CHAPTER 9

Stability in Enduring Rivalries

The punctuated equilibrium model in its various forms—biological, organizational and enduring rivalry—stresses that phenomena go through long periods of stasis. Formulated in the enduring rivalry context, this means that the "basic relationship" of rivals does not vary much over time.

The notion of stability in conflict relationships is generally at odds with traditional conceptions. A classic image in international security analyses is one of a competition or crisis climbing an escalation ladder and culminating in war. Herman Kahn's (1965) famous work on nuclear escalation symbolizes well that approach. Arms race models typically describe one such spiral mechanism (Jervis 1976). In the crisis literature, one often reads of crises "escalating" to war (Brecher 1993). We label the set of models that propose this type of pattern as "volcano models."[1] The imagery of these models relies frequently on the language of pressure building up to an eventual "eruption" of war. Choucri and North's (1975) lateral pressure explanation of World War I provides a good example of volcanic language. Empirically, Leng (1983) found in crisis bargaining that there was a tendency toward more coercion and escalation in recurrent disputes between the same states, with the end product of war around the time of the third dispute.

The rivalry approach moves attention away from crises, disputes, and wars to militarized relationships. Wars and disputes form a normal and expected part of an enduring rivalry. We expect rivalries to experience the "highs" of actual military conflict. The focus of the rivalry approach in general, and the punctuated equilibrium model of enduring rivalries in particular, is not on the crisis

[1] We use the term *volcano* as a rough analogy to the kind of process found in the conflict literature, namely one in which conflict gradually builds up to the crescendo of war. We recognize that, in practice, real volcanoes do not always follow this pattern and at times seem to erupt suddenly. Furthermore, we have conceptualized the volcano model as a onetime process, taking our cue from the causes-of-war-literature, in which one war event is considered independent of other outbreaks of war. In reality, the eruption of volcanoes at one point in time may condition the probability of future eruptions.

and war events but the underlying rivalry relationship, what we call the *basic rivalry level*.

The punctuated equilibrium model proposes that the basic rivalry relationship does not change significantly over the course of the rivalry. Variation will occur as periods of crisis are followed by periods of détente, but these are variations *around* an underlying and unchanging relationship. We define the "volatility" of the rivalry as the variation of conflict around the basic rivalry level. For example, the probability of war depends on *both* the severity of the basic rivalry level and the volatility of that relationship. It is possible that some severe rivalries have managed to reduce the volatility of their relationship—and hence the likelihood of war—through conflict management efforts. We focus on this consideration in the next chapter.

Traditional evolutionary theory, in contrast to the punctuated equilibrium model, emphasizes the gradual evolution of species. The enduring rivalry equivalent is a model that specifies that enduring rivalries evolve gradually from low-severity relationships to high-severity ones. In this chapter, we focus on hypotheses that stress escalatory patterns in enduring rivalries—what we call *volcano* hypotheses—in contrast to the stability predicted by the punctuated equilibrium model. Hence, we examine general patterns in the evolution of enduring rivalries. The punctuated equilibrium model predicts that there is no secular trend in enduring rivalries, merely variation around the basic rivalry level. Another pattern that supports the punctuated equilibrium hypothesis is what we call the *plateau* pattern. This consists of a rapid change from one baseline to another. Generally, increasing or convex patterns of conflict severity support the volcano hypothesis. Most of this chapter then concentrates on establishing the patterns in our 63 enduring rivalries and analyzing these patterns in terms of the volcano and punctuated equilibrium models.

The volcano and punctuated equilibrium models differ in how they picture the long-term lives of enduring rivalry. In addition, they have clear differences for the initial stages of enduring rivalries. The punctuated equilibrium model argues for rapid change and a quick lock-in of hostility patterns in the early stages of an enduring rivalry, while the volcano model proposes a gradual rise in hostility levels. Thus, a second test of the two frameworks involves examining the initial disputes of each enduring rivalry for patterns of increasing hostility, which would support the volcano model, or the relatively constant or random hostility patterns, which support the punctuated equilibrium model.

We divide our analysis of the punctuated equilibrium model into two parts. This chapter focuses on the volcano model and other escalatory patterns in enduring rivalries. The next chapter on conflict management examines deescalatory aspects of rivalry relationships. The punctuated equilibrium model contains both, but the emphasis is on the speed of each process. According to the punctuated equilibrium model, enduring rivalries are born and die quickly.

We begin our exploration of the punctuated equilibrium model of enduring rivalries by investigating some of the possible patterns, focusing especially on those that support the volcano model or the punctuated equilibrium one. The first step, however, is to specify in what domain we going to look for patterns. What does it mean to say that a rivalry is getting more severe over time? On what basis can one make such a claim? We propose that underlying each rivalry is a *basic rivalry level*, which determines the severity of disputes and wars and which can vary over time.

The Concept of a Basic Rivalry Level (BRL)

Our analysis of stability in enduring rivalries depends centrally on the concept of a basic rivalry level. Azar (1972) proposed that each pair of countries had an average level of hostile or cooperative interaction, which he termed their "normal relations range." Azar's idea of a normal relations range suggests the hypothesis that relations between states vary within certain limits. We reformulate this in terms of a basic rivalry level (BRL) around which relations fluctuate (McGinnis and Williams 1989 proposed a similar notion for the U.S.-Soviet rivalry). When we speak of patterns in the evolution of rivalries, we refer to change in this basic rivalry level. The unmeasured BRL manifests itself in the severity of disputes that arise between rivals. One obvious hypothesis is that the likelihood that a dispute will escalate to war is, in part, a function of the BRL (those with traditionally more hostile relations, that is higher BRLs, are more likely to make the jump past the threshold of war).

The punctuated equilibrium hypothesis states that the BRL does not change over the course of the rivalry. Periods of conflict and détente are "random" variations around this basic level: there is no secular trend toward more conflictual or more peaceful relations. The conflict level for successive confrontations in an enduring rivalry will be an identically distributed, random variations around the unchanging rivalry baseline. In statistical terms, the differences between dispute severity and the BRL are random variables independent of past disputes and wars and constant from one dispute to the next (i.e., the standard assumptions one makes about error terms in linear models).

The idea of a random events model is often misunderstood. For example, stars are distributed randomly in the sky, but they seem to be clustered in space (Gould 1991). Similarly, Gilovich, Vallone and Tversky (1985) have studied the "hot hand" phenomenon in basketball (the idea that players will at certain times in a game or season be more prone to making a basket) and found it to be without foundation (see Gould 1991 for an application of this model to Joe DiMaggio's 56-game hitting streak). The probability of making a basket can be explained by a model of independent events. The probability of making a shot is like to flipping a biased coin where the bias is the shooting average of the player.[2] Long strings of made (or missed shots) appear to be evidence of a pattern, but one should see such strings and clustering in a random process. For example, if one flips a fair coin four times, the probability of at least three heads or three tails is equal to that of two heads or two tails. For an unfair coin or a particularly skilled baseball player (e.g., Joe DiMaggio), one would expect the long strings to be more common (e.g., a long hitting streak) than with a fair coin or a mediocre player.

This "anti-hot-hand" model inspires our punctuated equilibrium model of rivalries. By the time a player becomes a professional, his basic ability level is fixed (at least not capable of modifiable in the short term) according to the anti-hot-hand model. One major problem is in defining a rivalry equivalent of a basketball player's shooting average. Conceptually this is the basic rivalry level of the enduring rivalry, similar to McGinnis and Williams's (1989) unmeasured rivalry dimension. The punctuated equilibrium model states that each rivalry has its own baseline that represents the bias of the coin that is flipped when a confrontation occurs. The more biased the coin, the higher the conflict level, and the more likely war will occur. For the moment, we leave as exogenous why some rivalry baselines may be higher than others. There are a variety of explanations that could be put forward; system polarity and the salience of the disputed issues are just a few possibilities. If this concept proves fruitful in the examination of rivalry trends, then an obvious item on our research agenda will be to try to understand the causes of the basic rivalry level.

In interpreting our analyses, we do not suggest that variations from the BRL (be it constant or changing) cannot be explained and are indeed "random," but rather that there is no systematic factor derived from the previous dispute (beyond that captured by the BRL). Our procedure in this is quite similar to Leng (1993), who devoted a chapter to the "structural" determinants of crisis outcomes. He found that structural factors have an important impact, but that a significant part of the variation in outcome was unexplained by structural factors. It could be accounted for by crisis bargaining. Similarly, we divide the conflict level into two parts, one determined by the BRL and the other determined by characteristics of the individual disputes. The latter part we do not attempt to explain and lump together in the miscellaneous category of "random."

The punctuated equilibrium model postulates this basic rivalry level as normally quite stable (except perhaps at the beginning and end of rivalries, or during periods of stress and shock—see chapter 11). When we speak of the evolution of a rivalry, we mean the evolution of this baseline level, not the ups and downs of crises. We conceive the periods of relative calm and the varying severities of wars and disputes as variations above and below this basic rivalry level. The idea is quite similar to our earlier work on military allocation ratios in which we calculated a "normal" level of military spending for different eras

[2]There is some dispute on the proposition that hot hands in an economic context are merely statistically anticipated aberrations; for example, see Brown and Sauer 1989.

based on the actual spending patterns of all major powers; states were over- or underspenders depending on their relationship to this norm (Goertz and Diehl 1986).

As Leng (1993) demonstrated, it is possible for one side to react at a significantly higher or lower level than the other during a crisis. Similarly, Hensel and Diehl (1994) have studied militarized disputes in which one side took no militarized action in response to the threat or use of force against it. Thus, it seems possible that the basic rivalry level could be different for each side. On the other hand, we emphasize that a rivalry *relationship* by definition is a dyadic one. On the personal level, a "loving" relationship is when there is love on both sides, and a happy marriage is one in which both are content. We do not deny that there may be asymmetries, but those asymmetries help *define* the relationship, which is a combination of factors on both sides of the rivalry.

Patterns of Enduring Rivalry Evolution

The punctuated equilibrium model views enduring rivalries as phenomena that establish themselves quite rapidly and then do not change much until some shock sets the stage for rivalry termination. We postulate a relatively quick lock-in for enduring rivals. Such a lock-in effect is consistent with the punctuated equilibrium hypothesis of "no change" over almost all of the rivalry. Once an enduring rivalry is under way, the particularities of the different crises, location, bargaining strategy, issue, and the like would be different, hence accounting for variations from the basic rivalry level. The more severe the basic level, ceteris paribus, the more likely a dispute is to end in war. This is the anti-hot-hand argument, as applied to enduring rivalries. The high shooting average that results in more hot hands corresponds to a high basic rivalry level that produces more wars.

Cioffi-Revilla (1998) has examined this "stability" hypothesis with a survival analysis and has found that rivalries exhibit short-term stability, some medium-term instability, and a strong tendency toward termination (an increasing hazard rate) in their latter phase. His analysis suggests another possible pattern, one with a quick lock-in effect, but with a falling rivalry level after a decade or two.

A related possibility is that a rivalry begins with some traumatic event, such as a war, and then drops immediately in its severity level and gradually withers away over time. In contrast to the previous pattern, the rivalry level is at its peak at the outset, but drops precipitously soon thereafter (rather than much later in the rivalry) and the decline is then gradual over of the rest of the rivalry. These are variations on an evolution that we call the "decreasing" pattern: there is some secular trend toward less conflictual relationships. In the next chapter we focus at length on decreasing or "de-escalatory" patterns that arise if conflict management attempts succeed in enduring rivalries.

The Volcano Model

The volcano model signifies some dynamic—usually self-reinforcing—mechanism that leads to the outbreak of war. The volcano name appropriately indicates the image of pressure building up over time until there is an explosion, the outbreak of war in most conceptualizations. There are several common themes in this metaphor. First is that conflict interactions always involve an escalatory pattern. Each successive interaction between the same states is more hostile. Second is the expectation that the process culminates in war. In effect, war is the end product, and there is little concern with what happens after that event. Third is the theme that there is a mechanism driving the process that may be endogenous or exogenous to the rivalry relationship.

The volcano model is found in a range of work on international conflict. The spiral model (Jervis 1976) is indicative of a process whereby states pursue aggressive policies, most notably arms acquisition, to protect their own security. The rivals may exhibit similar behavior as a response to those actions with the result of each side feeling less secure and more compelled to acquire further armaments or take more aggressive actions (the "security dilemma"). The expectation is that this spiral will drive competitors to ever increasing arms spending, insecurity, and hostility. The spiral will foster the conditions for war as resource scarcity, misperception, and the absence of mediating influences will exacerbate (or precipitate) the next confrontation between the enemies. Empirically, Smith (1988) reports that an exponential model of arms growth is best able to identify the outbreak of war, with that outbreak occurring roughly around the peak of the arms race spiral. Not all action-reaction models, however, are necessarily volcano-type processes. Richardsonian (1960) models allow for an equilibrium point and are rather ambiguous on the circumstances surrounding the outbreak of war (or potentially unrealistic as in the occurrence of war after complete exhaustion of resources).

The volcano process is also embedded in other studies of war. The power transition model (Organski 1958; Kugler and Organski 1989; Kugler and Lemke 1996) posits that national development drives the power capability of states and that differential rates of growth among states lead to inequities in the international system. Over time, a dissatisfied challenger will gain in strength vis-à-vis its status quo rival, and conflict will increase, with the likely result of war just after the challenger surpasses its rival. Here the mechanism driving the process is endogenous to the rivals, but exogenous to the rivalry.

Although the volcano model is common in many types of international conflict research, we are most concerned here with its application to long-standing rivalries. Most of the work on conflict escalation has been concerned with crises, which represent a more confined time frame and a narrower range of policy choice than do rivalries.[3] Leng (1993, 74) notes that one pattern in crisis escalation is a "fight," characterized by "symmetrical escalating hostility, described

[3] See Goertz and Diehl 1993 for a discussion of the difference between crises and rivalries.

by spiraling coercive actions," similar to what the volcano process describes. Yet this is only one of several types of escalation patterns that Leng discovers, and therefore the volcano metaphor may only have limited applicability.

In a broader temporal context, most of the work on recurring conflict between states has not focused on the severity level of successive confrontations, but only on the conditions for recurrence of conflict. Nevertheless, there is some work that suggests a volcano process over time and across crises, which is similar to the context of an enduring rivalry. Leng (1983) found that states adopted increasingly coercive bargaining strategies in successive crises with the same opponent. The result was almost always war at the time of the third confrontation. Brecher (1993) notes that crises that occur in the context of "protracted conflicts" are more prone to escalation both within the crisis itself and over time: "Actors in a protracted conflict do not see an end to their conflict and expect a recurrence of violence. Moreover, frequent resort to violence accentuates the image of violence as a protracted conflict norm . . . All this puts a premium on violent escalation in a protracted conflict crisis, including resort to war" (145–46).

There are several potential problems with the volcano model as applied to enduring rivalries. First, the approach is silent or downplays de-escalatory mechanisms that might be present in the rivalry relationship. If war does occur, it is easy to see an escalatory spiral preceding it, because by definition, earlier events are less severe and one perhaps naturally focuses on the events that lead to war (escalatory ones) as opposed to those that led in the other direction. Furthermore, not all international conflict continues to escalate until there is war; many states solve their differences without war and at a relatively low level of hostility. Leng (1993) and Axelrod (1984), in particular, have noted how reciprocal bargaining strategies can lead to more cooperative outcomes. Although enduring rivalries are more war prone than other dyads (see chapter 3), some of them nonetheless end without war.

Another problem with translating the volcano hypothesis to enduring rivalries is that war is but one potential—and potentially multiple—event in a rivalry. War may well represent the "explosion" of the rivalry, but most rivalries survive this traumatic event. Indeed, some Arab-Israeli rivalries have survived several wars. This crucial fact is ignored by volcano models, as the analysis stops at war. Within the context of an enduring rivalry, however, we must deal with competition that usually goes on after the war eruption. One possible revision of the volcano model would suggest repeated wars preceded by periods of buildup, essentially a war-cycle hypothesis embedded in a rivalry. Finally, volcano models have trouble dealing with a related problem—how can one explain wars that represent the beginning of a rivalry?

The volcano model was formulated for the study of war. For the reasons given above, it needs to be reformulated to be applied to enduring rivalries. Our reformulation involves changes in the basic rivalry level: what kind of patterns of BRL evolution are congruent with the volcano hypothesis? Hensel (1996) has taken the post hoc problem of enduring rivalries seriously and argued that countries know that they are engaged in a protracted conflict only after they have had several disputes. Loosely, they must first pass through infancy (isolated conflict) and adolescence (proto-rivalry) before becoming enduring rivals. He seems to be suggesting a general buildup of hostility and then a constant conflict level as a rivalry pattern. This contrasts with our earlier proposal of a quick lock-in of rivalry patterns after one or two disputes. More generally, there may be a gradual increase in the BRL. This buildup could continue to the very end of a rivalry, which then could be terminated by a dramatic shock. The pattern of gradually increasing severity fits with the general image of an escalatory conflict model. This pattern we term as “increasing.”

One could combine the Cioffi-Revilla and Hensel ideas: a rivalry could increase to a summit and then decline until the rivalry withers away. The first half of the rivalry exhibits a typical escalatory process, while the second part shows a Graduated Reciprocation in Tension-Reduction (GRIT)-like (Osgood 1962) decreasing pattern. We call this the “convex” rivalry pattern.

A third pattern is a conflict cycle or “wavy” configuration. This shows evidence of volcano processes, but also has characteristics of the flat pattern. There may be no secular trend in the rivalry, but it goes through clearly defined periods of escalatory and de-escalatory conflict. Here we do not refer to the way this happens before and after crises, where it is the case almost by definition, but rather this pattern is manifested over a number of disputes. This wavy pattern may tend to center around the basic rivalry level, but it is a more well defined ebb-and-flow pattern than the random variations around the flat distributions of the punctuated equilibrium model. Nevertheless, wavy patterns may offer some secondary support for a modified version of the punctuated equilibrium hypothesis.

Another gray zone pattern is one in which there is a clear decline in the first part of the rivalry, followed by an escalatory pattern in the second half. This “concave” pattern does not fit well within the usual volcano metaphor because we do not expect escalatory periods to follow declining hostility levels. Of course, this must occur in the wavy pattern, but even then one expects the wavy pattern to start on the rise and not on the decline. For reasons of completeness, it is useful to include both sides of a pair: increasing-decreasing, convex-concave, and the like. It remains an empirical question if these intuitively less plausible patterns actually occur in enduring rivalries.

Figure 9.1 depicts the ideal types for six of the patterns noted previously: punctuated equilibrium/flat, increasing, decreasing, convex, concave, and wavy. In actuality, we can expect few rivalries to mirror any one pattern exactly, and our matching of a given rivalry to a particular pattern will be based on which pattern offers the best approximation of the severity level across the whole rivalry (see coding discussion in the next section).

FIGURE 9.1: Patterns of Rivalry Evolution

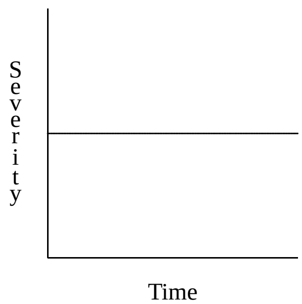

Figure 9.1a: Flat Pattern

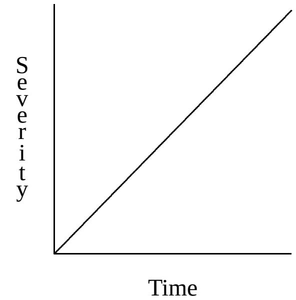

Figure 9.1b: Increasing Pattern

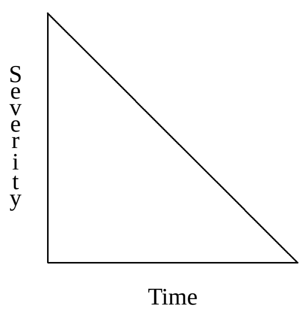

Figure 9.1c: Decreasing Pattern

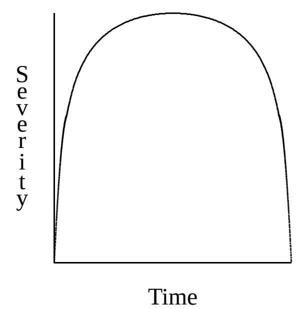

Figure 9.1d: Convex Pattern

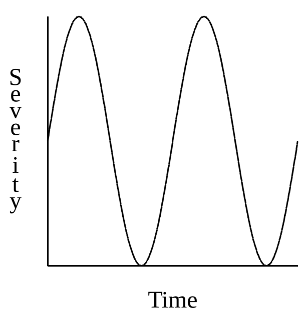

Figure 9.1e: Wavy Pattern

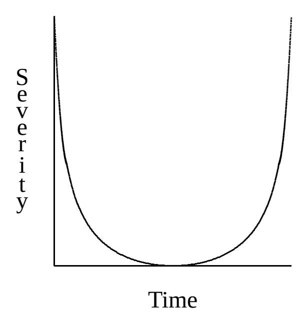

Figure 9.1f: Concave Pattern

In summary, we focus here on gradual escalatory—volcano—patterns and contrast them with the stability predicted by the punctuated equilibrium model. Two patterns clearly conform to the basic outlines of the volcano model: increasing and convex evolutions. The punctuated equilibrium postulates a flat pattern and in a modified form, a “plateau” pattern of two flat patterns in the same rivalry separated by a transition point. A third set of patterns arises from patterns generated by more de-escalatory processes represented by the concave and decreasing patterns, which pose basically different developmental models—the topic of the next chapter. The wavy process lies in the gray zone because it exhibits no secular trend, but does show several periods of rivalry buildup, as well as the pattern of decreasing conflict levels.

Research Design and Expectations

We are most interested in variations in the level of severity (corresponding to our rivalry conceptual components of military competitiveness, but this time at the dispute rather than rivalry level). One of the disadvantages of using militarized disputes as a tool of studying rivalries is that we have relatively few data points for each enduring rivalry; an enduring rivalry can have as few as six militarized disputes. Thus, in our analysis of patterns, we have few degrees of freedom with which to play. Nevertheless, we use the measure of severity first introduced in chapter 3 and described in detail in appendix B.[4]

We will look at the severity of enduring rivalries over time in order to detect patterns that are consistent with the expectations of the punctuated equilibrium and volcano models (as well as the other possible patterns). The volcano model envisions that the conflict level in the rivalry will increase over time, beginning at some low level and escalating to war or some dispute just short of war. It may be that there are several repeated patterns in the rivalry and for that contingency the volcano model predicts that the pattern of escalation will be duplicated in several cycles—escalation to high levels of conflict followed by a new set of disputes beginning at a low level, but of ascending hostility.

The punctuated equilibrium model predicts random variation in the conflict level of successive disputes around a constant baseline, because the conflict level of any given dispute is independent of the flat line. Thus, a dispute

[4]The duration of a dispute is also an aspect of its conflict level. The longer a dispute, the more it affects the attention and resources that a state can devote to other matters. Furthermore, longer disputes have broader and longer-lasting effects on state relationships because the accompanying times for peaceful relations are reduced and attitudes in societies adjust to the pattern of hostility between states. Duration is measured according to the number of months that the dispute lasted. Our intuitive impression is that many disputes tend to drag on, and this, combined with the difficulty of determining the termination date, leads to a wide variation in duration times. Severity and duration are thought to represent two separate dimensions of the conflict level of rivalries. The data generally support this conclusion, as the correlation between the two measures is moderate (r = .47). We also tested for duration patterns over time in an earlier study (Goertz and Diehl 1997) and the results are similar to those reported for conflict severity.

may be of greater, lesser, or similar severity as its predecessor. War or other severe disputes may be found at different junctures of the rivalry, and it would not be unusual to find that some rivalries begin with war or other high levels of conflict. The basic punctuated equilibrium hypothesis is, therefore, that the severity of the dispute/war in a rivalry is independent of the level of the previous dispute once we take into account the basic rivalry level.

We employ three separate tests to ascertain patterns in the evolution of enduring rivalries and thereby test the expectations of the volcano and punctuated equilibrium models, as well as identify any relationships that are not predicted by these models. First, we estimate a regression line for each rivalry in which the conflict level of each rivalry is the dependent variable and the independent variable is the number of the dispute (first, second, etc.) in the rivalry sequence. To test for nonlinear patterns (e.g., rising then falling conflict levels, as in a repeating cycle), we add polynomial terms to the equation. Because some of the rivalries have as few as six disputes, however, the small *N* will lead few of our results to pass statistical significance tests. In addition, we produce scatterplots of the relationships, which we then code according to the following categories: increasing, decreasing, concave, convex, flat, or wavy; we also identify "plateau" variations of the flat category. Although most of these patterns are self-evident or described above, there were several principles that guided our coding.[5] First, one observation should not change the coding decision, and therefore several observations are necessary to constitute a pattern. For example, it is possible to code a distribution as flat despite the occurrence of one dispute that was an outlier (e.g., the outbreak of a war). Second, flat patterns did not mean no variation, but rather random variation around some mean level. Third, the judgment that the conflict level is increasing or decreasing also must be based on more than one observation. Finally, wavy patterns are not those that show dramatic fluctuations from observation to observation, but are those with clear patterns or cycles across all the observations.

We are also concerned with the residuals of the regression lines rather than just the patterns. Recall that in order for the estimated coefficients to be correct, the model assumes that the residuals are identically and randomly distributed variables. Thus, another test of the BRL model is that the residuals are randomly distributed. This can be determined through statistical analysis with the Durbin-Watson test. In this analysis, correlated error terms are not merely a technical problem that needs to be corrected, but an indication that

[5] Given some of the results below, we might be accused of seeing (or inventing) patterns that are consistent with our punctuated equilibrium model and ignoring others. We have several responses. First, we devised the guidelines below before doing any of the actual coding. Second, during the actual coding, each of the authors independently judged the patterns and agreed on 80 percent of the patterns in this chapter and more than 90 percent of the patterns reported in the next chapter. Third, the results reported are quite similar to those from an earlier exercise (Goertz and Diehl 1998) that used a different indicator of conflict severity. As a result, we are confident of the results reported below.

the model needs substantive variables to explain the intertemporal relations. Durbin-Watson scores are calculated for each regression and then their significance level is ascertained. A large number of problematic scores would call into question not only the appropriateness of the regression model, but also the validity of the punctuated equilibrium model.

Finally, we recognize that patterns of escalation and de-escalation in enduring rivalries may not be fully apparent over the life of the rivalry, but rather confined to narrower time frames. We are particularly concerned with the "lock-in" and "fade-out" of rivalries. The punctuated equilibrium model indicates that the conflict level is quickly established in a rivalry (i.e., a quick lock-in). That same model suggests that enduring rivalries do not wither away as they move toward their termination. To test these possibilities, we examined the first three and the last three disputes in a rivalry respectively, and calculated the difference between the conflict level of the dispute in question and the mean conflict level for the rivalry as a whole. We then report how many of the "residuals" are negative. Negative residuals at the beginning of a dispute would suggest that the rivalry has a gradual buildup in the conflict level and therefore supply evidence for the lack of a rapid lock-in effect; this would be consistent with Hensel's (1996) analysis of rivalries slowly evolving into an enduring one. Negative residuals at the end of the rivalry indicate a fade-out or withering away of the rivalry. If the average number of negative residuals is approximately 1.5 (half of 3), however, then the null model expectation of random fluctuation seems appropriate. There is a quick lock-in and no fade-out, with consistent variation around the mean both at the beginning and the end, and therefore results that support the punctuated equilibrium model.

We considered other analyses, but did not find them suitable for our purposes. For example, one possibility was to consider the transition probabilities for the conflict level from time t to time $t + 1$. The punctuated equilibrium hypothesis is that the transition probabilities are the same for a given basic rivalry level, a process with no "memory." The set of transition probabilities would be greater than this average if the previous conflict level was influencing the outcome of the next dispute. The transition probabilities would vary with the different basic rivalry levels in an aggregated analysis. Thus, the punctuated equilibrium hypothesis does not stipulate that all rivalries exhibit the same dynamics, but that they may differ substantially, and we take into account this "context" (see Goertz 1994, especially on context as changing meaning) for a transition probability test. Geller (1993) has used these techniques to study power transitions in enduring rivalries. We have a continuous dependent variable (conflict level), and transition probabilities work best with clearly defined states from and to which there is a transition. But fundamentally we are interested in patterns over long periods of time, and prefer to examine them more directly via graphical and regression methods.

The punctuated equilibrium model proposes that the "structural factors" of enduring rivalry are basically constant throughout the rivalry. Fundamental—structural—changes to the rivalry should affect the baseline. In effect, our operational definition of structural change is a change in that baseline. Yet each crisis has its own specific characteristics; in statistical terms, the residuals around the regression line are the aspects of crisis bargaining that are unexplained, but not necessarily unexplainable. As in basketball, a player in some games shoots more or less than his average, and there may be good explanations for that occurrence in each instance (e.g., zone defenses, illness). These individual explanations are those of the residual.

Normally, the variance of the residuals in a regression model is of no real substantive importance. Reducing this variance is important only because this increases the accuracy (hence significance) of parameter estimates. In our situation, the size of the residuals reflects the "volatility" of the rivalry. A rivalry with a lower baseline but higher volatility may produce more wars than a rivalry with a high baseline and little variation. Whether a dispute in an enduring rivalry escalates to war is a function of *both* the BRL (mean) and the volatility (variance) of the rivalry. One possible definition of a security regime is when the baseline of a rivalry does not change, but the variance is reduced. A security regime does not try to "solve" the underlying conflict, but just to "manage" it. The Cold War seems to be a case in which the United States and the USSR developed a few rules for keeping the competition under control.

Our preference for a regression approach does not depend on any knockout arguments for its superiority. We prefer the simpler and more familiar machinery of regression models, the ease of graphical analysis, and the simple division of conflict level into dispute-specific and structural components. One major difference is that we conceive of the severity of a dispute to be a continuous variable. Event history and stochastic process models are most frequently used when there are clear, discontinuous states, such as married/single. We prefer to use a continuous, and we hope more accurate, measure of the conflict level.

One potential approach is evident in Davis, Duncan, and Siverson (1978). They examined spatial dependence by examining waiting times between dyadic wars on the system level. We are interested in dependence of severity and duration levels and not arrival (interdispute waiting) times, but the formal structure is quite similar between the two. Translating their model to our situation would involve postulating that the amount of time between disputes (as opposed to the level) is a function of the level of the previous disputes. This proposal suggests that there are different aspects of the connection of disputes over time. Our dependent variable is the conflict *level* of the dispute. Duncan and his colleagues suggest that another dependent variable could be the *timing* of the next dispute. Indeed, Hensel (1996) reports some evidence that the outcomes of previous disputes may indeed affect the timing of subsequent disputes between the same parties (see also the next chapter, where we use this as a measure of conflict

TABLE 9.1: Patterns in Enduring Rivalries

BRL Pattern	*N* (%) All Cases	*N* (%) Uncensored
Flat	47 (74.6)	18 (69.2)
Plateau-down	5 (7.9)	2 (7.7)
Plateau-up	6 (9.5)	2 (7.7)
Increasing	2 (3.2)	2 (7.7)
Plateau-up	1 (1.6)	1 (3.8)
Decreasing	5 (7.9)	2 (7.9)
Plateau-down	1 (1.6)	1 (3.8)
Convex	3 (4.8)	1 (3.8)
Concave	5 (7.9)	3 (11.5)
Wavy	1 (1.6)	0 (0.0)
Total	63 (100)	26 (100)

management success). It is possible that there are temporal connections for one but not the other, and it is possible that the conflict level and timing are completely independent of each other (i.e., the severity of a dispute is independent of how quickly it occurs after the previous one). Part of the difference is that in our case we know that the "next dispute" will occur (the post hoc character of enduring rivalry analysis), while the whole point of the Davis, Duncan, and Siverson study was to determine whether this was the case or not.

Empirical Results

General Patterns

In the first set of analyses, we explore the patterns evidenced from our regression analyses. These are summarized in table 9.1 with the full results given at the end of the chapter.

The punctuated equilibrium hypothesis suggests no secular trend in the conflict level of rivalry. Of the total, we find 74.6 percent fit the no-secular-trend pattern, with a comparable percentage for noncensored cases. Wavy cases provide more ambiguous support for the null hypothesis, but there is only one such case among the 63 rivalries. Taken together as evidence for the punctuated equilibrium model, these two categories account for just over three-quarters of the rivalry cases. This is fairly compelling evidence for the punctuated equilibrium model, even if its applicability is not universal.

Among the so-called flat cases are those that exhibit some unique patterns that we have labeled *plateau* cases. The plateau cases fit naturally within the punctuated equilibrium framework, which is why we include them in the flat category. Recall that the punctuated equilibrium model is one of abrupt change followed by stasis. This describes quite accurately the plateau pattern.

Five rivalries begin at relatively high levels of conflict and continue at that level for the first half or more of the rivalry. This is indicative of a flat pattern and a well-established BRL. Nevertheless, all five rivalries reach a transition point in which the severity of conflict drops precipitously, remaining at a lower plateau for the duration of the rivalry. This is not indicative of a gradual decline in hostility, as is characteristic of the decreasing pattern. Rather, the drop in severity is more abrupt and does not continue after the initial drop. In effect, a new, lower BRL is established in those rivalries. One may speculate about the causes for this movement to a lower plateau of rivalry severity, and these explanations include various conflict management techniques, informal agreements, and the like. One of the cases is the Israeli-Egyptian rivalry, which settles into lower conflict patterns after the Camp David Accords. That rivalry persisted after that "peace" agreement, but now at far less dangerous levels. Ben-Yehuda and Sandler (1998) report a similar shift downward in Arab-Israeli crisis severity, although they unfortunately used the term "winding down," when their data suggest a more dramatic drop from a high plateau to a low plateau. These five cases, and one case of a decreasing pattern that plateaus down to a flat BRL at the end, offer potentially interesting subjects for analysis of conflict management efforts.

There are also six rivalries that exhibit a pattern opposite to the one above: a lower BRL established in the first part of the rivalry that gives way to a significantly higher one in the second phase of the rivalry. The Iraqi rivalry with Kuwait is illustrative of this pattern, and the Persian Gulf War is only the latest manifestation of the more severe conflict between those two enemies. Together with a single case of an increasing pattern that also asymptotically increases to a plateau, these "plateau-up" cases may be subjects of an analysis that explains escalation in rivalries.

The second most frequent patterns of rivalry severity are the decreasing and concave patterns, each constituting just less than 8 percent of the rivalries. Unlike the plateau cases, the decreasing pattern exhibits a more gradual decline in rivalry severity for these cases, quite the opposite of what is predicted by the volcano model. These cases also present instances in which successful conflict management might be explored. Yet until we know what determines the BRL, we may not be able to sort out structural and exogenous influences. The concave pattern is perhaps indicative of rivalries that had the beginnings of successful conflict management, but at midlife returned to a pattern of severe confrontation. One might suspect that concave patterns were more evident among lesser-order rivalries that almost ended before they evolved into enduring ones.

We have suggested that two patterns are consistent with the general volcano model: increasing and convex. The first fits a rivalry scenario in which the rivalry is terminated by a major war and the second corresponds to a volcano effect followed by a GRIT-like (Osgood 1962) conflict resolution process. Only two (3.2 percent) rivalries show a strict or pure escalatory volcano pattern. The Franco-German rivalry in the twentieth century, culminating in world war, is the classic example, but we must remember that this pattern is quite exceptional. A modified version of the volcano model might suggest a convex pattern of increasing hostility and then decreasing hostility following the apex. Nevertheless only three (4.8 percent) of the rivalries (for example, Israel–Saudi Arabia) exhibit a convex pattern. Of our rivalries, then, less than 8 percent fit some form of the volcano model. Among the uncompleted rivalries, the percentages are only slightly higher, but still not exceeding 12 percent of the population. Even given the small *N*s, few of the individual regression parameters supporting the volcano model have estimates that are statistically significant or even in the predicted direction. Far from universally valid, this escalatory model appears to fit only a small subset of our cases.

The volcano hypothesis has most frequently been applied to events just before a war. Our extensions to rivalries both in terms of the lock-in hypothesis as well as trends in the basic rivalry level are natural extensions, but extensions nonetheless. We can more specifically examine the volcano hypothesis with regard to wars within enduring rivalries. Recall that Leng (1983) found escalating patterns in a number of repeated conflicts. A minimal definition of an escalatory pattern would involve an increasing severity level in the two disputes before a war. Because, by definition, a war has a higher level than the preceding dispute (except in the case where that is a war as well), a minimal escalatory pattern requires that the dispute twice prior to the war (the "pre-prewar" dispute) have a lower level than the prewar dispute. A simple test for this is whether the difference between the two levels is positive. If we examine wars in enduring rivalries, we do indeed find a positive difference of 17, but it is not statistically different from zero ($p < .16$), owing largely to the tremendous variance across the cases.[6] Thus, even a more direct test of the volcano model in terms of conflict level still does not provide strong support for its propositions.

Independence of Disputes

We suggested that one measure of patterns within rivalries is whether the conflict levels were related over time. This we operationalized in terms of regression line trends. If there is a connection over time, then the regression line will permit a prediction of the level of the next dispute based on the level of the last (except in the flat line case). A second test of that is whether the residuals of these trend lines are independent. The Durbin-Watson statistic tests for independence of the residuals. If there is autocorrelation, then that suggests that

[6] For this analysis, we were able to look only at wars in which there were two other disputes preceding it. We also relied on the Small and Singer (1982) definition of war to define a population of war dyads.

TABLE 9.2: Negative Residuals at the Beginning and End of Rivalries

	Number of Negative Residuals				
	0	1	2	3	Mean
Rivalry beginning	5	20	25	12	1.71
Rivalry ending[a]	2	14	7	3	1.42

Note: Cases that had not ended by 1992 (censored cases) are not included in this table.
[a]United States–Peru case is not included because there is no variation in severity level over the rivalry and therefore a regression line could not be estimated.

beyond the dependence found in the BRL there may be other kinds of dependence over time. Our analysis indicates that such was the case in about eight (13 percent) of the rivalries.[7] As with the basic rivalry level and volatility, such cases require special attention. It may be that a better specification of the basic rivalry level will eliminate autocorrelation problems. Again, this analysis provides support for the punctuated equilibrium model.

Mean Rivalry Levels and Volatility

Another empirical test concentrates on the residuals from the mean for the first and last three disputes in a rivalry sequence, noted in table 9.2. Within the rivalry framework, there are a variety of variations of the volcano model. First, there is the initial phase of the rivalry in which one might expect lower levels of conflict as the enduring rivalry gets under way. This we have referred to as the lock-in hypothesis. Table 9.2 shows no dramatic pattern, with a mean of 1.71. If the number of residuals were distributed randomly above and below the mean level, as is consistent with the punctuated equilibrium model, we would expect an average of 1.5 residuals to be below the mean level. The sign test (which tests whether the numbers of values above and below this level are equal) indicates no significant difference ($p < .11$). Certain patterns of the BRL, however, would lead us to expect a larger number of negative residuals. In particular, the increasing and convex trends imply negative residuals at the beginning. Indeed, the increasing and convex cases account for many of the higher negative residual rivalries.

We are working under the general assumption that there is a fair amount of variation in the BRL from rivalry to rivalry, and that this variation "explains" why disputes are likely to become wars in some rivalries and not others. The cross-sectional variation in the mean severity level (see table 9.3 at the end of this chapter) ranges from 31 (essentially serious threat level by at least one party but no fatalities) in the United States–Peru rivalry to 142 for the Israel–Jordan

[7]Because of the small sample sizes (number of disputes in each rivalry) for the regressions, we classified all Durbin-Watson scores that did not meet the significance tests at .01 and .05 in the insignificant category. These included both the so-called acceptable and ambiguous scores.

rivalry, which has been characterized by several wars. We find rivalries distributed quite evenly between these two extremes. Thus, the concept of a BRL seems as if it might provide one handle for trying to understand rivalries and war within them. This initial exploration of the concept of a BRL has the hidden agenda of trying to eventually explain why this level varies from rivalry to rivalry, as well as its evolution over time in those cases in which we see a clear pattern.

The likelihood of war is not only a function of the rivalry level, but also its volatility. Rivalries with the same mean level might have quite different variances, which would contribute to explaining why war can occur in a relatively low-level rivalry. One common empirical situation is that the variance of a random variable increases with the mean, a common form of heteroskedasticity. Substantively, we might expect to find a lot of relatively minor disputes in rivalries with a lot of wars, thus producing a large variance. In fact, there is only a weak correlation between the mean severity and the volatility of a rivalry ($\mathrm{r} = .30$, $p < .02$). Indeed, one of the rivalries with the least volatility is the most severe one, between Israel and Jordan. Thus, in addition to trying to understand why mean levels are higher in some rivalries than others, we suggest a separate research agenda that consists in trying to understand why the variability of disputes is much greater in some rivalries than others. As it currently stands, there are serious problems in using the BRL level to explain war in rivalries because the BRL includes wars. Careful thought will be required to avoid making the analysis of BRLs and war nontautological, but at least conceptually the two are separate.

Conclusion

We noted at the outset that a popular image, which we labeled the volcano model, of international conflict is the escalation of hostilities over time culminating in war. In contrast we propose a punctuated equilibrium model of rivalry that emphasizes the stability of conflict relationships over time. The conflict patterns in enduring rivalries showed no strong support for the proposition that the volcano model accurately describes the evolution of enduring rivalry conflict. In terms of basic trends in enduring rivalries, we found only a small percentage (approximately 8 percent) showed increasing or convex trends over time. In contrast, we found the punctuated equilibrium patterns—no secular trend or plateau—to be the primary ones (about 75 percent of the cases) in our analysis.

Other tests gave also little evidence of a volcano effect. There appeared to be no systematic relationship between the conflict level of successive disputes and no indication of a gradual escalation of conflict even at the beginning of a rivalry. The absence of any escalatory patterns at the beginning of rivalries supports one aspect of the punctuated equilibrium model, which argued for a rapid lock-in for rivalries. Other findings also supported the punctuated equilibrium model. There was little evidence that the severity of the conflict level was related to variations in that level, and regression analyses indicated general independence of residuals across disputes.

Despite some results that indicated a constant conflict level throughout a rivalry, there were other indications of significant variation around that level. There are some enduring rivalries of a concave or convex types, and these may not have the normal variation around the basic rivalry level. Structural factors will no doubt account for some variation around the BRL level, but our analysis cannot yet indicate whether the observed patterns are merely the result of structural factors or indicative of several different relationships inconsistent with the BRL model.

The punctuated equilibrium model of rivalries seems to us to revolve around processes that *maintain* rivalries. One class of metaphors is related to momentum (Lebovic 1994). This we find an unfortunate choice of analogy because momentum in the proper sense does not necessarily imply any force maintaining the object in motion (i.e., in a vacuum, an initial push sends an object going and its momentum remains constant until acted upon by another force). We suggest that rivalries must be kept going and reproduced over time; active forces must be present to keep a rivalry alive. Lebovic speaks frequently of "predilections," which sounds close to preferences. There are reasons why leaders continue to come to power with the same predilections and why predilections do not change.

The bandwagoning or snowballing model is more generally one of positive feedback; it is this positive feedback that accelerates the process. This is most clear in arms race models, but what is less clear is that in most of these models there are negative feedback loops as well. Diffusion models (see Mahajan and Peterson 1985 for an introduction) and more generally dynamic feedback models (Richardson 1991) usually include factors that keep the process from running off into infinity. In arms race models, budget constraints act as a brake on the escalatory spiral. The convex pattern is typical of processes where the positive feedback factor is dominant at the beginning and the negative at the end.

Although not universally applicable, our results support the argument that rivalries exhibit relative stability over time in their conflict patterns. Furthermore, this stability is evident quite quickly at the outset of the rivalry and does not fade away as the end of the rivalry approaches. The stability of enduring rivalries is also evident in the analyses of the next chapter, where we examine whether international mediation attempts can modify and mitigate the conflict patterns we see here. Hence we turn now to hypotheses about conflict management and deescalation in enduring rivalries.

TABLE 9.3: Patterns in Enduring Rivalries

Rivalry	Mean(SD)	Beg.[a]	End[b]	R^2	DW	Pattern
USA–Cuba	59(42)	1	1	.17	2.24	flat*
USA–Mexico	65(51)	2	2	.10	3.34**	flat
USA–Ecuador	44(38)	2	3	.29	2.83	flat*
USA–Peru	31(00)	–	–	—	—	flat*
USA–UK	71(32)	1	1	.04	2.77	flat+
USA–Spain	37(27)	0	2	.72*	2.87	decrease+
USA–USSR	58(36)	0	2	.05	2.65	flat*
USA–China	85(51)	1	3	.16	1.72	decrease
USA–N. Korea	109(50)	0	3	.37**	2.18	decrease*
Honduras–Nicaragua	106(50)	2	1	.60	3.47**	concave
Ecuador–Peru	83(47)	1	2	.03	2.70	flat
Brazil–UK	59(44)	3	1	.84	3.15	flat++
Chile–Argentina (I)	69(36)	1	2	.53	3.60**	flat
Chile–Argentina (II)	65(39)	2	1	.43**	1.75	flat++*
UK–Germany	77(66)	2	1	.50	2.88	flat
UK–USSR	82(40)	3	1	.61*	2.65	increase++
UK–USSR	66(41)	1	2	.17	2.21	flat*
UK–Ottoman Empire	66(59)	3	1	.23	2.01	flat
UK–Iraq	62(55)	2	1	.20	1.86	wavy*
Belgium–Germany	94(64)	2	1	.91*	3.11	concave
France–Germany	100(72)	2	3	.25	3.17	increase
France–Germany	59(61)	2	1	.37	2.37	flat+
France–Turkey	63(61)	3	1	.29	2.06	flat
France–China	88(66)	3	1	.26	3.16	flat
Spain–Morocco	65(41)	2	2	.52	2.07	convex*
Germany–Italy	97(78)	1	1	.63	3.02	concave
Italy–Yugoslavia	76(55)	2	2	.29	3.21	flat
Italy–Ethiopia	78(79)	3	1	.89	3.56*	flat++
Italy–Ottoman Empire	65(64)	2	3	.44	2.81	convex
Yugoslavia–Bulgaria	105(68)	1	0	.31	3.11	flat
Greece–Bulgaria	97(58)	1	2	.74**	2.40	flat
Greece–Turkey (I)	87(62)	2	1	.13	2.96	flat
Greece–Turkey (II)	65(50)	2	1	.07	2.94	flat*
Cyprus–Turkey	75(66)	3	1	.42	3.36*	flat++*
USSR–Norway	34(21)	3	2	.12	2.79	flat*
USSR–Iran	64(43)	2	1	.08	2.72	flat*
Russia–Ottoman Empire	58(67)	1	1	.08	2.58	flat
USSR–China	81(50)	1	0	.14**	1.84	flat*

Continued on next page

TABLE 9.3—*continued*

Rivalry	Mean(SD)	Beg.[a]	End[b]	R^2	DW	Pattern
USSR–Japan	63(56)	2	1	.15**	1.34	flat+*
Congo–Zaire	68(52)	2	1	.37	3.50*	flat*
Uganda–Kenya	83(59)	3	0	.96**	3.50**	flat++*
Somalia–Ethiopia	123(39)	2	1	.13	2.68	flat*
Ethiopia–Sudan	49(32)	2	2	.19	3.27	flat*
Morocco–Algeria	103(55)	1	1	.52	3.64*	flat*
Iran–Iraq	112(47)	2	1	.42*	2.63	flat*
Iraq–Israel	81(69)	1	2	.63	2.95	flat+*
Iraq–Kuwait	101(49)	2	0	.32	2.70	flat++*
Egypt–Israel	95(55)	0	3	.23*	2.29	flat +*
Syria–Jordan	87(50)	2	3	.41	2.71	decrease*
Syria–Israel	107(45)	1	1	.06	2.62	flat*
Jordan–Israel	142(28)	1	0	.29	2.88	flat
Israel–Saudi Arabia	97(55)	2	2	.81	2.93	convex*
Saudi Arabia–Yemen	80(49)	2	1	.76	2.96	concave*
Afghanistan–Pakistan	97(46)	1	1	.05	2.53	flat*
China–South Korea	104(63)	0	3	.67*	2.40	decrease*
China–Japan	91(65)	3	2	.08	1.76	flat
China–India	74(46)	3	1	.14	2.23	flat*
N. Korea–S. Korea	125(39)	1	2	.45*	2.04	flat*
South Korea–Japan	34(15)	2	3	.67*	1.85	flat*
India–Pakistan	105(53)	1	1	.03	2.03	flat*
Thailand–Kampuchea	92(49)	3	1	.29	2.87	flat*
Thailand–Laos	87(48)	1	0	.39	1.86	concave*
Thailand–N. Vietnam	99(70)	1	2	.30	3.55*	flat*

[a]Number of positive residuals at beginning, out of three possible.

[b]Number of negative residuals at end, out of three possible.

R^2: * Significant at .05 level. ** Significant at .10 level.

DW: * Problematic at .05 level. ** Problematic at .01 level.

Pattern: *Right-censored case. +Plateau down case. ++Plateau up case