disease. Doing so makes it possible to stop

costly disease control measures without risk to health. Unlike disease control campaigns, eradication campaigns are necessarily global in scope. Due to the risk of importation, a disease can't be eradicated from a region of the world: it can only be eradicate from the entire globe. Only then can all countries stop disease control measures without risking their population's health.

This global scope means that all countries engaging in an eradication effort have an interest not only in the success of their own, state-level campaigns, but also in the success of other countries' campaigns. Noncompliance and nonsuccess in any one country risk the health and undermines the efforts of all others. Because of this, we would expect states to face more pressure to implement PEI recommendations than they faced for EPI recommendations. This increased pressure against noncompliance suggests that the cost of commitment to an eradication campaign, such as the PEI, is greater than to a control campaign, such as the EPI. This leads to my third hypothesis:

> *H2A: The institution of the PEI improves polio immunization programs, as compared to programs under the EPI.*

COST OF COMMITMENT AND DISEASE SURVEILLANCE ACCOUNTABILITY

The PEI brought with it a new emphasis on disease surveillance. Reasons for this were two-fold. First, disease surveillance is necessary in order to confirm that a disease has been eradicated. Second, such surveillance can be used to tailor disease control activities more effectively. This first reason especially shapes how and when countries are accountable to the WHO for the performance of their disease surveillance systems.

As the campaign has progressed, more and more countries seem to be free of polio. To date, only 4 countries still have indigenous circulation of the disease. When all countries in a WHO region had no new cases of polio for at least a year, the WHO begins

a regional certification process, after which that region is certified polio-free. In order to be certified polio-free, all countries in a region must not only continue to report no new cases of polio, but must also maintain "certification standard surveillance" for at least 3 years.

The PEI has established 3 criteria for achieving "certification-standard surveillance" for polio. Countries must have disease surveillance systems that (1) collect 2 adequate stool samples from at least 80% of AFP cases, (2) detect at least one case of AFP for every 100,000 people under the age of 15, and (3) processes all samples at a WHO-certified laboratory (GPEI 2003). In order to be certified polio-free, all countries in a region must reach and maintain this level of surveillance for at least 3 years.

The first two criteria each derive from particular aspects of and difficulties involved in polio diagnosis. Polio has an extremely distinctive clinical syndrome that makes diagnosis easier: Acute Flaccid Paralysis (AFP). However, polio is not the only cause of this condition: the WHO estimates that at least 1 person under the age of 15 in every 100,000 should contract this condition for other reasons. Because of this, polio diagnosis cannot be purely clinical. It must also use laboratories to isolate poliovirus from stool samples taken from patients with AFP.

In order to carry out laboratory diagnosis, health practitioners must collect and analyze stool samples from new AFP cases. The PEI demands 2 samples collected 24 hours apart within 14 days of the onset of paralysis, and received "in good condition" by the laboratory (GPEI 2003). These requirements maximize the chances of having enough live poliovirus in samples to be isolated by the laboratories, but it requires a polio

surveillance system that both finds new cases of AFP quickly and maintains a "cold chain" in order to keep the sample in good condition as it travels from patient to lab[2].

Although the discrepancy between polio and AFP cases makes diagnosis more difficult, it also enables the second criterion, which assesses the overall reach and quality of polio surveillance systems. If a country does not detect at least 1 case of confirmed non-polio AFP for every 100,000 people under the age of 15, that suggests that their disease surveillance system does not have an adequate reach to confirm the presence (or lack thereof) of polio cases. If that is the case, lack of reported polio cases could be due to inadequate surveillance rather than the actual elimination of polio from the region.

Given the emphasis on maintaining "certification standard surveillance" during the certification process, data on both of these criteria can be used to distinguish the affects cost of commitment by distinguishing 3 time periods: pre-certification, undergoing certification, and post-certification. Cost of commitment should be lowest in the first, highest in the second, and somewhere between the two in the third. This leads to my two more hypotheses:

> *H2B: Undergoing polio-free certification improves state-level disease surveillance programs.*
>
> *H2C: States which are certified polio-free maintain better state-level disease surveillance programs than those not having undergone certification.*

FINAL CONSIDERATIONS

In addition to independently assessing the influence of global cultural and international organizations' activities, this study seeks to examine the relative strength of each influence. A model including both measures of connections to international society and indicators of the extent of "cost of commitment" states' are subject to partially does

[2] poliovirus is very heat-sensitive, and will not survive in stool samples if they are not kept cold.

this. However, we can also examine this question by seeing how the influence of either of these two sets of variables changes with the inclusion of the other in the model. As world society variables are more common in analyses, I focus here on how the inclusion of a cost of commitment measure affects world society measures. Doing so will give me a sense of the extent to which world society measures capture political versus associational effects.

> *H3: The influence of IGO membership and INGO involvement disappears with the inclusion of cost of commitment measures.*

Finally, this study should consider how state characteristics interact with international influences. As discussed below, I include a number of state-level control variables in all analyses. However, beyond this I will examine the influence of two state characteristics on the international influences included in this analysis. First, I examine how state wealth interacts with international influences. Many globalization theorists argue that international organizations have more influence over poor states than wealthy states. If so, we would expect the following:

> *H4: IGO membership, INGO participation and cost of commitment have a larger influence over immunization coverage and disease surveillance in poor countries than in wealthier countries.*

DATA AND METHODS

To test these hypotheses I carry out two sets of analyses. The first looks at polio immunization coverage, and the second disease surveillance indicators. For both analyses I use cross-sectional time-series data from WHO member countries. The first covers the years 1980 through 2006, and the second the years 1996 through 2006.

DEPENDENT VARIABLES

For my first analysis, I use immunization coverage data from the WHO (2007a). In particular, I use the Pol3 coverage rates for the years 1980 through 2006. This data is the WHO's best estimate of the percent of 1-year olds who have received 3 doses of vaccine against polio. My second analysis uses the two disease surveillance indicators discussed above: non-polio AFP rate and percent of adequate samples from cases of AFP. I create an index of these two variables by calculating their z-scores and adding them together. Here my analysis is restricted to the years 1996 through 2006 due to data constraints.

INDEPENDENT VARIABLES

To test my hypotheses, I use indicators both of connections to world society and of the cost-of-commitment. Following Hafner-Burton and Tsutsui (2005), I distinguish between countries' and individuals' connection to world society. Hafner-Burton and Tsutsui measure countries connections by a count of treaty ratification. Such a measure isn't appropriate here. All countries included in this analysis support both polio-fighting campaigns. In place of this measure, I use a count of countries membership in international governmental organizations, like the WHO and UN. This count measures how enmeshed countries are in world society in general, rather than their specific connections to world society values' regarding polio or health. As with Hafner-Burton and Tsutsui, I use a count of the number of international non-governmental organizations (INGOs) active in a country in any given year to measure individuals' connections to world society. Both variables are drawn from measures are collected from the Union of International Associations' *Yearbook of International Organizations*.

I measure cost of commitment by constructing two sets of dummy variables, one for each of my analyses. For my first analysis, I have a period dummy variable distinguishing the time-period in which the Polio Eradication Initiative (PEI) was in effect (1985 onward for the Americas region, and 1988 onward for all other regions). For my second analysis I distinguish three region-periods. The WHO is made up of 6 world regions, the Americas, Africa, the Eastern Mediterranean, Europe, South-East Asia and the Western Pacific. Each region has its own administrative structure and independently undergoes certification as "polio-free" as part of the PEI. I distinguish between 3 region-periods, pre-certification, undergoing certification and post-certification. To date, 3 regions have been certified polio-free: the Americas in 1994, the Western Pacific in 2000, and Europe in 2002. Countries in all other regions have only passed through one period: pre-certification. I only have data from the Americas for the post-certification period, and I have data from the Western Pacific and Europe for all three.

To assess the effects of countries' general level of wealth on my IGO, INGO and cost of commitment measures, I separate countries into three categories (high-income, middle-income and low-income) based on the World Banks' groupings.

CONTROL VARIABLES

As all scholars looking at the effect of global level phenomena acknowledge, state-level factors are also important influences. Therefore, I must include controls of relevant state-level factors in this analysis. In particular, I control for political, social, economic and health characteristics likely to affect immunization coverage and disease surveillance quality. Both immunization and disease surveillance are public services, and as such political variables affecting overall state capacity should also be influential here.

I follow previous studies of immunization coverage (Gauri and Khaleghian 2002; Khaleghian 2004) and include measures of drawn form the Polity IV dataset (Marshall and Jaggers 2007) indicating how democratic and how durable countries are. In addition, I include Polity IV's autocracy index in this analysis. Where democracies should presumably protect their citizens' health because of citizens' influence over government, autocracies may be efficient in public health campaigns for a different reason: control over their populations. Given their greater domination of their populations, autocratic governments often are highly effective in undertaking public health campaigns. As such, my analysis will include both measures.

As conflict disrupts the administration of public services, I also include an indicator of presence of armed conflict drawn from Wimmer and Min's dataset (2006). In addition, I control for incidence of polio (2007b). Finally, I draw several variables from the World Bank's World Development Indicators dataset (2008), including GDP per capita, population, population density, youth population and infant mortality rate[3].

DATA STRUCTURE AND DESCRIPTIVE STATISTICS

Most data included in my analysis is country-year data for the years 1980-2006, giving me a balanced panel of data. Where possible, I include yearly data by country for the years 1980-2006, for the first analysis, and 1996-2006 for the second set of analysis. However, some data wasn't available for these time periods. In addition, all variables were missing some data-points. Where possible, I filled in missing data by interpolating from surrounding years.

[3] I exclude three variables from my analysis due to my use of fixed-effects models. I don't consider ethnic fractionalization, literacy rate, or region-effects.

Other data were available only for certain years. Infant Mortality Rate data was mostly available in 5-year intervals, and the 6 political variables included in my second set of analyses were only available every two years. Here again, I interpolate data from surrounding years. My data on armed conflict only included information up to 2001. Analyses including this variable thus exclude all years past this point.

Table 1 shows summary statistics. I include within-group standard deviations and both the total number of observations and the number of countries for which I have data, in consideration of the fact that I have panel-data. The appendix also includes tables comparing means and standard deviations for raw and interpolated data and correlations between independent and dependent variables and between independent variables and missing data flags for the dependent variables.

[[Table 1 about here]]

METHODS

To take account of the grouped nature of panel data, I use fixed-effects models for all analyses. The fixed-effect model effectively introduces a dummy-variable for each country in my analysis, thus estimating within country variation only. To control for overall trends in the dependent variable (immunization coverage increases over the entire period), I include a lag of the dependent variable in the analysis as well. This gives the formula:

$$y_{it} = \beta y_{i(t-1)} + \beta_{ow} + \beta_{1w} x_{it} + \alpha_i D_i + \varepsilon_{i\upsilon}$$

The major advantage of this approach is that it controls for all unmeasured variables that vary by country. Thus, results cannot be skewed by some unmeasured or unknown systemic variation in state character or other systematic differences between countries.

The fixed-effects operator doesn't allow the inclusion of time-invariant variables in my analysis and arguably loses efficiency relative to other estimators. However, alternative approaches, including random-effects models, require the additional, strong assumption that time-invariant unobserved variables are independent of measured variables (for a detailed discussion see Halaby 2004; Petersen 2004). Because of this, random-effects models advantages in terms of efficiency and variables that can be included in analysis come at the price of stronger assumptions, posing a greater risk of invalid estimators. There are ways to overcome this problem, but given that my independent variables of interest are all time-variant, it makes sense to simply use fixed-effects models for my analysis.

For each dependent variable in my analyses, I report results from 2 models. Model 1 includes the IGO and INGO measures along with all the control variables discussed above. Model 2 additionally includes cost of commitment measures. Finally, to test the influence of countries' wealth, I carry out my model 2 analysis separately for three different income categories, derived from World Bank classifications: high-income countries, middle-income countries and low-income countries..

FINDINGS

Tables 2 and 3 show the results of my immunization coverage analysis. Table 2 shows results from models 1 and 2 for all countries, whereas table 4 shows results from model 2 separated by income category. Tables 4 and 5 show the results of my disease surveillance analysis. As with my analysis of immunization coverage, table 4 compares results of models 1 and 2 for all countries, and table 5 shows results of model 2 separated

by income category. Findings for immunization coverage versus disease surveillance vary quite a bit between these two sets of analysis, so I discuss them separately.

IMMUNIZATION COVERAGE

If my hypotheses are correct, in model 1 I expect INGO participation to have a positive influence on immunization coverage and IGO membership to have no influence, per hypotheses 1A and 1B. In model 2, I expect the influence of both INGO and IGO measures to either diminish or disappear, and I expect PEI to positively influence immunization coverage, per hypotheses 3 and 2A. Finally, in my analyses separated by income category, I expect the influence of all factors to grow as for lower income categories, per hypothesis 4.

As can be seen from table 2, findings support hypothesis 2A but don't support hypotheses 1A, 1B or 3.

[[Table 2 about here]]

The influence of IGO and INGO, as seen in model 1, is exactly the opposite of my expectations. INGO participation has no significant influence over immunization coverage, whereas IGO membership has a significant, positive influence. Taking a country with average IGO membership as an example, the positive influence of IGO membership accounts for a 3.7% increase in immunization coverage. One standard deviation increase in IGO membership increases this effect to 5.4%.

Model 2 does show a significant, positive impact of PEI on immunization coverage, but the addition of this variable has no effect on the influence of IGO membership or INGO participation. Controlling for immunization coverage in the previous year, the institution of the PEI accounts for a 4.4% increase in immunization

coverage. This suggests that countries improved their immunization coverage more rapidly during the PEI, controlling for other factors, than during the EPI alone. This supports my hypothesis that the increasing cost of commitment of the PEI over the EPI increases immunization coverage, suggesting that the tactics international actors employ influence state practice.

Table 3 carries out the analysis found in model 2 by World Bank income categories.

[[Table 3 about here]]

Contrary to my hypothesis, poorer countries are not more subject to influence from all the international-level variables in my analysis. Only PEI shows an increasing influence over low-income countries as compared to high-income countries. Here, we see that PEI has no significant influence over immunization coverage in high-income countries, but does in middle- and low-income countries. Further, this influence is larger for low-income countries than for middle-income countries (accounting for 6.7% increase in immunization coverage on average versus 5.1% for middle-income countries).

IGO membership shows an opposite pattern. It is only a significant influence over high-income countries. INGO participation shows even more surprising results. Like IGO membership, this variable is only significant for high-income countries. However, contrary to our general expectation about the influence of INGO participation on immunization coverage, it has a negative effect[4]. To get a sense of the scope of IGO membership and INGO participation's effects on immunization coverage, consider that

[4] An comparison of results of model 1 by income categories shows that the influence of INGO participation flips as income decreases. It is negative for high-income countries and positive for low-income countries. However, this positive influence for low-income countries disappears with the inclusion of PEI in our analysis, suggesting that it captures part of PEIs influence. Results of this analysis can be found in the appendix.

the average high-income country has membership in 51.4 IGOs, and residents participate in 1315.5 INGOs. This means that membership in the average number of IGOs accounts for a 9.9% increase in immunization coverage, and participation in the average number of INGOs accounts for a decrease of 6.05%. An increase of one standard deviation for each measure accounts for a 3.6% further increase and a 4.9% further decrease respectively.

In sum, my analysis of immunization coverage provides strong support for the hypothesis that increased cost of commitment of international campaigns positively impacts states' compliance with those campaigns objectives. Although features of the international environment also seem to influence immunization coverage, these environmental influences remain more surprising. *States'* enmeshment in world society (as seen in IGO membership) has a positive influence whereas *residents'* enmeshment (as seen in INGO participation) has no influence. Further, the nature of all international influences varies in surprising ways for high- versus low- and middle-income countries. Cost of commitment has a stronger influence on low- and middle-income countries than high-income countries, whereas associational ties seem to more significantly influence high-income countries (although in surprising directions).

DISEASE SURVEILLANCE INDICATORS

If my hypotheses are correct, in model 1 I expect INGO participation to have a positivex influence on disease surveillance and IGO membership to have no influence, per hypotheses 1A and 1B. In model 2, I expect the influence of both INGO and IGO measures to either diminish or disappear, and I expect my certification and post-certification to positively influence disease surveillance, per hypotheses 3 and 2B and 2C.

Finally, in my analyses separated by income category, I expect the influence of all factors to grow as for lower income categories, per hypothesis 4.

My analysis of disease surveillance indicators provides no support for any of these hypotheses.

[[Table 4 about here]]

No international-level variables have a significant influence on disease surveillance in either model 1 or model 2. Furthermore, as can be seen in Table 5, separating my analysis by income category generally provides a similar lack of results. The only international-level variable to attain significance in these models is INGO participation, which has a negative influence on diseases surveillance in high-income countries.

[[Table 5 about here]]

To be sure, control variables have a similar lack of predictive value. Only the lagged dependent variable and the autocracy and democracy scores are significant in both models 1 and 2. And while the lagged dependent variable is significant in most models, other variables influence proves more fleeting.

This lack of findings could be attributed to any one of three different factors. First, my disease surveillance index may be a poor substitute for the underlying measures it combines. Second, the smaller N found in this analysis, which is restricted to the years 1996 through 2006, might account for my lack of results. Third, disease surveillance may simply be influenced by different factors than immunization coverage.

To test the first two possibilities, I re-ran my analysis for each of the underlying measures of my disease surveillance index. In addition, I re-ran my analysis of immunization coverage for the years 1983-1993. Results from all three analyses can be

found in the Appendix. Although these analyses did suggest that the index and restricted time frame might in part account for the lack of findings in this analysis, the results didn't suggest that either of these factors could wholly explain it. It is likely that disease surveillance is subject to different influences than found for immunization coverage as well.

Clearly, further research on the factors influencing the quality of polio disease surveillance is needed. In his discussion of nested case analysis, Evan Lieberman (2005) notes that combining qualitative with quantitative methods can be especially revealing when quantitative models provide a poor fit. In this case, he recommends a "model-building" approach, in which the researcher picks outlying cases for in-depth examination, with the goal of developing new theories.

DISCUSSION

This investigation began by asking how international-level phenomena influence states. In particular, it weighs between Meyer's argument that a "world culture" diffuses through associational ties on both the state and individual level and Barnett and Finnemore's characterization of semi-autonomous international organizations wielding bureaucratic power. Findings for immunization coverage support both theories, but also raise complications with regards to how world culture diffuses. I begin with a discussion of my findings implications for world society theory before turning to a discussion of international influences more broadly. Due to the lack of significant findings related to disease surveillance, I only discuss my immunization coverage results below.

A COMMUNITY OF NATIONS OR INTERNATIONAL CIVIL SOCIETY?

My findings suggest that, for the case of immunization coverage, IGO membership generally has a positive influence, whereas INGO participation does not. This finding is especially surprising given Hafner-Burton and Tsutsui's findings regarding human rights practices, and the wide body of scholarship discussing the influence of international civil society (which INGO involvement helps capture). What accounts for the lack of civil-social influence in this case?

Considering the particularities of immunization as a social phenomenon helps explain this discrepancy. As public health experts have long known, disease *prevention* is not often the object of considerable public demand. Although the history of efforts to find a vaccine for polio involves an incredible amount of public mobilization, once such preventative measures exist, and especially once a vaccine-preventable disease becomes rare due to widespread vaccination, public interest in and demand for immunization tends to dissipate. Especially in the many cases where countries have had no cases of polio for years, it's easy to understand why public mobilization isn't playing a huge role in maintaining high levels of immunization.

Indeed, once a vaccine-preventable disease becomes rare, publics' may even begin questioning whether vaccination is worthwhile. Are the discomfort and potential side effects worth it? Especially considering how unlikely it is that children will ever come into contact with the virus against which vaccination protects them? The negative impact of INGO participation on immunization coverage in high-income countries could be due to just such an influence. Perhaps this negative influence is due to vocal *anti-vaccination* movements in wealthier countries.

Unlike publics, governments have a large interest in immunization as long as they have a vested interest in the health of their populations. Immunization against polio is a cheap and effective preventative measure, vastly less costly in all ways than treating patients paralyzed by polio. Furthermore, *eradication* of polio, by potentially making it possible to avoid even the cost of widespread immunization, is understandably attractive to governments. Public health officials are especially unanimous on this point. Although some do not support polio eradication efforts, all agree on the general desirability of immunization and disease surveillance in general.

Given the particularities of the case, my findings about the influences of the international geopolitical environment versus the international civil social environment make sense. The geopolitical environment, as represented by IGO membership, is likely more active and more consistently supportive of polio vaccination than the civil social environment. More generally, this suggests that we should be wary of focusing so much on the influence of global civil society on states that we neglect to look at international governmental organizations' influence. Instead, we should pay greater attention to the interplay between these two different international influences, and we should ask how their influence may vary, depending on the phenomenon under consideration.

In addition, the finding that the influences of IGOs and INGOs push in opposite directions in high-income countries begs the question: can we ever assume, *a priori*, the norm favored by these associational ties? This question points to a more general weakness in world society theory. Along with its tendency to not distinguish between the different levels on which world culture diffuses, it also assumes that the influence of both pushes in the same direction. For Meyer, world culture pushes rationalized, scientific

norms. Its values aren't a matter of empirical examination, but rather are assumed *a priori*. However, there is no *a priori* reason to assume that international organizations actually push these rationalized, scientific norms. International organizations may push very different norms, and may even work at cross-purposes to each other.

ENVIRONMENT OR ACCOUNTABILITY?

It is clear that, in this case, more positive international influence comes from IGOs than INGOs. However, my findings also suggest that many different types of international influence affect immunization coverage. The associational web in which states are enmeshed, as represented by the IGO membership count, influences state practice, with more membership ties correlated with higher levels of immunization. At the same time, the change in *tactic* represented by the shift from the EPI to the PEI also influences state practice. When the WHO and its associate organizations put more pressure on states to combat polio, they responded. Here we see the influence not of environment but of the direct actions of a particular group of international organizations involved in this campaign.

The consistent positive influence of PEI on immunization coverage suggests that organizations tactics affect states' open to their influence. Barnett and Finnemore (2004) suggest that international organizations are able to exert this influence in part because of power deriving from their bureaucratic structures. Rather than focusing on power deriving from bureaucratic structure in this analysis, I focus on the level of accountability states are subject to by adapting Cole's concept, "cost of commitment."

However, this analysis can't say how this increasing "cost of commitment" comes to influence state compliance. When international organizations exert a direct influence

over state practice, what means do they use to do so? And how does this influence play out? Answering these questions requires a different sort of analysis than the one presented here. Rather than large-N analysis with its inevitable lack of depth, answering this question would require a more in-depth examination of how the PEI influenced immunization coverage in a few states.

APPENDIX

In this appendix, I report further descriptive statistics and regression results of potential interest.

Descriptive Statistics

Table A.1 shows correlations between dependent and independent variables, and between a missing data flag for the dependent variables and independent variables. Table A.2 compares means, standard deviations, and number of observations for raw versus interpolated data.

[[Table A.1 and Table A.2 about here]]

Only one variable shows significantly different values in raw versus interpolated data: infant mortality rate. Most countries in the sample report infant mortality rate every 5 years. However, a small number of high-income countries report infant mortality rate yearly. This biases the raw data mean down, as there are more observations for high-income countries with low infant mortality rates. Looking only at raw data from the years in which most countries report gives a mean of 51.21 and a standard deviation of 43.32, very similar to that found for the interpolated data.

Immunization Coverage Analyses

In addition to the fixed-effects models reported above, I ran my immunization coverage models using standard linear regression techniques with robust standard error and using random-effects models. I will focus my discussion on international variables, as these are the variables of interest in this analysis. Tables A.3 and A.4 show the results of models 1 and 2 when using OLS and random-effects, respectively.

[[Tables A.3 and A.4 about here]]

There are some interesting differences between the findings in the OLS and random-effects analyses and the fixed-effects analyses. The influence of IGO membership drops out of these analyses, and, although the effects of the Polio Eradication Initiative (PEI) remain, the coefficients found for each are smaller.

Tables A.5 and A.6 show the results of model 2, separated by income, for OLS and random-effects analyses respectively.

[[Tables A.5 and A.6 about here]]

Here again the positive influence of the PEI persists with a smaller coefficient. The influence of IGO and INGO shows more puzzling patterns. They lose significance in high-income countries, where had a positive and negative influence respectively in fixed-effects models. Both also gain influence in middle-income countries, with IGO negatively effecting immunization coverage and INGO positively effecting it. In low-income countries only IGO has an influence: negative as found in middle-income counties.

Disease Surveillance

Tables A.7 and A.8 show the results of models 1 and 2 for analyses using OLS and random-effects methods respectively.

[[Table A.7 and A.8 about here]]

The positive influence of the lagged dependent variable persists, but all other variables lose significance in these models.

Tables A.9 and A.10 show results of model 2 by income category using OLS and random-effects methods respectively.

[[Table A.9 and A.10 about here]]

As with the fixed-effects models, these tables show few findings, although the variables that do show a significant influence are different from those found in the fixed-effects models, with the exception of the lagged dependent variable, which continues to show a positive influence here.

In addition to these OLS and random-effects analyses, I reran my disease surveillance analyses for each measure in my disease surveillance measure separately to test whether the use of this index accounted for my scanty findings. Results of these analyses can be found in tables A.11, A.12, A.13 and A.14. Tables A.11 and A.12 show the results of models 1 and 2 for analyses of non-polio AFP rate and % of analyzable samples respectively.

[[Tables A.11 and A.12 about here]]

As with the analyses of the disease surveillance index, no international level variables attain significance in these two analyses.

Tables A.13 and A.14 show the results of the model 2 analysis, separate by income category, for non-polio AFP rate and % of analyzable samples respectively.

[[Tables A.11 and A.12 about here]]

Here we see more differences from the analysis of the disease surveillance index. The negative effect of INGO participation in high-income countries disappears for both new analyses. Further, the analysis of non-polio AFP rate finds a positive influence of undergoing certification as polio free in middle-income countries only. The analysis of % of analyzable samples shows a similar positive influence of undergoing certification, along with a negative influence of IGO membership and a positive influence of INGO participation in middle-income countries.

Finally, to test whether the more abridged time frame included in my analysis of disease surveillance accounts for the lack of findings, I reran my analysis of immunization coverage for a 10-year period, from 1983 to 1993. The results of these analyses can be found in tables A.15 and A.16.

[[Tables A.15 and A.16 about here]]

Unlike analyses over the full time frame, these analyses show no influence of IGO membership on immunization coverage. However, the other international-level variable of interest, the PEI indicator, remains significant. Thus, although the time frame may explain part of the weakness of my findings for disease surveillance, especially as it relates to the influence of associational ties (IGO membership or INGO participation), it's likely that other differences are also at work here: disease surveillance simply isn't influenced by the same factors as immunization coverage.

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