Human Rights Treaty Ratification of Aid Receiving Countries *

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Abstract

This paper studies the role of economic and strategic incentives in the decision to ratify United Nations Human Rights Treaties (HRT). We present new empirical evidence that sheds light on who ratifies when and why. For a foreign aid receiving country, high levels of predetermined treaty participation relative to other aid recipients has a significant positive effect on GDP growth and aid receipts. Furthermore, previous ratifications have a strong negative effect on the country's current ratification decision. This evidence is consistent with the hypothesis that aid donors use HRT ratification as a criterion to allocate foreign aid, and that recipient countries are strategic and forward-looking. Based on these empirical findings, we propose a structural dynamic game of HRT ratification decisions by aid receiving countries. The model is analogous to a dynamic game of quality competition in an oligopoly industry (eg., Pakes and McGuire, 1994) in which countries compete for foreign aid and trade agreements by ratifying costly HRTs in the same way firms compete for demand by investing in costly product quality improvement. We estimate the model using data from a variety of sources, including the United Nations Treaty Collection. Our estimates show that economic factors play an important role in HRT ratification, and that HRTs have significant influence on the distribution of foreign aid among recipient countries. We also find that the ratification costs countries incur vary significantly across treaties and country regime types. We use the estimated model to evaluate the effects of counterfactual policies on HRT ratification decisions and on the distribution of foreign aid.

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1 Introduction

With the horrors of two catastrophic world wars fresh in its collective memory, the United Nations General Assembly adopted the Universal Declaration of Human Rights (UDHR) on December 10, 1948. In the years since, the UDHR has formed the basis of international human rights norms and their formal legal embodiment in the United Nations Human Rights Treaties (HRT). The ratification and in many cases subsequent integration of HRT's into domestic law by countries all over the political and cultural spectrum is considered one of the great achievements of the international community in the post war era.

At the same time, it is natural to ask why countries ratify HRT's at all. First, formal enforcement mechanisms generally do not exist. Countries party to a treaty can in practice violate its terms without formally specified punishment. This stands in contrast to treaties in trade and the environment, where monitoring is possible and non-compliant parties can be punished. Second, the benefits to ratifying a human rights treaty are not immediately clear. Treaties in trade and the environment solve a collective action problem by clearly stipulating and enforcing the rules of the game, and the mutual benefit associated with treaty participation is clear and tangible. When a country ratifies an HRT, on the other hand, it agrees not to take actions that affect its own citizens. It is not obvious what one country has to gain by agreeing to limit domestic behaviour while receiving unenforceable promises from other parties to do the same.

Despite the seemingly inconsequential nature of HRT's, we observe ratification throughout the history of the UN, and perhaps more importantly, substantial and persistent variation in the timing and frequency of ratification across countries and treaties (see figures 1 and 2 in the appendix). Exploiting a panel of 81 foreign aid receiving countries over the years 1962-2000, we investigate who ratifies, when, and why. Specifically, we examine the role of economic and strategic incentives in the decision to ratify HRT's at the UN. We approach the problem in two stages. In the first stage, utilizing dynamic panel data methods, we establish three pieces of novel empirical evidence. First, we find that a high level of treaty participation *relative to other countries* has a significant positive effect on GDP growth, and propose different channels through which HRT's affect domestic production. Second, we find that high levels of treaty participation are also associated with high levels of aid receipts, consistent with the hypothesis that aid donors use treaty participation as a criteria to distribute foreign aid among recipients.

Finally, we show that previous ratifications have a strong negative effect on the country's current ratification decision. Or, viewed in another light, the probability a country ratifies a treaty increases as countries in the rest of the world increase their treaty participation. This finding is consistent with the hypothesis that countries are strategic and forward-looking in their decision to ratify an HRT.

These empirical results, while providing new insight regarding the determinants of foreign aid and economic growth, also raise other interesting questions. For example, establishing that relative treaty participation positively affects aid and growth leads one to ask whether the economic benefits to ratification explain the patterns of behavior we observe. In other words, is economic growth and increased foreign aid receipts the motivation behind ratification? And if so, why don't all countries ratify all available treaties immediately? Absent a theoretical model of treaty ratification, these questions are difficult to answer. As such, to further understand how economic and strategic factors drive country decisions to commit to a human rights treaty, in the second part of the paper we develop and estimate a structural dynamic game of treaty ratification. The model we consider is analogous to a model of quality competition in an oligopolistic industry (eg., Pakes and McGuire (1994)). In our model countries compete for foreign aid and GDP growth by ratifying costly HRTs in the same way firms compete for consumer demand by investing in costly product quality improvement. Donor countries make resource allocation decisions based on the relative treaty participation of recipient countries. Recipient countries "invest" in the quality they offer donor countries by ratifying treaties at a cost. These investment costs are allowed to vary both by treaty and by the type of ratifier. We estimate the investment costs as well as the structural parameters of the ratification benefit function. Our first finding is that the ratification costs countries incur vary across country regime types. Ratification is less costly for democratic countries and for countries with unstable political institutions. This suggests that the cost of incorporating the terms of the treaty into the domestic political system is smaller if the country is either already somewhat compliant (democratic) or does not have firmly established institutional structure to change (unstable institutions). Second, we find significant variation in costs across treaties; some treaties cost twice as much to ratify as others. We relate this cost variation to variation in institutional characteristics of the treaties, in particular the verifiability of the treaty terms, and discuss the implications of this finding for institutional design.

We then use the estimated model to consider several counterfactual experiments. In the first experiment we attempt to quantify the importance of foreign aid receipts as a motive in the treaty ratification decision. We find that the average rate of participation drops by 20% in the absence of the aid motive, confirming that the economic returns to ratification we find evidence of in the first part of the paper are indeed a significant part of the reason countries ratify in the first place. In the second experiment we investigate the possible sources of the observed heterogeneity in country ratification behaviour. One of the key benefits of estimating a structural model that allows for several competing theories is that we are able to quantify the relative importance of each of the theories in turn. As such we evaluate the relative importance of benefit and cost side heterogeneity in explaining participation heterogeneity. We find that while both benefit side and cost side heterogeneity lay a significant role, cost side heterogeneity is more important in explaining heterogeneity in behaviour. In the third counterfactual experiment we examine the importance of competition in the context of our model. In the model it is a country's participation in HRT's *relative* to other countries that determines the economic resources it receives from donors. In order to continue receiving the same aid etc., a country must maintain its rate of participation relative to the rest of the countries in the world. We consider a counterfactual world where this is not the case; countries receive aid based on the absolute rate of participation. We find that the rate of participation drops significantly in the counterfactual scenario; competition is important. This result suggests that the aid and trade policies of rich countries play an informal yet key role in setting international human rights standards.

2 Preliminary Evidence

In this section we provide two sets of preliminary reduced form evidence. First, we establish that countries that ratify HRTs frequently relative to other countries in the world experience higher GDP growth and receive more foreign aid. We examine some potential channels through which treaty participation may have these effects. Second, we show that previous ratifications have a strong negative effect on the country's current ratification decision. The probability a country ratifies a treaty increases as countries in the rest of the world ratify more treaties. These empirical results together motivate the dynamic model of treaty ratification we spell out in section 3.

It is useful to conceptualize human rights treaty ratification as a lumpy investment decision. At any point in time there are several treaties open for ratification by a country, as new treaties appear throughout the history of our sample (see data section below). Countries rarely ratify many treaties at once, and instead decisions are spaced over time. As countries ratify they accumulate "capital." We now describe the measure of treaty capital that we use in our analysis.

Indexing countries by i, the year by t, and treaties (in chronological order) by r, note that the proportion of treaties ratified by country i before year t is given by:

$$K_{it} = \frac{\sum_r x_{irt}}{R_{t-1}} \tag{1}$$

where x_{irt} is a binary variable taking the value 1 if country i has ratified treaty r at any year before t and 0 otherwise, and R_t is the number of treaties open for ratification at time t. Therefore, the numerator represents the total number of HRTs that country i has ratified up to year t. While K_{it} is a natural measure of treaty participation, it is itself not a convincing measure of a country's commitment to human rights since it does not allow for depreciation of the country's treaty capital. If a country ratifies one treaty and then remains inactive for 10 years, if K_{it} is the measure of treaty capital, it will have the same size capital stock as a country that ratified its first treaty in the current year. This is particularly unrealistic, as governments change over time, and thus recent ratifications should carry more weight. To introduce depreciation, we define:

$$K^*_{it} = K_{it} - \frac{\sum_{j \neq i} K_{jt}}{N_{t-1} - 1} \tag{2}$$

where N_t is the number of countries in the world at time t. K^*_{it} represents the accumulated human rights treaty capital of country i relative to the average accumulated capital in the world at time t. As a country remains idle and the rest of the world ratifies, the country's stock depreciates. While allowing for depreciation on the one hand, K^*_{it} also makes transparent the sense in which recipient countries compete with one another for economic attention from the more developed world in our model.

It is useful to illustrate some ways in which the path of treaty capital can differ across countries. Figure 1 displays the capital paths over the duration of the sample for Argentina and Chile, while figure 2 displays the paths for Uganda and Chad. We purposefully select countries that are within close geographical proximity to one another to "control" for regional differences. In figure 1 it is clear that each country has a period of heavy investment (Argentina in the mid

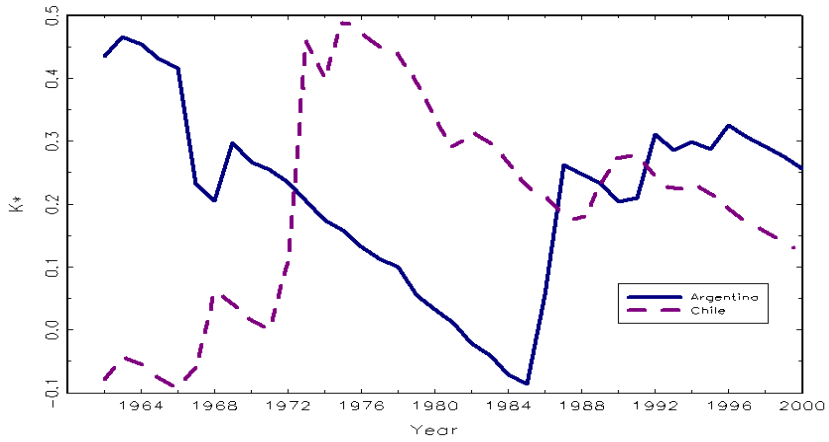


Figure 1: Argentina and Chile Treaty Capital

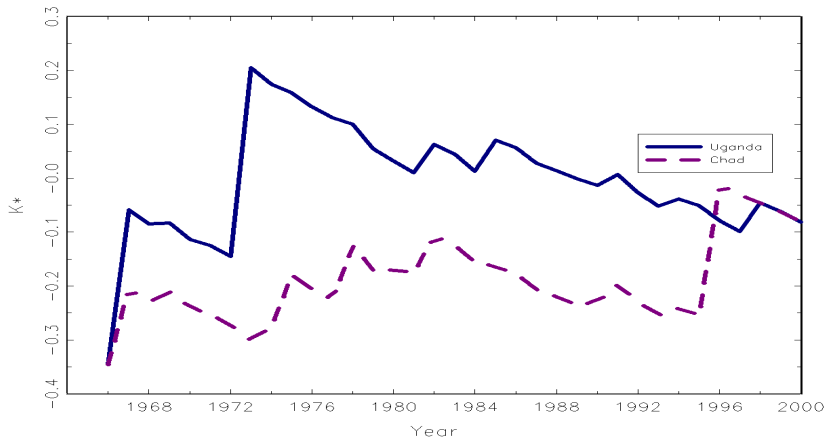


Figure 2: Uganda and Chad Treaty Capital

1980's, Chile in the Early 1970's), and each has long periods characterized by stagnation and decline. But most interesting is that each country's heavy investment comes at a time when the other's treaty capital is well into a period of decline. The striking feature in figure 2 meanwhile is that, while both country's investment dynamics are similar, the treaty capital stock of Uganda is persistently higher than the stock of Chad up until the last few years of our sample. This suggests there is important permanent heterogeneity in ratification patterns as well.

2.1 GDP Growth and Foreign Aid

In this section we establish that human rights treaty participation *Granger causes* economic growth and foreign aid receipts. Specifically, consider the following equations describing annual

GDP growth, g (the first difference in logs of GDP), and foreign aid receipts, a:[1]

$$g_{it} = \alpha_1^g K_{it}^* + \alpha_2^g K_{it}^{*2} + \gamma_g^g g_{it-1} + \gamma_a^g a_{it-1} + \gamma_{ak}^g a_{it-1} K_{it}^* + \beta^g z_{it} + \omega_i^g + \delta_t^g + \nu_{it}^g \quad (3)$$

$$a_{it} = \alpha_1^a K_{it}^* + \alpha_2^a K_{it}^{*2} + \gamma_g^a g_{it-1} + \gamma_a^a a_{it-1} + \gamma_{ak}^a a_{it-1} K_{it}^* + \beta^a z_{it} + \omega_i^a + \delta_t^a + \nu_{it}^a \quad (4)$$

K_{it}^*, the measure of country i's level of human rights treaty participation entering year t, is our key variable of interest. z_{it}^K includes control variables, and ω_i^K and δ_t^K are country specific and time specific fixed-effects. Note that we allow for the possibility of diminishing returns to treaty ratification by including K_{it}^{*2} in the equations. Conceptualizing ratification as an capital investment decision, we naturally expect that the ratification of the 10th treaty may have a different effect than the 1st. [2]

Formally, HRT *Granger causes* GDP and aid if:

$$E(g_{it}|I_{t-1}) \neq E(g_{it}|J_{t-1}) \quad (5)$$

$$E(a_{it}|I_{t-1}) \neq E(a_{it}|J_{t-1}) \quad (6)$$

where J_{t-1} contains information on past aid and growth (as well as other control variables), while I_{t-1} contains all the information in J_{t-1} plus information on K_{it}^*, the treaty capital stock (Wooldridge, 2008). In words, these equations say that past treaty behavior of a country is still informative for current growth and foreign aid even after conditioning on past aid, growth and the other explanatory variables. To establish Granger Causality, we require a dynamically complete model, which implies that there will be no serial correlation in the errors of our regression. Our model is dynamically complete if adding another lag to the regression equations is not informative (Wooldridge, 2008). In our regression analysis below we perform a standard

[1] Typically one should be concerned with the presence of deterministic time trends in variables such as GDP and foreign aid. This is particularly a concern for the sample of countries we are concerned with (aid recipients) over the time horizon we are considering (the second half of the 20th century). To avoid estimating a spurious relationship between these variables and our key variables of interest, we use de-trended GDP and foreign aid. Another serious concern when using GDP data is the presence of a unit root. This concern motivates our use of GDP growth as opposed to GDP in levels.

[2] Our choice to interact treaty capital with lagged aid is motivated by the possibility that countries that already receive significant aid have different returns relative to other countries. They are aided for reasons other than their treaty behaviour and the supply of aid from the developed world may be less sensitive to their treaty behaviour. We considered several other forms of heterogeneity in returns to ratification, without a significant change in results.

Table 1: Estimation of GDP Regression equation

Number of Observations: 2736. Years 1962-2000, 81 Countries

Variable	Pooled OLS	Country FE	Country/Time FE
Lagged GDP growth	.1462 (.0407)	.1400 (.0405)	.0748 (.0497)
Lagged Aid	.0067 (.0021)	.0072 (.0022)	.0107 (.0024)
Democracy	-.0051 (.0030)	-.0168 (.0049)	.0033 (.0060)
Stable	-.0015 (.0054)	-.0145 (.0096)	.0247 (.0110)
Openness	.0053 (.0021)	.0085 (.0026)	.0157 (.0034)
Population	-.0723 (.0327)	-.0899 (.0406)	.8130 (.3510)
K^*	.0059 (.0052)	.0075 (.0087)	.0161 (.0086)
$K^* \times$ Lagged aid	-.0368 (.01660)	-.0377 (.0171)	-.0429 (.0170)
K^{*2}	-.0409 (.0182)	-.0543 (.0271)	-.0539 (.0278)

Standard errors are robust to heteroscedasticity and autocorrelation (Greene, 2003).

LM test of serial correlation of the errors, and fail to reject the null hypothesis of no serial correlation both in the case of GDP growth and aid at any standard level of significance.

(a) GDP growth

Our purpose in estimating a GDP growth equation is not to explain growth. Instead, we posit that the relative rate of human rights treaty participation of a country is an important input into its production function, and seek to uncover the contribution of HRT to growth. In doing so we must account for other variables which may explain both treaty participation and growth, keeping in mind the type of country in our sample. Domestic political and economic institutions are likely to be important in this context. We control for the level of democracy and political stability in the country (both variables are from the Polity IV data, described in the data section below), as well as economic openness (Sachs and Werner, 1995). All variables are lagged by one year. We also control for lagged foreign aid receipts.

Table 1 displays the parameter estimates of the GDP growth equation 1. We include estimates of the regression model with and without fixed effects for illustrative purposes. The importance of including country fixed effects in cross country panel data analysis is made clear by Acemoglu et al (2008). Pooled OLS yields consistent estimates of our parameters of interest only if there

was no correlation between time invariant country characteristics and our explanatory variables. As an example, Argentina is one of the few countries to have ratified every treaty in our sample, yet receives below average aid throughout the history of our sample. Somalia, a country that at any point in the history of our sample had ratified well below the average number of treaties received well over the global average in aid. By comparing across the two countries we may conclude that past human rights treaty ratification results in a *decrease* in foreign aid. Few would dispute that there is something intrinsically different and time-invariant (at least for the duration of our sample) between these countries that help explain their growth and aid receipts. Figures 1 and 2 make explicit that there is heterogeneity in commitment to human rights treaties as well. The possibility that the sources of the heterogeneity are correlated necessitates controlling for fixed effects.

The first main result is the effect of human rights treaty participation on GDP growth. There is a positive and significant effect of participation on GDP growth. Moreover, there is significant heterogeneity in the effect depending on how much aid the country received last period. Recipients of significant aid dollars see much smaller growth benefits to ratification than non-recipients. Last, there are significant decreasing returns to ratification. To put the results in perspective, country that received no aid in the previous year sees a $0.0161*0.10-0.0539*0.10^2 \approx 0.001$ increase in GDP growth for a 0.10 increase in own treaty participation. This is a not an insubstantial effect: the mean change in GDP growth for a country from one year to the next in our sample is 0.00014. Countries that were aid receivers the previous year are a different story however. The mean aid recipient in our data set (roughly 23.5 million dollars) would see a $0.0161 * 0.10 - 0.429 * 0.0235 * 0.10 - 0.0539 * 0.10^2 \approx 0$ change in GDP growth for a 0.10 increase in own treaty participation.[3] It is worth pointing out that Burnside and Dollar (2000) have examined the relationship between foreign aid, economic policy of the recipient and economic

[3]While we estimate the partial effect of HRT on growth in the above equation, we are also interested in the partial effect on GDP itself. Note that with some manipulation can rewrite the GDP growth equation above as:

$$y_{it} = y_{it-1} \exp(g_{it})$$

where y_{it} is the level of GDP in country i at year t. Then, we can obtain the partial effect of treaty ratification on the level of GDP in terms of the partial effect of treaty ratification on GDP growth as:

$$\frac{\partial y_{it}}{\partial K^*_{it}} = y_{it-1} \frac{\partial g_{it}}{\partial K^*_{it}} \exp(g_{it})$$

growth, and found that aid is good for growth conditional on certain economic policies in the recipient country. We find aid to be good for growth regardless of the policies of the recipient country. One key difference between our study and theirs, besides the obvious difference in the set of countries present and the time horizon considered in the sample, is that we control for country level fixed effects. This is not possible in their case, as some of the key variables of interest to them are time invariant.[4]

While we do not explicitly model the mechanism here, it is worth noting the potential channels through which HRT may affect GDP. Chief among these is trade. It is well known that trade deals often have implicit or explicit human rights commitments linked to them. For example, the EU's Generalised System of Preferences Plus (GSP Plus) offers duty free access as well as large tariff reductions to developing countries [5] in exchange for the ratification of key international treaties, 8 of which are UN human rights treaties that we consider here. Moreover, the countries that meet these criteria and obtain the GSP Plus benefits are subject to review of their practices with respect to the human rights commitments they have made. [6]

Additionally, the effects of treaty ratification on GDP may be indirect. As an example:

> In Estonia, 28 treaties...were ratified in one session, a month after independence, without even having been translated into Estonian. Estonia "wanted to send a

[4]Easterly (2000) shows that the results of Burnside and Dollar (2000) are not robust to different definitions of "aid", "growth", or "good policy", and moreover, shows that with more data, the key conclusion of Burnside and Dollar's study disappears.

[5]See:www.ec.europa.eu/trade/wider-agenda/development/generalised-system-of-preferences/ and http://trade.ec.europa.eu/doclib/docs/2005/june/$tradoc_1$23861.*pdf*

[6]As an example, Sri Lanka, a benefactor of the GSP plus program, fought a costly war against separatist rebels in 2009. As the war neared its end, international organizations and heads of state expressed concern at the possibility that Sri Lanka had committed severe human rights violations during the course of the war. As a result, the EU trade commission conducted an investigation into Sri Lanka's human rights practices and found it in breach of its human rights commitments it had made and is "in violation of the contract it agreed" to (Leahy and Fontella-Khan, 2009). EU officials have recommended Sri Lanka's removal from the GSP plus scheme, a decision that could cost the country several hundreds of millions in export dollars. Other international financial flows were effected by Sri Lanka's human rights behaviour. Near the end of the war, Sri Lanka had requested a loan of 1.9 billion dollars from the IMF. Decisions on whether to grant a loan are decided by vote of the executive directors of the IMF. Though the US (the IMF's largest shareholder) was not directly strategically interested in Sri Lanka, secretary of state Hilary Clinton stated it was "not an appropriate time" for Sri Lanka to receive the loan, though it was viewed as crucial to helping Sri Lanka cope with the global financial crisis.

> strong signal that it would respect human rights and was not a part of the Soviet Union anymore." (Heyns and Viloen, 2002)

That a government of a country would agree to abide by the terms of 28 complicated documents potentially not even knowing the language they were written in lends credence to the possibility that treaties may act as a signalling device, whereby countries with a dark history that would have been unfriendly to trade and investment signal to the Western world that they are now "open for business."

(b) Foreign Aid Receipts

We interpret equation (4) as a supply function that describes the decision process of aid donor countries. Our primary interest here is in uncovering how the supply of aid responds to human rights treaty participation of recipient countries, holding fixed other variables that may effect both HRT participation as well as aid receipts. Our choices for controls here are identical to those in the GDP regression equation. We are not the first to try to disentangle the effects of different economic and political variables on aid receipts. Two papers that guide our analysis here are Burnside and Dollar (2000) and Alesina and Dollar (2000). Alesina and Dollar (2000) find that aid flows are as much dictated by strategic and political interest as they are by the economic conditions and performance in recipient countries. While we do not *directly* control for strategic importance and political importance of the recipient to the donor(s), the inclusion of country specific fixed effects is useful in this regard. Provided that strategic importance is time invariant, as in many cases it is, country specific fixed effects allow us to control for the average strategic value of the recipient across the donors (OECD members). Alesina and Dollar also find that aid donors reward democratization. As many episodes of democratization are accompanied by commitment to UN human rights treaties, democracy is an important control variable in our analysis. Table 2 displays the parameter estimates of the aid equation.

We find a significant and positive effect of ratification on aid receipts. As in the case of GDP growth, countries that were recipients of aid in the previous year are treated differently than countries that were not recipients. A country that received aid in the previous year experiences a smaller increase in aid receipts when it increases treaty participation. Note that there are not decreasing returns as there were in GDP; the coefficient on K^{*2} is small and far from statistically significant. To put the effect of an increase in treaty ratification on aid receipts in perspective, a

Table 2: Estimation of AID regression Equation

Number of Observations: 2736. Years 1962-2000, 81 Countries

Variable	Pooled OLS	Country FE	Country/Time FE
Lagged GDP growth	-.1404 (.0848)	-.1295 (.0857)	-.1406 (.0871)
Lagged Aid	.7190 (.0479)	.7092 (.0494)	.6997 (.0519)
Democracy	.0033 (.0197)	.0248 (.0204)	.0679 (.0237)
Stable	.0276 (.0385)	.0437 (.0643)	.0418 (.0555)
Openness	-.0334 (.0115)	-.0597 (.0145)	-.0227 (.0169)
Population	.0134 (.1049)	.0008 (.1244)	-.0567 (.1154)
K^*	.0254 (.0226)	.0906 (.0469)	.1001 (.0477)
$K^* \times$ Lagged aid	-.5233 (.2783)	-.5608 (.3185)	-.5298 (.3182)
K^{*2}	.1331 (.0771)	.1150 (.1190)	.0218 (.1241)

country that received no aid in the previous period and increases participation by 0.10 receives a $0.1001 * 0.10 \approx 0.01$ increase in foreign aid, which in dollar terms amounts to about 10 million dollars. However a country that received very significant aid in the previous period, say 100 million dollars experiences a $0.1001 * 0.10 - 0.53 * 0.10 * 0.10 \approx 0.005$ or 5 million dollar increase in foreign aid.

It is also of interest to note how the estimate of the effect of treaty capital on foreign aid receipts changes as we add country fixed effects. In the pooled OLS case the effect is estimated to be not significantly different from zero. Yet as we add country fixed effects the effect becomes positive and statistically significant. Thus leaving out country specific fixed effects would result in a negative bias on the estimate of the effect of treaty participation. This suggests that unobserved permanent country heterogeneity is negatively correlated with treaty participation and positively correlated with foreign aid receipts. The example above of Argentina (low aid, high participation) and Somalia (high aid, low participation) illustrates this bias. There are some countries with permanently bad deep- rooted social, political and economic institutions. These countries tend to be poor and require foreign aid. Their poor institutions are also inimical to human rights. On the other hand, countries like Argentina with relatively good institutions do not require much aid, and also tend to have good human rights practices. In passing we

note that as in Alesina and Dollar (2000) we find that democracies receive more aid than non democracies.

2.2 Treaty Ratification Dynamics

In this section we examine the hypothesis that countries are strategic and forward looking. Specifically, we look at how the propensity to ratify a treaty depends on a country's own past behavior and the behavior of other countries. To do so we consider a probit model of the form

$$\{d_{irt} = 1\} \Leftrightarrow \{\alpha_1^d K_{it}^* + \alpha_2^d g_{it-1} + \alpha_3^d a_{it-1} + \beta^d z_{it} + \omega_i^d + \delta_t^d + \nu_r^d > \varepsilon_{irt}^d\} \tag{7}$$

where d_{irt} is country i's ratification decision on treaty r in year t, and $\omega_i^d, \delta_t^d, \nu_r^d$ are country, time, and treaty specific fixed effects. ε_{irt}^d is an exogenous shock, iid over countries, time and treaties. The other variables are as defined above. In table 3 in the appendix we display the partial effect of each variable on the probability of ratification. Again, we display results both allowing for and ignoring fixed effects for illustrative purposes. The variable with the strongest partial effect on the ratification probability is the K^* ratification index. A marginal increase in this variable results in a 3.4 percent decrease in the probability of treaty ratification. A country's ratification decision is very strongly negatively effected by its previous ratification decisions relative to the other aid receiving countries. This suggests that political "pressure" is an important determinant of the ratification decision, and countries are more compelled to ratify as their peers ratify. This evidence of the presence of strategic effects, along with the regression results from the previous section, motivates the structural model we describe below.

3 Model

3.1 Discussion

The empirical results of the previous section shed some light on the economic returns to treaty participation. However we can not conclude from this analysis that the economic returns themselves explain the ratification behaviour we observe. To consider this hypothesis, we require an estimable model of behaviour. Developing and estimating a structural model is particularly useful here, as we will then have the opportunity to consider several interesting policy experiments.

The structural model we propose here has as an analogue in the empirical IO literature to a dynamic game of oligopoly competition where firms invest in quality (eg.,Pakes and McGuire (1994)). Before formally laying out the model it is worthwhile to make explicit the relation between a dynamic game of quality competition and the problem we study here. In a model of quality competition, each firm in an industry composed of several firms produces a product which is indexed by quality. Consumers derive utility only from the quality (net of price) of the good they choose to purchase, and so demand for a given product in the industry is determined fully by its quality relative to the quality on offer from the other firms. Firms also have the option to increase the demand for their products by making a costly investment in quality. Firm profits thus depend on quality through both the revenue and cost channel: a higher quality means more demand and the ability to command a higher price, but comes at an economic cost. Firms who do not invest in quality may see their demand decrease if other firms in the market continue to invest.

In the model we consider here, poorer countries in the world compete with each other to increase GDP growth (through increased trade) and aid receipts from OECD countries. Donor countries have a finite amount of aid and other resources to distribute among recipient countries, and rely on K^* to make allocation decisions. Recipient countries have the option to increase the economic resources they receive by making a costly ratification of a human rights treaty. This is a costly investment because ratifying a treaty commits a country to the terms of the treaty, at least in principle. Different treaties are allowed to have different ratification costs for a country, and different countries can have different costs of ratification of a given treaty. As in the quality investment model country payoffs depends on quality through both the benefit and cost channel: a larger treaty capital stock means more aid and economic growth, but comes at a cost. Further, countries that do not invest in quality may see the economic resources they receive decline if other countries continue to increase their participation in human rights treaties.

3.2 Formal Model

At year t, the international community is configured by C_t recipient countries and R_t treaties. Countries and treaties are given exogenously in our model. Let $x_{irt} \in \{0, 1\}$ indicate country i's status in treaty r at year t. If $x_{irt} = 1$, we say country i has ratified treaty r at some time $\tau < t$. We can represent country i's membership status in the set of R_t treaties at time

t by the vector $\mathbf{x_{it}} = \{x_{irt} : r = 1, 2, ..., R_t\}$, and we can represent the ratification status of the entire international community as the vector $\mathbf{x_t} = \{\mathbf{x_{it}} : i = 1, 2, ..., C_t\}$. Ratification is *irreversible*: once a country has ratified a treaty it may not exit (erase its name) from the treaty, an assumption clearly validated by the data. We represent the ratification decisions at period t as $\mathbf{d_{it}} \equiv \{d_{irt} : r = 1, 2, ..., R_t\}$.

Country payoffs in year t are the difference between per-period economic payoff R_i and a ratification "investment" cost EC_i:

$$\Pi_i(\mathbf{x_t}, \mathbf{z_t}, \mathbf{d_t}, \varepsilon_{\mathbf{it}}) = R_i(\mathbf{x_t}, \mathbf{z_t}) - EC_i(\mathbf{x_t}, \mathbf{z_t}, \mathbf{d_{it}}, \varepsilon_{\mathbf{it}}) \tag{8}$$

$\mathbf{z_t}$ is a vector of exogenous political and economic variables and $\varepsilon_{\mathbf{it}}$ is a vector of private information shocks of country i. We specify the benefit and ratification cost functions in turn.

Economic Payoffs

We make the following assumption on the economic payoff function $R_i(\mathbf{x_t}, \mathbf{z_t})$:

- Assumption **(E1)** The function $R_i(\mathbf{x_t}, \mathbf{z_t})$ depends on the vector $\mathbf{x_t}, \mathbf{z_t}$ only through its effect on GDP growth and foreign aid receipts. Specifically, let $y_{it} = Y_i(\mathbf{x_t}, \mathbf{z_t})$ and $a_{it} = A_i(\mathbf{x_t}, \mathbf{z_t})$ represent country i's GDP growth and foreign aid received respectively at year t. Then:

$$R_i(\mathbf{x_t}, \mathbf{z_t}) = \alpha_y Y_i(\mathbf{x_t}, \mathbf{z_t}) + \alpha_A A_i(\mathbf{x_t}, \mathbf{z_t})$$

The inclusion of these variables in payoffs is motivated by our regression results in the first stage, and capture the hypothesis we propose in this paper, that who ratifies and when is determined by the different economic tradeoffs different types of countries face. $Y_i(\mathbf{x_t}, \mathbf{z_t})$ and $A_i(\mathbf{x_t}, \mathbf{z_t})$ are functions that make explicit the fact that these variables depend on treaty status $\mathbf{x_t}$ as well as other political and economic variables $\mathbf{z_t}$. α_y and α_a are parameters to be estimated, representing the relative weights of GDP and aid in country payoffs.

One potential criticism of the payoff function we have presented here is that foreign aid is a component of GDP and we are in a sense double counting. We argue that this is not the case. Foreign aid can be thought of as an income transfer from donor countries to recipient countries. How this income transfer affects GDP growth depends on how it is used (Burnside and Dollar, 2000). Aid can either be used for productive purposes, for example, investment, or can be consumed by the recipient through corrupt behaviour. The rewards of increased GDP growth

are of course much more difficult for governments to simply "pocket." In this way, including both GDP growth and aid in the payoffs allow us to remain somewhat agnostic on the motives of a government.

What remains then is to specify the functions $y_{it} = Y_i(\mathbf{x_t}, \mathbf{z_t})$ and $a_{it} = A_i(\mathbf{x_t}, \mathbf{z_t})$. It is natural here to use the results of the first stage estimation, and assume that these functions are given by equations (3) and (4) above. Implicit in this specification is:

- Assumption **(E2)** The vector of ratification statuses $\mathbf{x_t}$ of the international community enter the payoff of country i in the dynamic game only through K^*_{it}.

Treaties are interconnected in the sense that we allow ratification decisions in one treaty to affect the payoff to ratifying any other treaty. Thus, country $i's$ status, and the status of all other countries in all other treaties, influences country i's decision in any given treaty. This is a departure from the traditional "isolated markets" assumption typically made in the literature in empirical industrial organization. As we discuss below in the estimation of the dynamic model, this specification of the payoff function plays an important practical role in alleviating the computational burden associated with the solution and estimation of the dynamic game. We discuss these in more detail below.

Investment Costs

The ratification cost function $EC_i(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{\mathbf{it}})$ is directly analogous to the concept of irreversible investment cost in the IO literature; it can be interpreted as either a one time cost paid upon ratification of (investment in) the treaty or the discounted present value of a sequence of costs. We specify the following investment cost function for ratifying treaty r in country i at time t:

$$EC_{irt} = \gamma^C + \gamma^{de} m_{it} + \gamma^{du} s_{it} + \xi_r + \epsilon_{irt}$$

where the γ's are parameters to be estimated, ξ^r is a treaty specific cost (to be estimated), m_{it} is the level of democracy in country i at time t, and s_{it} is the country's political "stability". γ^C is the component of entry cost that is common to all countries and treaties, and is constant over time. γ^{de} and γ^{du} represent the incremental increase in entry cost to being democratic/politically stable.

It is important to note here that we can not estimate a fixed cost of being a party to a treaty. To separately identify fixed costs from our investment costs we would need to observe

both entry and exit into treaties. Since ratification decisions are irreversible, we do not observe exit. The choice to include democracy and political stability is not arbitrary, as the existing literature on human rights treaty ratification examines precisely these two dimensions. Hathaway (2002, 2007) attempts to rationalize the empirical observation that autocratic countries sometimes ratify human rights treaties more readily than democratic countries. Hathaway argues that ratifying a treaty is only costly for those countries that a) are not compliant with the treaty's terms ex-ante of ratification and b) can be held to the terms of the treaty by some domestic enforcement mechanism post-ratification. In other words, only countries that need to change their behavior post ratification actually pay the cost. These countries are typically non-compliant democracies. Moravcsik (2000) argues that the value of stabilizing or "locking in" democratic institutions is high relative to the sovereignty costs associated with ratification for newly established democracies. We would generally expect the ratification cost to be smaller for newly established regimes, as the transition to new institutions is less onerous when there is no firmly entrenched institutional structure in place. The existing human rights treaty ratification literature has adopted a strictly reduced form approach to studying the effects of political institutions on ratification, and we are the first to obtain structural parameter estimates of how ratification costs vary with the type of ratifier. By allowing costs to vary across treaty type for a given regime we are also able to study questions of institutional design. Once we have estimates of treaty specific costs we can examine possible relationships between observable institutional features of the treaties and the cost of ratification.

Now, taking the international treaty status vector $\mathbf{x_t}$ and the variables $\mathbf{z_t}$ as given at time period t, each country decides which of the treaties to ratify. Implicit in our definition of the payoff function Π_i is a *time to build* assumption:

- Assumption **(E3)** Ratification costs are paid at the time period of ratification, but the ratification decision is not effective until the following time period.

Countries pay the investment cost at the time of ratification but do not see consequent improvements in economic variables until the following period. This assumption is important, and is justified particularly in the case of GDP. It is reasonable to think that the act of ratifying a treaty does not result in immediate tangible changes to a country's key economic variables, but rather triggers a set of complex and subtle events that culminate in future changes in the path

of economic variables. Note that this assumption is inherent in the first stage estimation of the growth and aid equations, as we are considering the effect of year t treaty participation on year$t+1$'s GDP growth and aid.

Countries are forward looking and maximize intertemporal payoffs, and take into account the direct effect of their actions on their own future payoffs as well as the indirect effect through the expected reaction of other countries. Strategies depend only on payoff relevant variables: we restrict players to using Markov strategies. A country's payoff relevant information at any time t is given by the vector $\{\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{\mathbf{it}}\}$. Then let $\sigma_i(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{it})$ be a strategy function for country i. Given this strategy function we can define a conditional choice probability (CCP) function as

$$P_i\big(d_{it}|\mathbf{x_t}, \mathbf{z_t}\big) \equiv \int I\big\{\sigma_i(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{it}) = d_{it}\big\} dG(\varepsilon)$$

In words, this is the probability with which country i takes action d_{it} at time period t given the ratification status $\mathbf{x_t}$ and state $\mathbf{z_t}$.

We define country i's value function given equilibrium entry probabilities $\mathbf{P}_i\big(d_{-i}|\mathbf{x_t}, \mathbf{z_t}\big)$ as $V^{\mathbf{P}_i}(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{it})$, and we say that a strategy function σ is a Markov Perfect Equilibrium if for any possible state $(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{it})$:

$$\sigma_i(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{it}) = \arg\max_{d_{it}} \Big\{\Pi_i(\mathbf{x_t}, \mathbf{z_t}, \varepsilon_{it}) + \delta E\big[V^{\mathbf{P}_i}(\mathbf{x_{t+1}}, \mathbf{z_{t+1}}, \varepsilon_{it+1})|\mathbf{x_t}, \mathbf{z_t}\big]\Big\}$$

We discuss the dynamic model and further assumptions in more detail in the estimation section below.

4 Data

The country-years that comprise the working sample we use are found in table A2 of appendix 1. As our study is targeted at the developing world, we restrict ourselves to the countries of Latin America, Africa, Asia and the Middle East. We consider every country that existed on these continents at any point during the period 1962-2000, was a member of the United Nations, and has a population of at least 500,000.[7] We exclude countries that are major oil exporters throughout the time horizon of the sample, as these countries were non-aid recipients

[7] Much of the data we use, most importantly the Polity IV data set, does not provide values for countries with a population below 500,000.

for most of our sample. Altogether this sample contains 81 countries and 2736 country-year observations.

Treaty ratification dates come from the United Nations Treaty Collection.[8] We restrict consideration to treaties that opened after the founding of the United Nations in 1945 (See table A1 in the data appendix for the full list of treaties). [9] From these data we construct all variables related to ratification. There are dozen s of treaties in the collection, many pertaining to human rights related issues.[10] While chapter IV of the treaty collection is titled "Human Rights," many other treaties in other chapters have an important (often predominantly) human rights dimension, and we thus do not restrict our attention only to treaties from this chapter. The set of treaties we select is broad enough that basic human rights (torture, political killings etc.), property rights, civil rights (religious and political freedoms), and emancipatory rights (worker rights, discrimination) are each considered explicitly by at least one of the treaties in the data set. We consider seven of the eight "core" human rights treaties,[11] as well as eight other treaties considered human rights treaties by the Encyclopedia of Human Rights (1996).

The data on country level democracy over time comes from the Polity IV data set (Marshall and Jaggers, 2004). Each of the democracy and autocracy indexes in the Polity data set, which range from 0-10 (0 being the lowest level of democracy (autocracy) and 10 being the highest level of democracy (autocracy)) are composites of other political variables. First, democracy is conceived as the composite of three things: the degree to which citizens can freely express preferences over political leaders and policies, the constraints on the exercise of power by the executive, and the guarantee of civil liberties to citizens. Autocracy on the other hand is determined by how sharply political participation and competition is restricted, and how freely

[8] Available at http://treaties.un.org/Pages/Home.aspx?lang=en

[9] While treaties dealing with substantive human rights issues did exist in the pre-world war II era, the concept of international human rights law is widely considered to have been a product of the founding of the UN .

[10] There are other international governmental organizations (IGO's) that have as part of their raison d'etre a well established treaty regime that is valid under international law. A prominent example is the International Labour Organization (ILO). While we could have included treaties from these organizations in our sample, doing so would have raised additional problems. For example, there are countries that are members of the United Nations and not the ILO. Thus there are countries that are "players" in the ratification game associated with UN treaties, but not ILO treaties. Further, treaty rules vary across organizations. In sum, the nature of the treaty ratification game differs across IGO's, and we wish to minimize these differences.

[11] We are unable to consider the last of these treaties, the Convention on the Rights of Persons with Disabilities (in force 3 May 2008), because it opened too late with respect to the scope of our data set.

the executive, once selected, exercises power. We follow the literature and use the difference between these two scores (the Polity Composite Index) as our measure of a country's level of democracy, and transform the score so that it lies between 0 and 1. Our measure of political stability comes from the "durable" variable in the Polity IV data set. This variable simply measures the number of years since a major political regime change in the country, and is also normalized to lie between 0 and 1. Any missing data from the polity data set is imputed using the suggestions of the authors. The measure of trade openness we use is the Sachs and Warner (1996) trade openness indicator (updated by Wacziarg and Welch (2003)). This is a binary variable which designates a country as "closed" if one of five policy criteria are met: the country has an average tariff rate greater than 40%, non-tariff barriers cover more than 40% of imports, there is a state monopoly over major exports, the country has a socialist economic system, or there is a black market exchange rate premium greater than 20%.

Country GDP data is measured in thousands of international Geary-Khamis dollars, and is taken from Maddison (2003). Population data is also taken from Maddison (2003). The data on foreign aid comes from the Net Aid Transfers (NAT) data set constructed by David Roodman (2005). While this data is constructed from the same underlying OECD Overseas Development Assistance (net ODA) data perhaps more familiar from other studies on foreign aid, the NAT data corrects for two sources of concern with the original net ODA data among practitioners. First, Net ODA does not account for interest payments paid on past loans by recipients to donors, it is only net of principle payments received on past ODA loans, not of interest received on such loans. NAT is net of both principle and interest payments. Second, NAT does not account for cancelation of old non-ODA loans, while the ODA does. For these reasons, Roodman's NAT data is much more in accord with our definition of aid as a net *transfer* from aid suppliers to recipients than is the Net ODA data. The data is in billions of constant 2007 dollars. The DAC members (aid donors) change over time, but the countries that are members at some point during the time horizon of our sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States, and the Commission of the European Communities.In table 3 we present some basic summary statistics.[12]

[12]These summary statistics are computed for the de-trended variables.

Table 3: Summary Statistics

Variable	Mean	Standard Deviation
GDP growth	4.6870e-005	0.0535
ln(GDP)	0.0135	0.1220
Foreign Aid	0.0236	0.3857
Democracy	0.4210	0.3357
Duration	0.1555	0.1553
Trade Openness	0.2993	0.4581
ln(Population)	0.0032	0.0376
Own Ratification Rate	0	0.2054

5 Estimation of the Dynamic Model

The dynamic model we have described above leads to three interrelated dimensionality problems that render estimation of the model in its current form impossible:

1. **(P1)** In the model section above we have formally defined the Markov states of our game to be $\mathbf{x_t}, \mathbf{z_t}$, and thus player strategies depend on the full vector $(\mathbf{x_t}, \mathbf{z_t})$ of treaty statuses and exogenous variables. Ignoring z_t, the dimension of $\mathbf{x_t}$ alone is $2^{R_t * C_t}$ can be as large as 2^{1215}. Solving the value functions associated with a game defined on this space is computationally infeasible.

2. **(P2)** Player i's action space at time t, $\mathcal{D}_{it}$, is the set of treaties yet to be ratified by player i. This can be as large as 2^{15}.

3. **(P3)** Player payoffs depend on the behaviour of other the players in the game. Thus the expectation of future payoffs depend on expected behaviour of all (81) players, and the transition of the state variables has a very high dimension.

We describe in detail how we deal with each of these dimensionality problems so as to facilitate estimation of the model. As described above, a key benefit of the modeling approach we have taken is that the economic payoffs of players in the game depends on the vector $(\mathbf{x_t})$ only through the functions $Y_i(\mathbf{x_t}, \mathbf{z_t})$ and $A_i(\mathbf{x_t}, \mathbf{z_t})$. This effectively solves problem **(P1)** above.

Since potentially many values of $\mathbf{x_t}, \mathbf{z_t}$ yield the same value of y_{it}, a_{it}, [13] the space over which player strategies are defined is considerably reduced.

To deal with problem **(P2)** we adopt the method proposed by Aguirregabiria and Ho (2009). We assume first that at each period t, each country appoints a committee to each treaty it has not ratified yet. This committee observes some private information about the treaty that neither any other country, nor any other committee in its own country observes. Based on this information, the state of the game, and beliefs about the strategies of other committees within the country and committees in other countries, the committee makes a recommendation to the government to either ratify or not. The government then takes the decision that was recommended. We imagine that the government finds it too costly to research the implications of ratification of all the treaties open to it and delegates this task to the committee. Committees within a country can not share *all* their private information with each other, and thus do not fully co-ordinate. What does this assumption buy us? It allows us to treat each country as a "different player" in each treaty, while still moving away from the "isolated markets" assumption. The country payoff to ratifying each treaty is still affected by the decisions made in other treaties through the K^* variable. In this sense we are moving away from the "state as monolithic decision maker" assumption that has been used in similar problems (i.e., Wagner (2008)). [14] More formally, we make the following assumptions:

- **(D1)** Committee r in country i at time t makes recommendation $d_{irt} \in \{0, 1\}$ to maximize the expected discounted value of the stream of country-treaty (committee) payoffs: $E_t\big(\sum_{s=1}^{\infty} \beta^s \Pi_{ir,t+s}\big)$, where:

$$\Pi_{irt} \equiv x_{irt} R_i(1, x_{-irt}, z_t) + (1 - x_{irt}) R_i(0, x_{-irt}, z_t) - d_{irt}(1 - x_{irt}) EC_{irt}(x_t, z_t, \varepsilon_{irt})$$

- **(D2)** The shocks $\{\varepsilon_{irt}\}$ are private information of committee r in country i at time t.

[13] This of course depends on the discreteness of y_{it}, a_{it} which we discuss later

[14] This assumption is motivated partly by the literature on "formal" and "real" authority in organizations, spawned by Aghion and Tirole (1997). In this literature "formal" authority is defined as the right to decide, while "real" authority is defined as effective control over a decision. The difference between the two types of authority is generated by private information. Aghion and Tirole derive conditions under which a principal (here the leader of a country) may allocate authority over a decision to an agent (here the treaty committees) who possesses private information. Importantly, they show that when a principal can "trust" an agent (i.e., aligned incentives), authority will be delegated. Here our agents' payoffs are closely aligned with those of the country.

These shocks are unknown to the other committees in country i and unknown to all other countries.

Assumption **D1** explicitly says that committees that enter period t having ratified the treaty for which they are responsible ($x_{irt} = 1$) obtain $R_i(1, x_{-irt}, z_t)$, and committees that have yet to ratify earn $R_i(0, x_{-irt}, z_t)$. Further, committees that have yet to ratify and recommend ratification in year t ($d_{irt} = 1, x_{irt} = 0$) pay the cost $EC_{irt}(x_t, z_t, \varepsilon_{irt})$. Assumption **D2** says that there is statistical independence across treaties within a country. Note that committees within a country have the same general objective, as the variables that enter the committee economic payoff are country level aid and GDP. While committees in the same country are playing "against" one another in the treaty ratification game, the decisions of committees within the same country and the decisions of committees in other countries enter the payoffs of a committee differently. Technically speaking, the portfolio of treaties chosen by the country (the set selected by the committees) will be the optimal portfolio for the country up to a deviation in *one treaty* holding decisions in all other treaties fixed. [15]

Note now that for any treaty committee r in country i, current payoff is fully determined by the treaty status x_{irt}, payoff variables y_{it}, a_{it} and the variables m_{it}, s_{it} in the cost function. Then define the reduced vector of variables $\mathbf{w}_{irt}$:

$$\mathbf{w}_{irt} \equiv \{x_{irt}, y_{it}, a_{it}, m_{it}, s_{it}\}. \tag{9}$$

We make the following further assumption:

Assumption (D3): *The strategy function of treaty office (i,r) is given by* $\sigma_{ir}(\mathbf{w}_{irt}, \varepsilon_{irt})$ *that maps from* $W \times \mathbb{R}$ *into* $\{0, 1\}$

As we did above for the full state space, we can now define the vector of *conditional choice probabilities* (CCPs) associated with the strategy functions σ as:

$$P_{ir}(\mathbf{w}_{irt}) \equiv \int I\{\sigma_{ir}(\mathbf{w}_{irt}, \varepsilon_{irt}) = 1\} dG_{\varepsilon}(\varepsilon_{irt}). \tag{10}$$

[15] The inability of committees within a country to perfectly co-ordinate and select the best overall portfolio of treaties for the country to hold at a given time can be alternatively viewed as a bounded rationality assumption. Information about treaties is costly to aggregate and process for countries, and so each decision is made in some isolation.

With these assumptions in hand we now write the value function of committee r in country i at time t:

$$\begin{aligned} V_{ir}^P(1, w_{irt}) &= R_i(1, w_{irt}) + \delta E\big[V_{ir}^P(1, w_{irt+1})|1, w_{irt}\big] \\ V_{ir}^P(0, w_{irt}) &= R_i(0, w_{irt}) + \max\big\{ - EC_{ir}(w_{irt}, \varepsilon_{irt}) + \delta E\big[V_{ir}^P(1, w_{irt+1})|1, w_{irt}\big], \delta E\big[V_{ir}^P(0, w_{irt+1})|0, w_{irt}\big]\big\} \end{aligned}$$

where we abuse notation slightly by writing value functions in the form $V_{ir}^P(x_{irt}, w_{irt})$ though x_{irt} is actually a component of the vector w_{irt}.

Markov Perfect Equilibrium

We now define a Markov Perfect equilibrium of the treaty ratification game given assumptions $A1-A3$. Note that by the time to build assumption, we can write the flow economic payoff to choosing action a for treaty office r in country i at time t as $\Pi_{irt}(a) = \alpha_y y_{ir} + \alpha_a a_{ir} - a * EC_{irt}$. Formally, let $\sigma \equiv \{\sigma_{ir}(\mathbf{w}_{irt}, \varepsilon_{irt}) : i = 1, 2, ..., C; r = 1, 2, ..., R;\}$ be a set of strategy functions, one for each treaty office such that σ_{ir} maps from the space $W \times \mathbb{R}$ into $\{0, 1\}$. Then we have that σ is an MPE if for every treaty office in every country (i, r) that has *yet to ratify treaty r* (i.e., $x_{irt} = 0$) and every possible state $(\mathbf{w_{irt}}, \varepsilon_{irt})$:

$$\{\sigma_{ir}(\mathbf{w}_{irt}, \varepsilon_{irt}) = 1\} \iff \{\varepsilon_{irt} \leq -EC_{irt} + \delta E\big[V_{ir}^P(1, \mathbf{w}_{irt+1})|1, \mathbf{w}_{irt}\big] - \delta E\big[V_{ir}^P(0, \mathbf{w}_{irt+1})|0, \mathbf{w}_{irt}\big]\},$$

and $\{\sigma_{ir}(\mathbf{x}_{irt}, \varepsilon_{irt}) = 1\}$ for every treaty office in every country (i, r) that has ratified treaty r ($x_{irt} = 1$). In words, each treaty office that has yet to ratify ratifies the treaty if and only if doing so maximizes the value of the country given the state and the decisions of all other treaty offices in all countries. By the assumption of irreversibility treaty offices that have already ratified in a past period do not make a decision in the current period.

Then, a Markov Perfect Equilibrium of our dynamic game can be expressed as a vector $\mathbf{P} = \{P_{ir}(\mathbf{w})\}$ of conditional choice probabilities (CCPs) such that for every $(i, r, \mathbf{w}_{irt})$ such that $x_{irt} = 0$:

$$P_{ir}(w_{irt}) = G_\varepsilon\big(- EC_{irt} + \delta E\big[V_{ir}^P(1, \mathbf{w}_{irt+1})|1, \mathbf{w}_{irt}\big] - \delta E\big[V_{ir}^P(0, \mathbf{w}_{irt+1})|0, \mathbf{w}_{irt}\big]\big) \tag{11}$$

and $P_{ir}(w_{irt}) = 1$ otherwise. More explicitly:

$$P_{ir}(w_{irt}) = G_\varepsilon\big(- EC_{irt} + \delta \sum_{w'} V_{ir}^P(\mathbf{w}')\big[f_{ir}^{\mathbf{w},P}(\mathbf{w}'|1, \mathbf{w}_{irt}) - f_{ir}^{\mathbf{w},P}(\mathbf{w}'|0, \mathbf{w}_{irt})\big]\big) \tag{12}$$

where $f_{ir}^{\mathbf{w},P}(\mathbf{w}_{irt+1}|a_{irt}, \mathbf{w}_{irt})$ is the transition probability of the vector of payoff relevant state variables $\mathbf{w}$ given equilibrium probabilities $\mathbf{P}$.

Finally, before moving to the estimation of the structural parameters, we need to deal with problem **(P3)**. Here the issue is estimation of the transition probabilities $f_{ir}^{\mathbf{w},P}(\mathbf{w}_{irt+1}|a_{irt}, \mathbf{w}_{irt})$ of the state vector $\mathbf{w_{it}}$. In more standard applications the transition of the exogenous payoff relevant state variables is estimated separately from the conditional choice probabilities using simple maximum likelihood methods, while the transition of the endogenous payoff relevant state variables which depend on the choices made by the players in the game is estimated jointly with the parameters of the model. In the current application, the large number of players in the game renders the standard method computationally infeasible. Specifically, the transition probability of the payoff variables $y_{it} = Y_i(\mathbf{x_t}, \mathbf{z_t})$ and $a_{it} = A_i(\mathbf{x_t}, \mathbf{z_t})$ depends on the actions of all players in the game. One option would be to estimate the transition of $\mathbf{w_{it}}$ separately from the choice probabilities $\mathbf{P}$, in a manner analogous to Hendel and Nevo (2006). While such a method is highly attractive from the point of view of simplicity and the minimal computational burden it imposes, there are some important concerns with using this method in the current application. While we would be able to argue that the estimated transition is consistent with the equilibrium $\mathbf{P}$ in the data, our primary interest here is in considering counterfactual experiments. If the transition probabilities are estimated separately from the choice probabilities, when considering equilibria that are counterfactual with respect to the equilibrium estimated in the data, we will be forced to assume that the counterfactual transition is the same as the true transition we originally estimated. This clouds somewhat the comparison between behaviour observed in the data and behaviour in a counterfactual regime. To reconcile the computational infeasibility of the standard method with our desire to have a transition probability that is consistent with the equilibrium conditional choice probabilities of the model, we adopt the method of Aguirregabiria and Ho (2009). The details of this method are provided in the appendix.

For the estimation of the model we discretize the state space in the following way. For each of GDP growth and AID we select a uniform grid of points based on the sample standard deviations of the variables. For democracy, m we simply break up the data at each time period according to the time specific median, and assign a value of 1 to those observations with democracy level above the median, and 0 to countries with a democracy level below the median. The political

stability variable s is by definition "years since a substantial regime change." At each time period we separate the observations into countries that have gone at least 3 full years since a regime change and those that have gone less than three years, and assign a 1 to the former and 0 to the latter.

Now we have the elements we need to estimate the full dynamic model. Given the model we have described above, the vector of structural parameters θ of interest is given by:

$$\theta = \{\alpha_y, \alpha_a, \gamma_c, \gamma^{de}, \gamma^{du}, \{\xi_r\}_{r=1}^{R-1}\}$$

that is, the weights on GDP and foreign aid in the countries per-period payoff, the entry cost parameter, the democratic regime specific cost parameter, the politically stable regime specific parameter, and the treaty specific entry cost parameters.

Following Aguirregabiria and Mira (2007), we express the entry thresholds and conditional choice probabilities in a form that is more convenient for the purposes of estimation (see the appendix for a detailed derivation):

$$P_{ir}(\mathbf{w}_{irt}) = \Phi\Big(\tilde{z}_{irt}^{\mathbf{P}} \frac{\theta}{\sigma_\varepsilon} + \tilde{e}_{irt}^{\mathbf{P}}\Big)$$

where we have assumed that ε_{irt} is normally distributed with variance σ_ε^2.

Estimator

For notational simplicity, let us redefine $\theta = \frac{\theta}{\sigma_\varepsilon}$. For arbitrary values of parameters and entry probabilities $\theta, \mathbf{P}$, define the likelihood function:

$$\mathcal{L}\big(\theta, \mathbf{P}\big) = \sum_{t=1}^{T} \sum_{r=1}^{R_t} \sum_{i=1}^{C_t} d_{irt} \ln \Phi\big(\tilde{z}_{irt}^{\mathbf{P}}\theta + \tilde{e}_{irt}^{\mathbf{P}}\big) + (1 - d_{irt}) \ln\big(1 - \Phi\big(\tilde{z}_{irt}^{\mathbf{P}}\theta + \tilde{e}_{irt}^{\mathbf{P}}\big)\big)$$

We estimate the model using the Nested Pseudo-Likelihood Estimator (NPL). We briefly describe the NPL estimator here. Let $\big(\theta_0, \mathbf{P}_0\big)$ represent the true parameter vector and CCP vector in the population. The two step PML estimator of the above likelihood function is a pair $\big(\hat{\theta}, \hat{\mathbf{P}}\big)$ such that $\hat{\mathbf{P}}$ is a consistent non-parametric estimator of $\mathbf{P}_0$, and $\hat{\theta}$ maximizes the function $\mathcal{L}\big(\theta, \hat{\mathbf{P}}\big)$. In many applications, in particular those involving permanent unobserved heterogeneity, the implementation of this estimator is problematic, because obtaining an unbiased estimator of the choice probabilities $\hat{\mathbf{P}}$ is not feasible. Given that we are interested in estimating treaty specific investment costs (the analogue of controlling for market level permanent unobserved heterogeneity in more standard IO applications), we should expect such a

problem in our model. The NPL estimator has a clear advantage in such cases, as a consistent estimator of choice probabilities is not required. One can obtain the NPL estimator in the following way. Given any (consistent or not) initial estimate of the true choice probabilities $\mathbf{P}_0$, say $\mathbf{P}^1$, one may obtain the vector θ^1 that maximizes the pseudo-likelihood $\mathcal{L}\big(\theta, \mathbf{P}^1\big)$. This estimate allows us to obtain an updated estimate of the choice probabilities $\mathbf{P}^2$ using the mapping described above:

$$\mathbf{P}^2 = \Phi\big(\tilde{z}_{irt}^{\mathbf{P}^1}\theta^1 + \tilde{e}_{irt}^{\mathbf{P}^1}\big)$$

With these estimates of the choice probabilities in hand, we now find the parameters θ that maximize $\mathcal{L}\big(\theta, \mathbf{P}^2\big)$, and again obtain a new estimate of the choice probabilities using these parameter estimates. We continue iterating in this fashion until the sequence of probability estimates converges to the limit $\mathbf{P}^*$. The vector θ^* that maximizes $\mathcal{L}\big(\theta, \mathbf{P}^*\big)$ is the NPL estimator.[16]

One alternative method for estimating the model we have presented here is that of Benkhard, Bajari and Levin (BBL) (2007). There are two potential reasons a practitioner may prefer to use BBL over NPL. First, when using BBL one never has to invert a large matrix to solve value functions, whereas in using NPL we must solve the value functions once for each NPL iteration. Second, BBL allows for continuous variables in the state space, while NPL does not. Since many applications are naturally modeled with continuous state variables, this is an important consideration. However, we prefer the NPL estimator for several reasons. First, implementation of BBL requires a consistent estimate of the conditional choice probabilities, which as we argued above, is typically not available for applications with permanent unobserved heterogeneity. Second, NPL generally delivers more efficient estimates of the structural parameters. Finally, while it is true that not having to incur the computational cost of solving value functions is an important virtue, we will be using the estimated parameters to perform counterfactuals. In order to perform counterfactuals, regardless of the estimation procedure, one must solve the value functions. Given that we must endure this cost at the counterfactual stage in any case, the benefit of avoiding it at the estimation stage is not as large.

Estimation Results

[16] See Aguirregabiria and Mira (2002,2007) for details.

The estimates of the structural model are in table 4. [17] The discussion of the structural parameter estimates is divided into three subsections, treaty specific costs, regime specific costs and payoff parameters.

(a) *Treaty Specific Costs*

The most striking pattern in the treaty specific cost estimates is the substantial variance in the costs across treaties. In an attempt to rationalize this result, let us consider closely two treaties, the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW) (1979) , and the Convention on the Political Rights of Women (CPRW) (1952). We choose these treaties to illustrate our point because they address a similar issue, but have very different estimated costs of ratification. In particular, CPRW is much more costly to ratify than CEDAW is. CEDAW defines the term "discrimination against women", and requires state parties to domestically institutionalize gender equality and change any existing laws that discriminate against women. Further, states party must adapt their judicial systems in a manner so as to prosecute violations. CPRW mandates that state parties allow women to vote, hold public office, and be entitled to the political rights that men enjoy.

This is somewhat puzzling. Ex-ante, if one treaty was more costly than another, we would naturally expect CEDAW to be more costly. Discrimination against women in the political sphere is merely one form of discrimination against women. If a country is willing to ratify a treaty concerned with *all* forms of discrimination against women (CEDAW), it should be willing to ratify a treaty concerned with just one type of discrimination against women (CPRW). To begin to rationalize our result, let us look closer at the terms of the treaties. Consider articles 1-3 of CPRW:

Article 1 : *Women shall be entitled to vote in all elections on equal terms with men, without any discrimination.*

Article 2 : *Women shall be eligible for election to all publicly elected bodies, established by national law, on equal terms with men, without any discrimination.*

[17] The standard error estimates presented in the table should be interpreted with caution. The estimates do not account for variability in the choice probability estimates or noise introduced in the simulation stage of the estimation. Accounting for these is very computationally demanding. More accurate estimates will be presented in a later version.

Article 3 : *Women shall be entitled to hold public office and to exercise all public functions, established by national law, on equal terms with men, without any discrimination.*

By contrast, consider now articles 2 and 3 of CEDAW (article 1 defines "discrimination against women"):

Article 2 : *States Parties condemn discrimination against women in all its forms, agree to pursue by all appropriate means and without delay a policy of eliminating discrimination against women, and to this end undertake:*

- To embody the principle of the equality of men and women in their national constitutions or other appropriate legislation...
- To adopt appropriate legislative and other measures, including sanctions where appropriate, prohibiting all discrimination against women...

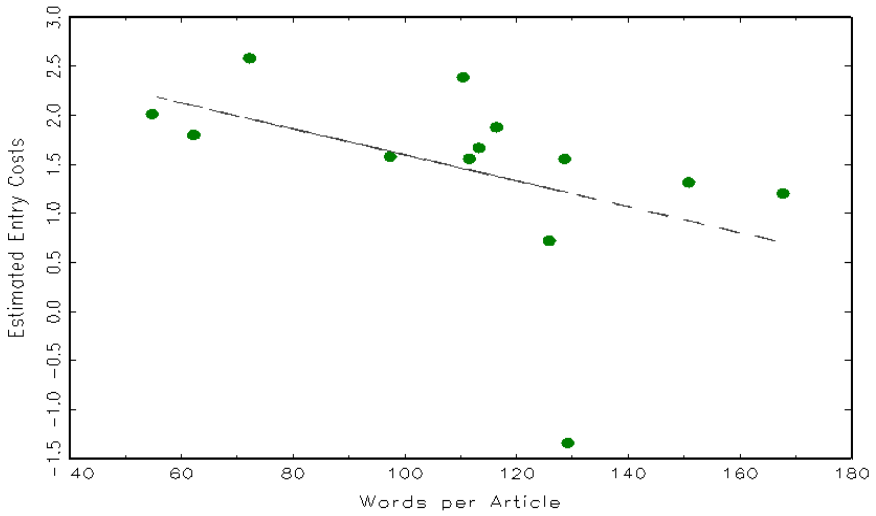
Article 3 : *States Parties shall take in all fields, in particular in the political, social, economic and cultural fields, all appropriate measures, including legislation, to ensure the full development and advancement of women, for the purpose of guaranteeing them the exercise and enjoyment of human rights and fundamental freedoms on a basis of equality with men.*

In particular, note the ease with which articles 1-3 of CPRW can be verified. Election monitoring by reputable organizations deployed by the OECD and the EU occur regularly in countries of all political stripes.[18] Further, the monitoring is generally done over a long period prior to the election itself. Any failure to comply with any of articles 1-3 of CPRW would not go unnoticed, and at the very minimum would be brought to the attention of the international community. On the other hand, note the liberal use of the word "appropriate" in articles 2 and 3 of CEDAW. What is demanded by the treaty is to a great extent open to interpretation. Verification of compliance ex-post of ratification is not simple, as it would require consensus in the international community on whether a violation has occurred. In a world where strategic alliances are important but fluid, the set of countries who agree that another's actions violate the terms of a treaty can be small and uncertain.

One hypothesis then is that the more open to interpretation, or more difficult a violation is to verify, the cheaper the ratification cost should be. There are several candidate characteristics

[18] See for example the Handbook for European Union Election Observation (2008)

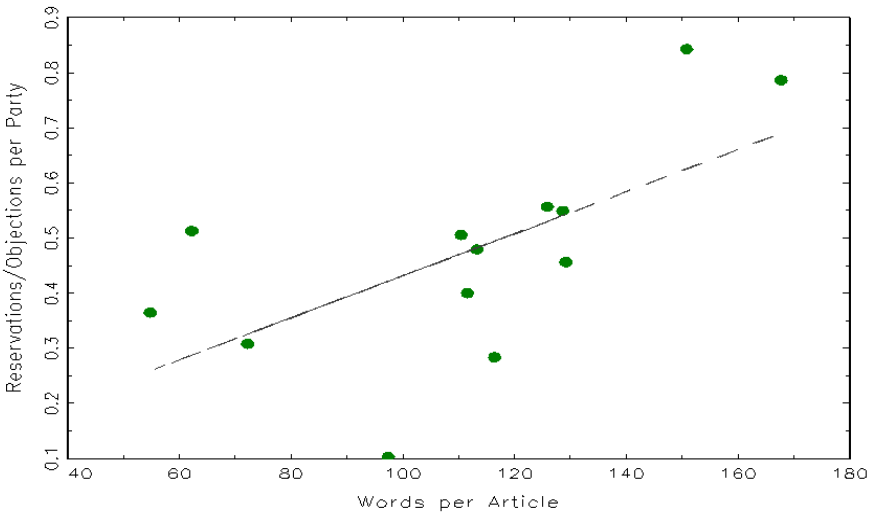
Figure 5



that vary across treaties that measure how "open to interpretation" a treaty is. For example each treaty contains a section on reservations ratifiers may have with respect to the contents of the treaty, and objections existing parties may have to the reservations. Objections and reservations are easier to make (and perhaps more necessary) when the treaty is less interpretable. However these variables are endogenous in the actions of the players. The larger the number of ratifiers the more objections and reservations there will be. Possible "exogenous" characteristics on the other hand include the number of articles, number of words, as well as any other institutional parameter set prior to the opening of the treaty for ratification. For illustrative purposes, in figure 5 we plot a candidate exogenous measure of verifiability against the estimated ratification costs. On the X-axis, motivated by the example given above, we have the number of words per article in the treaty, and on the Y-axis the cost estimates from our structural model. There is clearly a negative relationship: the fewer the words per article, the more costly is ratification. In figure 6 we again plot the number of words per article on the X-axis, but on the Y-axis we plot the average number of reservations and objections per ratifier.

The question then is what does this imply for the optimal design of treaties? Is there an optimal level of verifiability? Arguably, the treaty designer trades off "bite" with number of ratifications. On the one hand the designer doesn't want a treaty so unbending in its terms that no country ratifies, while on the other hand a treaty so unverifiable that ratifiers can expect to violate treaty terms with impunity serves no purpose. A common criticism of the UN

Figure 6



Human Rights Treaty system is that the option to make reservations at the time of ratification significantly "cheapens" the treaty for current and future ratifiers (Lijnzaard, 1995). It is easier to ratify with reservations when a treaty is very open to interpretation than when it is not. Looking once again at the treaties we compared above, 47 reservations have been made by ratifiers of CPRW, while 80 have been made by ratifiers of CEDAW, and as an example, Saudi Arabia, which has yet to ratify CPRW, ratified CEDAW with the reservation:

In case of contradiction between any term of the Convention and the norms of islamic law, the Kingdom is not under obligation to observe the contradictory terms of the Convention.

It is unclear then what kind of sovereignty Saudi Arabia gives up by ratifying CEDAW. If Saudi Arabia were to be accused of a violation of the terms of the treaty, citation of this reservation would be enough to absolve it of any guilt.

Then perhaps the "optimal" treaty, from a designer's perspective, is one with many ratifications and few if any reservations. To approach this question, it would be ideal to control for observable treaty characteristics set by the designer in the cost function, while also allowing countries the option to make ratify with reservation. Then counterfactual analysis would allow us to determine how the propensity to ratify and to ratify with reservation change as institutional treaty characteristics change. This of course requires a significant modification of the model we have presented here, and leave it for future work.

(b) *Regime Specific Costs*

As we discussed earlier, our choice to include country democracy and political stability measures in the ratification cost function is motivated by the existing literature on human rights treaty ratification, which addresses exactly the question of how commitment to human rights treaties varies along these dimensions. Our findings are that ratification is cheaper for democratic countries, and that ratification is cheaper for politically unstable countries. Hathaway (2007) proposes a theory of why democracies often ratify less frequently than autocracies. Hathaway theoretically links state decisions to ratify a human rights treaty to the domestic enforceability of the treaty by arguing that ratification is only costly for those countries that a) are not compliant with the treaty's terms ex-ante of ratification and b) are to the terms of the treaty by some domestic enforcement mechanism post-ratification. While the cost of abiding by the terms of a treaty is in principle the same for any ratifier, only countries that need to change their behavior post ratification actually pay the cost. Several predictions follow from this theory. First, we expect that democratic countries that have good human rights practices ratify more readily than democratic countries with bad human rights practices. This follows because democratic countries with good human rights practices don't need to change their behavior after ratification. Second, and more importantly, we expect autocratic countries with bad human rights practices to ratify more readily than democratic countries with bad human rights practices. The reason is that democratic countries are bound to the promises they make by domestic enforcement mechanisms. Ratifying and not complying is costly. For autocratic countries, ratifying and not complying is not costly, because these domestic institutions are not present. Using hazard rate analysis, Hathaway finds that the hazard rate of ratification is decreasing in the interaction between human rights violations and democracy level. From this Hathaway concludes that for a given level of democracy, countries with worse human rights practices have lower probability of ratifying, while for a given level of human rights, more democratic countries have a lower rate of ratification. Direct comparison of our results with Hathaway's are not easy, as we do not control for compliance, or human rights behaviour.[19] Ideally we would have an interaction between ex-ante compliance and democracy in our cost function. The best we can do is make

[19]The available data on human rights behaviour is not of high quality. Many values are missing for many countries, and moreover the data starts well after the first year of our sample. Using the data in our analysis would severely reduce our sample size and introduce other complications.

statements with respect to the *average* democratic country in our sample. In doing so, we note that the countries in our sample are the poorer countries in the world over the second half of the 20th century. These countries also generally possess the worst human rights records over the same period. Then our result says that for the average democratic country in this group, ratification is less costly than for the average non-democratic country. Though we must be cautious in interpretation, this result stands in partial contrast to Hathaway's.

Our finding that less stable countries pay a smaller ratification cost than more stable countries is consistent with the existing literature. Moravcsik (2000) establishes that nascent democracies more readily ratify because the value of stabilizing new and often unfamiliar democratic institutions and protecting these institutions by linking them to the international community outweighs the cost of foregone sovereignty. Hafner-Burton et al. (2009) argue that countries in the midst of a democratic transition use participation in human rights institutions to signal their new type to the international community. Note however, our finding is that unstable regimes of *any* type (democracy or autocracy) pay a smaller ratification cost. The country does not need to be a new democracy, young regimes in general pay a smaller sovereignty cost relative to the returns of ratification than do more established regimes. This gives support to our hypothesis that adapting to new institutions is less costly when there are no entrenched domestic institutions to change.

(c) *GDP and Aid*

In the estimation we fix the parameter on GDP at 1, as our interest lies in determining the *relative* importance of GDP and aid in the decision to ratify. The economic significance of the coefficient on aid suggests that the aid motive in treaty ratification is important.[20] It is difficult to interpret *how* important aid receipts are as a motive in the treaty ratification decision. We answer this using counterfactual analysis below.

6 Counterfactual Experiments

In this section we use the estimated model to try and disentangle plausible theories of who ratifies when and why. There are many ways to rationalize the empirical observations on treaty

[20] While the estimate presented here is not statistically significant, a finer discretization of the grid of points of aid should yield a more precise estimate. A finer grid requires more computational power, however.

ratification patterns we have discussed above. Further, more than one theory may be correct, but one may be more important than the others. One of the key benefits of estimating a structural model which allows for several competing theories is that we can "shut down" one theory while allowing for the other(s) and observe how much the original patterns in the behavioral responses we were interested in changed. In particular, if the patterns in the regenerated data are not significantly different from the observed data, we can conclude that the theory we "shut down" was probably not that important. On the other hand, if the regenerated data is significantly different, it is probably the case that the theory we shut down explains much of the pattern we were observing.

Performing counterfactual analysis in dynamic games is often complicated by the potential multiplicity of equilibria. How behaviour responds to a change in the structural parameter(s) of interest directly depends on the equilibrium played under the counterfactual parameter(s). If the model has multiple equilibria, we can not know *which* equilibrium the model is in under the counterfactual scenario, and thus can not make counterfactual predictions.[21] Many applications in the dynamic game literature simply get around this problem by assuming a unique equilibrium, or assuming that the counterfactual equilibrium is the same as the equilibrium in the data. These assumptions are strong and in many cases not realistic. Here we adopt the approach of Aguirregabiria and Ho (2009) (see appendix for details). The counterfactual equilibrium probabilities are obtained in two steps. In the first step we use the data and the estimated parameters and equilibrium probabilities $(\hat{\theta}, \hat{\mathbf{P}}_0)$ to obtain an approximation to the equilibrium probabilities associated with the counterfactual parameters θ^*, say $\mathbf{P}^*_{app}$. The approximation error can be quite large if the counterfactual is large (i.e., if θ^* is very different from $\hat{\theta}$). The second step addresses this potentially large approximation error. Supposing the error is small enough so that $\mathbf{P}^*_{app}$ lies in the dominion of attraction of the counterfactual equilibrium $\mathbf{P}^*$, by starting from $\mathbf{P}^*_{app}$ and iterating in the mapping $\mathbf{P}_{k+1} = \Phi\big(\tilde{z}^{\mathbf{P_k}}_{irt}\theta + \tilde{e}^{\mathbf{P_k}}_{irt}\big)$ we will reach the counterfactual equilibrium $\mathbf{P}^*$.

There are three separate counterfactual questions we examine here. First, we would like to get some idea of how important aid is as a motive for treaty participation. We have seen above that countries with higher levels of relative treaty participation tend to receive more

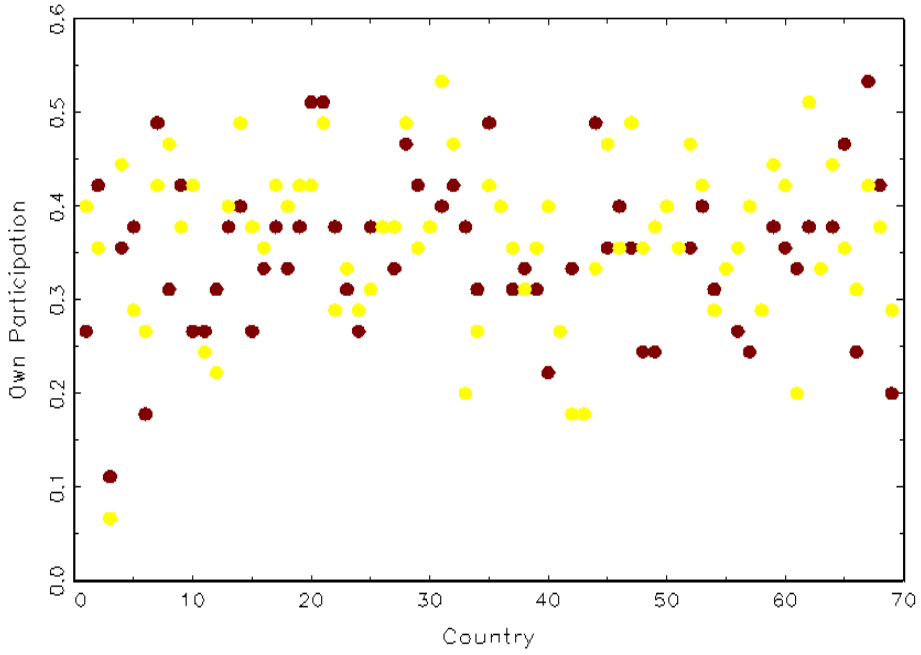
[21] If we had a method to solve for *every* equilibrium in the model we could at least say what all the potential counterfactual scenarios would be. Note however that if the number of equilibria is very large model has little ability to predict behaviour under counterfactual scenarios.

aid, but does this explain the decision to participate in the first place? And if so how, much of the decision does it explain. To answer this question we suppose there is no aid motive for participation, ($\alpha_a = 0$), and examine how equilibrium behaviour responds. The metric we use is the average rate of own participation across countries (the average relative participation K^* across countries at a given time is always zero). We find that the average own rate of participation drops by over 20% when aid doesn't enter into the payoffs of ratifying countries. Aid explains a significant proportion of the decision to participate.

Second, as we noted above, there is a significant amount of heterogeneity in behaviour across countries. It is interesting to consider whether this heterogeneity in behaviour is driven more by heterogeneity in the benefits of ratification or heterogeneity on the cost of ratification. In the model above, there is heterogeneity in the benefits in that countries that already receive significant aid see less of an increase in aid receipts when they ratify a treaty than do countries that don't receive aid. The heterogeneity on the cost side comes from differences across democracies/autocracies and stable/unstable countries. To answer this question we first suppose there is no benefit heterogeneity, and obtain the own participation rates implied by equilibrium behaviour. We then suppose there is no cost heterogeneity and obtain the equilibrium own participation rates in this case. By comparing the variances in own participation rates across these two counterfactual cases we get an idea of whether heterogeneity in costs or benefits explains more of the participation decision; if the variance across countries is larger in the case where there is no cost side heterogeneity we can conclude that more of the heterogeneity in behaviour is explained by benefit side heterogeneity. Similarly, if the variance is larger in the case where there is no benefit side heterogeneity, we would conclude the cost side differences are more important. In figure 7 we plot the own participation rates in each case. The red dots represent own participation when there is no cost side heterogeneity, and the yellow dots represent own participation when there is no benefit side heterogeneity. The variance across countries is 12% larger when there is no benefit side heterogeneity; cost-side heterogeneity is more important in explaining overall heterogeneity in behaviour.

Finally, we examine the importance of competition in the context of our model. Treaty capital K^*_{it} is such that, when countries do not ratify treaties capital can begin to decline if other countries continue to ratify. As capital declines, so do economic returns from donor countries. In order to maintain receipts at there current level, countries must keep pace with

Figure 7: No Cost Heterogeneity (red) vs. No Benefit Heterogeneity (yellow)

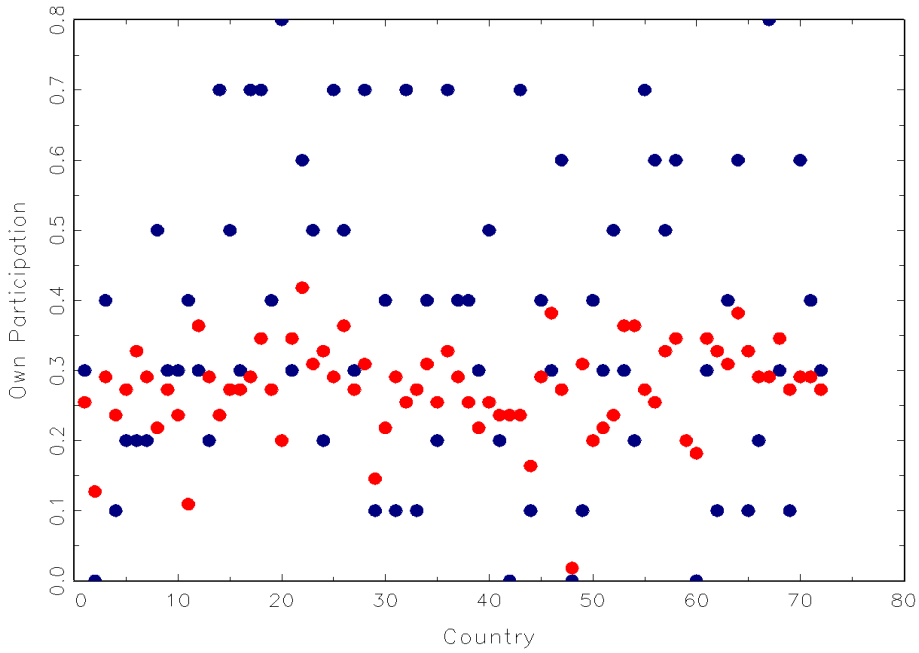


others, or "keep up with the Jones'es."[22] Suppose instead that countries do not need to keep pace with others' behaviour in order to maintain economic returns at their current level. Instead, donor's judge countries only by their absolute behaviour. Studying such a counterfactual is also interesting in that it will allow us to assess the importance of strategic effects in the treaty ratification problem; if ratification drops significantly we can conclude that the political pressure countries face from other's ratification decisions is significant.[23] In figure 8 we plot the own ratification rates in two scenarios, the true scenario (dark blue dots) where economic rewards are conditioned on relative behaviour and the counterfactual scenario (light red dots) where economic rewards are conditioned on counterfactual behaviour. Generally speaking, there is much less ratification when absolute behaviour determines economic returns. The average own ratification rate drops by about 25%, suggesting the competition effect is very important here. The result suggests that human rights standards themselves are very much affected by the fact

[22]I thank David Byrne for pointing out the appropriateness of this phrase.

[23]Wagner (2009) considers a similar counterfactual question in a dynamic game of treaty ratification. In his model however ratification decisions are assumed to be strategic complements, and the counterfactual he effectively considers is, how do ratification decisions change in the absence of strategic complementarities. Our question is slightly more general in that we allow for any strategic relationship between country ratification decisions, and consider a counterfactual where there is no strategic relationship.

Figure 8: Ratification behaviour with Relative and Absolute Compensation



that rich countries use relative participation as a criterion for aid donation decisions.

7 Conclusion

We model the decision of aid receiving countries to participate in human rights treaties at the United Nations. Using dynamic panel data techniques, we first establish that there are significant economic returns to treaty ratification. Countries that ratify experience higher GDP growth and receive more foreign aid than those that do not. We further establish that the propensity to ratify depends on a country's own past ratification behaviour as well as the behaviour of others. Motivated by these findings, we develop and estimate a dynamic game of treaty ratification to explore the hypothesis that economic and strategic incentives drive the treaty ratification decision. The dynamic model we consider is analogous to a dynamic game of oligopoly competition where firms invest in quality (eg.,Pakes and McGuire (1994)). Here, aid receiving countries compete to attract economic resources from the developed world by ratifying costly human rights treaties. We estimate the costs and benefits of ratification, allowing for heterogeneity across treaties and regimes. We find that the attendant economic returns to ratification induce countries to ratify. This is a contribution of the paper, as the

literature on treaty ratification has generally focused on the cost of ratification as opposed to the possible benefits in rationalizing observed behaviour. We also find that ratification costs vary significantly across regimes and across treaties. Specifically, newer, less politically stable regimes, and democratic regimes, pay a smaller cost than their counterparts. While this result is concordant with the existing literature to some degree, we are the first to examine how costs may vary across treaties. We find significant variance in the cost of ratification, and discuss how this variance may be explained by observable institutional details of the treaties, in particular the verifiability of treaty terms. In future work we hope to address this issue in more detail, as this result can have interesting policy implications for the design of international treaties from a welfare perspective.

We then use the estimated model to consider several counterfactual experiments. In the first experiment we find that the average rate of participation drops by 20% in the absence of the aid motive, confirming that the economic returns to ratification are indeed a significant part of the reason countries ratify in the first place. In the second experiment we evaluate the relative importance of benefit and cost side heterogeneity in explaining participation heterogeneity. We find that while both benefit side and cost side heterogeneity lay a significant role, cost side heterogeneity is more important in explaining heterogeneity in behaviour. In the third counterfactual experiment we examine the importance of competition in the context of our model. In the model it is a country's participation in HRT's *relative* to other countries that determines the economic resources it receives from donors. In order to continue receiving the same aid etc., a country must "keep up with the jones'es." We consider a counterfactual world where countries instead receive aid based on the absolute rate of participation. We find that the rate of participation drops significantly in the counterfactual scenario; competition is important. This result suggests that the aid and trade policies of rich countries play an informal yet key role in setting international human rights standards. The model can also be used to address the "optimality" of the decision of donor countries to use treaty participation as a criterion for allocating foreign aid. The decision to give aid is often made with the intention of improving economic conditions in the recipient country. Yet it is well known that more aid does not always mean more economic development (Burnside and Dollar, 2000 and Collier, 2007), as different types of leaders use the aid for different purposes. It is then useful to ask from an economic policy perspective whether using human rights treaty ratification as a criterion for

allocating foreign aid is effective in improving economic growth, or is there a more effective policy available? While these experiments are not included here, they can be addressed with the existing model and remain an attainable goal of ongoing work.

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9 Appendix

Table 4: Probit Estimation

Data: Number of Observations: 18047. Years 1962-2000, 81 countries

Variable	No fixed effects	Country Fixed Effects	Country/Time Fixed Effects	Country/Time/Treaty FE
GDP growth	-0.0581	-0.0123	0.0194	0.0160
	(0.0242)	(0.0222)	(0.0213)	(0.0153)
Aid	0.0013	0.0027	-0.0011	-0.0009
	(0.0038)	(0.0033)	(0.0031)	(0.0022)
Democracy	0.0123	0.027	0.0111	0.0086
	(0.0045)	(0.0067)	(0.0072)	(0.0051)
Stable	-0.0112	0.0125	-0.0203	-0.0155
	(0.0095)	(0.0129)	(0.0129)	(0.0093)
Openness	-0.0028	0.0032	-0.0012	-0.0003
	(0.0032)	(0.0041)	(0.0043)	(0.0031)
K^*	0.0089	-0.0978	-0.1135	-0.0615
	(0.0074)	(0.0107)	(0.0106)	(0.0080)
Pseudo R2	0.0028	0.0579	0.0864	0.1912

Transition Probabilities

Note first that the vector of payoff relevant state variables $\mathbf{w}_{imt} \equiv \{x_{irt}, y_{it}, a_{it}, m_{it}, s_{it}\}$ is a deterministic function of the variables $\{\mathbf{x}_t, \mathbf{z}_t\}$. Specifically, $y_{it} = Y_i(\mathbf{x_t}, \mathbf{z_t})$ and $a_{it} = A_i(\mathbf{x_t}, \mathbf{z_t})$ are fully determined by the first stage estimation, while m_{it}, s_{it} are simply elements of the full vector z_{it}. We express this deterministic relationship by $\mathbf{w}_{irt} = w_{ir}(\mathbf{x_t}, \mathbf{z_t})$. Now, the transition probability can be expressed as:

$$f_{ir}^{\mathbf{w},\mathbf{P}}(w_{irt+1}|a_{ir}, w_{irt}) \equiv \sum_{a_{-ir}} g_{ir}^{\mathbf{w}}(\mathbf{w}_{irt+1}|a_{ir}, \mathbf{a}_{-(ir)}) Q_{ir}^{\mathbf{P}}(\mathbf{a}_{(-ir)}|\mathbf{w}_{irt}) \tag{13}$$

while treaty office r in country i knows, given a vector of his own payoff relevant variables w_{irt} and a profile of other players' actions $\mathbf{a}_{-(ir)}$, what the distribution over states w_{irt+1} is, he cannot take other players' actions $\mathbf{a}_{-(ir)}$ *as given* at time t, as he does not observe them. More formally, given $\mathbf{a}_{-(ir)}$, player i's choice a_{ir}, the probability of state $\mathbf{w}_{irt+1}$ is given by:

$$g_{ir}^{\mathbf{w}}(\mathbf{w}_{irt+1}|a_{ir}, \mathbf{a}_{-(ir)}) = \sum_{z_{t+1} \in Z} \mathbf{1}\{\mathbf{w}_{irt+1} = w_{ir}(\mathbf{a}_t, z_{t+1})\} p(z_{t+1}|z_t) \tag{14}$$

where $p(\mathbf{z}_{t+1}|\mathbf{z}_t)$ is the Markov transition probability of the exogenous variables z. We emphasize again that the function $g_{ir}^{\mathbf{w}}$ is a primitive of the model which does not depend on the equilibrium choice probabilities. It simply defines the probability distribution over states tomorrow *given* the actions of players. However, $\mathbf{w}_{irt}$ is informative about the actions other players are likely to take, because it is informative about the other players' vectors of payoff relevant variables. The relationship between $\mathbf{w}_{irt}$ and the actions $\mathbf{a}_{-(ir)t}$ taken by other players is given by:

$$Q_{ir}^{\mathbf{P}}(\mathbf{a}_{-(ir)t}|\mathbf{w}_{irt}) \equiv \sum_{w_{-(ir)t}} \Big[\Pi_{(j,n)\neq(i,r)} P_{-jn}(a_{jnt}|\mathbf{w}_{jnt})\Big] Pr(\mathbf{w}_{-(ir)t}|\mathbf{w}_{irt}, \mathbf{P}) \tag{15}$$

The computation of $f_{ir}^{\mathbf{w},\mathbf{P}}(w_{irt+1}|a_{ir}, w_{irt})$ comes at a significant computational price. It requires us to compute exactly $Pr(\mathbf{w}_{-(ir)t}|\mathbf{w}_{irt}, \mathbf{P}) = \frac{p^*(\mathbf{w_t}|\mathbf{P})}{p_{ir}^*(\mathbf{w_{irt}}|\mathbf{P})}$. This in turn implies that we need $p^*(\mathbf{w_t}|\mathbf{P})$, the ergodic distribution of w_t, which has dimension $W \times W$, where W itself at time t has a dimension $|W|^{R_t C_t}$. To solve this problem we adopt the simulation method proposed by Aguirregabiria and Ho (2009).

Representation of Choice Probabilities

Table 5: Structural Parameter Estimates

Parameter	Estimate	Std. Err	Treaty
γ^c	1.315	0.0647	
γ^{de}	-0.0601	0.0319	
γ^{du}	0.1216	0.0534	
ξ^1	0.2419	0.1270	Economic, Social and Cultural Rights
ξ^2	0.238	0.1269	Political and Civil Rights
ξ^3	-0.1122	0.1296	Elimination of racial discrimination
ξ^4	0.6978	0.1370	Prevention and punishment of genocide
ξ^5	-2.659	0.3435	Rights of child
ξ^6	0.8887	0.1585	Worker's Rights
ξ^7	1.2683	0.1444	War Crimes
ξ^8	0.2622	0.1287	Apartheid
ξ^9	-0.5976	0.1648	Discrimination Against women
ξ^{10}	0.5623	0.1338	Taking of Hostages
ξ^{11}	0.7481	0.1338	Inhumane Weapons
ξ^{12}	1.0727	0.1318	Protection and Freedom for Performers
ξ^{13}	0.4847	0.1353	Women Political Rights
ξ^{14}	0.3536	0.1311	Status of Refugees
ξ^{15}	-	-	Torture
y_{it}	1*	-	
a_{it}	1.5564	(0.9654)	

* not estimated

We show how we arrived at the expression $P_{ir}(\mathbf{w}_{irt}) = \Phi\Big(\tilde{z}^{\mathbf{P}}_{irt}\frac{\theta}{\sigma_\varepsilon} + \tilde{e}^{\mathbf{P}}_{irt}\Big)$ explicitly. For notational simplicity, let us redefine $\theta = \frac{\theta}{\sigma_\varepsilon}$.[24] Recalling that $\mathbf{w}_{irt}$ contains all payoff relevant information for treaty office r in country i at time t, let us for the sake of clarity continue to keep separate the ratification status and all other payoff relevant variables in w_{irt}, and let the pair (x_{irt}, w_{irt}) represent the treaty status and all other payoff relevant variables respectively. Let $v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}), v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt})$ represent the *choice-specific* values to ratification and non-ratification of treaty r in state $\mathbf{w}_{irt}$. The entry threshold for treaty office r in country i is given by the difference in the choice specific values:

$$\Delta_{ir} = v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}) - v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt})$$

Treaty r is ratified in country i when the private information shock ε_{irt} is no larger than this difference. Then we have the ex-ante probability of ratification in any $(x_{irt}, \mathbf{w}_{irt})$:

$$P_{ir}(0, \mathbf{w}_{irt}) = \Phi\big((v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}) - v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt}))/\sigma_\varepsilon\big) \quad (16)$$

$$P_{ir}(1, \mathbf{w}_{irt}) = 1 \quad (17)$$

What we need to show now is that $v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}) - v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt}) = \tilde{z}^{\mathbf{P}}_{irt}\theta + \tilde{e}^{\mathbf{P}}_{irt}$. Define the *integrated value function* of treaty office r in country i as:

$$V^{\mathbf{P}}_{ir}(\mathbf{w}) = E_\varepsilon\Big(\max\big\{v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}) + \varepsilon_{irt}, v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt})\big\}\Big)$$

The model we have described above implies that:

$$\begin{aligned} v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}) &= R_{irt}(\mathbf{w}_{irt}; \theta) - (1 - x_{irt})C_{irt}(\mathbf{w}_{irt}; \theta) + \delta F^{\mathbf{w},\mathbf{P}}_{ir}(1, \mathbf{w}_{irt})'\mathbf{V}_{ir} \\ v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt}) &= R_{irt}(\mathbf{w}_{irt}; \theta) + \delta F^{\mathbf{w},\mathbf{P}}_{ir}(0, \mathbf{w}_{irt})'\mathbf{V}_{ir} \end{aligned}$$

where $\mathbf{V}_{ir}$ is the vector of values (as many value functions as there are values of $\mathbf{w}_{irt}$) and $F^{\mathbf{w},\mathbf{P}}_{ir}(0, \mathbf{w}_{irt})$ and $F^{\mathbf{w},\mathbf{P}}_{ir}(1, \mathbf{w}_{irt})$ are vectors with transition probabilities. Note that we can express the choice specific values in this way even though we assume that entry is irreversible, as long as we have $P_{ir}(w_{irt}) = 1$ for any vector $\mathbf{w}_{irt}$ such that $x_{irt} = 1$.

By the definition of the integrated value function, we have that:

$$V^{\mathbf{P}}_{ir}(\mathbf{w}_{irt}) = \big(1 - P_{ir}(\mathbf{w}_{irt})\big)v^{\mathbf{P}}_{irt}(0, \mathbf{w}_{irt}) + P_{ir}(\mathbf{w}_{irt})v^{\mathbf{P}}_{irt}(1, \mathbf{w}_{irt}) + e^{\mathbf{P}}_{irt} \quad (18)$$

[24] Note however that given the structure of the model we are able to identify σ_ε separately.

where

$$e^{\mathbf{P}}_{irt} = P_{ir}(\mathbf{w}_{irt})E\big[\varepsilon_{irt}|v^{\mathbf{P}}_{irt}(1,\mathbf{w}_{irt}) + \varepsilon_{irt} > v^{\mathbf{P}}_{irt}(0,\mathbf{w}_{irt})\big] + (1 - P_{ir}(\mathbf{w}_{irt}))0 \tag{19}$$

In the case of normally distributed error, we have that $e^{\mathbf{P}}_{irt} = \sigma_\varepsilon \phi\big(\Phi^{-1}(P_{ir}(\mathbf{w}_{irt}))\big)$. Now, by substituting the expressions for the choice-specific values into the above expression for the integrated value function, we get:

$$\begin{aligned} V^{\mathbf{P}}_{ir}(\mathbf{w}_{irt}) &= R_{irt}(\mathbf{w}_{irt};\theta) + P_{ir}(\mathbf{w}_{irt})\big[-(1-x_{irt})C_{irt}(\mathbf{w}_{irt};\theta) + \delta F^{\mathbf{w},\mathbf{P}}_{ir}(1,\mathbf{w}_{irt})'\mathbf{V}^{\mathbf{P}}_{ir}\big] \\ &+ \big(1 - P_{ir}(\mathbf{w}_{irt})\big)\big[\delta F^{\mathbf{w},\mathbf{P}}_{ir}(0,\mathbf{w}_{irt})'\mathbf{V}^{\mathbf{P}}_{ir}\big] + e^{\mathbf{P}}_{irt} \end{aligned}$$

By stacking the value functions by state $\mathbf{w}$, we can express this more compactly as:

$$\begin{aligned} \mathbf{V}^{\mathbf{P}}_{ir} &= \mathbf{R}_{ir}(\theta) + \mathbf{P}_{ir} \times [-(1-\mathbf{x}_{ir})\mathbf{C}_{ir}(\theta) + \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{ir}(1)\mathbf{V}^{\mathbf{P}}_{ir}] \\ &+ \big(1 - \mathbf{P}_{ir}\big) \times \big[\delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{ir}(0)\mathbf{V}^{\mathbf{P}}_{ir}\big] + \mathbf{e}^{\mathbf{P}}_{ir} \end{aligned}$$

where $\times$ denotes the element-wise product.

Further, define:

$$\begin{aligned} \mathbf{F}^{\mathbf{w},\mathbf{P}}_{ir} &\equiv (1 - \mathbf{P}_{ir}) \times F^{\mathbf{w},\mathbf{P}}_{ir}(0) + \mathbf{P}_{ir} \times F^{\mathbf{w},\mathbf{P}}_{ir}(1) \\ \mathbf{A} &\equiv \big\{\mathbf{I} - \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{ir}\big\}^{-1} \end{aligned}$$

Then we have:

$$\mathbf{V}^{\mathbf{P}}_{ir} = \mathbf{A} * \big(\mathbf{R}_{ir}(\theta) - \mathbf{P}_{ir} \times [(1-\mathbf{x}_{ir})\mathbf{C}_{ir}(\theta)]\big) + \mathbf{A} * \mathbf{e}^{\mathbf{P}}_{ir}$$

Now recalling the definition of the entry threshold and the expressions for the choice-specific values, we write the vector of entry thresholds as:

$$\begin{aligned} \mathbf{\Delta}^{\mathbf{P}}_{ir} &= v^{\mathbf{P}}_{ir}(1) - v^{\mathbf{P}}_{ir}(0) \\ &= -(1-\mathbf{x})\mathbf{C}_{ir}(\theta) + \delta\big(\mathbf{F}^{\mathbf{w},\mathbf{P}}_{ir}(1) - \mathbf{F}^{\mathbf{w},\mathbf{P}}_{ir}(0)\big)\mathbf{V}_{ir} \\ &= -(1-\mathbf{x})\mathbf{C}_{ir}(\theta) + \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{D}\mathbf{A} * \Big(\mathbf{R}_{ir}(\theta) - \mathbf{P}_{ir} \times [(1-\mathbf{x})\mathbf{C}_{ir}(\theta)]\Big) + \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{D}\mathbf{A} * \mathbf{e}^{\mathbf{P}}_{ir} \\ &= \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{D}\mathbf{A} * \big(\mathbf{P}_{ir} - \mathbf{1}\big) \times (1-\mathbf{x})\mathbf{C}_{ir}(\theta) + \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{D}\mathbf{A} * \mathbf{R}_{ir}(\theta) + \delta \mathbf{F}^{\mathbf{w},\mathbf{P}}_{D}\mathbf{A} * \mathbf{e}^{\mathbf{P}}_{ir} \end{aligned}$$

where $\mathbf{F}^{\mathbf{w},\mathbf{P}}_{D} \equiv \mathbf{F}^{\mathbf{w},\mathbf{P}}_{i,r}(1) - \mathbf{F}^{\mathbf{w},\mathbf{P}}_{i,r}(0)$.

Note first that the parameters of the model θ enter into the thresholds in the first two terms of the expression only. Further, we have assumed that the functions $R_{irt}(\mathbf{w}_{irt},\theta)$ and

$EC_{irt}(\mathbf{w}_{irt}, \theta)$ are linear in the parameters θ. We can therefore express the vector of entry thresholds as

$$\boldsymbol{\Delta}_{ir}^{\mathbf{P}} = \tilde{\mathbf{Z}}_{\mathbf{ir}}^{\mathbf{P}}\theta + \tilde{\mathbf{e}}_{\mathbf{ir}}^{\mathbf{P}}$$

Table A1: Treaties

Treaty	Date Opened
International Covenant on Economic, Social and Cultural Rights	19/12/1966
International Covenant on Civil and Political Rights	19/12/1966
International Convention on the Elimination of All Forms of Racial Discrimination	7/3/1966
Convention on the Prevention and Punishment of the Crime of Genocide	9/12/1948
Convention on the Rights of child	20/11/1989
International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families	18/12/1990
Convention on the non-applicability of statutory limitations to war crimes and crimes against humanity	26/11/1968
International Convention on the Suppression and Punishment of the Crime of Apartheid	30/11/1973
Convention on the Elimination of All Forms of Discrimination against Women	1/3/1980
International Convention Against the Taking of Hostages	18/12/1979
Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects	10/4/1981
International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations	26/10/1961
Convention on the Political Rights of Women	20/12/1952
Convention relating to the Status of Refugees	28/7/1951
Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment	10/12/1984

Table A2: Country Years

Country	Start Year	End Year
Algeria	1962	2000
Angola	1977	2000
Argentina	1962	2000
Armenia	1993	2000
Azerbaijan	1993	2000
Bangladesh	1974	2000
Benin	1962	2000
Bolivia	1962	2000
Botswana	1968	2000
Brazil	1962	2000
Burkina Faso	1962	2000
Burundi	1964	2000
Cameroon	1962	2003
Central African Republic	1962	2000
Chad	1962	2000
Chile	1962	2000
Colombia	1962	2000
Congo, Republic of the	1962	2000
Democratic Republic of the Congo	1962	2000
Costa Rica	1962	2000
Dominican Rep	1962	2000
Ecuador	1962	2000
Egypt	1962	2000
El Salvador	1962	2000
Equatorial Guinea	1968	2003
Ethiopia	1962	2000
Gabon	1960	2003
Gambia, The	1967	2000
Ghana	1962	2000
Guatemala	1962	2000
Guinea	1962	2000
Guinea-Bissau	1976	2000
Haiti	1962	2000
Honduras	1962	2000
India	1962	2000
Indonesia	1962	2000
Israel	1962	2000
Cote d'Ivoire	1962	2000
Jamaica	1964	2000
Jordan	1962	2000

Table A2: Country Years (cont'd)

Country	Start Year	End Year
Kazakhstan	1993	2000
Kenya	1965	2000
Korea, South	1962	2000
Kyrgyzstan	1993	2000
Madagascar	1961	2003
Malawi	1967	2000
Malaysia	1964	2000
Mali	1962	2000
Mauritania	1969	2000
Mauritius	1970	2000
Mexico	1962	2000
Morocco	1961	2000
Mozambique	1977	2000
Myanmar	1962	2000
Nepal	1962	2000
Nicaragua	1962	2000
Niger	1962	2000
Pakistan	1962	2000
Paraguay	1962	2000
Peru	1962	2000
Philippines	1962	2000
Rwanda	1962	2000
Senegal	1962	2000
Sierra Leone	1962	2000
Singapore	1967	2000
Somalia	1962	2000
South Africa	1962	2000
Sri Lanka	1962	2000
Syria	1962	2000
Tajikistan	1993	2000
Tanzania	1962	2000
Thailand	1962	2000
Togo	1962	2000
Tunisia	1962	2000
Turkey	1962	2000
Turkmenistan	1993	2000
Uganda	1962	2000
Uruguay	1962	2000
Uzbekistan	1993	2000
Venezuela	1962	2000
Zambia	1964	2000
Zimbabwe	1970	2000

Figure 1: Treaty Heterogeneity in the Years until Ratification. X-axis: Countries. Y-axis: Years to ratification of Rights of Child treaty (blue) and Rights of Migrant Workers treaty (green). Rights of Child is ratified earlier by almost every country.

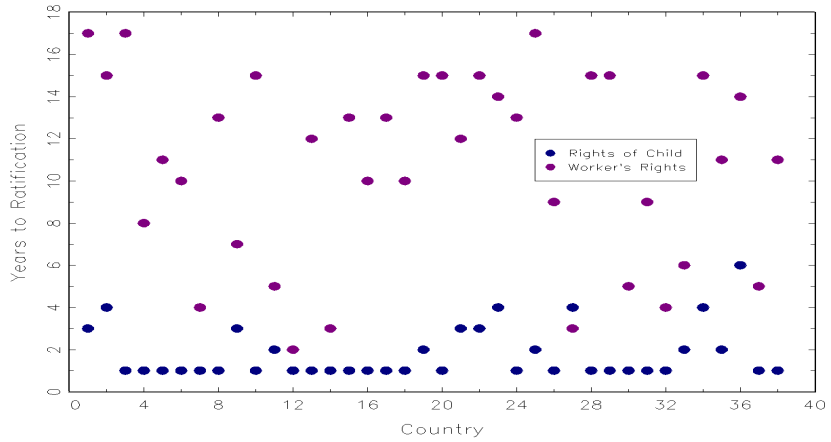

Figure 2: Country Heterogeneity in the Years until Ratification. X-axis: Treaties that both Armenia (blue) and Kazakhstan (green) have ratified. Y-axis: Years to ratification. Armenia almost always ratifies earlier.