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Size and Stability in the Modern Great Power System

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The theoretical question under consideration is the relationship between the size of the international system and its stability. After several alternative conceptualizations are examined, size is defined as the number of individual Great Powers and stability is conceptualized as relatively infrequent and limited wars. Hypotheses linking stability to size are then tested for the last five centuries of the modern Great Power system using the author's compilation of war data. Neither the frequency, magnitude, nor severity of war indicators show any increasing, decreasing, or curvilinear relationship with the number of Powers, demonstrating that the stability of the modern Great Power system has been independent of the size of the system.

INTRODUCTION

It has long been argued, by balance of power theorists and others, that the number of major actors in the international system is a key element of the structure of the system[1] and a major determinant of its stability. The debate over the size-stability question has drawn considerable attention in the literature, but it has failed to generate agreement regarding the specific nature of the relationship and has yet to be resolved by rigorous empirical analysis. The aim of this study is to review the theoretical and empirical literature on the size-stability relationship, reconceptualize the question and operationalize the key variables, and conduct a systematic empirical analysis of the modern Great Power System over the last five centuries in order to help resolve the debate.

THEORETICAL PERSPECTIVES

The most common hypothesis, advanced by Morgenthau (1967), Deutsch and Singer (1964), Kaplan (1957), Gulick (1955), Hoffmann (1965), Burns (1957), Zinnes et al. (1978), and others, is that stability increases with an increasing number of major actors in the system. These scholars all agree that a minimum of three major actors is required for stability, but there is considerable disagreement over the form of the relationship as the number of major actors increases. Gulick (1955:9) and Hoffmann (1965:94-95) insist on the minimum of three actors but do not argue that further increases are necessarily more stabilizing. Ostrom and Aldrich (1978:752-753) suggest a "balancer hypothesis" in which a three actor system is the optimum as well as the minimum. Burns (1957:355) posits five as the minimum, with stability increasing with an increasing odd number of actors. Others suggest that a three-Power system is particularly unstable (Kaplan, 1957:34; Spanier, 1975:ch. 11; Waltz, 1979:163). Both Kaplan (1957:34) and Morgenthau (1967:335) argue that stability increases with size but both fail to specify the form of this relationship. Wright (1964:755) suggests an increasing linear function between size and stability while Deutsch and Singer (1964) hypothesize a second-order-relationship, with stability increasing rapidly with the number of actors after a certain point.

Various theoretical arguments are advanced in support of the general hypothesis that the stability of the system increases as the number of major actors increase. Many balance of power theorists refer to the greater number of possible coalitions that might form against and hence deter any potential aggressor (Morgenthau, 1967:332-335; Kaplan, 1957: 34). In addition, it is hypothesized that the uncertainty concerning these potential defensive coalitions—which increases with an increasing number of actors—induces a caution which further contributes to the stability of larger systems (Morgenthau, 1967:335; Singer, Bremer, and Stuckey, 1972:23-24; Bueno de Mesquita, 1975:190).[2] Another argument derived from balance of power theory is that larger systems are more stable because they can incorporate the role of a "balancer," a perpetually unaligned state which helps to deter war by constantly threatening to shift its decisive political and military support to the weaker coalition (Morgenthau, 1967:337-338; Claude, 1962:48; Ostrom and Aldrich, (1978:752-753). Deutsch and Singer (1964:317-322) advance a different set of reasons for the stability of many-Power systems:[3] the increased

number of interaction opportunities in larger systems generates pluralist cross-cutting pressures which reduce the likelihood of mutually reinforcing antagonisms; the level of attention allocated to any single state is reduced, increasing the stability of the system because some minimal level of attention is a prerequisite for conflict; and arms races escalate more slowly in larger systems.[4] The greater stability of larger systems is also derived from a mathematical model of balance of power theory proposed by Zinnes (1978).

Others assert that it is smaller systems that are the most stable. This position is stated most forcefully by Waltz (1964:882-886; 1979:ch. 7-8) in his defense of bipolar systems. Many of these arguments are also applicable to small systems in general and I shall modify them for that purpose. It is argued that the fewer the number of Powers, the greater the simplicity of their power calculations, the clarity of the status quo, and the predictability of their behavior, and hence the less the likelihood of war by miscalculation. Each actor in smaller systems has a greater stake in the system and hence a greater incentive to contribute to system management.[5] It might also be argued that in systems of many Powers there are increased mathematical opportunities for war and also for the expansion of war after its initial outbreak.

These latter considerations lead to a final hypothesis suggesting an inverse relationship between the frequency of war and its seriousness in particular systems. Rosecrance (1969:329) represents the most common position in arguing that in larger systems war may be more frequent than in smaller systems but they are also more limited. Waltz (1979:172) implies the opposite: it is in small systems, and particularly two-Power systems, that wars are frequent but limited. It is clear that both Rosecrance and Waltz define periods of frequent but limited wars as the most stable.

It should be noted that all of these propositions deal explicitly with the size-stability relationship. While some of the above theoretical arguments are also applicable to the question of the relationship between the polarity of the system and its stability, it is clear from this survey that the size-stability relationship constitutes an important theoretical question in its own right. The concepts of size and polarity are analytically distinct (and will be defined later), and it is important not to confuse the size-stability question with the debate regarding the relative stability of bipolar and multipolar systems. Propositions dealing only with the polarity-stability question are not included in

this study, but overlapping arguments are included when they are applicable.

The enormous amount of theorizing on the size-stability question has not been matched by a comparable number or quality of systematic empirical studies designed to test these divergent hypotheses, though there have been a few recent studies along these lines. Midlarsky (1974: 422-429) finds that the frequency of war increases logarithmically with the number of poles in the system, and explains this relationship through the intervening variable of uncertainty. Ostrom and Aldrich (1978) examine several of the above-mentioned hypotheses and conclude generally that there is no significant relationship between the number of major actors in the system and its stability.

THE OSTROM-ALDRICH STUDY AND THE CONCEPTUALIZATION OF SIZE AND STABILITY

The most sophisticated of the size-stability studies is that by Ostrom and Aldrich (1978). They clearly define their major concepts, operationalize them in an unambiguous way, and proceed to test them over the 1824-1938 period by applying the technique of probit analysis to the Singer-Small data. However, their conclusion that there exists no relationship between size and stability is open to question, because their idiosyncratic conceptualization of both the independent and dependent variables fails to capture the essence of the theoretical relationship as hypothesized in the literature. A thorough examination of these problems will provide the conceptual foundation for a more valid empirical test of the size-stability hypotheses.

Let us begin with the concept of the size of the system. Ostrom and Aldrich correctly note that size is usually conceived of in terms of the number of "independent and prominent" actors in the system (p. 744), and they correctly operationalize the prominence criterion by focusing on the Great (or Major) Powers. It is clear that the theoretical literature on the size-stability question is far more concerned with the number of Great Powers than with the total number of states in the system. Balance of power theory itself is essentially a theory of Great Power behavior, and several other theories of international politics are strongly biased toward the Great Powers.[6] Balance of power theory assumes that in any anarchic international system, like any oligopolistic economic system, a

small number of leading actors dominate (Waltz, 1979; Modelski, 1972). They basically determine the "governance," stability, and transformation of the system.[7] Exogenous influences, such as the number of secondary states, have a marginal impact in balance of power theory. For this reason, the ratio of the number of Great Powers to the number of minor powers (Zinnes, et al., 1978) does not reflect the thrust of the size-stability literature in particular or balance of power literature in general.

The Ostrom-Aldrich focus on clusters of nations rather than individual states is more open to question. They attempt to justify this in terms of the "presumed unity of the allied nations in terms of a decision to go to war" (p. 745). This argument cannot be sustained on either theoretical or empirical grounds. It involves a serious exaggeration of the degree of coordination of the policies of the Great Powers and even of the convergence of their distinct interests. After all, the central defining characteristic of the Great Powers, recognized in nearly all treatments of that concept, is their relative self-sufficiency in security matters (Ranke, 1833:86; Haas, 1970:122; Rothstein, 1968:24-29; Hoffmann, 1965:138; Bull, 1971:27). It is this self-sufficiency that allows the Great Powers to play relatively independent and prominent roles in international politics. This is the basis for Hoffmann's (1965:138) argument that Great Powers can provide for their security and even make alliances without sacrificing their independence; small states, on the other hand, must often choose between security and independence. Great Powers have permanent interests rather than permanent friends; it is these interests which determine their policies and commitments, not vice versa. This accounts for the frequent failure of the Powers to come to the defense of a victimized ally and their occasional turning against an ally or wartime partner (Singer and Small, 1966; Sabrosky, 1980). It is the individual Great Powers and not clusters of them which are the "independent and prominent" actors in the theory and practice of international politics, and for this reason the size of the system should be defined in terms of the number of Great Powers in the system as distinct from the patterns of alliance relationships among them.[8]

Similarly, the size of the system is analytically distinct from the polarity of the system. Whereas size refers to the number of Great Powers, polarity is best defined in terms of the distribution of military capabilities among the Great Powers, a conceptualization which is consistent with a growing body of literature (Modelski, 1974:2; Li and Thompson, 1978; Hart, 1979; Wayman, 1981; Jackson, 1977; Snyder

and Diesing, 1977:420; Rapkin, Thompson and Christopherson, 1979; Waltz, 1979:167-69).[9] I have shown that the correlation between the size of the system and the polarity of the system is quite low, indicating that these variables are empirically independent as well as analytically distinct (Levy, 1979).[10]

Having examined the concept of the size of the system, let us now turn to the concept of stability. There are two distinct conceptualizations of stability in the literature (Zinnes, 1967): (1) the maintenance of the status quo[11] and (2) peace, or at least the relative absence of war. Most of the theoretical literature and all of the empirical literature on the size stability and polarity/stability questions conceive of stability as the relative absence of war (Deutsch and Singer, 1964:315-316; Waltz, 1967: 230; Haas, 1970:99).[12] Ostrom and Aldrich (1978:747) also conceive of stability in terms of peace rather than the status quo. What is questionable is whether their narrow focus on the *probability* of war (based on whether war occurs or does not occur in a given year) captures the essence of the stability-as-peace concept. For Deutsch and Singer the main criterion is the absence of "large-scale war" (1964:315-316), and Waltz (1967:230) refers to the absence of "destructive violence." This is consistent with the general use of the stability concept in the rest of the literature. Nearly all balance of power of theorists identify war as one of several necessary means (albeit the last resort) of maintaining the balance of power and many theorists speak of the frequent need to fight small wars in order to make larger wars unnecessary (Waltz, 1979: 172). Similarly, it is often said that wars are either frequent but limited or relatively infrequent but unlimited, and there is no doubt regarding which combination is conceived as most destabilizing. Finally, the focus on large-scale war is generally consistent with the other conception of stability as system maintenance. The proposition that it is primarily large-scale war rather than a series of smaller wars which leads to systemic transformation is supported by recent theories of global (or hegemonic) war and the world system (Modelski, 1978; Gilpin, 1981; Levy, 1983c). The Ostrom-Aldrich distinction between large-scale wars (over 10,000 battle deaths) and small-scale wars is not adequate to resolve this problem, for their standard is far too low to define large-scale war.[13] An alternative operationalization of stability as the relative absence of large scale war is necessary.

In conclusion, the Ostrom and Aldrich study provides a sophisticated analysis of the relationship between the number of clusters of Powers in the system and the probability of war, but that this is only one narrow aspect of the broader theoretical question of the relationship between the size and the stability of the system. Further empirical analysis based on a more refined conceptualization is necessary.

RESEARCH DESIGN

The Modern Great Power System

The measurement of the size of the system requires the definition and identification of the Great Powers and specification of the temporal boundaries of the system. Since I have elsewhere defined the Great Power concept and identified the Powers historically (Levy, 1983a:ch. 2), a brief summary will suffice here. A Great Power is defined as a state which plays a major role in international politics with respect to security-related issues. Empirical indicators of Great Power status include the following: possession of high level of power capabilities, providing for reasonable self-sufficiency in security matters and permitting the conduct of offensive as well as defensive military operations; participation in international congresses, conferences, or organizations, or recognition as a Great Power by such; participation in Great Power guarantees, territorial compensations, or partitions; and the general perception of and treatment as a relative equal by other Great Powers.

One weakness of all previous studies of the size/stability (or polarity/stability) relationship is that they are confined to the post-Vienna period. This is particularly serious given the limited variation in the independent variable during this period. This restricts our ability to generalize, and for both substantive and methodological reasons we extend the temporal domain back over time to the origins of the system.[14] The modern Great Power system, centered in Europe and becoming truly global only in the last century, emerged in the late 15th century, with the year 1495 symbolizing the transition from the medieval world.[15] The composition of the modern Great Power system and the size of the system at each point is presented in Table I. For each of the periods given on the left, the individual Great Powers and the total number of Powers in the system are given. The points of entry into and departure from the system can easily be determined from the table.[16]

TABLE 1

The Size of the Modern Great Power System

Period	Members of the System												Number of Powers
	Fr	Eng	Sp	AH	Tur	UH	Net	Sw	Rus	Ger	It	US	Jap	Ot	
1495-1519	*	*	*	*	*									*	5
1519-1556	*	*			*	*									4
1556-1609	*	*	*	*	*										5
1609-1617	*	*	*	*	*		*								6
1617-1699	*	*	*	*	*		*	*							7
1699-1713	*	*	*	*	*		*	*		*					6
1713-1721	*	*	*	*	*			*		*					5
1721-1740	*	*	*	*	*				*	*					5
1740-1808	*	*	*	*	*				*	*	*				6
1808-1861	*	*	*	*	*				*	*	*				5
1861-1898	*	*	*	*	*				*	*	*	*			6
1898-1905	*	*	*	*	*				*	*	*	*			7
1905-1918	*	*	*	*					*	*	*	*	*		8
1918-1943	*	*	*						*	*	*	*	*		7
1943-1945	*	*	*						*	*		*	*		6
1945-1949	*	*	*						*	*		*			5
1949-1975	*	*	*						*	*		*		*	6

Note: The abbreviations represent the following Great Powers: France, England, Spain, Austrian Hapsburgs/Austria/Austria-Hungary, Turkey, United Hapsburgs, the Netherlands, Sweden, Russia/Soviet Union, Prussia/Germany/Federal Republic of Germany, Italy, the United States, Japan, China.

The Operationalization of Stability

Stability has been defined as the relative absence of war, and particularly large-scale war, in the international system. For this reason only interstate wars involving the Great Powers are included. Wars involving secondary states and the colonial and imperial wars of the Powers are excluded because they are not generally considered to be destabilizing unless they precipitate the intervention of the outside Powers. "Great Power wars" between the Powers can be used as a more discriminating indicator of large-scale war. Three analytically distinct dimensions of war can be identified: frequency, magnitude, and severity. The *frequency* of war is the number of wars in a given period. *Magnitude* refers to the total nation-years of war among participating Powers and reflects its spatial-temporal scope. The *severity* of war reflects its human destructiveness and is measured by the number of battle fatalities.

The data base is the one I have generated elsewhere. For the 1815-1975 period the Singer-Small (1972) compilation is used (with some modifications based on our criteria). For the pre-1815 period a combination of the Sorokin (1937), Wright (1965), and Woods and Baltzly (1915) compilations is used, applying the Singer-Small (1972) battle-death criterion to eliminate all conflicts involving less than 1,000 battle fatalities among the Powers.[17] These procedures generate 119 interstate wars involving the Great Powers and sixty-four Great Power wars. Each of the wars is measured along the frequency, magnitude, and severity dimensions using the Wright, Sorokin, and Singer-Small data. An extensive analysis of the data-generating procedures can be found in Levy (1983a: ch. 3-4).

The stability of systems of different size can then be compared in terms of (1) the frequency of war, (2) the magnitude and severity of the wars that occur, and (3) the yearly amount of war underway along these dimensions.[18] Since the results for Great Power wars are basically the same as those for interstate wars involving the Powers, we focus primarily on the latter. For each of the indicators we compute both the total amount of war in the Great Power system as a whole and also the average amount of war for each Power in the system (regardless of the number of Powers actually participating in war). The per-Power measure is useful as a control for the increased mathematical opportunities for war in larger systems.[19] The best measure of the existence of an increasing or decreasing relationship between the size of the system and each of

the stability indicators is the simple rank-order correlation coefficient,[20] but Pearson's r and analysis of variance will also be used as reliability checks. Correlations for the yearly number, magnitude, and severity of war underway are based on a one-year period of aggregation, giving an n of 481. Correlations involving the characteristics of the wars that occur are based on an n of 119, corresponding to the 119 wars in the system.[21]

DATA ANALYSIS

We begin by analyzing the frequency of war dimension of stability as a function of the size of the system and then consider the characteristics of the wars and the yearly amount of war underway. The τ_b correlation statistics are summarized in Table II. The statistical significance of tau-b is not included because it is artificially inflated by the large number of cases. Moreover, significance levels are based on sampling error, but that is not relevant here because we are dealing with the statistical population rather than a sample selected from it.

TABLE II

Rank-Order Correlations (Kendall's tau-b) Between Size of System and Key War Indixators[a]

Unit	Dimensions of War		
	Frequency	Magnitude	Severity
Incidence of war			
entire system	-.05	–	–
average per Power	-.10	–	–
Characteristics of the Wars			
entire system	–	.06	.12
average per Power	–	-.03	.05
Yearly Amount of War Underway[b]			
entire system	-.05	.10	.14
average per Power	-.23	-.05	.11

[a] For interstate wars involving the Great Powers.
[b] Here the number of wars underway per year rather than frequency is used.

The correlation between the number of Powers in the system and the frequency of war is tau-b = -.05, indicating the lack of any relationship. Nor are the results any different if we use the frequency of Great Power war as a measure of higher levels of instability (tau-b = -.06). If we attempt to control for the increased mathematical opportunities for war in larger systems by using the average frequency of war per Power in the system as a measure of stability, we get tau-b = -.10 (-.08 for Great Power war). We must conclude that the frequency of war is basically independent of the number of Great Powers in the system.[22]

If we focus on the characteristics of the wars that occur rather than their frequency we again find no meaningful relationship between size and stability. The correlation between magnitude and system size is tau-b = .06, or -.03 if we use the average magnitude for all Powers in the system. This finding is particularly surprising because of the expectation that multilateral wars are more likely in larger systems. The correlation between severity and system size is also small (tau-b = .12, and .05 for severity per Power).[23] These correlations are low enough to conclude that the magnitude and severity of wars as well as their frequency of occurrence appear to be neither increasing nor decreasing functions of the size of the system. This is true also for Great Power wars.[24]

Turning to the yearly number of wars underway and their aggregate magnitude and severity, the tau-b's are -.05, .10, and .14, respectively. If we normalize for the size of the system by using the average yearly amounts of war per Power, we get tau-b = .10, -.05, and .11.[25] These correlations suggest very weak relationships, if any, between the size of the system in a given year and the yearly amount of war underway.

Thus we find no increasing or decreasing relationships between the size of the system and its stability, whether we conceive of stability in terms of magnitude or severity of wars, the frequency of their occurrence, or the yearly amount of war along these dimensions. Our confidence in the validity of these findings is further enhanced by the consistency of the results for three distinct methods of analysis—rank-order correlation, Pearson product-moment correlation, and analysis of variance. This ensures that the results are not simply an artifact of a particular statistical technique. It can also be demonstrated that there are no curvilinear relationships between size and stability, contrary to the findings of Ostrom and Aldrich (1978:760-765). The amount of additional explanatory power generated by the introduction of cubic and quadratic terms in a multiple regression analysis is found to be negligible.[26]

CONCLUSION

The size of the system has been defined as the number of individual Great Powers and stability conceived as relatively infrequent and limited wars involving the Great Powers. Operational indicators of stability include the frequency of war, the magnitude and severity of the average war, and the yearly amount of war along these dimensions. The findings consistently demonstrate that the stability of the modern Great Power system is basically independent of its size over the last five centuries. None of the stability measures shows any increasing, decreasing, or curvilinear relationship with the size of the system. All of the correlations are low, generally below tau-b = .15, and these are consistent with the results using Pearson's r and the eta coefficient from an analysis of variance. This evidence fails to support any but the null hypothesis regarding the size-stability relationship. Particularly lacking in empirical support is the common view that large systems are more stable because their wars are frequent but limited while those in small systems are relatively infrequent but much more serious.[27]

Some may argue that the limited variation in the independent variable precludes a valid test of the hypothesis (the system has never contained fewer than four nor greater than eight Powers and has usually consisted of five, six, or seven Powers). Far from invalidating our findings, however, the limited variation in system size serves to confirm and explain it. It is precisely *because* the size of the Great Power system has varied so little that it cannot account for significant variations in stability. Moreover, if the data do not allow the stability of two-Power systems (not to be confused with bipolar systems) to be investigated, that is not a limitation of the data but rather a commentary on the lack of historical relevance of some of the theoretical literature. The demonstrated absence of an empirical relationship between size and stability suggests that in spite of a variety of plausible theoretical arguments, there has been too much attention in the literature to the impact of the size of the system on stability. The real determinants of stability or war are to be found elsewhere.

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NOTES

1. The number of major actors is for Waltz (1979:ch. 5-8) the single defining characteristic of the structure of an international system and for Snyder and Diesing (1977:419) one of two defining characteristics (the other being the distribution of power among the major actors).
2. It can be argued, of course, that this increased uncertainty may be destabilizing because it may lead to a war by miscalculation. See Rosecrance (1969:329-330), Blainey (1973:ch. 3), White (1968), Stoessinger (1978), and Levy (1983b).
3. Note that while Deutsch and Singer entitle their piece "Multipolar Systems and International Stability," the question with which they deal is "the relationship between the number of actors and the stability of the system" (1964:315).
4. It is not clear that some minimal level of "attention" is a prerequisite for conflict or that the attention directed toward a given actor is less in larger as compared to smaller systems (Hopkins and Mansbach, 1973:120). Nor is it clear that arms races escalate more slowly in larger systems. In fact, the opposite may be true because of the perceived necessity of matching the armaments of more than one rival, as illustrated by Britain's two-power naval standard at the turn of the century.
5. Waltz also argues that in bipolar systems the actions of third states and minor shifts of power are inconsequential, and that persistent crises substitute for wars and increase the stability through the inducement of increased vigilance. These arguments are less applicable to small systems of more than two Powers and in any case are of questionable validity even for two-Power systems. The assertion of the stabilizing role of crises is at odds with a growing body of recent empirical research (Hermann, 1972; Holsti, 1972; Brecher, 1980; Lebow, 1981). Moreover, motivations for expansion may be increased rather than decreased in bipolar systems. Bipolarity may encourage the perception of a zero-sum game where minor shifts in power on the periphery of international politics may acquire a disproportionate significance because of their symbolic value.
6. Waltz (1979:73) argues that "a general theory of international politics is necessarily based on the great powers," and Ranke (1833) conceived of the international history of Europe as the history of Great Power relations. Dorn (1963:3) writes that 18th century international affairs were "controlled by a small group of great powers which applied the doctrine of the balance of power only to themselves, not to their relations with smaller and weaker states." Contemporary theories of deterrence are essentially theories of the Great Powers. For a more thorough justification of a Great Power perspective see Levy (1983a:ch. 1-2).
7. The concept of the governance of the system by its leading actors is more explicit and more fully developed in the long cycle theory of Modelski (1978) and Thompson (1983) and in Gilpin's theory of hegemonic war and change.
8. This is not to suggest that alliances are unimportant for stability but only that they should be conceptualized as analytically distinct from the size of the system.
9. Others have defined the polarity of the system as well as the size of the system in terms of clusters of states, contributing to the confusion between size and polarity. For further discussion of this distinction see Levy (1979).
10. Polarity was operationalized as a trichotomous categorization of the distribution of military capabilities among the Great Powers, and measured for the five-century span of the modern Great Power system. The correlation between the size and polarity of the system was found to be tau-b = .13 (Levy, 1979).
11. Hopkins and Mansbach (1973:123-124), for example, define stability as the

"maintenance of international structure with no changes sufficient to alter the basic pattern of emergent properties: concentration of influence, nature of goal conflict, number of participants, and interdependence . . ."

12. Deutsch and Singer (1964) and Waltz (1964) use both status quo and peace criteria in their theoretical definitions.
13. There were three "large-scale wars" (by the Ostrom-Aldrich definition) in the quarter-century from 1765 to 1790 but this is hardly considered an unstable period; nor is it very useful to categorize the Vietnam War as a large-scale war, in the same category as World War II.
14. By extending the temporal domain back over time, we incorporate a richer body of historical data; increase the number of observations and hence the validity of statistical generalizations; increase the variation in both the independent variables and extraneous variables, which furthers the randomization of these extraneous effects over systems of various sizes and minimizes the possibility that any of the observed relationships are spurious. This is done without violating the basic assumption of sovereign states interacting in an anarchic environment.
15. In 1495 the League of Venice formed in response to the French invasion of Italy. This general period marks the fusion of several separate historical processes: the internal centralization of power within territorial states, the decline of the universal secular authority of the Pope and Holy Roman Emperor, the coalescence of the major territorial states of Europe into an interdependent system of power relations, and the emergence of a global world economy centered in Europe and sustained by sea power. This is consistent with a diverse body of literature on the origins of the modern system (Toynbee, 1954:237; Hill, 1914:209; Albrecht-Carrié, 1974:1081-1082; Mattingly, 1955:124-125; Petrie, 1967:1-2, 11; Mowat, 1928:7, 28; Oman, 1936:16; Dehio, 1962:23; Howard, 1976:20; Wallerstein, 1974; Modelski, 1978). For further discussion see Levy (1983a:ch. 2).
16. Analytical and methodological problems involved in the identification of points of entry into and departure from the system for each of the Powers, including the problem of temporary periods of occupation and question of Great Power status in the nuclear age, are discussed in Levy (1983a:ch. 2).
17. Wars prior to 1815 are included if and only if they (1) involve a Great Power, (2) involve at least 1,000 battle deaths among the Powers, (3) are neither civil nor imperial in nature, and (4) are included in at least two of our three basic sources.
18. The yearly number of wars underway and their aggregate magnitude and severity reflect a combination of the frequency and seriousness dimensions and are therefore good overall measures of stability. Given the absence of yearly severity data, we are forced to assume that fatalities are distributed uniformly over the entire duration of a war. This serves as an adequate approximation when averaged over the 119 wars and 481 years of the system.
19. The statistical relationship between the number of Powers and the amount of war per Power admittedly involves an inherent inverse or downward bias, but by controlling for the increased opportunities for war in larger systems it provides a useful alternative measure of stability, particularly when used in conjunction with the total amount of war.

    Some might prefer n(n-1)/2 rather than n, because it is the former that measures the number of dyads, and hence the mathematical number of opportunities for war in the system. This mathematical expression does not reflect the real increases in opportunities for war, however, given geographical considerations of contiguity, distance, etc. Furthermore, the amount of war per Power is more satisfying conceptually than the amount of war per dyad. The two measures are highly correlated, and Ostrom and Aldrich (1978:746) report that the use of n(n-1)/2 rather than n in their analyses results in no significant changes.

20. Tau-b measures only whether two variables increase or decrease together, without positing a linear form of the relationship; extreme values from the highly skewed severity and intensity distributions are not given disproportionate weight; and an interval scale of measurement would assume more precision in the data than is warranted. While tau-b handles ties better than other ordinal measures of association, the large number of ties with only five categories of the independent variable is of some concern. Consequently, Pearson's product-moment correlation analysis (using a logarithmic transformation of the highly skewed severity indicator) and an analysis of variance are also undertaken. In the latter, the eta coefficient is reported as a measure of the variance in the dependent variable accounted for by the independent variable.
21. It should be emphasized that a bivariate analysis is sufficient to answer the question under consideration given our research design and data base. The extension of the temporal domain of this study to cover 481 years incorporates a diversity of international and domestic conditions. This sufficiently randomizes the impact of extraneous variables so that the imposition of controls is not necessary.
22. The results are no different if Pearson's r or analysis of variance is used. The product-moment correlations with the size of the systems are $r = -.04$ for the frequency of interstate wars and $r = -.13$ for the average frequency per Power in the system. In an analysis of variance, $eta^2 = .01$ for the frequency of war indicator and .03 for the frequency of war per Power, indicating that the size of the system accounts for essentially none of the variance in the frequency of war or frequency of war per Power.
23. The product-moment correlations for interstate wars are slightly higher but still low: $r = .18$ for magnitude and $r = .22$ for severity (logged value), and $r = .03$ for average magnitude per power in the systems and $r = .14$ for severity per power.
24. For Great Power wars, tau-b = .18 for both the magnitude and severity of war in the system as a whole; tau-b = .03 and .12 for the average magnitude and severity per Power in the system, respectively.
25. The corresponding product-moment correlations are $r = .004$, .15 and .25 for magnitude, and severity of war underway, respectively, and $r = -.23$, $-.08$, and .23 for the normalized indicators. The eta coefficients are $eta^2 = .12$, .09, and .12 for the number, magnitude, and severity of wars underway, respectively, and $eta^2 = .19$, .09, and .09 for the normalized indicators, indicating that the size of the system can account for little of the variance in the amount of war underway or the average yearly amount of war underway for each Great Power in the system.
26. One aspect of the size-stability relationship not captured by the methods used above is the points of minimum and maximum stability for each of our indicators, the analysis of which is revealing even though these maxima and minima would not be a manifestation of any more general increasing, decreasing, or curvilinear trends. Here we compare the average values of each of the stability indicators for each size system. We find that the frequency of war (or Great Power war) is greatest in four-Power systems and lowest in eight-Power systems, while both the magnitude and severity of the average war are lowest (barely) in five-Power systems and clearly highest in eight-Power systems. While these findings are weak they are suggestive, particularly in conjunction with another piece of weak but consistent evidence. The rank-order correlations between size and the frequency of war (and Great Power war) are small but negative while those between size and both magnitude and severity are small but positive. This is suggestive of a very

slight tendency for wars to be frequent but limited in the smallest systems and relatively infrequent but more serious in the largest systems. This is contrary to the common argument that it is large systems that have frequent but limited wars (e.g., Rosecrance, 1966:329), and more consistent with the opposing argument by Waltz (1979:172). However, these findings can only be viewed as tentative and interpreted with caution because of the limited time in which the system has consisted of either four or eight Powers and also because of the absence of any general increasing or decreasing relationship between size and stability.

27. For further analysis of the relationship between the frequency of wars and their seriousness, see Levy and Morgan (1983c).

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