

Lawrence University Lux

Lawrence University Honors Projects


6-1-2016

A Game Theoretic Analysis of International Justice Disputes

Mishal Ayaz

Lawrence University, mishal.ayaz@lawrence.edu

Follow this and additional works at: <https://lux.lawrence.edu/luhp>

 Part of the [Economic Theory Commons](#), [International Law Commons](#), and the [International Relations Commons](#)

© Copyright is owned by the author of this document.

Recommended Citation

Ayaz, Mishal, "A Game Theoretic Analysis of International Justice Disputes" (2016). *Lawrence University Honors Projects*. 89.
<https://lux.lawrence.edu/luhp/89>

This Honors Project is brought to you for free and open access by Lux. It has been accepted for inclusion in Lawrence University Honors Projects by an authorized administrator of Lux. For more information, please contact colette.brautigam@lawrence.edu.

A Game Theoretic Analysis of International Justice Disputes

Author: Mishal Ayaz

Abstract: This paper works towards analyzing international justice disputes, through a game theoretic lens. The result of such an analysis is an accurate working model for the international justice dispute resolution process, limiting its scope to those disputes that fall under the International Court of Justice's jurisdiction post 1986. This time limitation on the explanatory power of the model was deduced from all of the court's findings since its inception. The game can be formed in four ways: perfect information, incomplete information, no information, and partial information, all of which have their own unique equilibria, which are formed and discussed individually.

Table of Contents

INTRODUCTION	3
THE INTERNATIONAL COURT OF JUSTICE, LEGITIMACY AND COMPLIANCE	3
SCOPE OF THE ANALYSIS, BUILDING A MODEL	6
PREVIOUS MODELING ATTEMPTS	11
GAME THEORY IN INTERNATIONAL RELATIONS	12
METHODOLOGICAL APPROACH	14
TYPES OF MODELS	16
CRAFTING A MODEL	20
BUILDING THE PAYOFFS	25
SOLVING THE MODEL	26
COMPLETE INFORMATION GAME	27
INCOMPLETE INFORMATION GAME	28
NO INFORMATION GAME	32
PARTIAL INFORMATION GAME	33
IMPLICATIONS OF THE RESULTS	36
CONCLUSION	37
WORKS CITED	39

Introduction:

Many academics have used game theory in order to analyze international disputes. Most commonly, game theory is used in the analysis of high conflict situations, such as war.

Theoretically, the science could be used to understand any dispute in the international arena which deals with two or more strategic actors. International justice disputes are one such type of dispute.

This paper will look into international justice disputes that arise after the formation of the International Court of Justice, further referred to as the ICJ. In order to attempt to model such disputes as an extensive form game, this paper will begin with an analysis of the ICJ. Many modern international disputes are resolved through institutional measures, the ICJ being one of the most prominent of those available institutions, especially for issues of international justice. The questions this paper aims to answer are: 1) What would a game theoretic model of international justice disputes look like? and 2) Under what conditions will a state opt to take its case to the ICJ? In an attempt to answer these questions, this paper also comes across another question that must be addressed first, which is: What is the recent history of ICJ rulings and compliance?

The International Court of Justice, Legitimacy and Compliance:

The ICJ, formed in 1945 by charter of the United Nations, is an international regulatory institution, which settles legal disputes, in accordance with international law (ICJ website). The court receives two main types of questions: legal questions and legal disputes. The UN, or other specialized agencies refer legal questions to the court. These questions are not particularly relevant for an analysis of international justice disputes. The legal disputes, on the other hand,

are submitted to the court by states. There are three main types of legal disputes: special cases, cases provided for in treaties and conventions, and contentious cases.

Special cases are those where one or both parties in the issue are not member states of the ICJ, but both voluntarily bring the issue before the court, submitting themselves to the court for this one issue. Cases provided for in treaties and conventions are those where the treaty or convention explicitly states that any dispute relating to said treaty or convention is to be handled by the ICJ, and that is the only available course of action. Contentious cases are those where both states in the dispute have recognized the court's jurisdiction, which is done by signing a treaty to become a member state of the court, and one of the states brings the issue to the court.

Contentious cases are the types of cases that are crucial in gaining an understanding of international justice disputes and the ICJ. These cases will therefore serve as the focus of this paper's analysis. Cases provided for in treaties and conventions, on the other hand, mandate ICJ resolution; and special cases, while they do warrant strategic choices that may be organized, in a game theoretic model, they are a unique type of case, and would ultimately call for their own separate evaluation.

Interestingly, despite the ICJ being a voluntary court, for many of its early years the court was met with significant instances of non-appearance, non-compliance, and even open defiance (Jones, 2012). Yet, international law continued to be deemed as legitimate, but perhaps not as powerful as officials may have liked (Goldsmith and Posner, 2005). The ICJ was established through a voluntary international charter, and therefore should have been met with widespread compliance, as opposed to reluctance. This expectation of widespread compliance would be further predicted as the ICJ only receives cases where the states involved have given the court recognition and authority to take in cases concerning said state (Rosenne, 1957).

Fortunately, this era of reluctance did have an end, with Nicaragua serving as the “turning point” (Llamzon, 2008). Interestingly, the Nicaragua case’s judgment was in favor of the applicant/plaintiff, and the defending state did not comply with the ruling (Llamzon, 2008). Yet, the case did seem to yield some long-term effects; there has not been any significant evidence suggesting non-compliance after *Nicaragua v United States of America* (1984) (Llamzon, 2008). There have been 5 cases, however, which have been met with relatively less compliance, but not outright defiance or even non-compliance. These cases are as follows¹:

1. Land, Island, and Maritime Frontier Dispute (El Salvador/Honduras; Nicaragua Intervening)
2. Territorial Dispute (Libya/Chad),
3. Gabčíkovo-Nagymaros Project (Hungary/Slovakia),
4. Land and Maritime Boundary Between Cameroon and Nigeria (Cameroon v. Nigeria; Equatorial Guinea Intervening)
5. Avena and Other Mexican Nationals (Mexico v. US); LaGrand (FRG v. US)

Legitimacy, in the realm of international law, is often defined through compliance; compliance is then defined in terms of defiance; and defiance refers to “wholesale rejection of a judgment as invalid, coupled with the refusal to comply” (Jones, 2012). Although, it is not enough to simply state that the ICJ is now regarded as a legitimate or valid option when dealing with international justice disputes, it is also imperative to understand what it is that affects the court’s perceived validity. Ultimately, there are four key factors that contribute to compliance: external political influence, internal political influence, internal need for a definitive solution, and substance of the judgment issued (Jones, 2012).

It is important to note that there are sometimes instances in which states are unable to comply, but this failure to comply is not for lack of will, they are instead due to a lack of ability

¹ See Llamzon, 2007, pages 825 – 844 for full discussion on these 5 cases.

to fully comply with the substance of the judgment (Jones, 2012). These instances are important to note, as many point to them as evidence to detract from the legitimacy of the ICJ. Though, in reality, these instances are no more than comments on the abilities of the state facing the judgment, and, more specifically, their ability to perform complete compliance. Thus, overall, it seems as though the ICJ is regarded as a legitimate justice dispute resolution entity by the international community, and therefore a valid option when handling international justice disputes.

Although it is still important to keep in mind that, despite the ICJ being regarded as a valid and legitimate option overall, each individual case is unique, and therefore requires its own unique valuation. In the instance of the maritime dispute between China and the Philippines, China made it clear that it would not respect any decision by the ICJ, meaning it was no longer a viable option for the Philippines (Aitken, 2014). Non-the-less, instances such as these do not detract from the Court's legitimacy or viability as an option, they simply remove that option in a given circumstance, dispute or, more generally, iteration of the game.

Scope of the Analysis, Building a Model:

When attempting to build a game theoretic model of any situation, it is important to understand the parameters of the game, and what exactly falls within its scope. Not every international justice dispute is created equally. Some justice disputes are small issues between states that are not member states of the ICJ, others are large issues that garner attention from the international community as a whole, while others involve upwards of 3 states. For the purposes of this paper the justice disputes deemed relevant are those which occur between two states and fall under ICJ jurisdiction, as viable contentious cases. This is done in an attempt to create a

simple model, which could be altered and made more complex in the future, in order to accommodate more options within its scope. When building any model, there is always a tradeoff between simplicity and applicability. The simpler the model, the easier it is to conceptualize, and possibly even craft, but this comes at a cost of power of explanation. Conversely, a more complex model, while it may be better equipped to explain a situation in more intricate detail, bears the costs of limited applicability, increased difficulty in conceptualization, and most probably, increased difficulty in its crafting.

While the scope of this model will be limited to justice disputes falling within ICJ jurisdiction, this does not mean that the court system was not an option prior to 1945. In fact, the ICJ had a predecessor, known as the Permanent Court of International Justice, further referred to as the PCIJ. The PCIJ, which handled many of the same issues as the current ICJ, was dissolved shortly before the formation of the ICJ (ICJ website). Furthermore, the limitation to issues falling under ICJ jurisdiction does not mean to imply that the ICJ is the only international court which hears justice disputes. In fact, there are both regional courts, as well as temporary pop-up courts that serve as other institutional approaches available to select states. Examples of Regional Courts include the Caribbean Court of Justice, the East Caribbean Supreme court, and the European Court of Justice. While these institutions are available to certain states as a potential dispute resolution media, the jurisdictional limitations of these courts are not completely identical to the ICJ, though there may be some overlap. For example, the European Court of Justice does hear cases related to justice disputes, but these cases are limited to those concerning dealings of European Union Law.

These courts also employ far more restrained member policies as compared to the ICJ, which is open to any state willing to sign off in its treaty in order to award the court jurisdiction

over disputes related to it. In fact, not every case heard by the ICJ even requires that the state appearing before it be a member state of the court. States can bring “special cases” before the ICJ, where both parties voluntarily submit to the ICJ’s jurisdiction for the issue at hand (ICJ website). The European Court of Justice, on the other hand, is limited to cases concerning members of the European Union. Although, for simplicity purposes, this paper will limit its scope to disputes between member states of the ICJ.

Temporary pop-up courts, such as the Andean Tribunal of Justice, on the other hand, are formed for limited periods of time in order to handle a niche group of cases, should the need arise (Alter and Helfer, 2010). These courts also often have unique logistical structures and a far more limited scope of issues that fall under the court’s jurisdiction. These temporary courts are often established by the international community as a whole, to deal with specific issues, such as a mass genocide within the borders of a certain state. These courts also can be independent, operating through the United Nations, or hybrid courts, created both by the international community as well as the government of the state in which they will be operating.

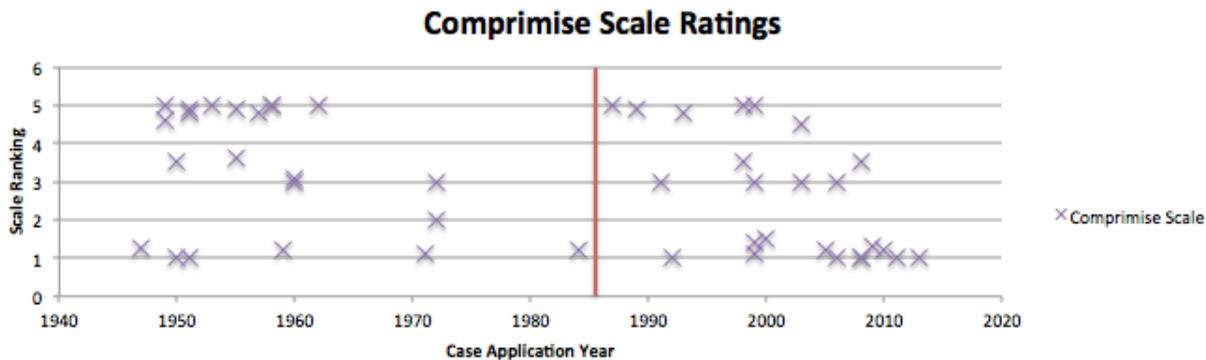
Attempting to incorporate such tribunals and courts would pose a significant hurdle as these entities deal with hyper-specific issues, often confined to the borders of a single state, as opposed to the topic of international justice disputes in a general sense. The Andean Tribunal, for example, addressed questions between the Andean Community Member States: Bolivia, Colombia, Ecuador, and Peru, relating to questions of trade-related obligations (International Justice Resource Center). These institutions deal in a very narrow selection of issues, which sparked their formation. Furthermore, the formation of these institutions is not a guarantee, but instead an exception to the norm, they traditionally require a great amount of cases on the issue, which require attention, in order to even be considered. Therefore, predicting the formation of

these tribunals and courts is a great task in it of itself. Thus, these institutions will not be incorporated in the scope of this paper.

Therefore, the only cases of international justice disputes relevant for this analysis are those that fall under ICJ jurisdiction, limited to only those states that are member states of the court. Although, given the nature of the shift in international perceptions on the court after the Nicaragua case, and the importance of a coherent game, it would be worthwhile to analyze the cases of the ICJ in order to pick an appropriate time restriction on cases falling under the scope of this paper. Jones, in 2012, outlined a shift in the views of the ICJ as a valid option, met with compliance by the member states and the international community. For the purposes of this paper, in an attempt to analyze the shift, all the cases brought to the ICJ were looked into and the rulings of the court analyzed. A variable was created in order to quantify the nature of the rulings, similar to what is done in political science when attempting to quantify a qualitative variable. This variable is called the “compliance scale” and ranges from a score of 1 to 5. A score of 1 means the ruling on the merits of the case resulted in an outcome strongly in favor of the plaintiff, the state that filed for the case. Alternatively, a score of 5 means the outcome was strongly in favor of the defense, the state that was brought to court. A score of 3 means the ruling favored neither party and/or was a split decision where half of the case was ruled in favor of either side. This resulted in an image depicted in Figure 1 below².

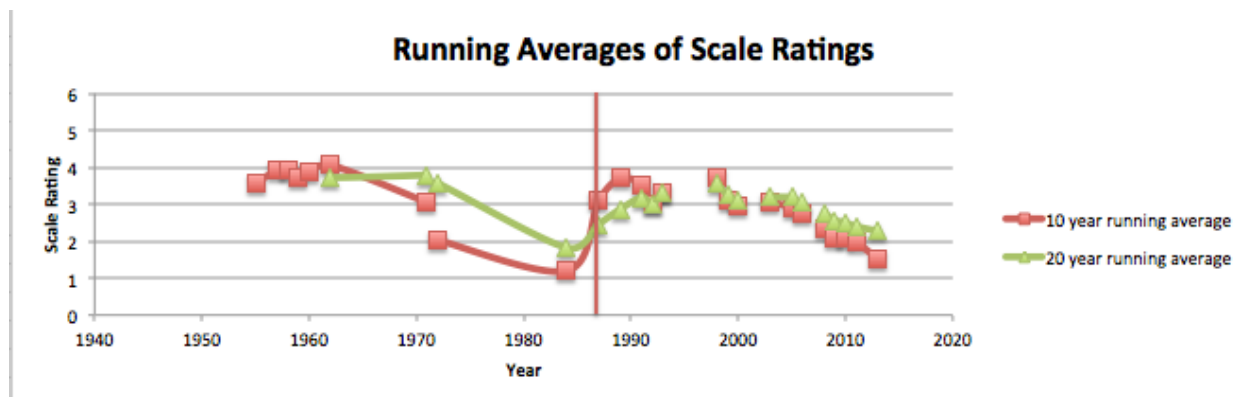
² All data may be recreated using information available at: <http://www.icj-cij.org/docket/index.php?p1=3&p2=3> or requested from the author at: mishal.ayaz.94@gmail.com.

Figure 1: Compromise Scale Ranking of ICJ Cases



When calculating the average of compromise scale scores since the formation of the court, the average comes out to 2.953. When calculating the average after the Nicaragua case in 1986, the average comes out to 2.58. When analyzing the running averages the resulting graph is as depicted in Figure 2 below.

Figure 2: 10 and 20 Year Running Averages of the compromise Scale Scores



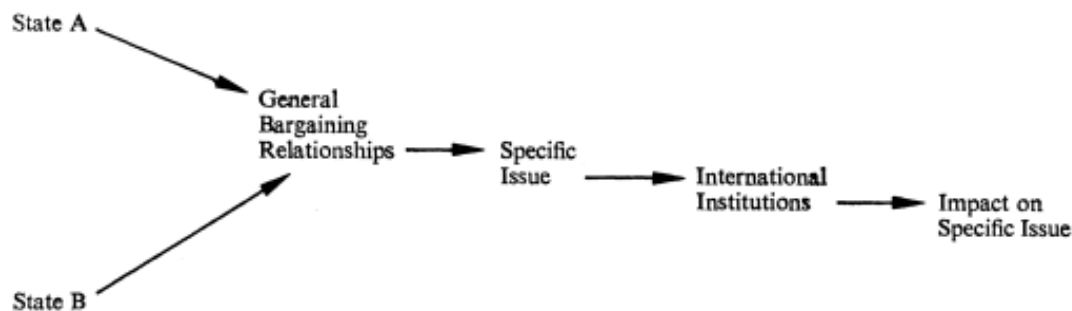
Ultimately, for the purposes of this analysis, the cases prior to the issuance of the Nicaragua ruling of June 27, 1986 will be kept out of the analysis. While the reasoning for the shift in views about the court after this ruling may not be completely clear, as Llamzon outlined, there was in fact a shift in the actions of states in response to the court. Therefore, the justice disputes considered in this paper, in order to formulate a working game theoretic model, will be

limited to disputes after June 27, 1986, which fall under ICJ jurisdiction and involve member states of the court.

Previous Modeling Attempts:

The current literature provides more of a schematic illustration, as opposed to a strategic game theoretic model (Coplin and Rochester, 1972). This schematic, which is depicted in Figure 3 below, begins with two parties, State A and State B, which have a bargaining relationship of some sort, and then encounter a specific issue, which is then brought through the international institutions, resulting in some sort of impact on the specific issue (Coplin and Rochester, 1972). Although this schematic does lay out the major steps of the dispute resolution process, what it fails to do is actually sketch out the moves of the players or formulate any payoffs for the players.

Figure 3: Coplin and Rochester Schematic Illustration³



Game Theory in International Relations:

³ Coplin and Rochester (1972) Figure 1 – “Schematic Illustration of Framework Relating Variables in the Study of International Institutions in Bargaining Among States”

Much of the game theoretic literature on international relations focuses on bargaining theory specifically. Essentially, bargaining theory accounts for a series of negotiations between two parties, allowing them to come to a mutually beneficial outcome, which is a common way for states to resolve their justice disputes. Here, what is interesting is identifying the point where negotiations are no longer viable. These breaking points are where other options, such as the ICJ, come into play. This is where a viable payoff matrix would be important, as it would serve to identify the move where continuing negotiations is no longer sensible for a given party.

When conducting such negotiations, it is important to keep in mind that there is a two-level game occurring (Putnam, 1988). Domestic politics and international relations are always entangled, and the negotiators have to address parties in both domains. Any agreement, to be viable, has to satisfy both the other international party at the negotiating table, as well as the negotiating state's constituents or heads of state, whoever the relevant party may be given the issue (Putnam, 1988). This becomes important when crafting the payoff matrix for a player. The level of "state strength" and the level of unity on the issue become important factors in how the issue is dealt with (Putnam, 1988).

"State strength" refers to the strength of the legal argument on its merits. This could be determined by figuring out which, of multiple opposing possible precedents, is the standing precedent on the issue, or simply what the accurate reading of a given treaty or law means for a certain issue. Much like with domestic legal issues, there may be more than one legitimate and supportable interpretation but, the actual implications are singular in their interpretation. "Unity", on the other hand, refers to the level of cohesiveness on domestic politics for a given issue. Both unity and state strength affect a given state's decision on how to handle a given issue when

presented with a breaking point, but these variables also affect the valuations for any given course of action, thereby affecting the point at which a state reaches its breaking point.

For example, given two possible states of the world, the first in which State “A” has a state-strength level of x and a unity level of y , and the other state of the world in which State “A” has a state-strength level of x and a unity level of z , where y is significantly greater than z , State “A” would reach its breaking point in negotiation at different points in time in the lifespan of a given justice dispute. Which state of the world, further referred to as SOW, reaches its breaking point first is determined on what stance the domestic politics favors in their unity. If in SOW1, the unified domestic politics does not seem to care for a given justice dispute and would simply like to move on, then SOW1 may reach its breaking point far earlier than SOW2. Alternatively, if the unified domestic politics sees the issue as one of high importance, then SOW1 may reach its breaking point far later than in SOW2. What move is made at these breaking points is also affected by these varying levels of unity. If domestic politics are unified in the belief that the given issue is of very high importance, then State A may opt to pursue a conflict situation at its breaking point in SOW1 as opposed to walking away or going to the ICJ, depending on the value of x , in SOW2.

However, breakdowns in negotiations are not the only possible end point in the bargaining theory model. There are situations where bargaining is successful, and the states come to a resolution through bargaining/negotiations alone. When attempting to come to a resolution through negotiations, the win sets deemed feasible through level 2 negotiators, or the state itself, serve to limit the possible resolutions through level 1 negotiation, which occur between states (Putnam, 1988). Win sets include all the possible sets of outcomes which are amenable to both states in the disputes. For example, in a territorial dispute, the possible win sets

could include any distribution where A gets at least 40% of the disputed territory and B gets at least 45% of the disputed territory. Situations of deadlock occur when acceptable options for each state fail to overlap, resulting in a breaking point in bargaining. This is where other options would come into play, such as the institutional options outlined in Coplin and Rochester's work. For the purposes of this paper, the institutional options will be limited to the ICJ, due to the limited scope of cases included in the analysis.

Interestingly, international institutions and negotiations are not the only feasible options to a state that finds itself in a justice dispute. There is always the option for international conflict; in fact, conflict has its own strategic value and, of course, must be seemingly warranted by the situation for a given state (Signorino, 1999). Ultimately, this option only becomes viable at the breaking point of negotiations and the importance of the issue to level 2 politics, which refers to the domestic politics on the issue.

Methodological Approach:

In order to build a game theoretic model of international justice dispute resolution, reflective of current beliefs and norms, all cases included in the analysis to build such a model will be limited to disputes occurring after June 27, 1986. Since the question to be analyzed in this paper involves an explanation for states turning to the ICJ, the scope will be further limited to disputes involving member states of the court. Although cases may be heard by the ICJ on a voluntary basis, when neither party is a member but both states submit to the ICJ for the issue at hand, these types of cases are outliers and would involve an analysis specific to themselves.

In the interest of tractability, this paper's analysis will be limited to cases involving certain types of disputes. While the ICJ has jurisdiction over a variety of different issues, this

paper will base its model on extradition and territory. Territorial issues will cover both land territory and maritime boundaries. In order to gauge an understanding of the issue, and the steps states taken in the resolution process, approximately 30 cases of each type will be examined, of varying severity. These cases should ideally encompass disputes in which states opted to walk away, disputes they resolved through negotiation, disputes brought to the ICJ, as well as disputes resulting in some sort of conflict situation, hence the varying severities.

These cases will be analyzed on an individual case-by-case basis, in order to gain an understanding of the specific issue and the steps taken to come to a resolution. This is done in order to gain an understanding of how the case is handled, as well as why it is handled in that specific manner. The analysis will be limited to the end point of the given issue, meaning either a successful negotiation or a breakdown in bargaining. Many instances of bargaining breakdowns, especially those resulting in conflict situations, have aftermaths of their own, be it a third party (another state) getting involved, or an international body intervening, such as the United Nations. This aftermath will not be a part of the relevant analysis, for the purpose of building this model, as it is conceptually a whole different game altogether.

Ideally, this analysis should reveal important factors, in addition to level 1 and level 2 politics, as described by Putnam, which are of particular importance when building a bargaining theory model, payoff matrix and game tree. Examples of other possible factors include state strength of the case, reluctance to return to the negotiating table, need for a definitive solution, and associated costs for a given course of action. In fact, Jones even highlights the need for a definitive solution as one of her four factors contributing to compliance (Jones, 2012).

From there, a trial and error approach will be used in order to build a game, and associated payoff structure. This simply means attempting to build a model based on the

information revealed through the analysis of the cases. The working model will include certain variables within its payoffs that may vary in reality, from case to case, but will be analyzed through a set of clearly outlined assumptions in this paper. This base model will then be used in order to construct toy games, which will lay out model situations which will be analyzed and solved out fully. The payoffs should ideally be able to be easily modified in order to be applied to any specific issue presented, so long as it falls within the guidelines of the analysis of this paper. The toy games will have increasing levels of difficulty/complexity. This means beginning with cases that have complete information, working up to cases with partial information. Partial information is what is observed in reality, where each player has some information, but not all the relevant and necessary information.

Ultimately, this approach should yield a model, which is not only more in-depth than the existing “schematic illustration”, but also an accurate portrayal of the international justice dispute resolution process for cases falling under ICJ jurisdiction post 1986.

Types of Models:

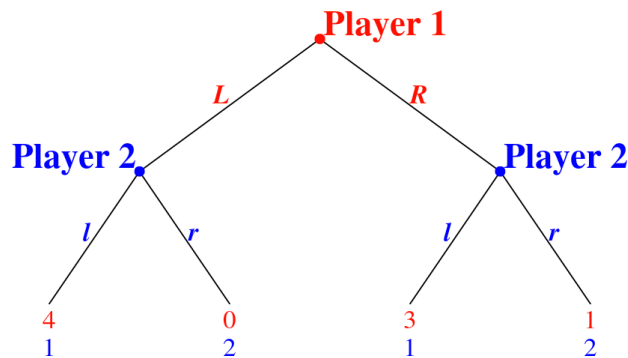
Strategic game theory, as it stands currently, has two basic types of models, those in the normal form, and those in the extensive form. Normal form games are often represented in a matrix chart, which lays out the players, their strategic options, and the payoffs of each combination of options. Normal form games are often restricted to situations where players make simultaneous decisions, independent of one another. Perhaps the most widely known normal form game is the prisoners’ dilemma, which is depicted below in Figure 4, in order to illustrate a complete normal form game.

Figure 4: Model Prisoners’ Dilemma Game

		Player 2	
		Quiet	Fink
Player 1	Quiet	(-1, -1)	(-10, 0)
	Fink	(0, -10)	(-9, -9)

Since international justice disputes are handled through a series of negotiation moves, and a player acting on an issue sparks the game, the relevant type of model for this paper is one in the extensive form. Extensive form games, like the one in Figure 5 below, are often depicted through game trees, with players making choices at decision nodes. In these types of games, sequencing matters, players can make decisions in order to optimize their results, based on moves made before hand. These games are often solved through backward induction, using the concepts of Nash Equilibrium and sub-game perfect Nash Equilibrium.

Figure 5: Extensive Form Game

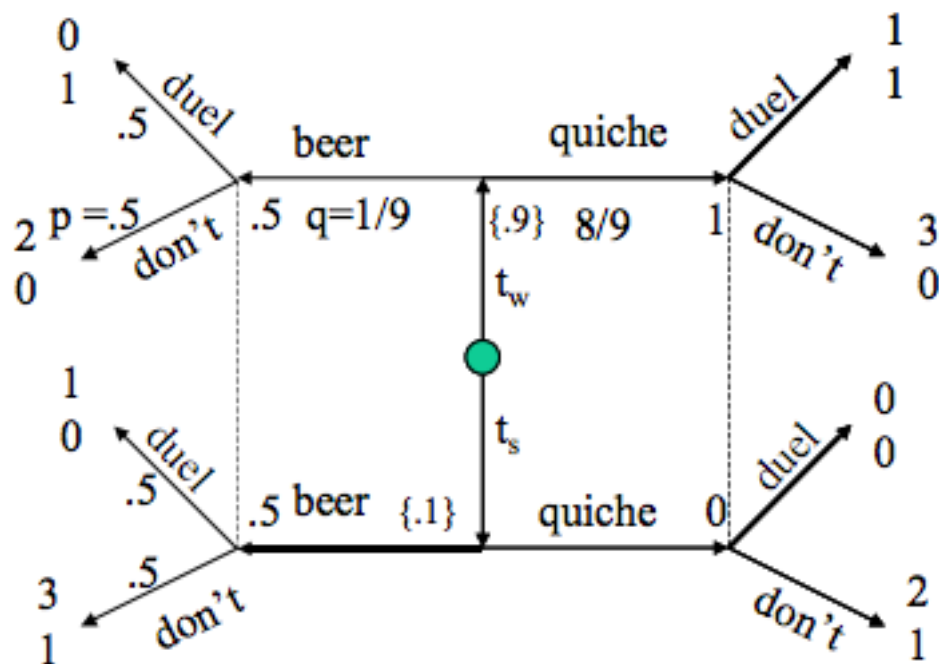


Backwards induction is exactly as it sounds, begin at the end of the game, figuring out what players would do at each decision node, in order to gauge the best course of action to reach a given outcome. An outcome is a Nash Equilibrium if no one player would make a unilateral deviation, given that the strategies of all other players remain the same. A sub-game perfect Nash

Equilibrium is one in which every sub-game is in Nash Equilibrium, where sub-game refers to the restriction of the game to what follows after some particular decision node.

Extensive form games also vary based on information available to players. There are games of complete information, imperfect information, and incomplete information. Imperfect information games are those in which players do not know what actions are chosen by other players but do know what the other player's available strategies are, and their associated payoffs and preferences. Incomplete information games, on the other hand, are when a player does not know a key piece of information about the other player, be it their type, their strategies, their preferences, or their payoffs.

Games of incomplete and/or imperfect information often result in information sets. Information sets include one or more decision nodes. The player is able to determine between different information sets, but is unable to determine between different decision nodes, within the information set, adding a layer of complexity for the player. A popular extensive form game incorporating information sets is the beer quiche game, which is depicted below in Figure 6.

Figure 6: Beer Quiche Game⁴

The Beer-Quiche game begins by a move of nature, which determines the type for player one. Player one can either be strong or wimpy. From there, player one has a strategic choice to make, does he order beer or does he order quiche? Player one, if he is of the strong type, prefers beer to quiche but, if he is of the wimpy type, prefers quiche to beer. Player 2 in this game is looking to start a fight, but wants to fight if and only if player one is of the wimpy type. Player one must then make his choice based not only on his own preference between beer and quiche, but also what the choice would mean for player 2's action.

In the version depicted above, player one is nine times more likely to be of the wimpy type. The associated equilibrium for this game is that player one, when he is of the strong type, will always order beer, and when he is of the wimpy type, will mix between ordering beer and ordering quiche in order to make player two perceive the two types as equally likely, making him

⁴ Muhamet Yildiz Figure 7 – 14.2 Game Theory Lecture Notes Reputation and Signaling

indifferent between fighting and not fighting. The probability distribution that makes this possible is: player one chooses beer with probability $1/9$ and quiche with probability $8/9$, when he is of the wimpy type.

Therefore, since player one only picks quiche when he is of the wimpy type, ordering quiche serves as a signal to player two, revealing that player one is a wimp. Player two will then opt to always pick a fight when he observes player one ordering a quiche. Although, since player one orders beer both when he is a wimp and when he is strong, no information is revealed to player two in this move. Given the probabilities chosen by player one, player two also believes that player one is equally likely to be of the strong type or the wimpy type when ordering beer. Therefore, player two will mix, with equal probability, between fighting and not fighting when observing player one order beer.

Crafting a Model:

An international justice dispute is sparked by a state, which has an issue and makes a move. The first moving player therefore has 4 basic options available: WALK AWAY, NEGOTIATE, ICJ, and CONFLICT. All the options, besides from NEGOTIATE, signal a breaking point for the purposes of the bargaining theory model. This breaking point could be reached at the very first move, or 12 moves into the game. A common example of a breaking point at the first move would be an extradition issue which either does not warrant enough attention to be pursued, has no justifiable legal standing, or both, and results in a move of WALK AWAY at the onset of the game.

For the purposes of this model, a basic set of assumptions will be made. The first assumption is that the game has reached its potential breaking point. This means either the

breaking point must happen in the moves depicted within the model, or the model must yield an outcome that depicts a successful negotiation. The second assumption is that the type of issue being analyzed is one which warrants neither the WALK AWAY option nor the CONFLICT option. As Jones discussed, issues which are of relatively mid-level importance, meaning they are too important to walk away from but not important enough, domestically, to pursue a conflict situation, are the ones which would be resolved through negotiations or brought to the ICJ (Jones, 2012).

Issues of particularly high importance, on the other hand, often lead to situations of conflict. While these are still issues concerning international justice disputes, they warrant a different type of analysis. Potential conflict situations, as well as conflict resolution situations, have been analyzed thoroughly in the political science arena, through the use of both game theory and bargaining theory, and therefore will be excluded from the model produced in this paper. Similarly, issues of very low importance often call for states to simply walk away, meaning these types of issues would provide little insight into the situations in which states opt to go to the ICJ, and will therefore be excluded from the model as well. Ultimately, issues of mid-level importance are the ones that the model produced in this paper will focus on examining. These are the issues that often result in negotiations, and potentially even ICJ cases, when negotiations do not seem to pan out.

The next set of assumptions relates to the second moving player. This player will be limited to 3 options: ACCEPT, COUNTER, and ICJ. This means that the issue is also of mid-level importance to player 2. Theoretically, player 2 could also reject player 1's offer and walk away from the issue, or even pursue a conflict situation, but in this model, it is assumed that the situation at hand would not warrant any of those two moves.

Another interesting piece of information was revealed about the choice to go to the ICJ in the analysis of all cases applied to the ICJ. Interestingly, only 50 percent of legitimate cases applied to the court are actually followed through on. The other 50 percent of cases result in out of court settlements, resulting in a removal of the cases from the court's docket. Figures 7 and 8 depict this by quantity of cases as well as percentages.

Figure 7: Cases In Court v Out of Court - Quantity

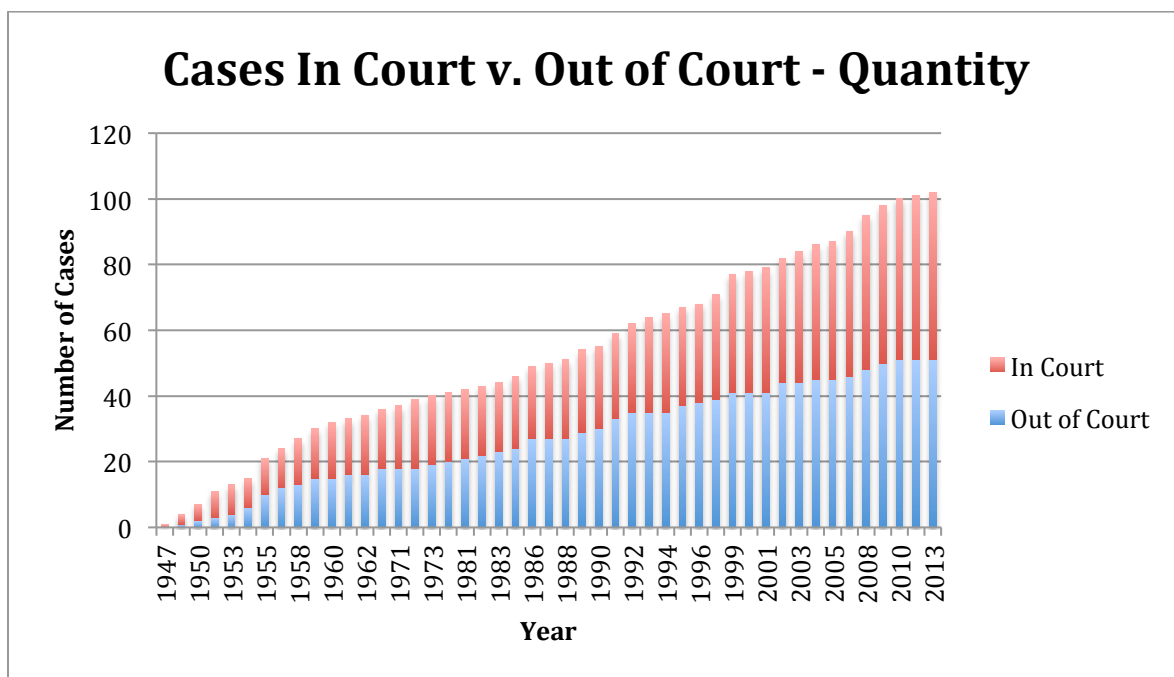
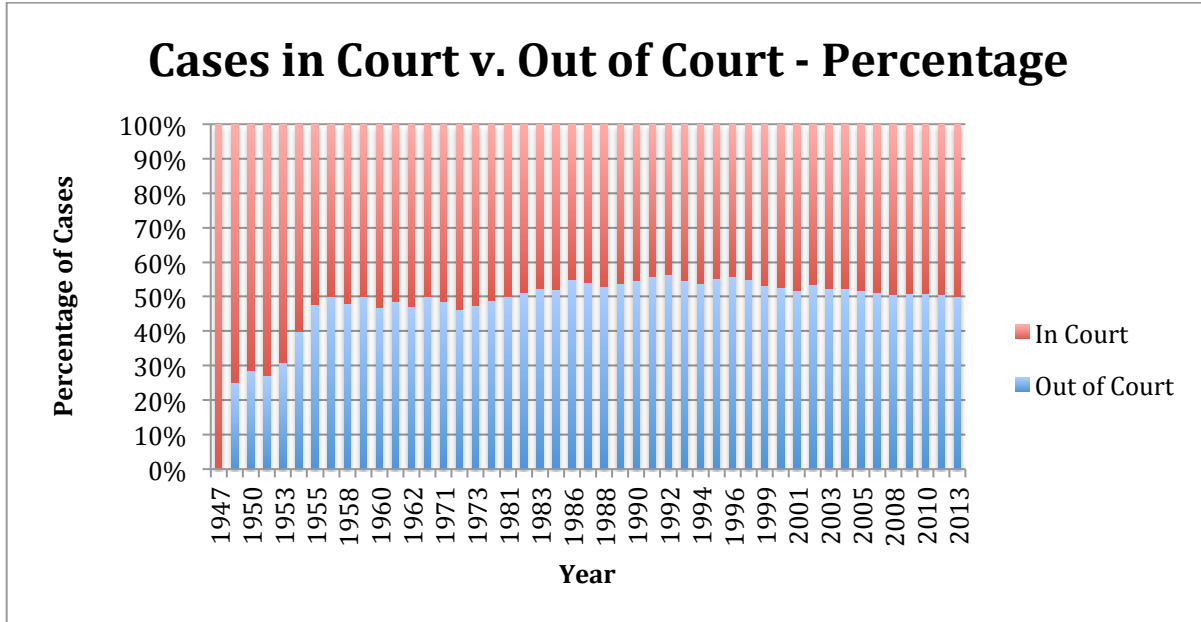


Figure 8: Cases Settled In Court v Out of Court - Percentage

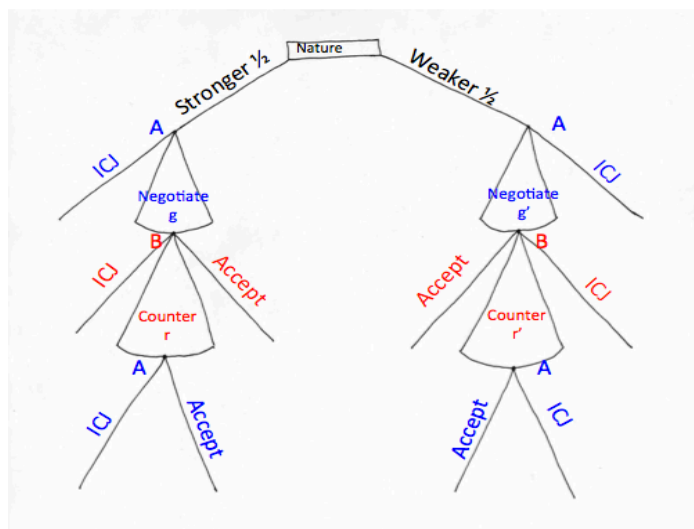


Unfortunately, while this may be characterized as a successful negotiation, in if of itself, the negotiation is happening in a new game. Once the case is sent to the ICJ, the state being brought before the court faces a new game with the state bringing them to the court. This game is centered on figuring out how to handle the legal case, as opposed to the dispute itself. This situation is much more synonymous to attorneys figuring out the best course of action when presented with a case, with the options being seeing the case through the court system, or negotiating an out of court settlement. While one could potentially combine this phenomena with the game analyzed in this paper, in order to create a more elaborate model, it would not be accurate to the situation. Since these cases are now in a new environment, and a new game, they deserve their own model. For this reason, an assumption will be made that the move of ICJ is a game-ending move, for the game crafted in this paper. The situation may be analyzed on its own, but that analysis will be beyond the scope of this paper.

It is also important to keep in mind that states do have stronger or weaker standings on the merits of the issue, as was depicted through the analysis of the ICJ rulings in Figure 1. While a state may have a split merit issue on the case as a whole, this is often quantified through one state having the stronger legal claim to half of the questions presented before the court and the weaker legal claim to the other half of the questions. While the case may as a whole be a split merit case, the individual questions often have one party as the stronger party and the other as the weaker party. For this reason, the next assumption in the crafting of the model will be that the SOW can either have player 1 be STRONGER or WEAKER. A classification of the SOW is in reference to player one, or State A. STRONGER means that State A has the stronger legal claim, and State B has the weaker legal claim. WEAKER means that State A has the weaker legal claim and State B has the stronger legal claim. The final assumption related to the crafting of the model is that each SOW has an equal probability. This is again for simplicity purposes; this probability distribution could of course be adjusted, thereby adjusting the possible solutions for the game but, for this paper, the probabilities will remain $\frac{1}{2}$ for SOW Stronger and $\frac{1}{2}$ for SOW Weaker.

The resulting game, without the payoffs, would look like the image depicted in Figure 9.

Figure 9: Model without payoffs



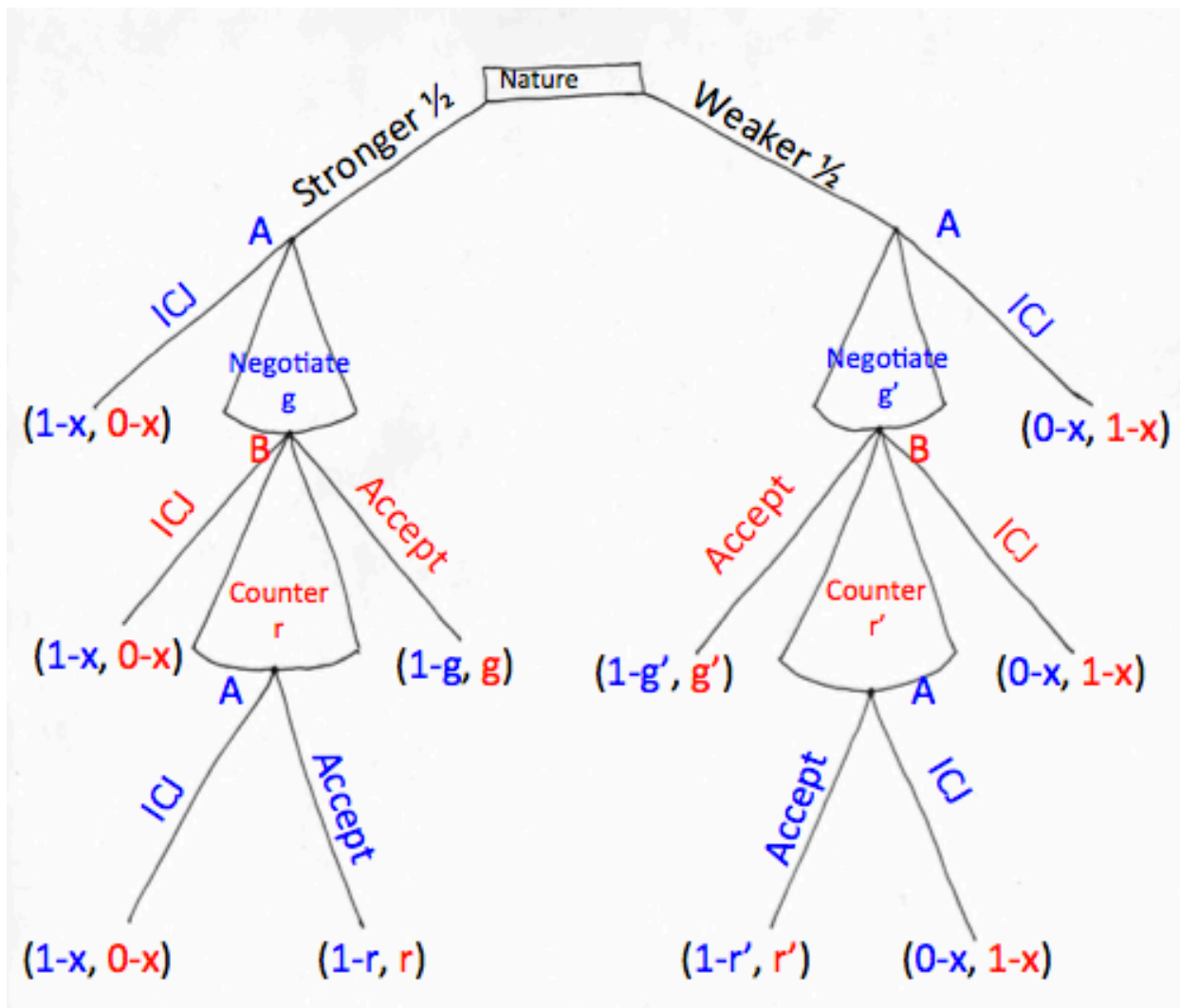
Building the Payoffs:

Each of the ending nodes in Figure 8 require some sort of payoff for State A and State B. Building a payoff matrix also begins with a series of assumptions. The first of these assumptions is that the highest possible payoff is 1, or the entire value of the topic of the dispute. The lowest payoff, not taking into account costs of differing actions, is 0. Theoretically, any split between the two parties is feasible. For territorial disputes, this means potentially splitting this disputed territory, this could be a 50-50 split, a 10-90 split, a 0-100 split, ultimately yielding a continuous range from 0 to 1.

The next assumption is that while there may be some cost of negotiation, this model assumes that this cost is negligible. Therefore, negotiation costs will not factor into this game. Another assumption would be in relation to the cost of going to the ICJ. This could be financial costs of paying the lawyers, political costs of this move affecting relationships with other states, or a combination of the two. In this game, all associated costs of the ICJ will be encompassed in the variable x .

The complete working model would look like the image depicted below in Figure 10. It is important to note that this is the baseline model, on which the other models will be based. Modified versions of this model will include information sets as well as signals in relation to the SOW.

Figure 10: Complete Working Model



Solving the Model:

When solving the model, it is important to note that this game is no longer solved through a simple Nash Equilibrium. Instead it employs the Sequential, or Assessment, Equilibrium, in conjunction with Bayesian Equilibrium. The Sequential, or Assessment, Equilibrium is a refinement of the Nash Equilibrium for extensive form games, incorporating an assessment pair (s, μ) where s is a profile of behavioral strategies, and μ is a profile of beliefs, with an assessment pair for each information set in the game. An information set is similar to the

information set described in the Beer-Quiche game, it is where a player knows it is their turn but does not know which decision node they are in. While a player can distinguish between separate information sets, they cannot distinguish between decision nodes within a set. The assessment equilibrium must further satisfy two conditions to be an equilibrium. The first condition is that the strategy profile, s , must require that each player optimize at each information set, given the beliefs assigned to the information set by the belief profile μ (Binmore, 2007). The second condition is the belief profile, μ , must be obtained through Bayesian updating on the assumption that players have used the strategy profile s (Binmore, 2007). Bayesian updating requires that belief updates are confirmed by the output path. Ultimately, a Perfect Bayesian equilibrium is an assessment equilibrium where strategies are sensible given beliefs and beliefs are confirmed by the output path (Binmore, 2007).

It is also important to keep in mind that the model depicted in Figure 9 is modifiable into 4 distinct types of games: a complete information game, an incomplete information game, a no information game, and a partial information game.

I. Complete Information Game

Perfect information is where both players know which SOW the game is operating in, what the available moves for each player are, and the subsequent payoffs for each player in each pair of strategic choices. The model for the perfect information game is depicted in Figure 10. There are subsequently two resulting equilibriums in this game, one for SOW Stronger and one for SOW Weaker. The strategy for the SOW Stronger is $g=r=x$. State A would NEGOTIATE with the offer, $g=x$, state B would subsequently ACCEPT. The resulting equilibrium payoff would be $(1-x, x)$. If state A were to ever to offer anything where $g < x$, state B would counter. If state B

were to ever counter, state A would accept so long as $r \leq x$, if $r > x$, then state A would go to the ICJ.

This has a lot to do with what the players can guarantee themselves in the game. Since state A can guarantee itself a payoff of $1-x$, in SOW S, by going to the ICJ, state A would never accept anything less than that through negotiations. Although, given that this is a game of perfect information, State B is also aware of the fact that State A can only guarantee itself $1-x$ by enforcing its stronger case through the ICJ, sue to associated costs. State A is therefore subject to a last mover disadvantage and fails to be able to capture any of the surplus of negotiations.

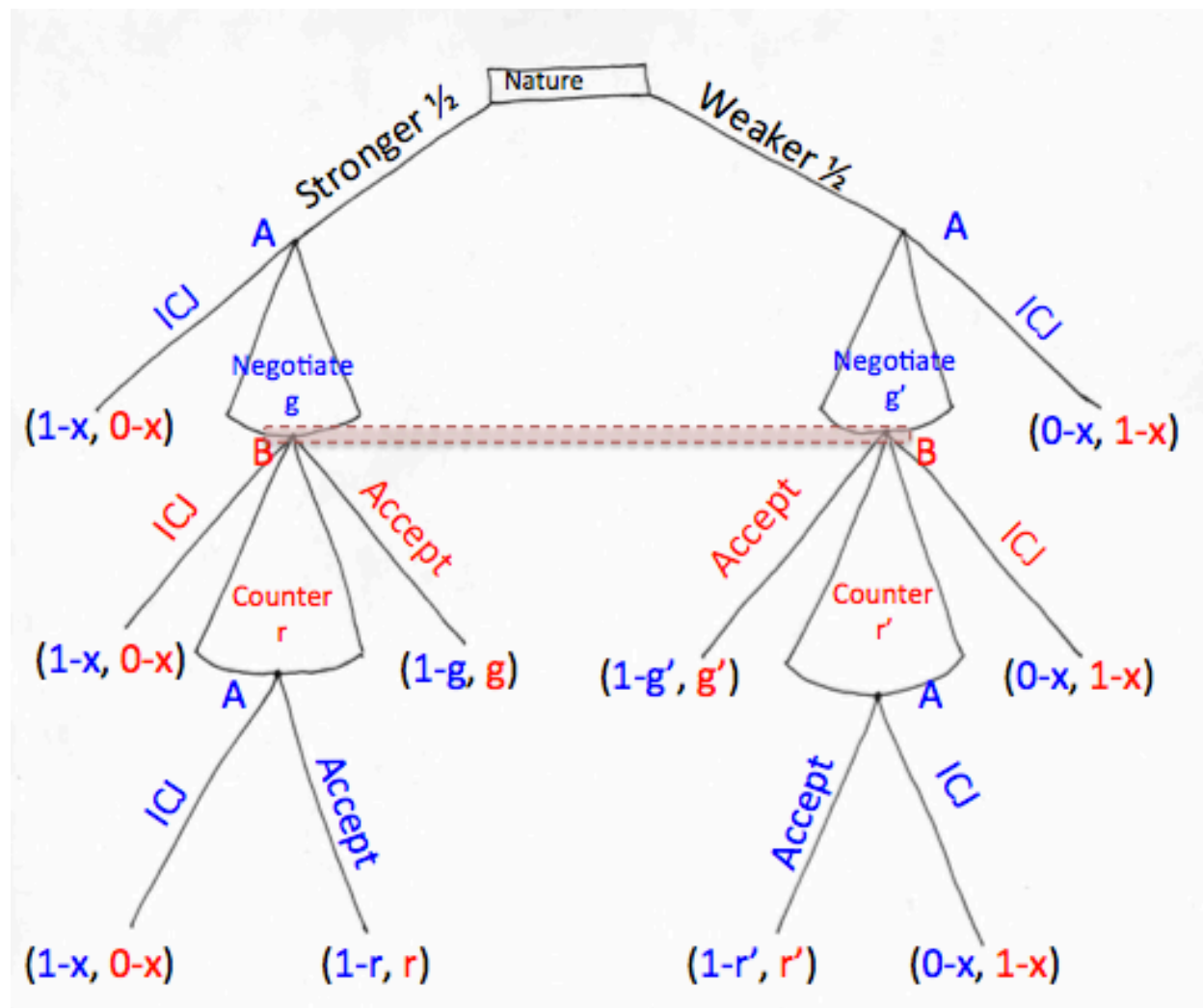
The equilibrium in SOW Weaker would operate under a strategy of $g^*=r^*=1$. State A would negotiate with $g^*=1$. State B would subsequently accept. If state A ever offers anything less than 1, state B would counter with $r^*=1$, and state A would accept. This is due to the fact that when State A is the weaker party, and is faced with its final decision of ACCEPT or ICJ, the ICJ option ends with a negative payoff. Knowing this, State B is able to expropriate the saving from avoiding the ICJ. The resulting payoffs are $(0,1)$. In this SOW, the most state A can guarantee itself is $0-x$, so state A would be better off through negotiations, even if they walk away with nothing.

II. Incomplete Information Game

The incomplete information game exists when one player knows the SOW and the other does not. Figure 11, depicted below, models such a game, where State A happens to be the player who knows the SOW, while State B does not. It is worthwhile to note that because State B's move is contingent on State A's offer, State B, in fact, has infinitely many information sets, now for each possible offer State A may give. Therefore, State B's strategy must technically be specified for

every possible offer State A could give. For simplicity purposes, the discussion below will focus in on the exact offer and associated response of State A and State B respectively.

Figure 11: Incomplete Information Game



This game should theoretically have two types of equilibria, an informative equilibrium and an uninformative equilibrium. The uninformative equilibrium reveals no information in the game. State B will never learn anything about State A's type, even once the game has ended. The uninformative equilibrium in this game calls for State A to offer $g=g'=1/2 - x/2$. Player 2 would accept that offer but counter with $r=r'=1$ with any other offer. Player A, if presented with

such a counter offer, would accept when in SOW W and go to the ICJ in SOW S. In the equilibrium, the parties should never go to the ICJ, unless State A ever deviates from the equilibrium strategy of offering $g=g'=1/2 - x/2$.

An informative equilibrium, on the other hand, would serve to reveal some information to State B. An example of an informative equilibrium would be the equilibrium discussed above in the Beer-Quiche game. By the end of that game, player 2 knew the type of player one in at least some of the outcomes. Finding equilibria in games like this is not simply a matter of following an algorithm, and can prove to be very challenging. This paper is unable to offer an informative equilibrium, and it is possible that there does not exist one in this particular game.

At the same time, it is possible to make some statements about the likelihood and nature of an informative equilibrium. First, for State B, the strategy ICJ is weakly dominated by proposing a counter offer of $r=1$. In SOW W, State A would ACCEPT this counter offer, yielding State B a higher payoff than the ICJ. In SOW S, State A would choose ICJ rather than ACCEPT, but this would still leave State B with a similar payoff structure as expected from choosing ICJ. Therefore, we can conclude that State B will never choose ICJ in equilibrium. In this game, if anyone does choose to take a case to the ICJ, it will be the better-informed party.

Second, there does not exist an equilibrium like in the Beer-Quiche game, in which State A would choose to offer a low share to State B in SOW S, and then mix between a low offer and a high offer in SOW W. To see this, note that player B would not have to employ a mixed strategy in order to keep State A indifferent between the low offer and the high offer in SOW W. Because the ICJ is weakly dominated, State B would mix between ACCEPT and some positive COUNTER offer. The high offer would have to be 1, because that offer would reveal to B that the SOW is W, and so B would only accept 1. That would mean a payoff of 0 for State A. But,

the low offer, with B mixing between ACCEPT and COUNTER, would yield a positive payoff to State A, which means that State A would never mix between a high offer and a low offer.

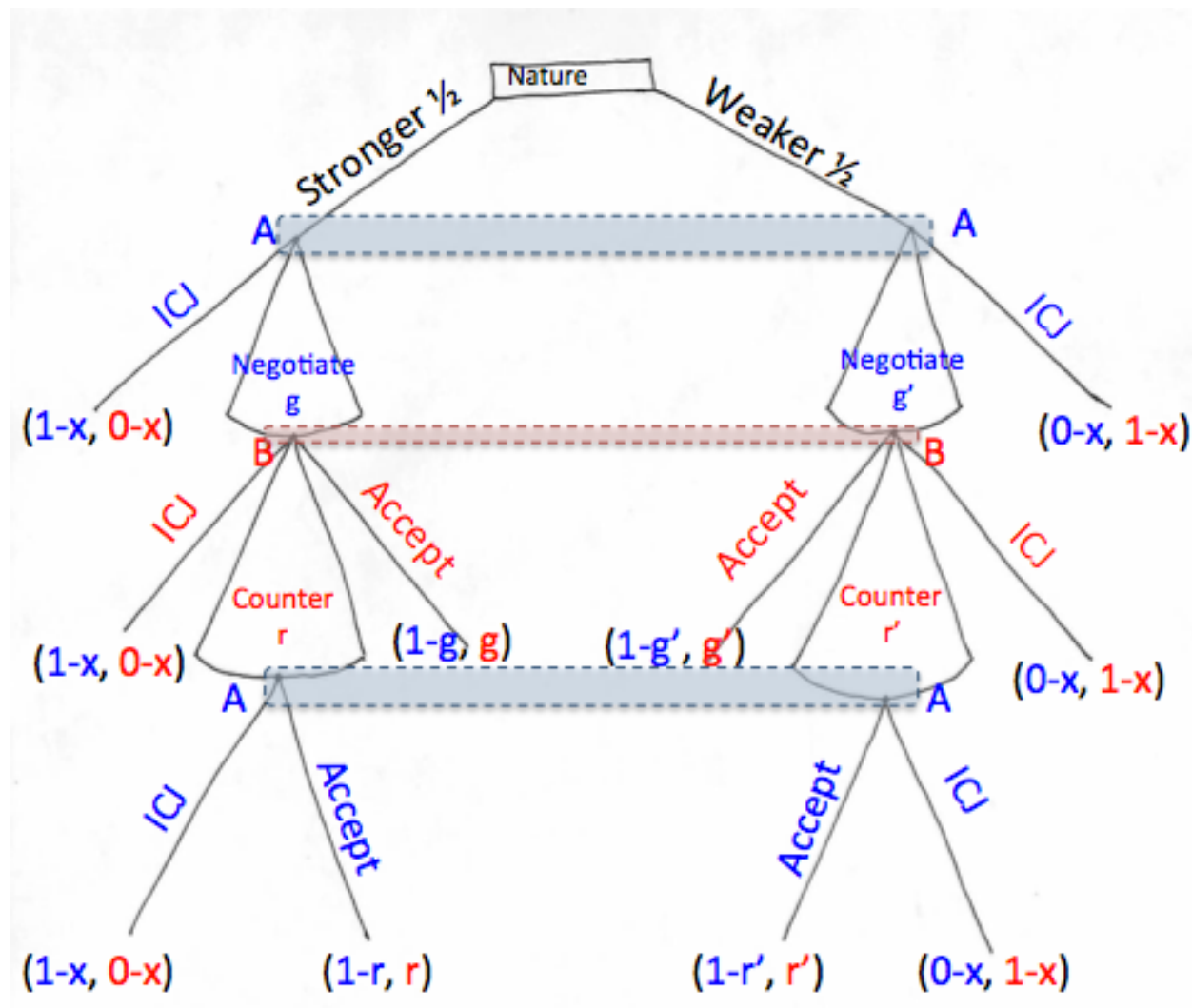
While the search for an informative equilibrium for this particular formulation (and especially this particular payoff structure) of this game does not seem promising, there are results in the literature that allow us to draw broad conclusions about this type of game. Jeffery S Banks, in *Equilibrium Behavior in Crisis Bargaining Games*, sets up a very similar game as to the one presented in figure 11 above. Although Banks does not specify the details of the game, only the general structure, he does prove certain results about the equilibria of this type of game. The one distinct difference between Banks' game and the one presented above is the option available to states outside of negotiation. In Banks' game, states can either negotiate or go to war, as opposed to negotiate or go to the ICJ. Otherwise, the game is actually very similar, including the imperfect information component. Ultimately, Banks' results are also applicable to the type of game presented in this paper.

The first characteristic is that the probability of going to the ICJ cannot decrease as the expected utility for State A, for going to the ICJ, increases. This follows from the idea that in any Bayesian equilibrium, for Banks' game, the probability of war cannot decrease as country 1's expected utility for war increases (McCarty and Meirowitz, 2007). The second characteristic is that State A must do at least as well in bargaining as it would going to the ICJ, in accordance with its probability and utility for the ICJ. This follows from the idea that country 1 must do at least as well in bargaining as its utility for war improves, suggesting that higher types get better bargaining outcomes but incur greater risk for war (McCarty and Meirowitz, 2007). Higher types, for the game presented in figure 10, is synonymous to a state's strength on the merit of the issue, while war is replaced with ICJ.

III. No Information Game

The third type of game, depicted below in Figure 12, would be that of no information, where neither player would know the state of the world.

Figure 12: No Information game



This is where the probability distribution of the SOW comes into play. The version of the game analyzed in this paper assumes that SOW S and SOW W are equally likely but, this probability distribution could very well be anything else where probability of SOW s is p and probability of SOW W is $1-p$. In the version depicted in figure 12, the expected payoff for going to the ICJ, for both state A and state B is $0.5-x$. This is calculated by multiplying the probability

of a move with its associated payoff in each SOW and finding the sum, $((1/2)(1-x)) + ((1/2)(0-x))$. This is the most either player can guarantee themselves. The resulting strategy would be $g=r=g'=r'$. The resulting payoff, obtained through negotiations would be $(0.5-x, 0.5+x)$. The expected payoff from going to the ICJ would be $(0.5-x, 0.5-x)$. Since the most State A can guarantee itself, by going to the ICJ, is $0.5-x$, State B can take advantage of State A's final mover disadvantage and capture essentially all of the surplus created in negotiations, much like in the equilibrium for SOW S in the full information game presented earlier. Any deviation from this strategy, that leaves either player with a potential payoff less than $0.5-x$, would result in a move for the ICJ by said party.

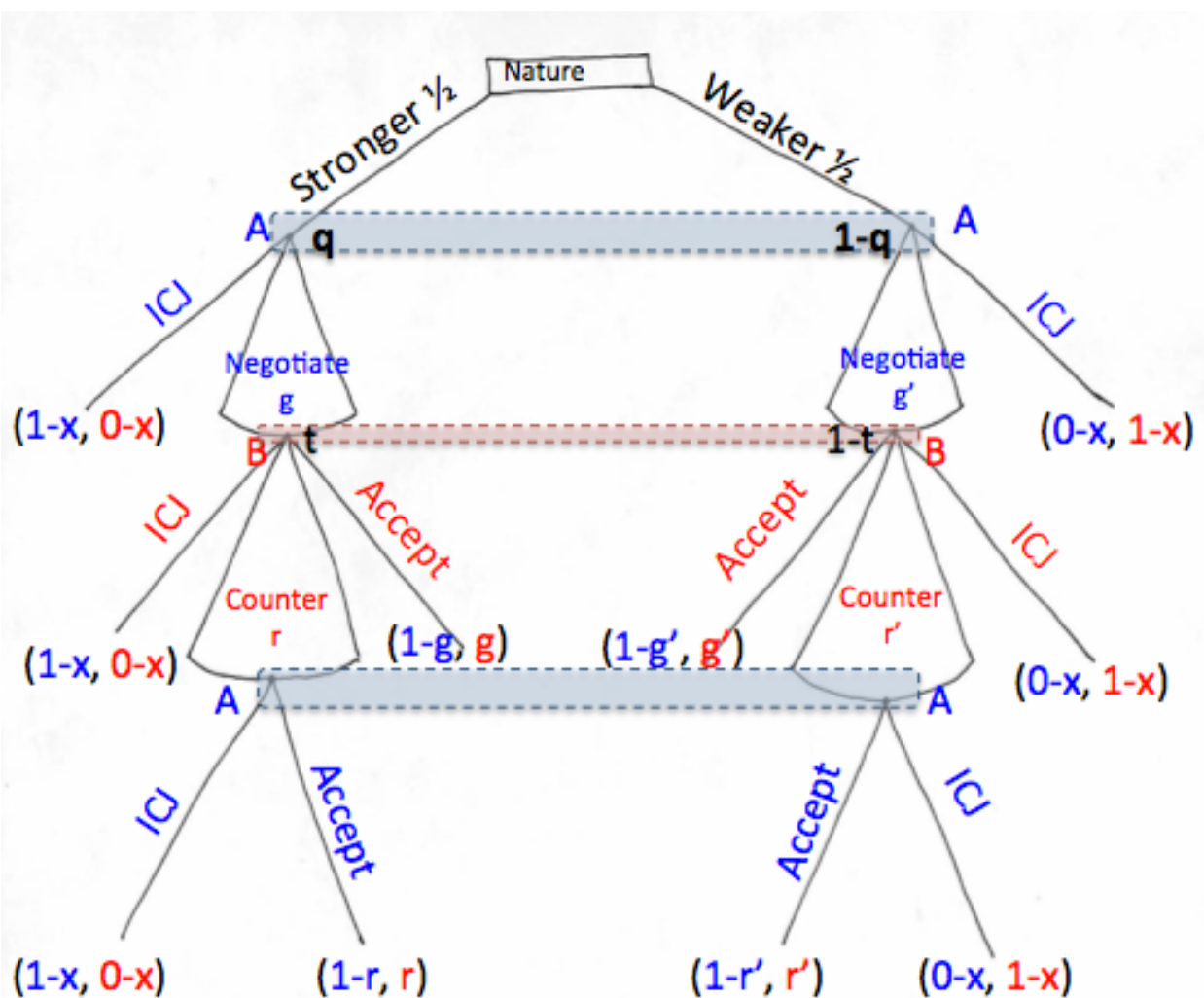
IV. Partial Information Game

The partial information game would be the version in which both players have some information on the SOW, but not the full, or potentially even accurate, information. Information, in this game is given through signals. These signals are quite different from the signals presented in the Beer-Quiche game. In the Beer-Quiche game, the party with full information gives the signal, to the less informed party. In the partial information game, depicted below in figure 12, each state receives its own independent signal, from nature.

This signal is represented by each state's belief about the probability of being in one particular node within the information set as opposed to the other. The probability could theoretically be 0 for SOW S and 1 for SOW W, if a state received the signal W from nature. What this type of distribution means is that the player has full faith in the signal it receives. Alternatively, a player could have a probability distribution of 0.4 for SOW S and 0.6 for SOW W, given the very same signal. This would highlight the fact that the player does not have full

faith in the signal but does view it as informative, to a degree. In the version of the game depicted below, the probabilities are represented as variables, q and $1-q$ for State A, and t , $1-t$ for State A. The exact values would be dependent on the signal received in the game, and the player's faith in that signal's accuracy.

Figure 13: Partial Information Game



Overall, there are eight possible signal combinations, which are depicted below in Table

1.

Table 1: Partial Information Game Signal Combinations

True SOW	State A's Signal	State B's Signal
S	S	S
S	S	W
S	W	W
S	W	S
W	S	S
W	S	W
W	W	W
W	W	S

Finding equilibria under this information structure could be the subject of future research. However, there are some characteristics that are quite a bit obvious that are revealed in this game. Ideally, if both state's receive the same signal, and have similar beliefs as to its accuracy, the states should be able to reach an agreement through negotiations, especially if the belief is that the signal is completely accurate, as there would be no reason for either party to doubt the signal. This would cause the players to operate under similar conditions as the full information game. Theoretically, this could happen even in situations where both states receive the signal that the SOW is S, while the true SOW happens to be W, or vice-versa.

Another characteristic that is evident is that players should only opt to go to the ICJ when their beliefs are diametrically opposed. One possible situation for this is when State A receives a

signal that the SOW is S, and believes that the signal is completely accurate, and State B receives a signal that the SOW is W, and believes that the signal is completely accurate. In this situation, each player would have a different idea of what they can guarantee themselves in the game, making the set of viable negotiations an empty set. Therefore, going to the ICJ would be the only viable option for either party, since neither would be willing to accept anything less than $1-x$. However, at this point, these are simply speculations, as they are not based on actual proven equilibria.

Implications of Results:

Ultimately what the solutions of the above games shows is that there is a last mover disadvantage. The second to last mover can gain any surplus that may be created in negotiations by virtue of being able to counter with such an offer, making the final mover either equally as well off in negotiations as they would be by going to the ICJ, or potentially even better off. In the no information game, while the equilibrium payoffs may be $(0.5-x, 0.5+x)$, State A is ultimately indifferent between going to the ICJ and negotiating, while State B prefers negotiations over going to the ICJ. Therefore, in reality, what may happen, is State B may forfeit part of its surplus, a portion of that x value, in order to incentivize player A to negotiate as opposed to go to the ICJ.

Furthermore, going to the ICJ, according to the model, is a very rare occurrence, which is an implication that fits with reality rather well. While there are no quantifiable statistics on what percentage of viable cases are solved through the ICJ, it is widely known that this is a relatively small number. When looking at extradition issues in the US alone, there are upwards of 700 issues a year, yet there are fewer than 120 cases to ever be taken through the ICJ since its

inception. In fact, a number of the cases applied to the court were brought because the two parties had a disagreement on the standing legal precedent. The two potential precedents gave the two states different signals as to the SOW, creating a situation very similar to that of the partial information game. Needless to say, going to the ICJ is a very rare occurrence, not only based on the model, but in reality more generally.

Theoretically, the only situations in which states should opt to go to the ICJ are instances of opposing or contradictory information in the hands of the two parties, or instances where a state deviates from the equilibrium strategy in a way that puts the other state in a worse position. It is important to note that the idea that states should go to the ICJ when presented with diametrically opposed beliefs is still simply a theory, which remains to be proven through the formulation of an exact equilibrium to that effect. Though, it is shown, based on the equilibria presented above, that if a state would deviate from the equilibrium strategy, in either the complete information, incomplete information, or no information game, then a move to the ICJ is completely justified. Realistically, this happens when states fail to compromise and negotiate, even when presented with the legal precedent and full information on the reality of their situation in term of legal merit.

Conclusion:

Overall this paper has done two things. The first is the analysis of ICJ cases through the creation of a political science inspired scale rating, in order to determine the nature of the shift in thinking on the legitimacy of the court. Second, this paper crafted a working model of International Justice disputes that are viable contentious cases for the ICJ, and posed solutions for two of the four versions of the model, the full information and the no information game. In

the incomplete information game, the non-informative equilibrium is discussed, as well as characteristics that should be evident in the informative equilibrium. For the final version of the game, the partial information game, the characteristics that must be evident in equilibrium are discussed.

What remains to be done is finding the informative equilibrium for the incomplete information game, as well as finding the equilibrium, or equilibria, for the partial information game. The working game could also be modified in order to be more specific to certain types of issues, or expanded in order to incorporate disputes that would result in a move to WALK AWAY or pursue CONFLICT. Alternatively, a model could also be crafted in order to analyze what happens once a state make the decision to go to the ICJ. Needless to say, there is still work to be done, but it is important to keep in mind that significant progress has also been made here.

Works Cited:

- Alter, Karen J. and Helfer, Laurence R. Nature or Nurture? Judicial Lawmaking in the European Court of Justice and the Andean Tribunal of Justice (2010). *International Organization*, 64, pp 563-592. Web. doi:10.1017/S0020818310000238.
- Banks, Jeffrey S. "Equilibrium Behavior in Crisis Bargaining Games". *American Journal of Political Science* 34.3 (1990): 599-614. Web. 06 May 2016.
- Binmore, K. G. *Playing for Real: A Text on Game Theory*. Oxford: Oxford UP, 2007. Print.
- Coplin, William D. and Rochester, J. Martin. *The Permanent Court of International Justice, the International Court of Justice, the League of Nations, and the United Nations: A Comparative Empirical Survey* (1972). *American Political Science Review*, 66, pp 529-550. Web. doi:10.2307/1957797.
- "Court of Justice of the Andean Community." International Justice Resource Center. N.p., 05 Sept. 2012. Web. 14 Mar. 2016. <<http://www.ijrcenter.org/regional-communities/court-of-justice-of-the-andean-community/>>.
- Goldsmith, Jack L., and Eric A. Posner. *The Limits of International Law*. Oxford: Oxford UP, (2005). Print.
- ICJ Website - <http://www.icj-cij.org/court/index.php?p1=1>
- Llamzon, A. P. "Jurisdiction and Compliance in Recent Decisions of the International Court of Justice." *European Journal of International Law* 18.5 (2007): 815-52. Web.
- McCarty, Nolan M., and Adam Meirowitz. "Chapter 10 Bargaining Theory." *Political Game Theory: An Introduction* (2007). New York: Cambridge UP. 275-319. Print.
- Putnam, Robert D. *Diplomacy and domestic politics: the logic of two-level games* (1988). *International Organization*, 42, pp 427-460. Web. doi:10.1017/S0020818300027697.

Jack L. Goldsmith and Eric A. Posner, *The Limits of International Law* (2005), Oxford University Press.

Jones, Heather L., *Why Comply? An Analysis of Trends in Compliance with Judgments of the International Court of Justice Since Nicaragua* (2012). 12 *Chi.-Kent J. Int'l & Comp. L.* Web.

Rosenne, Shabtai. *The International Court of Justice: An Essay in Political and Legal Theory*. Leyden (1957): A.W. Sijthoff. Print.

Signorino, C. S.. *Strategic Interaction and the Statistical Analysis of International Conflict* (1999). *The American Political Science Review*, 93(2), 279–297. Web.
<http://doi.org/10.2307/2585396>