WHAT MAKES SOME BOUNDARY DISPUTES IMPORTANT?
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INTRODUCTION

Why does the international community view some boundary disputes as more important than others? It is not simply the size of the area at issue or the antagonism of the claimants, though these aspects are important. Boundary and sovereignty disputes, including separatist claims, vary in scale, severity, and history. However, there are common elements that they share in varying degrees.

As a framework for analysis, a mathematical modelling technique, the Analytic Hierarchy Process (AHP), was borrowed and adapted to examine the various dimensions of boundary and sovereignty disputes and rank them. North American, Western European and Israeli disputes were excluded from the analysis in order to highlight 'lesser known' quarrels. The results are subjective, but transparent. They depend upon the perceptions and knowledge of the person who 'grades' the disputes according to various criteria and who estimates the relationships between various attributes and factors. However, the AHP makes these assumptions and decisions explicit. The results seem consistent with perception.

Boundary and sovereignty disputes, including separatist claims, vary in scale, severity, and history. However, there are common elements that they share in varying degrees.

Each dispute is evaluated for 'prominence' by examining intensifying factors, the magnitude of the dispute, and the nature of the dispute. Disputes are intensified by ethnic conflict, recent violence, historic animosity, weakness of the claimant governments who may be unable to control activities on their frontiers or who may be unwilling to take unpopular initiatives to resolve disputes, and third-party involvement. The magnitude of a dispute is associated with: the size of the area involved; the number of inhabitants at risk; the resources of the area; whether the area provides access to trade or invasion routes; and the number of people killed in the dispute. The nature of the dispute is related to: whether the argument is over land or maritime jurisdiction; the number of claimants; the legal framework of the dispute; the status of negotiations or arbitration; and the type of dispute.

The prominence of a given dispute is then combined with an index of national interest to indicate how a given country would view a dispute among other nations. Since the author has some experience with United States foreign policy, the US was used as the basis for depicting this aspect of the analysis.[1] In determining the international community's view of a given boundary dispute, one would generate values for various international actors and produce a composite index. Such an undertaking is beyond the scope of this analysis, but could be a product of an international conference.

AHP METHOD

This analysis applies a method developed by Thomas L. Saaty and others to the problem of ranking boundary and sovereignty disputes.[2] Sovereignty or boundary disputes are unique, but they share common characteristics that allow them to be compared. The Analytic Hierarchy Process offers a rigorous analytic approach that compares many qualitative and quantitative aspects of the disputes and provides for transparency and self-correction in its application.

Essentially, each dispute is graded on 22 variables (attributes), which are divided into four groups. The scores are combined for each group (factor). An overall score is then calculated and used to rank all the disputes.

AHP postulates a hierarchy for policy analysis. It has been applied to consumer purchases, the future of higher education, allocating resources for commercial power generation, and regional seas management.[3] In this instance, the hierarchy descends

from an overarching focus on ranking the disputes, through four primary factors, to groups of attributes that elaborate these factors. Each of the attributes is defined by a set of criteria against which the individual boundary or sovereignty dispute is 'graded.' Within a level, each component should be independent of other components (*orthogonal* in mathematical parlance). Each upper level of the hierarchy gives weight to elements in the next lower level. The composite *eigenvalues* (characteristic values) are matrix products.

> The AHP technique uses a pair-wise comparison among a set of elements in a given level to arrive at these weights. Two elements are scored with respect to their mutual importance to an element in the next higher level of the hierarchy. The comparison is qualitative: are they equally important, or is the first element *weakly* more important, *strongly* more important, *very strongly* more important, or *absolutely* more important that the other? Based on these questions, a matrix of values from 1 (equally important) to 9 (the first is absolutely more important) is generated, with inverse (fractional) values for the converse pairing.

The general priority of the set is the principal eigenvector produced from the comparison matrix. The overall scheme or hierarchy for ranking the boundary or sovereignty disputes is elaborated in Appendix A. It shows each level and its elements. For example, the intensifying factors in a boundary dispute were identified as ethnic/religious conflict, recent violence, historic animosity, weakness of the central government and third party involvement. The author evaluated each pair of components with respect to their effect in intensifying a dispute (Table 1). For example, recent violence was judged to be much more important than a weak government in intensifying a dispute. Third party involvement was estimated to be more important than animosity in intensifying a dispute, but less important than recent violence.

The resultant eigenvalues for the matrix suggest that recent violence is the most important factor in intensifying a dispute, followed by ethnic conflict and third-party involvement. A weak central government of one or both claimants was judged least important among the intensifying factors.

TABLE 1: Comparison Matrix for Intensifying Factors in Boundary Disputes

	Ethnic	Violence	Animosity	Weak Gov.	3rd Party	Eigenvalue
Ethnic Conflict	1.00	1.00	3.00	5.00	1.00	0.2573
Recent Violence	1.00	1.00	5.00	7.00	3.00	0.3906
Historic Animosity	0.33	0.20	1.00	3.00	0.20	0.0826
Weak Central Government	0.20	0.14	0.33	1.00	0.33	0.0486
Third-party Involvement	1.00	0.33	5.00	3.00	1.00	0.2209

The eigenvalues were generated by consecutive matrix multiplication until the matrix was raised to the eighth power. The matrix values were also checked for mathematical consistence (if A>B and B>C, is A>C?) by calculating a consistency ration, which should be less than 0.10. Similar comparison matrices were produced for each of the components at each level.

The lowest level of the hierarchy used comparison matrices to estimate grades or scores for criteria relevant to each attribute. For instance, Table 2 compared various levels of ethnic or religious differences with respect to ethnic conflict. This matrix has a consistency ration of 0.037. The author's assumptions suggest that a dispute between claimants with both ethnic and religious differences is twice a likely to

intensify a dispute than is the case where claimants differ in ethnic makeup, but not religion.

By itself, ethnic differences were judged slightly more likely to contribute to the intensity of a dispute than religious differences. A dispute that involved both ethnic and religions differences would be awarded a score of 0.5273. This score is then multiplied by the weight of 0.2573 for ethnic conflict in Table 1 to give its contribution (0.1357) to the combined intensifying factor score, which would also include scores for recent violence, historic animosity, etc. This scoring and combining is carried upward through the hierarchy to arrive at a composite score for a given boundary dispute.

TABLE 2: Ethnic Conflict Criteria

ETHNIC CONFLICT	Ethnic & Religious	Ethnic	Religious	Little Difference	Eigenvalue
Ethnic & religious differences	1.00	3.00	3.00	7.00	0.5273
Ethnic differences	0.33	1.00	2.00	5.00	0.2517
Religious differences	0.33	0.50	1.00	4.00	0.1670
Little ethnic or religious differences	0.14	0.20	0.25	1.00	0.0540

ALTERNATIVE GEOMETRIC EXPLANATION

An alternative and equally valid description of the AHP is geometric. Imagine that each of the boundary disputes is an arrow (vector) in a multi-dimensional 'policy space.' A dispute may measure x-number of units in economic importance, y-number of units in historic animosity, etc. The Analytic Hierarchy Process seeks to standardise the units of all the dimensions and find a common reference frame for describing the characteristic lengths of these disputes in terms of intensifying factors, magnitude, and the nature of the dispute. Some combination of these three dimensions is estimated to be the direction of maximum interest to US policy makers. The dispute whose vector is longest in this direction ranks first, the second longest ranks second, and so forth, in the composite score.

INTENSIFYING FACTORS

Forty-two boundary and sovereignty disputes have been analysed using primary factors of prominence and U.S. national interest. Prominence was further broken down into intensity, magnitude, and nature of the dispute. Each dispute was scored for various criteria using a variation of the Analytic Hierarchy Process.

Among factors that intensify a given boundary or sovereignty dispute, recent violence was judged to be the most important factor, with a score of 0.3906, followed by ethnic conflict (0.2573), third-party involvement (0.2209), historic animosity (0.0826), and weak government (0.0486). The results for intensifying factors are given in Appendix B. Note that at each level, the sum of the eigenvalues equals one.

In terms of intensity, the top ten boundary disputes were judged to be:

- Armenia-Azerbaijan (Nagorno-Karabakh)
- Iran-Iraq-Turkey (Kurdistan)
- Georgia (Abkhazia)
- Moldova (Dniester)
- Iran-United Arab Emirates (Abu Musa and Tunb islands)
- India-Pakistan (Kashmir)
- Caspian Sea maritime boundaries

- Japan-Russia (Kuril Islands/Northern Territories)
- China-India (Aksai Chin and Arunachal Pradesh)
- Burma-Thailand

The dispute between Armenia and Azerbaijan over Nagorno-Karabakh ranked highly in all the intensifying factors, as did the stateless nation issue of Kurdistan among Iran, Iraq, and Turkey. The separatist Abkhazia issue in Georgia was high in overall score, because of recent violence, ethnic differences, weak central government, and third-party involvement. Moldova's issue with separatist Dniester had similar scores except for third-party involvement. The land and maritime dispute between Burma and Thailand made the top-ten list, because it combined ethnic differences with armed clashes and significant historic animosity.

MAGNITUDE OF A DISPUTE

Perhaps the easiest measure of a boundary or sovereignty dispute is its magnitude. This measure was assumed to include the amount of area at issue, the number of inhabitants in that area, the resources in contention, invasion or trade routes through the area, and the number of people killed in the dispute. Each of these measures was subdivided (see Appendix A). That is, a disputed area of more than one million square kilometres was assumed significantly more important than an area of less than one thousand square kilometres. However, even a small area or one with few people can hold an inordinate importance for claimants, so the measure is not strictly proportional. The hierarchy gives relatively greater weight to smaller territories or fewer people. The amount of area, number of inhabitants, and number killed were roughly scaled logarithmically. It would be possible to incorporate the precise area and population values into the matrix using appropriate mathematical transformations, but given the uncertainty in such numbers approximate values seemed sufficient for generating the overall magnitude scores.

For resources and access, a more subjective scoring was used. On average, an area with oil or gas potential was assumed to be more significant that one with water or fish or other mineral resources. Similarly, a disputed area that had been used as an invasion route against one of the claimants was judged to be more significant (strategic) than an area that provided access to the sea or other trade routes. When each of the magnitude factors was compared, pair-wise, with respect to the overall prominence of a dispute, the number of people killed in the conflict received the largest weight (0.4162). The amount of area, number of inhabitants, and resources were given approximately equal weight (Appendix C). Disputed areas that provided access were given the least weight with respect to the overall magnitude of a dispute. Judged just by their magnitude, under this rubric, the top ten boundary or sovereignty disputes were:

- India-Pakistan (Kashmir)
- Iran-Iraq-Turkey (Kurdistan)
- Armenia-Azerbaijan (Nagorno-Karabakh)
- Egypt-Sudan
- Iran-United Arab Emirates (Abu Musa and Tunb islands)
- Georgia (Abkhazia)
- Russia-Ukraine (land and maritime)
- China-India (Aksai Chin and Arunachal Pradesh)
- Cameroon-Nigeria (Bakassi Peninsula and maritime)
- China-Vietnam (Gulf of Tonkin)

The large disputed areas with significant populations ranked high: Kashmir, Kurds, Nagorno-Karabakh, and Abkhazia. The Halaib Triangle disputed between Egypt and Sudan was fourth, because the area is large and the resource potential, especially offshore, may be significant. Resource potential similarly elevated the Iran-UAE,

Russia-Ukraine, and Cameroon-Nigeria disputes. The Gulf of Tonkin dispute involves a large maritime area and significant offshore hydrocarbon potential.

NATURE OF THE DISPUTE

The hierarchy for the nature of the dispute attempts to capture aspects of the formal status of the disagreement relating to the difficulty of resolution: whether it is offshore or on land, the number of claimants, the legal basis for the dispute, the status of any negotiations, and the type of dispute. The last dimension distinguishes among sovereignty and boundary disputes that include significant areas of land or islands, long boundary disputes that do not relate specifically to distinct geographic regions, separatist or irredentist problems, and arguments about the alignment of a generally recognised boundary. Disputes over land and maritime zones are assumed more significant, in general, than land disputes. Maritime jurisdictional disputes are considered the least significant in this category. Among types of disputes, those that combine sovereignty and boundary dimensions are considered more severe than disputes over a long boundary. Alignment disputes are judged the least significant. The nature of a dispute clearly grows more complex as the number of claimants increases. A separatist movement is equated to one claimant.

The matrices for the legal basis of a dispute and the one for negotiations/ adjudications are examples of inverse relationships. That is, they try to measure retarding influences on the disputes. A low value is a good thing; a high score implies a complex, difficult situation. Under the legal basis of a dispute, one to which no relevant treaties apply is considered the most significant or difficult to resolve. If the dispute is a maritime issue, then a general treaty, the 1982 UN Convention on the Law of the Sea or one of the earlier Geneva Conventions applies. The existence of colonial agreements is considered a greater moderating influence, because the claimants have a framework for their debate. The greatest moderating aspect among the legal considerations is assumed to be a dispute where the parties disagree about interpreting a boundary that has been delimited by treaty. The scores for negotiation or adjudications are similarly interpreted (Appendix D).

A pair-wise comparison among the measures of the nature of a dispute gave greatest weight to the number of claimants (0.3900), followed by the status of negotiations (0.2961), and type of dispute (0.1383). The legal basis of a dispute and whether a dispute was maritime or land received the lowest scores. The top ten most difficult disputes to resolve, by their nature were:

- Spratly Islands
- Iran-Iraq-Turkey (Kurdistan)
- Belize-Honduras
- China-India
- China-Japan-Taiwan (Senkaku/Diaoyu islands)
- Iran-United Arab Emirates (Abu Musa and Tunb islands)
- Egypt-Sudan
- Columbia-Nicaragua (San Andres islands)
- Bulgaria-Romania (maritime)
- Bulgaria-Turkey (maritime)

The Spratlys dispute ranked high along each measure of the nature of disputes. It has the most claimants (five claim all or some of the islands and a sixth, Brunei, claims maritime jurisdiction), includes both maritime and island sovereignty issues, has a weak legal basis for resolution and is not the subject of formal negotiations. Island disputes generally ranked higher among these measures. The Belize-Honduras and Egypt-Sudan disputes include both land and offshore issues and are not known to be the subject of negotiations.

**PROMINENCE OF
A DISPUTE**

The next level of the hierarchy addressed the prominence of a given dispute by seeking to combine measures of its intensifying factors, magnitude, and nature. The pair-wise comparison among these aspects is shown in Table 3. Its consistency ratio was 0.016.

**TABLE 3:
Prominence of a
Dispute**

	Intensifying	Magnitude	Nature	Eigenvalue
Intensifying Factors	1.00	0.33	2.00	0.2385
Magnitude of Dispute	3.00	1.00	4.00	0.6250
Nature of Dispute	0.50	0.25	1.00	0.1365

The magnitude of a dispute was judged to contribute most to its prominence, having nearly twice the weight of the other two factors. The measure of the formal nature of the dispute had the least weight, estimated to be about 14% of the total components. For every dispute, its scores for each of these components was multiplied by the eigenvalue above to yield its relative prominence (Appendix E, column 2).

**PROMINENCE
AND US
INTEREST**

A dispute is important to a country's policy makers if it directly affects national interests, even though it may be non-violent and quiescent. At the other end of the spectrum, there are many examples of violent, volatile disputes that do not break the policy maker's horizon, because they do not affect national interests. For purposes of this analysis, the interplay of a dispute's prominence and the way it might be viewed by the United States were modelled. The way a dispute is viewed by the international community would be a composite of such national views. US national interest in a dispute is a function of whether a US ally is involved or if there is a US domestic constituency for the claimants, the military power of the claimants, their economic importance, and strategic location. In the postulated hierarchy, US interest is given one-third weight, and prominence of a dispute is given two-thirds weight. The results are listed in Appendix E. Under the assumptions of this AHP model, the top ten boundaries at issue for the United States from this list should be:

- Iran-Iraq-Turkey: the Kurdish homeland issue
- China-Japan-Taiwan: the sovereignty dispute over the Senkaku/Diaoyu Islands and related maritime boundaries
- Japan-Russia: the Kuril Islands/Northern Territories sovereignty dispute
- India-Pakistan: their dispute over Jammu and Kashmir
- Iran-United Arab Emirates: the dispute over Abu Musa and the Tunb islands
- China-South Korea: their unresolved maritime boundary
- The Spratly Islands, disputed among China, Malaysia, the Philippines, Taiwan, and Vietnam. Brunei also claims maritime jurisdiction there.
- Japan-South Korea: the sovereignty dispute over Liancourt Rocks (Tokdo/Takeshima) and the related maritime boundary issues
- Armenia-Azerbaijan: the issue of Nagorno-Karabakh

Another international actor would view the various international disputes through a different lens of self-interest and arrive at other scores. The international community as a whole would be a composite of such views, which might be weighted by the 'importance' of the particular international actor and its influence on the community. However, that exercise is beyond the scope of this analysis.

**ADVANTAGES
AND
DRAWBACKS**

The above analysis attempts to capture some of the complexity of international boundary disputes and the factors that might influence how they are perceived. As a subjective exercise by one individual, it is undoubtedly flawed and incomplete. Application of the AHP to rank boundary and sovereignty disputes could be refined by polling specialists in the various fields of international relations. Both the

hierarchy with its loading factors and scores for the individual disputes would be improved by having various experts apply the model.

The strength of the approach lies in the transparent nature of the process. Instead of examining a few aspects of a dispute, one is asked to grade a dispute according to fifteen criteria for prominence and seven criteria for the viewing country's national interest. The relationships of these judgements to the overall score are explicit and can be modified for new data. Values from several experts could be combined mathematically to achieve an overall rank that distills their combined judgements. For some of the variables, such as economic importance, numerical values (trade statistics) could be inserted into the model. The AHP automatically measures the logical consistency of the comparison matrices.

One drawback to the model is that one can be consistently wrong. As a numerical model, the AHP may appear to be objective, but it relies on judgement and opinion. The AHP makes those judgements and opinions more explicit, but it cannot correct for errors in judgement. The process is limited by how accurately the hierarchy mirrors reality and how well the disputes are scored. However, the approach includes many qualitative aspects of the disputes and provides for self-correction in its application. It would appear to be a useful tool in evaluating the multitude of sovereignty and boundary disputes around the world.

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[1]   The author served in the US Department of State from 1981 to 1989. For most of that period, he worked in the Office of the Geographer.

[2]   See, for example, Saaty, T. L., (1990) *Decision Making for Leaders: The Analytic Hierarchy Process of Decisions in a Complex World,* Pittsburgh: RWS Publications; Saaty, T. L., (1980) *The Analytic Hierarchy Process: Planning, Priority Setting, and Resource Allocation,* New York: McGraw-Hill.

[3]   Saaty, *Decision Making*; Dzurek, D. J., (1993) 'An Analytical Model of Regional Seas Management: The Sea of Japan', *Ocean Yearbook 10*, University of Chicago Press: 248-76.

APPENDIX A: ANALYTIC HIERARCHY FOR BOUNDARY DISPUTE EVALUATION

DETERMINING BOUNDARY DISPUTES IMPORTANT TO THE UNITED STATES

US INTEREST

Strategic Location	Continuous to Ally	Near Chokepoint	Remote		
Economic Importance	Large Economy & Trade Partner	Major US Trade Partner	Large Economy	Medium Economy	Small Economy, Little Trade
Military Power of Claimants	WMD-powered Claimant	Conventionally-powered Claimant	Claimant with Weak Military		
US Domestic Constituencies	Strong Constituencies for All Claimants	Strong Constituency for One Claimant	Little Domestic Influence		
Visibility to US Public	Significant Media Coverage	Moderate Coverage	Sporadic Reporting		
US Ally Involved	Both Claimants Are US Allies	One Claimant Is US Ally	US of Ally Is Patron of a Claimant	No Allies Significantly Involved	
US Commitment in Claimants	Substantial US Forces Deployed	US Military Advisors Present	US Ex-patriot Presence	No Significant Presence	

PROMINENCE OF DISPUTE

(1) INTENSIFYING FACTORS

Ethnic Conflict	Ethnic & Religious Differences	Ethnic Differences	Little Ethnic/Religious Difference	
Recent Violence (since 1989)	War	Armed clashes	Incidents (incl Fishermen)	No Violence
Historic Animosity	Recent Violence (before 1989)	Ancient Violence (before 1900)	Colonial Experience	Little History of Animosity
Weakness of Central Government	Both Claimants with Weak Governments	One Claimant with Weak Government	Both Claimants with Strong	
Third-party Involvement	Actively Supplying Arms	Aggravating Dispute	No Significant Involvement	Restraining Efforts (Alliances)

PROMINENCE OF DISPUTE (CONT)

(2) MAGNITUDE OF DISPUTE

Amount of Area	>1 million km^2	1,000-1 million km^2	100-999 km^2	<100 km^2		
Number of Inhabitants	> 1 million people	1,000 - 1 million	100-999	<100 people		
Resources in Area	Oil/gas Potential	Water Resources	Fish or Agricultural Resources	Other Mineral Resources	Area of Little Potential	
Access-Related	Area Holds Invasion Route	Provides Access to Sea	Area Provides Other Access	Not Access Related		
Number killed (since 1900)	> 1million killed	100-999,000	10-99,000	1-10,000	100-999	<100 killed

(3) NATURE OF DISPUTE

Maritime/ Land	Land & Offshore	Land	Maritime			
Type of Dispute	Sovereignty & Boundary	Long Boundary	Separatist/ Irredentist	Alignment Dispute		
Number of Claimants	Six	Five	Four	Three	Two	One (Separatist)
Legal Basis of Dispute	No Relevant Treaties	General Treaties (LOS) Applicable	Partial Accords (MOUs)	Colonial Agreements	Delimited by Treaty	
Negotiations/ Adjudication	None	Suspended	Active	Under Mediation	Being Arbitrated	Being Adjudicated

APPENDIX B: INTENSIFYING FACTORS IN BOUNDARY DISPUTES

DISPUTES	Ethnic Conflict 0.2573	Recent Violence 0.3906	Historic Animosity 0.0826	Weak Government 0.0486	3rd Party Involvement 0.2209	EIGENVALUE
Armenia-Azerbaijan (N-K)	0.527	0.564	0.547	0.570	0.576	**0.5560**
Bahrain-Qatar	0.054	0.274	0.547	0.097	0.038	**0.1792**
Belize-Guatemala	0.054	0.274	0.162	0.333	0.038	**0.1589**
Belize-Honduras	0.054	0.125	0.162	0.333	0.091	**0.1124**
Botswana-Namibia (river islands)	0.252	0.125	0.050	0.097	0.038	**0.1309**
Brazil-Colombia	0.252	0.125	0.050	0.333	0.091	**0.1541**
Bulgaria-Romania (maritime)	0.252	0.038	0.241	0.097	0.091	**0.1244**
Bulgaria-Turkey (maritime)	0.527	0.038	0.241	0.097	0.091	**0.1952**
Burma-Thailand	0.252	0.274	0.547	0.333	0.091	**0.2533**
Cambodia-Thailand (maritime)	0.252	0.274	0.241	0.333	0.091	**0.2281**
Cameroon-Nigeria (Bakassi)	0.252	0.274	0.162	0.333	0.091	**0.2215**
Caspian Sea	0.527	0.038	0.162	0.570	0.294	**0.2565**
China-India	0.527	0.125	0.547	0.333	0.038	**0.2542**
China-Japan-Taiwan (Senkaku Is)	0.252	0.125	0.547	0.097	0.091	**0.1837**
China-Korea, North	0.252	0.038	0.162	0.333	0.091	**0.1293**
China-Korea, South (maritime)	0.252	0.125	0.547	0.097	0.091	**0.1837**
China-Vietnam (Tonkin)	0.252	0.125	0.547	0.097	0.091	**0.1837**
Colombia-Nicaragua (San Andres)	0.054	0.125	0.162	0.333	0.091	**0.1124**
Colombia-Venezuela (maritime)	0.054	0.125	0.241	0.333	0.091	**0.1189**
Egypt-Sudan	0.252	0.274	0.162	0.333	0.091	**0.2215**
El Salvador-Honduras-Nicaragua (sea)	0.054	0.125	0.547	0.097	0.038	**0.1210**
Equatorial Guinea-Nigeria	0.527	0.038	0.050	0.570	0.091	**0.2024**
Georgia (Abkhazia)	0.252	0.564	0.162	0.333	0.294	**0.3796**
India-Nepal	0.252	0.038	0.050	0.333	0.091	**0.1201**
India-Pakistan (Kashmir)	0.527	0.274	0.547	0.333	0.038	**0.3124**
Indonesia-Malaysia (Sipadan)	0.252	0.125	0.050	0.333	0.091	**0.1541**
Iran-Iraq-Turkey (Kurds)	0.527	0.564	0.547	0.333	0.576	**0.5445**
Iran-UAE (islands)	0.527	0.274	0.547	0.097	0.091	**0.3126**
Iraq-Syria	0.252	0.038	0.162	0.333	0.091	**0.1293**
Japan-Russia (Kuril Is)	0.527	0.125	0.547	0.097	0.091	**0.2544**
Korea, South-Japan (Liancourt)	0.252	0.125	0.547	0.097	0.091	**0.1837**
Malaysia-Thailand (maritime)	0.527	0.125	0.241	0.097	0.091	**0.2291**
Moldova (Dniester)	0.252	0.564	0.162	0.333	0.038	**0.3231**
Philippines-Taiwan (maritime)	0.527	0.125	0.050	0.097	0.091	**0.2134**
Romania-Ukraine (maritime)	0.527	0.038	0.162	0.097	0.091	**0.1886**
Romania-Turkey (maritime)	0.527	0.038	0.162	0.097	0.091	**0.1886**
Russia-Ukraine (land & maritime)	0.054	0.125	0.162	0.097	0.091	**0.1009**
South Africa-Swaziland	0.252	0.038	0.162	0.097	0.091	**0.1179**
Spratly Islands	0.527	0.125	0.547	0.097	0.038	**0.2427**
Syria-Turkey (maritime)	0.252	0.038	0.162	0.097	0.091	**0.1179**
Western Sahara	0.252	0.274	0.547	0.097	0.038	**0.2302**
Zambia-Zimbabwe (river islands)	0.054	0.038	0.050	0.097	0.091	**0.0577**

APPENDIX C: MAGNITUDE OF A DISPUTE

DISPUTES	*Amount Area 0.1965*	*Number Inhabitants 0.1597*	*Resources 0.1653*	*Access-related 0.0623*	*Number Killed 0.4162*	EIGENVALUE
Armenia-Azerbaijan (N-K)	0.262	0.242	0.030	0.546	0.204	**0.2140**
Bahrain-Qatar	0.118	0.092	0.456	0.039	0.039	**0.1319**
Belize-Guatemala	0.262	0.242	0.132	0.282	0.039	**0.1458**
Belize-Honduras	0.118	0.092	0.132	0.282	0.039	**0.0935**
Botswana-Namibia (river islands)	0.055	0.092	0.307	0.039	0.039	**0.0949**
Brazil-Colombia	0.055	0.036	0.030	0.039	0.039	**0.0402**
Bulgaria-Romania (maritime)	0.262	0.036	0.456	0.039	0.039	**0.1513**
Bulgaria-Turkey (maritime)	0.262	0.036	0.456	0.039	0.039	**0.1513**
Burma-Thailand	0.055	0.242	0.030	0.134	0.055	**0.0857**
Cambodia-Thailand (maritime)	0.262	0.036	0.456	0.039	0.039	**0.1513**
Cameroon-Nigeria (Bakassi)	0.118	0.242	0.456	0.039	0.055	**0.1625**
Caspian Sea	0.262	0.036	0.456	0.039	0.039	**0.1513**
China-India	0.262	0.242	0.132	0.134	0.122	**0.1711**
China-Japan-Taiwan (Senkaku Is)	0.262	0.036	0.456	0.039	0.039	**0.1513**
China-Korea, North	0.055	0.092	0.030	0.039	0.039	**0.0491**
China-Korea, South (maritime)	0.262	0.036	0.456	0.039	0.039	**0.1513**
China-Vietnam (Tonkin)	0.262	0.092	0.456	0.039	0.039	**0.1602**
Colombia-Nicaragua (San Andres)	0.262	0.242	0.132	0.039	0.039	**0.1306**
Colombia-Venezuela (maritime)	0.262	0.092	0.456	0.039	0.039	**0.1602**
Egypt-Sudan	0.262	0.242	0.456	0.039	0.055	**0.1908**
El Salvador-Honduras-Nicaragua (sea)	0.118	0.036	0.132	0.282	0.039	**0.0846**
Equatorial Guinea-Nigeria	0.118	0.036	0.456	0.039	0.039	**0.1230**
Georgia (Abkhazia)	0.262	0.242	0.030	0.039	0.204	**0.1824**
India-Nepal	0.055	0.092	0.307	0.134	0.039	**0.1008**
India-Pakistan (Kashmir)	0.262	0.630	0.132	0.546	0.204	**0.2928**
Indonesia-Malaysia (Sipadan)	0.262	0.092	0.132	0.039	0.039	**0.1067**
Iran-Iraq-Turkey (Kurds)	0.262	0.630	0.307	0.039	0.204	**0.2902**
Iran-UAE (islands)	0.262	0.242	0.456	0.039	0.039	**0.1842**
Iraq-Syria	0.055	0.092	0.456	0.039	0.039	**0.1195**
Japan-Russia (Kuril Is)	0.262	0.242	0.132	0.039	0.055	**0.1373**
Korea, South-Japan (Liancourt)	0.262	0.036	0.132	0.039	0.039	**0.0977**
Malaysia-Thailand (maritime)	0.055	0.242	0.456	0.039	0.039	**0.1435**
Moldova (Dniester)	0.262	0.242	0.030	0.039	0.055	**0.1204**
Philippines-Taiwan (maritime)	0.262	0.036	0.132	0.039	0.039	**0.0977**
Romania-Ukraine (maritime)	0.262	0.036	0.456	0.039	0.039	**0.1513**
Romania-Turkey (maritime)	0.262	0.036	0.456	0.039	0.039	**0.1513**
Russia-Ukraine (land & maritime)	0.262	0.092	0.456	0.282	0.039	**0.1754**
South Africa-Swaziland	0.118	0.242	0.030	0.134	0.039	**0.0914**
Spratly Islands	0.262	0.036	0.456	0.039	0.039	**0.1513**
Syria-Turkey (maritime)	0.118	0.036	0.132	0.039	0.039	**0.0694**
Western Sahara	0.262	0.242	0.076	0.039	0.122	**0.1559**
Zambia-Zimbabwe (river islands)	0.055	0.092	0.030	0.039	0.039	**0.0491**

APPENDIX D: NATURE OF THE DISPUTE

DISPUTES	*Maritime/ Land 0.0943*	*Type of Dispute 0.1383*	*Number Claimants 0.3900*	*Legal Basis 0.0813*	*Negotiation/ Adjudication 0.2961*	**EIGENVALUE**
Armenia-Azerbaijan (N-K)	0.297	0.267	0.096	0.081	0.064	**0.1279**
Bahrain-Qatar	0.540	0.554	0.047	0.478	0.028	**0.1930**
Belize-Guatemala	0.540	0.554	0.047	0.081	0.140	**0.1939**
Belize-Honduras	0.540	0.554	0.047	0.081	0.472	**0.2922**
Botswana-Namibia (Kasikili Is)	0.297	0.046	0.047	0.081	0.028	**0.0676**
Brazil-Colombia	0.297	0.046	0.047	0.038	0.140	**0.0972**
Bulgaria-Romania (maritime)	0.163	0.133	0.047	0.319	0.472	**0.2178**
Bulgaria-Turkey (maritime)	0.163	0.133	0.047	0.319	0.472	**0.2178**
Burma-Thailand	0.297	0.554	0.047	0.038	0.140	**0.1675**
Cambodia-Thailand (maritime)	0.163	0.133	0.047	0.319	0.140	**0.1195**
Cameroon-Nigeria (Bakassi)	0.540	0.554	0.047	0.081	0.028	**0.1607**
Caspian Sea	0.163	0.133	0.256	0.081	0.140	**0.1816**
China-India	0.297	0.554	0.047	0.081	0.472	**0.2693**
China-Japan-Taiwan (Senkaku Is)	0.540	0.554	0.096	0.478	0.140	**0.2453**
China-Korea, North	0.297	0.046	0.047	0.083	0.472	**0.1992**
China-Korea, South (maritime)	0.163	0.133	0.047	0.319	0.140	**0.1195**
China-Vietnam (Tonkin)	0.540	0.133	0.047	0.081	0.140	**0.1357**
Colombia-Nicaragua (San Andres)	0.540	0.554	0.047	0.038	0.249	**0.2227**
Colombia-Venezuela (maritime)	0.163	0.133	0.047	0.319	0.140	**0.1195**
Egypt-Sudan	0.540	0.554	0.047	0.081	0.249	**0.2262**
El Salvador-Honduras-Nicaragua (sea)	0.163	0.133	0.096	0.319	0.140	**0.1386**
Equatorial Guinea-Nigeria	0.163	0.133	0.047	0.319	0.140	**0.1195**
Georgia (Abkhazia)	0.297	0.267	0.022	0.478	0.064	**0.1313**
India-Nepal	0.297	0.046	0.047	0.081	0.140	**0.1007**
India-Pakistan (Kashmir)	0.297	0.554	0.047	0.083	0.249	**0.2034**
Indonesia-Malaysia (Sipadan)	0.540	0.554	0.047	0.081	0.028	**0.1607**
Iran-Iraq-Turkey (Kurds)	0.297	0.267	0.154	0.478	0.472	**0.3036**
Iran-UAE (islands)	0.540	0.554	0.047	0.083	0.249	**0.2263**
Iraq-Syria	0.297	0.046	0.047	0.038	0.140	**0.0972**
Japan-Russia (Kuril Is)	0.540	0.554	0.047	0.081	0.140	**0.1939**
Korea, South-Japan (Liancourt)	0.540	0.554	0.047	0.081	0.140	**0.1939**
Malaysia-Thailand	0.297	0.046	0.047	0.319	0.140	**0.1201**
Moldova (Dniester)	0.297	0.267	0.022	0.478	0.064	**0.1313**
Philippines-Taiwan (maritime)	0.163	0.133	0.047	0.319	0.472	**0.2178**
Romania-Ukraine (maritime)	0.163	0.133	0.047	0.319	0.140	**0.1195**
Romania-Turkey (maritime)	0.163	0.133	0.047	0.319	0.472	**0.2178**
Russia-Ukraine (land & maritime)	0.540	0.133	0.047	0.319	0.140	**0.1550**
South Africa-Swaziland	0.297	0.554	0.047	0.081	0.140	**0.1710**
Spratly Islands	0.540	0.554	0.424	0.319	0.472	**0.4586**
Syria-Turkey (maritime)	0.163	0.133	0.047	0.319	0.472	**0.2178**
Western Sahara	0.297	0.554	0.096	0.081	0.047	**0.1626**
Zambia-Zimbabwe (river islands)	0.297	0.046	0.047	0.038	0.472	**0.1955**

APPENDIX E: BOUNDARY DISPUTES IMPORTANT TO THE UNITED STATES

DISPUTES	US Interest 0.3333	Prominence of Dispute 0.6667	EIGENVALUE
Armenia-Azerbaijan (N-K)	0.1336	0.2844	**0.2341**
Bahrain-Qatar	0.1382	0.1517	**0.1472**
Belize-Guatemala	0.1066	0.1556	**0.1393**
Belize-Honduras	0.1185	0.1252	**0.1230**
Botswana-Namibia (Kasikili Is)	0.0548	0.0999	**0.0849**
Brazil-Colombia	0.1744	0.0753	**0.1083**
Bulgaria-Romania (maritime)	0.1275	0.1541	**0.1452**
Bulgaria-Turkey (maritime)	0.3329	0.1710	**0.2250**
Burma-Thailand	0.2094	0.1371	**0.1612**
Cambodia-Thailand (maritime)	0.1975	0.1655	**0.1762**
Cameroon-Nigeria (Bakassi)	0.1175	0.1766	**0.1569**
Caspian Sea	0.2954	0.1808	**0.2190**
China-India	0.2783	0.2046	**0.2291**
China-Japan-Taiwan (Senkaku Is)	0.5392	0.1720	**0.2944**
China-Korea, North	0.2370	0.0889	**0.1383**
China-Korea, South (maritime)	0.4678	0.1548	**0.2591**
China-Vietnam (Tonkin)	0.2370	0.1626	**0.1874**
Colombia-Nicaragua (San Andres)	0.0938	0.1389	**0.1239**
Colombia-Venezuela (maritime)	0.1647	0.1449	**0.1515**
Egypt-Sudan	0.1549	0.2032	**0.1871**
El Salvador-Honduras-Nicaragua (sea)	0.1066	0.1007	**0.1027**
Equatorial Guinea-Nigeria	0.0938	0.1416	**0.1257**
Georgia (Abkhazia)	0.0667	0.2229	**0.1708**
India-Nepal	0.2139	0.1055	**0.1417**
India-Pakistan (Kashmir)	0.2756	0.2856	**0.2823**
Indonesia-Malaysia (Sipidan)	0.1801	0.1255	**0.1437**
Iran-Iraq-Turkey (Kurds)	0.4191	0.3532	**0.3752**
Iran-UAE (islands)	0.3703	0.2209	**0.2707**
Iraq-Syria	0.1501	0.1190	**0.1293**
Japan-Russia (Kuril Is)	0.5050	0.1732	**0.2838**
Korea, South-Japan (Liancourt)	0.4530	0.1315	**0.2387**
Malaysia-Thailand	0.1975	0.1610	**0.1731**
Moldova (Dniester)	0.0548	0.1706	**0.1320**
Philippines-Taiwan (maritime)	0.3531	0.1419	**0.2123**
Romania-Ukraine (maritime)	0.1495	0.1560	**0.1539**
Romania-Turkey (maritime)	0.3329	0.1695	**0.2239**
Russia-Ukraine (land & maritime)	0.2487	0.1549	**0.1862**
South Africa-Swaziland	0.0649	0.1087	**0.0941**
Spratly Islands	0.3389	0.2153	**0.2565**
Syria-Turkey (maritime)	0.4072	0.1013	**0.2033**
Western Sahara	0.0758	0.1747	**0.1418**
Zambia-Zimbabwe (river islands)	0.0548	0.0712	**0.0658**