The Costs of Major Wars: The Phoenix Factor*

A. F. K. ORGANSKI
University of Michigan

JACEK KUGLER
Boston University

A major unexplored area in the field of international politics is the consequences of major wars for members of the international system in terms of power lost or gained. This paper explores these shifts of power among neutrals, winners, and losers as a result of these wars, using a sample of 32 cases and time series analysis. The findings register unexpected but systematic patterns after major conflicts; while winners and neutrals are affected marginally by the conflict, losers' powers are at first eroded. Over the long run (15–20 years), though, the effects of the loss dissipate; losers accelerate their recovery and soon resume antebellum status. It is this phenomenon that the authors call the phoenix factor.

Introduction

There is no end of books and articles about war, and yet we know little of the subject that is of use. Of the three major aspects of interest in war—its causes, its outcomes, and its consequences—our concern in this paper is with consequences. These, of course, are intimately related both to beginnings and outcomes. The relationship between studies undertaken in the past and the effort in hand is useful briefly to elucidate.

Specialists and laymen alike have traditionally assumed the existence of a tie between the outbreak of major wars and the distribution of power among the major actors in an international system. In a general way, this premise postulates which power distributions went with war and which with peace. But there has been no interest in viewing the problem from the opposite angle of vision: what effects did outcomes of the conflicts have on the power distribution of the international system?

Can an inferior power reduce a superior one by means of war? Can the superior turn back the inferior by winning such a war? In short, what is "gained" and what is "lost," in power terms, by war? The overriding answer to such questions, the one accepted in the past, is that major wars and their outcomes make a tremendous difference in the international system. The future of a belligerent nation depends on victory or defeat. Regardless of other rationales advanced, this is the "logical" basis for going to war. It seems a powerful reason, and it is widely accepted. The justification of wars is rooted in such convictions.

However, we suspect that such reasoning is invalid. Hence, this investigation. A problem confronting the researcher in this area is how to ascertain the validity of the propositions that the outcomes of war either do or do not affect the power distribution in the international system. Several separable tasks are involved:

1. Considerable attention must be devoted to the method by which power is measured.
2. Attention must be accorded to the selection of conflicts to be studied.
3. It must be determined whose performance, in any given conflict, is to be evaluated. In other words, who are the principal actors?
4. One's philosophical concern must initially be translated into theoretical propositions and then into operational hypotheses.
5. One should test and report one's findings.

These five points represent the table of contents of this paper.

The Measurement of Power Resources

Power has long been considered to be the capacity of an individual, group, or nation to control the behavior of others in accordance with its own ends.[1] It is an element of every

*This paper is a portion of a much larger work on the beginnings, outcomes, consequences, and prevention of wars. We wish to acknowledge our gratitude to the Earhart Foundation for its financial support in connection with this project.

[1] A. F. K. Organski, *World Politics*, 2nd ed. (New York: Knopf, 1968), p. 104; Karl Deutsch, *The Analysis of International Relations* (Englewood Cliffs, N.J.: Prentice-Hall, 1968), p. 70; Hans J. Morgenthau, *Politics Among Nations*, 4th ed. (New York: Knopf, 1966), p. 26.

relationship, when each party has at its disposal resources, tangible or intangible, likely to alter the conduct of the other. Power becomes apparent only when a disagreement arises between the parties, in which event, the will of the more powerful usually prevails. The measurement of power, therefore, is vital to the prediction and explanation of joint behavior.

There have been attempts to study the actual degree of control which one nation has exercised over another. For the most part, however, specialists in international politics have retreated to measuring the resources that generate power.[2] This procedure presents problems. Power resources do not necessarily reflect the exercise of their potentialities, nor do reliable estimates include certain essential components (e.g., diplomatic skills, charismatic leadership, and internationally appealing belief systems) not susceptible to easy or dependable measurement. Moreover, hard estimates do not indicate the power a particular nation may ostensibly possess simply because other nations may mistakenly assume that it is either more or less powerful than is actually the case. The semblance of power often passes for its reality.[3]

This problem may be set aside for this study. A discrepancy between the possession of real power and the external perception of it is more likely to occur in time of peace than in wartime and is most likely to occur just before nations actually commit themselves to conflict. During and after wars, however, the two views tend to merge. Thus the perception and the reality of American military power were far apart until this country's gradual commitment in Vietnam when war brought the two together again. The same occurred in Korea more than a decade earlier.

Procedure for the measurement of objective power comprises two steps: (1) one must compose a list of all the indicators that can influence the exercise of national power and select the indicators considered most important; (2) one must determine a way of aggregating these components to obtain a single measure of national capability.

The Selection of Indicators. Among scholars interested in the construction of empirical estimates of national power, there is agreement that measures of economic, political, military, and demographic capabilities suffice to give a reasonably accurate overall indication of power.[4] Quantitative indicators are generally available. The economic capacity of a nation, for example, is suggested by per capita, total, or disposable output. Demographic capabilities are grossly reflected by total population or, more accurately, by the fraction in working or fighting age groups. Military preparedness may be inferred from expenditures on arms and the size of military forces. Only political capabilities are still unmeasured. The necessary data are usually not available and, if available, are not easy to interpret.

This problem of satisfactorily measuring political capability has important implications for our study and requires comment. It has been long assumed that economic development and the capacity of a political system to penetrate and mobilize the human resources of a nation go hand in hand. When a country evinced high degrees of social and economic development, it was taken for granted that it would exhibit a high estimate of the extent of mass-elite political linkages, that is, the ability of government to organize and motivate its population for national purposes and to muster national resources through political channels. This is only partially true.

Discrimination is required. High degrees of political mobilization do not necessarily accompany a comparable level of economic development. China, for instance, is highly mobilized politically, but not economically. The same statement is applicable to North Korea and North Vietnam. The outcomes of direct military confrontations between the United States and China, North Korea, and North Vietnam

[2]This distinction between national capabilities and national power is widely used in international politics. Throughout this paper we are concerned *solely* with national capabilities and power resources; however, to relieve the tedium of repeating over and over again "national capabilities" we shall use three terms–national capabilities, power resources, and national power–interchangeably.

[3]Ole Holsti, "The Belief System and National Images: A Case Study," *Journal of Conflict Resolution,* 6 (1962), pp. 245–51; cf. also K. J. Holsti, *International Politics: A Framework for Analysis* (Englewood Cliffs, N.J.: Prentice-Hall, 1967), Ch. 7.

[4]See, for example, Raymond Aron, *Peace and War,* Trans. Robert Howard and Annette Fox (New York: Doubleday, 1966); cf. also, William Coplin, *Introduction to International Politics* (Chicago: Markham, 1970); Organski, Ch. 6–8; J. David Singer, Stuart Bremer, and John Stuckey, "Capability Distribution, Uncertainty and Major Power War, 1820–1965," in *Peace, War and Numbers,* ed. Bruce Russett (Beverly Hills: Sage Publications, 1972), pp. 21–27; Nazli Choucri and Dennis Meadows, "International Implications of Technological Development and Population Growth: A Simulated Model of International Conflict" (Center for International Studies, MIT, mimeographed, 1971), pp. 23–24. This presentation considers technology an independent variable.

clearly indicate that if a nation is economically underdeveloped, estimates of its power which are based mainly on socioeconomic and military indicators may be totally unreliable.[5]

We include in our survey nations ruled by various forms of government, for there is no suggestion that economic development and democracy are uniquely harmonious. Often, the reverse is true. The United States and national-socialist Germany were, in the third and fourth decades of this century, economically developed, and both had political systems which could effectively mobilize human and material resources. Yet one nation was a democracy, the other a totalitarian dictatorship. We cannot directly measure the political resources which are a central feature of national power, and because without such data measurements of national power in underdeveloped countries are unreliable, we consider in this article only economically developed countries.

The Problem of Aggregation. The selection of critical indicators and a method of combining them to form a single measure is the first step. Until recently, no aggregation was attempted. Frequently, values of all the indicators were presented; the reader was left to bring them into some sort of focus. An intuitive or impressionistic measure could be derived if a nation scored equally high on all elements measured. However, if a country scored high in some areas and low in others, impressionistic estimates became fanciful.

Our choice of an overall yardstick of national capabilities, in preference to all others considered, is gross national product.[6] This decision may appear unwise. Might not a single economic indicator prove inadequate? Would not a more comprehensive index, composed of a number of other indicators, perform better? Unfortunately, more complicated indices do not perform so well as does this single one, and data for them are not as reliable for the period covered by this research.[7]

The utility of measurements of total output should not be surprising. Estimates of gross national product closely reflect the movement of the underlying variables crucial to the generation of national power resources: the fraction of the population of working and fighting ages and the level of productivity.[8]

Because total output is the result of the interaction between the size of the productive population and its level of productivity, the national equation can be expressed in the following fashion:

$$\text{Power} = \text{Population} \times \frac{\text{GNP}}{\text{Population}} = \text{GNP}$$

In this formulation, Population implies the size of the fraction of members of working age, and per capita product implies their productivity level. The interaction of components implies a weighting system. Fluctuations in productivity affect the importance of population upwards or downwards. One population twice as productive as another implies that two individual workers in the less productive economy are required to perform the labor of one in the more productive. This weighting system, while arbitrary, seems theoretically justifiable. More importantly, it reflects the realities of international politics.

Estimating Consequences of War. As critical as the problem of power aggregation is the decision about the procedure to follow in estimating outcomes of war. This can be accomplished in one of three ways. First, one can simply establish suitable points before and after a conflict and compare them, with the differences regarded as the costs of war. This

[5] Attempts to measure "political development" are reviewed in Irma Adelman and Cynthia Morris, *Economic Growth and Social Equity in Developing Countries* (Stanford, Calif.: Stanford University Press, 1973).

[6] Alternate explicit attempts to estimate a single measure of national capabilities are: Wilhelm Fucks, *Formeln Zur Macht* (Stuttgart: Deutsche Verlags-Anstalt, 1965); Clifford German, "A Tentative Evaluation of World Power," *Journal of Conflict Resolution*, 4 (March 1960), pp. 138–44; Organski, pp. 207–14; Singer, Bremer, and Stuckey, pp. 19–49; Klaus Knorr, *Military Power and Potential* (Lexington, Mass.: Heath, 1970); Ray Cline, *World Power Assessment* (Washington, D.C.: Georgetown University, 1975).

[7] We compared the performance of GNP over time with the measure developed by Singer, Bremer, and Stuckey, the only other multidimensional measure available for the same period. Both measures are highly correlated and the similarity increases as the reliability of data improves. (R^2 of .95 was obtained for the sample of major powers for 1870–1970.) See Jacek Kugler, "The Consequences of War" (Ph.D. Dissertation, University of Michigan, 1973), pp. 82–96.

[8] See Steven Rosen, "War, Power, and the Willingness to Suffer," in *Peace, War and Numbers*, p. 171; and Charles Hitch and Roland McKean, *The Economics of Defense in the Nuclear Age*, 2nd ed. (Cambridge, Mass.: Harvard University Press, 1967) Pt. 1; Norman Alcock and Alan Newcombe, "Perceptions of National Power," *Journal of Conflict Resolution*, 14 (1970), pp. 335–43. For opposite views see Klaus P. Heiss, Klaus Knorr, and Oskar Morgenstern, *Long Term Projections of Political and Military Power* (Princeton: Mathematica Inc., 1973).

method is often applied, but is vulnerable to major error.

A second technique consists of calculating losses from a conflict by taking into account those changes that one estimates would have occurred had no conflict taken place. This procedure controls for normal growth, but is still based on the difference between two points. The rates of change are stipulated to be the same as those before the onset of the conflict. This procedure is clearly superior to the first, but it is weak because any comparison of the last year *before* and the first year *after* a conflict, work with times that are plainly abnormal, thus rendering difficult, if not impossible, the estimation of war costs. On the other hand, choosing points more widely separated distorts even more the measurement of war's effect. Moreover, the method produces misleading results because it maximizes the effects of different growth rates across countries and usually imputes high losses to rapidly growing nations.[9]

A third method represents a significant improvement over the others. Three steps are involved: (1) a base period prior to the war is selected, and a trend during this period is established; (2) the trend is extrapolated and serves as a moving base for comparison with actual performance; (3) differences between real behavior and the extrapolated lines are estimated. Figure 1 should facilitate an understanding of the mechanics of the model. The procedure we suggest permits the avoidance of distortions resulting from others proposed.

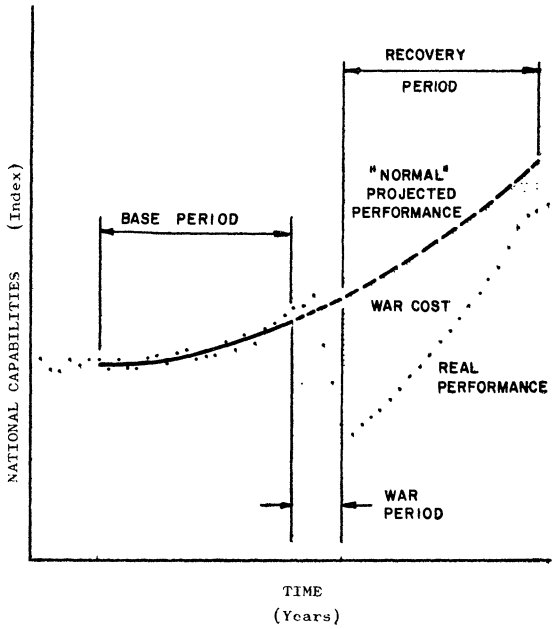

Figure 1. The Costs of Major Wars

Forecasting. Our efforts to extrapolate require additional comment. The attempt to estimate changes over time by extrapolating trends from the base period is obviously a crucial factor since the quality of the projections is of paramount importance. The difference between anticipated and actual behavior rests on where we place the extrapolated line. If the selected series is well behaved with only minor fluctuations from year to year, regression techniques can be used to extrapolate from the pattern established in the base period. These techniques are particularly well suited for time series analysis, provided a variety of tests are performed guarding against violations of assumptions and controls are introduced reducing undesirable effects of fluctuations. However, a number of interrelated questions must be answered: (1) Of what durations should the base period and the projections be? (2) How is one to deal with the abnormalities in periods serving as bases for forecasts? (3) What models should be employed in making projections?

Let us begin with the question of the lengths of base and extrapolation periods. Where a base period is said to end and a recovery period to begin are critical moments to choose. For example, Germany began to arm and mobilize long before the declaration of hostilities in World War II. Italy quit that war long before peace was declared. Such contingencies abound in wars, and adjustments become increasingly arbitrary. To avoid bias, the starting point of conflict for all contenders was judged to be the first full year of active confrontation between two sides. The beginning of the recovery period was judged to be the first full year after belligerence came to a halt.

From these two points, the official beginning of the war and the official termination, we selected a base period of 19 years and extrapolated onward for 20. Our decision was not arbitrary. We were aware that the longer the time segment available to fit the regression line, the more reliable the prediction. On the other hand, the longer the period, the less

[9]See Frank Notestein, Irene Taeuber, Dudley Kirk, Ansley Coale, and Louise Kiser, *The Future Population of Europe and the Soviet Union; Population Projection 1940–1970* (Geneva: League of Nations, 1944), Ch. 3; also Gregory Frumkin, *Population Changes in Europe Since 1939* (New York: Augustus M. Kelley, 1951).

characteristic were the growth trends.[10] Our own selections were made by trial and error. Similar regressions were run for periods of 15, 20, and 25 years prior to the two conflicts in order to determine the stability of results. Those obtained for regressions using a period of 15 years were considerably less stable than those of 20, and regressions using a period of 25 years did not produce improved results. A period of 19 years seemed most suitable, because it provided as much separation as possible between the two world wars and a sample of years large enough to permit the use of at least 16 points in all estimates.

We extrapolated for 20 years. Clearly, a recovery period is difficult to isolate. Some effects of war linger. French resentment simmered for decades after their defeat by Germany in the Franco-Prussian War. German anger and revanchism, after their defeat by the Allies in World War I, produced World II. We are primarily interested in the period when the effects of war are immediate and dominate the behavior of the international system.

Much of the analysis that follows rests on our choice of a forecasting model. We decided that linear models would not serve; they imply that yearly additions to total output are constant. They assume, therefore, a decrease in growth rates as the base expands. Such assumptions seemed invalid; the problem of underestimation is reduced with logarithmic transformations, because constant growth rates can be estimated with an ever-extending base.

To check our choice, we tested the performance of logarithmic adjustments with data unaffected by war from 1870 to 1913. In all cases, the nonlogarithmic projections consistently underestimated the real performance of the nations considered, and outliers systematically increased in the latter part of the series. In all instances better fits resulted from data which had been logarithmically transformed.[11]

One caveat, however, should be made: there is no assurance that the patterns of growth for the period of 1900–1970 which we used for this study are identical to those of 1870–1913 used to test our model. The log model excludes all acceleration of growth rates over time. We know that national growth sometimes undergoes such acceleration.

An additional matter should be raised. Normal growth is essential if one is seeking to forecast the future through extrapolation. Periods between wars are regarded as times when normal growth takes place. This is not the case. Wars are but one kind of disturbance; depressions and revolutions can also occasion havoc with patterns of total output, as did the Great Depression of the 1930s. This economic downturn overlapped the period of recovery from the effects of World War I and the end of the era which served as the base for our projections from 1946 to 1965. No analysis could be carried out unless the effects of the depression were eliminated or at least substantially reduced. The simplest and most efficient way was to omit some outlying points to obtain estimates for nations affected by the cycle. It was impossible and theoretically unacceptable, however, to eliminate all of the effects of the depression, and some of the results show the distortions which originate in this disturbance in the base period.

Nor was the depression the only disturbance in the trends of our base period: two revolutions and accompanying civil wars also created major problems. The disastrous effects of the Spanish revolution and civil war on Spain's economic performance caused us to drop that country from our sample altogether, in spite of our wish not to reduce further the already small sample. The Russian revolution and civil war also had extreme effects on the economic performance of the country. Moreover, data were available only for 1895, 1899, 1913, 1920, and yearly after 1928. Nevertheless, we retained the USSR for compelling reasons: Russia was a critical actor in World War I.

Making the best of the situation, we used the data we had and maintained our procedure of estimation of consequences. Reliability measures were quite good, but it should be clear that results in the Russian case cannot be considered as stable or reliable as other projections.

Projections are not predictions. The fitting of data statistically is not equivalent to predicting how much real output there would have been in the absence of war. Moreover, even the correspondence between estimates and reality is not a final test of the validity of the estimates themselves. As Frumkin reminds us, absurd and unscientific estimates occasionally hit the mark.[12]

[10] Scholars have justifiably cautioned that given the deficiencies in data and models in the social sciences, projections should not exceed 20 years; see Heiss, p. 107; Simon Kuznets demonstrates that growth rates of developed countries remained constant or increased in the last century; see his *Economic Growth of Nations* (Cambridge, Mass.: Harvard University Press, Belknap Press, 1971), Ch. 1.

[11] Kugler, pp. 116–17.

[12] Frumkin, p. 17.

Standardization. Consequences of war as they affect power distribution cannot be estimated merely by the calculation of comparative national losses. Differences in size and rates of growth render meaningless comparisons of absolute losses. Total national capabilities of a country the size of Denmark are smaller than losses of a major power involved in the same great war. Again, identical absolute losses for a fast- vs. a slow-growing nation imply greater absolute losses for the faster growing nation because of its expectation of greater growth. Standardization is obviously required.

We have used three methods. First we constructed an index. Theoretically, the optimal choice of a base year would have been 1930, for it stands at the halfway point in the period under analysis. This was, however, a year of general depression; thus, 1913, the base year established by Angus Maddison who provided us with the original data, was a more useful point of departure, for it was the last year of a very long period of peaceful growth.

We also held constant the size of all nations in our sample to avoid the distortions produced by any changes in boundaries rather than by human or material losses incurred during the war. We dealt with the problem by using throughout the boundaries of 1970. Maddison, whose national product data we used, had followed the same procedure. In his adjustments of his gross national product series Maddison assumed territorial changes to influence output in direct proportion to population changes.[13]

And we chose *years* as our unit of measure in order to cope with differences in size and growth rates among nations. Our estimation however was complicated by the fact that our original index was logarithmically transformed and prevented simple evaluations of losses in time units as deviations from the original regression, because algebraic manipulations could not be applied to them. This difficulty was resolved by reversing the dependent and independent variables in the regression estimates and reducing the resulting residuals to time units.[14] For time is obviously a commodity equally available to all and one that is not affected by growth rates. Thus, when we say that one country has lost or gained 15 years, we mean only that its power resources diminish or increase relative to the performance of that nation in the base period. Because we thought it important to establish negative signs corresponding to losses and positive signs corresponding to gains, the residuals are multiplied by -1.

Independent estimates of normal performance were run for all relevant nations and included the study of each of the wars considered. In all cases, the model was:

Time = a + b log of the index of total output of each nation + error, where Time = 0, 1, 2, . . . , n, where n is the length of the base period.

In this model, the slope and intercept have no significance; only the residuals are important. Two-variables are used in the estimate, and goodness-of-fit measures are not affected when we once again reverse the model to the more familiar function, with total output as the dependent and time as the independent variables.

The Reliability of the Projections. As we have noted earlier, estimates of normal growth after a war depend on stable data for trends in the prewar period. A variety of interrelated statistical techniques was used to determine the reliability of the regression estimates, given the assumptions of that model. The coefficient of determination, R^2 (showing the proportion of total variance explained), was used to estimate the reliability of the trend in the base period. Average values were utilized to establish levels of tolerance for residuals central to the evaluation of costs of war.

Table 1 displays results of major tests conducted. It is evident from a consideration of Table 1 that the coefficient of determination for the period before World War I is consistently in the high nineties, and that only in the case of the United Kingdom and Japan can one obtain an R^2 figure below that level, .80 and .87 respectively. Such estimates are not unexpected, given the behavior of the series in that period. Thus, one could consider projections of normal trends after World War I to be stable and reliable.

Results of World War II, following similar criteria, are less satisfactory. Only after controls are imposed to minimize the effects of depression does the coefficient of determination for most countries rise to the levels reached for World War I. Without such controls, coefficients run as low as .04 for Austria, .30 for the United States. But in the cases of some

[13] Angus Maddison, *Economic Growth in the West* (New York: Twentieth Century Fund, 1964), pp. 194–203; see also Kugler, pp. 31–36.

[14] Thomas Sanders, Lutz Erbring, Department of Political Science, and J. Landwehr, Statistical Research Laboratory, University of Michigan, generously contributed to the solution of this difficult methodological problem. They are not responsible, of course, for any weaknesses of the final product.

Table 1. Measures of Goodness of Fit and Range of Residuals in Base Period

Nation	World War I					World War II					
			Residuals for Base Period 1895–1913 (Years)						Residuals for Base Period 1921–1939		
	Number of Observations	R^2	Max. Loss	Max. Gain	Last Year (1913)	Number of Observations	Depression Years Excluded	R^2	Max. Loss	Max. Gain	Last Year
United States	19	.97	−1.7	2.0	−.9	19		.30			
						16	1932–1934	.66	−6.2	4.6	2.6
West Germany	19	.99	−1.0	1.0	.7	19		.76			
						16	1931–1933	.87	−4.5	2.7	−1.9
United Kingdom	19	.80	−6.0	5.2	−.1	19		.83			
						16	1931–1933	.84	−2.9	2.3	−2.3
Japan	19	.87	−4.1	5.0	−.3	19		.92	−2.4	2.6	− .7
						–	none	–	–	–	–
USSR	3		Special Estimate			19		.98			
						16	1931–1933	.98	−1.3	1.5	.7
Italy	19	.96	−2.4	1.9	−.6	19		.80			
						16	1931–1933	.80	−4.2	3.3	.8
France	18	.92	−2.4	2.7	1.2	19		.56			
						16	1931–1933	.56	−5.1	5.5	4.5
Belgium			Data Unavailable			19		.65			
						16	1931–1933	.67	−5.1	5.5	4.4
Denmark	19	.98	−1.5	1.3	.6	19		.95			
						16	1931–1933	.95	−2.8	2.2	.3
Sweden	19	.98	−1.8	1.5	1.4	19		.89			
						16	1932–1934	.93	−2.5	2.1	.1
Switzerland			Data Unavailable			19		.79			
						16	1931–1933	.79	−3.6	4.8	3.0
Canada	19	.97	−1.6	2.3	.6	19		.37			
						16	1932–1934	.59	−5.9	6.1	3.2
Australia	19	.96	−2.4	1.8	.4	19		.56			
						16	1931–1933	.79	−5.0	6.4	1.1
Netherlands	14	.96	−1.3	1.1	.7	19		.75			
						16	1932–1934	.78	−4.0	4.4	2.4
Norway	19	.95	−2.2	2.3	2.3	19		.98			
						16	1931–1933	.98	−1.2	2.0	.1
Czechoslovakia			Not a Nation			17		.47			
						14	1933–1935	.61	−6.8	3.4	n.a.
Hungary			Not a Nation			15		.65			
						12	1931–1933	.72	−3.4	3.7	n.a.
Yugoslavia			Not a Nation			19		.80			
						16	1932–1934	.83	−4.9	3.9	.1

nations considered, even after controls are established, the coefficients remain low: Austria (R^2 = .17), France (R^2 = .56), Canada (R^2 =.59), Czechoslovakia (R^2 = .61), the United States (R^2 = .66), and Belgium (R^2 = .67). Such evaluations require exegesis.

Austria's performance is explained by her troubled history in the postwar period: Austria-Hungary was dismembered after World War I; the economic depression was particularly acute; there was civil war; and finally, Austria was absorbed by the Third Reich. A stable estimate was not possible. Therefore, Austria was dropped from the sample. France also represents a special case. French growth was very slight in the interwar period, and the regression estimate, while producing a good fit, was statistically not significant because it was close to zero. The remaining low correlations show the effects of the depression of the 1930s. Although the impact of the economic catastrophe is minimized when outliers are removed from the calculations, it is plain from Table 1 that the effects of the depression are still visible; residual values of maximum losses reach −12.3 years in the case of the United States when no controls are imposed and are cut almost in half, to −6.2 years, when three outliers are deleted.

The residuals in our table indicate three points: (1) estimated trends are more reliable for the period prior to World War I than for that before World War II; (2) we expect that the performance of nations over time in the sample will not depart more than two or three years from the projected line during the period covered; (3) the sharp improvement in values in the last year of observation suggests that the forces depressing the economies of the nations considered were being overcome.

One more important item should be noted. Because the information contained in the residuals was so crucial to this study, some additional tests were carried out. In the base period for World War II, some residuals were high when previous values were high. These traces of tracking, however, were sharply reduced when the outlying points for the depression years were eliminated. This operation considerably increased our confidence in the accuracy of the regression model designated.[15]

Choice of Test Cases

In discussing problems connected with the measurement of war consequences, the choice of conflicts to be used is vital. If results are to represent what actually happens as a consequence of war, test cases must be representative as well. Since it is not possible to draw a representative sample of conflicts, it is important to choose those which maximize opportunities for the behaviors we wish to study to surface. If, as the results of such extreme tests, consistent patterns do not occur, we could at least assert with confidence that different findings were not likely to be obtained in less extreme cases.[16]

Thus, our choice of wars to consider could not be arbitrary. We sought two conditions: (1) wars whose contestants were totally committed to victory; otherwise, we would not know if the actual victors would have won had the vanquished made a more serious effort; (2) wars whose consequences were not altered by the interference of other powers. We looked for wars in which the nations which appeared to be victors and vanquished were so in reality, to insure that the consequences ascribed to victory and defeat were properly matched.

Some categories of wars had thus to be excluded: wars between small powers and limited wars did not offer conditions suitable for the testing of our propositions. Even assuming that small countries fought as devotedly as possible, one could not be certain that the consequences were not determined by the behavior of nations not directly participating. The Middle East offers a good illustration of this difficulty: Egypt, Syria, Jordan, and Israel have been combatants in several all-out wars over the years. All contestants have fought to the limits of their strength. Yet the losers have always alleged that the outcomes and consequences were chiefly influenced by the interference of outside interests, specifically, the United States and the Soviet Union. Consequently, such conflicts do not provide adequate tests for our hypotheses.

Limited wars are equally if differently perplexing. In such conflicts, one or both sides limit their efforts and their objectives. Outcomes, therefore, demonstrate only what the contestants actually accomplished, not what they might have achieved had they committed themselves fully to the fight. We must select for testing wars sufficiently important and hard-fought to eliminate possible suspicion that the

[15] See Kugler, Ch. 4 and App. III.

[16] This procedure was used by economists in the study of economic depressions. See Arthur Burns, ed., *The Business Cycle in a Changing World*, 2nd ed. (New York: National Bureau of Economic Research, 1969), pp. 3–53.

combatants were not exerting maximum efforts. Limited wars, therefore, do not make good test cases for our propositions.

We have chosen for consideration conflicts[17] in which the contestants on each side included at least one major power as an active participant, for wars involving great powers can be expected to be massive undertakings, and their outcomes are not easily influenced by external forces. We also insured, in two ways, that the great powers were themselves completely committed to the struggles. We stipulated that wars chosen should show a quantum leap in the number of battle casualties, by comparison with the carnage produced by any previous war. We further insured that the commitment of all combatants was absolute by selecting wars on whose outcome depended loss of territory and/or population.

The availability of data is a final and indispensable criterion in the selection of wars suitable for the testing of our proposals. Lack of data has been a problem besetting most rigorous studies of international politics. Only very recently has research made available reliable time series data, in a small number of areas, going back to the end of the nineteenth century. Such series, however, are still very rare; quality and availability drop virtually to the vanishing point when material occurring in the period prior to 1900 is at issue.[18]

The stringent theoretical and data requirements reduced to a very small number the sample of utilizable wars. Although the Napoleonic Wars and World Wars I and II meet the theoretical criteria we have established, only for the latter pair have we time series data at frequent enough intervals and of high enough quality to permit the analyses we wished to undertake. Here, therefore, we must raise the question of whether or not the analysis of two wars can be more generally representative than the examination of simply two case studies, with all the limitations this approach has on the drawing of broad inferences beyond the cases themselves.

We think that the results of this study should be considered sources of significant generalization because, although the number of wars we analyze is extremely small, the sample of 31 cases we observe is adequate. These cases are observed throughout the two most terrible wars in history and include most of the countries of the central international system. Moreover, the two great wars we examine are those which offer the best opportunity for testing our propositions. The reduction of our area of study to two wars undoubtedly has sharply restricted the nature of the inferences that one might wish to make. On the other hand, the process developed allows tests on a much enlarged sample as soon as improved theory, methodology, and data permit it.

Actors

Some would argue that in the study of war one does not learn much of value if sole attention is given to the behavior of nations, and that other levels or kinds of analysis are more appropriate. In some cases, one might justifiably prefer to concentrate on units of analysis other than nations. Were one interested in questions related to causes and outcomes, particularly the former, it might be meet to observe the views and behavior of military leaders, politicians, diplomats, industrial and labor officials, and mass publics. However, if one is interested in the effect of victory and/or defeat in war on the distribution of international power in postwar periods, this is not the case. Here decision making and the behavior of individuals play an inconsequential role; the nations are the only actors.

Casting nations as uniquely relevant actors poses its problems. In order to compare the performance of a country before and after war, one must be certain that one is comparing the behavior of the same entity over time; otherwise, differences in behavior would legitimately be ascribed to the fact that the entity itself is different. The problem inherent in this kind of comparison is that nations are not as stable over time as one could wish. Ideally, one would expect a nation to have as a minimum: (1) a fixed territory and population; (2) governmental sovereignty over both; and (3) the formal diplomatic recognition of most of the international community. Reality is different

[17] We accept Quincy Wright's theoretical definition of war as "the legal condition which equally permits two or more hostile groups to carry on conflict by armed force," in *A Study of War*, abr. ed. (Chicago: University of Chicago Press, 1964), p. 7; and we further accept the operational definition of Lewis Richardson that any conflict resulting in the death of approximately 300 people can be considered a war. Since our concern is with international war we utilized the list of wars between 1815 and 1965 provided by J. David Singer and Melvin Small in their *Wages of War, 1816–1965: A Statistical Handbook* (New York: Wiley, 1972), pp. 17–19, 30–32, and 58–70.

[18] The bulk of the capability data for our study comes from Angus Maddison, "Trends in Output and Welfare," unpublished manuscript, 1972. The gratitude of the authors goes to Dr. Maddison, who generously allowed us access to a data set, as yet unpublished, which made this study possible. For a complete data set see Kugler, App. II.

from the ideal. Nations shrink and expand, established countries disappear, and new ones appear in their places. Some are administered, at least in part, by international bodies, while still others make a token effort to supervise populations and territories within their legal jurisdiction but in fact are regulated by rebel groups prompted by authorities operating abroad. Increasingly, this reality has been recognized;[19] the most exhaustive list of nations compiled to date has been established on the premise that not all the elements of sovereignty, territorial continuity, and international recognition need be present all the time.[20]

In seeking the cast of nations whose performance we should measure, it was clear that it should incorporate all belligerents in World Wars I and II, with a group of nonbelligerents serving as a control group. We began with the comprehensive list of belligerents compiled by Singer and Small in their classic data-gathering effort, *The Wages of War*, to which we added, as an initial massing for a control group, all of the nations in existence at the time of the conflict under study which had not participated in it.[21]

The first list had to be pared. We immediately eliminated from our sample all nations that were not developed,[22] since there was no way to estimate their power satisfactorily. A number of combatants in the two wars had to be dropped from our consideration for this reason. This category is unfortunately long, including Mongolia, Bulgaria, Rumania, Ethiopia, Greece, Brazil, and Turkey. On the other hand, South Africa, New Zealand, Poland, and Finland were eliminated from the study because data were inadequate.

We also had to take into account the fact that Australia, Norway, Germany, Japan, and Austria were not totally free and independent for part of the period important to this study. Australia had not achieved dominion status; Norway had not been separated from Sweden. *De jure*, therefore, they were not free, although they were free in fact and in action. Finally disregarding their legal status, we treated them as free and independent units. Germany and Japan were not free because of their occupation after World War II; Austria was annexed by Germany before the onset of that war. For our purposes this inhibition could be devastating: loss of freedom of action was not important if it occurred during a war, but a nation under the control of one or more other nations either before or afterwards might lack independence in the allocation of its resources; this, in turn, could be a factor influencing its prewar pattern of growth or its recovery period. We decided that there was no reasonable way to establish control for the possible data distortions due to foreign occupation and determined simply to consider as continuous units all nations which recovered their identities after occupation. Germany and Japan were included without giving weight to their occupation periods. This sample was further reduced when we lost Spain and Austria because reliable estimates could not be generated.

The Analytic Groups: Belligerents/Nonbelligerents; Winners/Losers; Active/Occupied. Having assembled our basic components, we divide our cast into belligerents and nonbelligerents, winners and losers, both active and occupied. First, a distinction must be made between nations which were belligerent and those which were merely hangers-on, always present in major coalitions. This determination is not easy to make. Argentina, for example, declared war on the Axis in the waning days of World War II. She never dispatched a soldier to the war area, and for most of the war her sympathies were clearly with the opposite side. Was Argentina a belligerent? Brazil is another case in point: she sent only a minuscule force to fight, and her principal contribution was permission to use an air base for refueling planes destined for Africa. How is one to separate the belligerents from the countries whose behavior ranged from total neutrality to one of merely symbolic participation?

Much the same kind of difficulty presents itself within the category of winners. The position of France in World War II is an example of this problem: for much of the war France was fully occupied by Germany. Yet France began and ended that war on the side of the winning coalition. Was France a winner, in the same sense as England, the Soviet Union, or the United States can be thought winners? One would be forced to reject such a notion. The same distinction separates losers. Italy began the war on the side of the Axis, but switched

[19] See Deutsch, p. 70; John Herz, *International Politics in the Atomic Age* (New York: Columbia University Press, 1959), p. 104.

[20] Singer and Small, pp. 58–90 and Bruce Russett, J. D. Singer, and Melvin Small, "National Political Units in the Twentieth Century: Standard List," *American Political Science Review*, 62 (September 1968), 932–51.

[21] Ibid.

[22] Wherever more than 50 percent of the working-age males were in non-agricultural pursuits, the country was considered developed.

allegiance in the middle, and ended as a member of the Allied forces. Is Italy to be construed a winner or a loser?

Operational distinctions such as those above require definitions which clarify any ambiguities arising from the theoretical conceptions; thus the following definitions of the analytic groups:

1. Belligerent nations are those whose participation in the conflict resulted in military losses of 5000 troops.

2. Nations whose strict neutrality or symbolic participation resulted in losses of less than 5000 troops were considered nonbelligerents.

3. Nations still fighting in the final third of the conflict on the same side as at its beginning were classified as active belligerents.

4. Belligerents which in the last third of the conflict were no longer members of the coalition they had joined at the beginning were classified as occupied belligerents.

5. Nations that retained all their territories or extended them immediately after a conflict and as a direct result of that conflict were considered winners. The rational support for such a definition is plain: no victor in a major war would tolerate the loss of any territory under its jurisdiction.

6. Loss of territory would be construed as the behavior of a loser. Even transfer of territory, with full compensation made for that loss, is considered an overt sign of defeat; for no victor would submit to such terms, and only a loser would have no alternative.[23]

The analytical groupings that we use from different combinations of our three fundamental dichotomies—belligerent/nonbelligerent, active/occupied, and winner/loser—do not exhaust all the logical combinations one could explore. They do, however, satisfy the theoretically interesting possibilities for the analysis of war. Such groups can be most simply and elegantly expressed in the theoretical language of set theory:

Active Belligerent Winner $= B \cap (O \cup T)^C$
Active Belligerent Loser $= B \cap T \cap O^C$
Occupied Belligerent Winner $= B \cap O \cap T$
Occupied Belligerent Loser $= B \cap O \cap T$
Nonbelligerent $= B^C$

The above can best be represented in a Venn diagram (Figure 2).

We are also interested in an additional distinction that crosses all the analytic groups we have established. We should like to explore the consequences of war for major powers as well as for the entire group of nations; we should also like to analyze the consequences of both wars and then, individually, for each of the two wars. The reason for this attempt to disaggregate is that our sample is so small that it is imperative to see whether or not the patterns of behavior we find are a by-product of our aggregation and, as such, not present when disaggregation occurs. Two points need emphasis, however. First, we do not wish to disaggregate at the level of individual nations. Second, the results of disaggregation are not

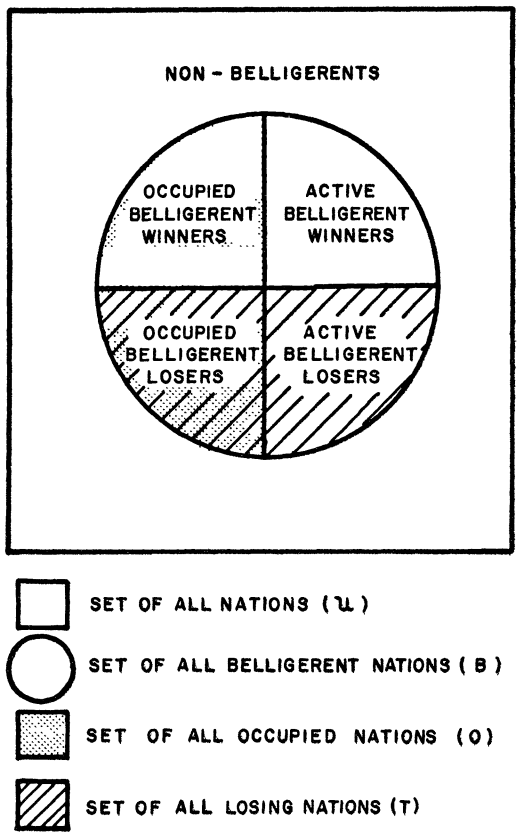

Figure 2.
Venn Representation of Analytical Groups

[23]Charles Kindleberger, "International Political Theory from the Outside," in *Theoretical Aspects of International Relations*, ed. William Fox (Notre Dame: Notre Dame University Press, 1959). Our operational indicator of a loss in war is based on the observation that winners in the past have extracted from losers some territory, while never giving up any of their own. We assume, but have no evidence, that losers would have exacted territory from their adversaries had they won the war and cannot rerun the conflicts to see what would have happened had the outcome been reversed.

independent findings for they are based on the same sample.[24]

The distribution of our total cast of nations into analytic groups discussed above can be seen in Table 2. The sample of 18 nations and 31 cases respectively was the very best we could assemble given our theoretical constraints and the lack of data. It is scant, but sufficient for the research we wished to undertake.

Theoretical and Empirical Propositions

Theoretical Propositions. To many observers, the power position of members of the international system seems obviously influenced by their choice to participate in conflict and by their fortunes in war. Most scholars and practitioners have believed that it made the greatest difference to the power of a country in the modern age whether it won or lost a war. Very few disputed this view.

In our effort to separate the long-run from the short-run consequences of war and to present, in an approximate way, the distribution of opinion, three important theoretical propositions, with different short- and long-term results, seem to emerge.

The first proposition asserts that in the short run the movement of power between winners and losers creates a pattern much like the gradual opening and then closing of a pair of scissors. J. M. Keynes maintained that the gap which developed between winners and losers as a result of war would continue to increase for a short time in the future and the losers would fall behind at an ever-growing rate. Interestingly enough, Keynes also thought that in the long run, losers laid waste by economic ills would contaminate their partners in trade and bring chaos to the entire system. Thus, the winners would move downward to join the losers, and the gap between them would tend to disappear.[25]

[24]Our results are not simply the effects of the aggregations. The number of nations in each of our major analytic categories is very small; however, the number of points used in our base period in order to make our calculations is quite adequate. Conscious that aggregations inevitably distort results, we inspected the behavior of each of the countries to see if their individual performance *deviated widely* from the performance of the analytic groups, and we found that this was not the case. Moreover, similar behaviors of the analytic groups is found in partition after partition making clear that aggregation does not cause the results obtained.

[25]John Keynes, *The Economic Consequences of the Peace* (New York: Harcourt, 1920). For discussion of the short-term effects of wars on belligerents, see United States Strategic Bombing Survey, *The Effects of Strategic Bombing on the German War Economy* (Washington, D.C.: Government Printing Office, 1945); cf. also, *The Effects of Strategic Bombing on*

Table 2. Final Sample of Nations Used in the Analysis

	Active Belligerent Winners	Active Belligerent Losers	Occupied Belligerent Winners	Occupied Belligerent Losers	Nonbelligerents
Australia	I & II[a]				
Belgium			II		
Canada	I & II				
Czechoslovakia				II	
Denmark			II		I
France*	I		II		
Germany (West)*		I & II			
Hungary		II			
Italy*	I	II			
Japan*		II			I
Netherlands			II		I
Norway			II		I
Sweden					I & II
Switzerland					II
Russia (USSR)*	II	I			
United Kingdom*	I & II				
United States*	I & II				
Yugoslavia			II		
Total WWI	6	2	–	–	5
Total WWII	5	4	6	1	2

[a]I = World War I; II = World War II; * = Major Powers.

A second view suggests that as a result of war all nations lose national power, but the winners do not lose as much as losers, and the gap thus created between victors and defeated nations continues for a lengthy period of time. Norman Angell was a supporter of this notion.[26]

A third proposition, advanced by A. F. K. Organski, asserts that while it is indisputable that losers suffer a good deal more than winners and are in a much worse position immediately after conflicts, levels of power distribution return reasonably soon to the patterns they would have followed had no war taken place. The mechanics of the change work in approximately the following way: After their defeat (and the plummeting of their capabilities) losers accelerate their recovery. Winners, in the wake of victory, show a rate of recovery in capabilities depleted by war which is substantially slower than that of losers. Neutrals are not affected. Within a relatively short period of time, all nations return to the levels of national capabilities they would reasonably expect to hold had there been no war. There is a convergence of winners and losers; the major reason for this seems to be the speed with which the losers recover. They appear almost literally to rise from the ashes of their defeat.[27] There is a "phoenix factor" at work.

Empirical Propositions. Let us phrase our empirical propositions in the precise operational language of this study. We have eight hypotheses: The first four represent short-range expectations; the second four represent long-range expectations. Our propositions for short-range effects are:

H_1—Belligerent countries that emerge as winners of major wars gain in power; nonbelligerent countries retain their antebellum power patterns; belligerent losers suffer substantial power losses.

H_2—In the period immediately after a war, belligerent winners and nonbelligerents retain antebellum power patterns; belligerent losers suffer substantial power losses.

H_3—After major wars, all belligerent countries suffer major losses in their power capabilities; nonbelligerents retain antebellum power patterns.

Our null hypothesis is stated thus:

H_4—After major wars, the power patterns of belligerents and nonbelligerents are not affected in a systematic manner.

Our propositions for long-range effects are:

H_5—All groups involved in war suffer long-range losses of power and do not regain power patterns at levels established before the onset of major conflicts.

H_6—Belligerent winners and nonbelligerents retain antebellum levels of growth; power cleavages between belligerent winners and nonbelligerents, on the one hand, and belligerent losers, on the other, are rapidly erased by the accelerated recovery rate manifested by losers.

H_7—Differences which result from victories and defeats in major wars are maintained or even slowly increased; thus, the immediate postwar gap between belligerent winners and nonbelligerents, on the one hand, and losers, on the other, is maintained or possibly enlarged.

Our null hypothesis for long-range expectations is:

H_8—The postwar patterns of all groups considered are not affected in a systematic manner as a result of war.

Two final points: it should be clear that in order to test our propositions about long-range effects, the null hypothesis for short-range expectations must be disproved. Second, the two sets of hypotheses, as well as the theoretical propositions that precede them, do not represent all the logical possibilities, but do summarize the views expressed in the literature regarding the outcomes of war and the effects of these outcomes on power distribution.

Now let us turn to what we have found.

Findings

We first wish to examine the behavior of the entire sample; then, in order, that of the subset of great powers taken together; and then that of both for each war taken separately. Had our sample of countries and wars been larger, the performance of all countries taken together would have offered evidence of the kind of behavior we could expect from winners, losers, and neutrals as a consequence of even a major war. However, due to the smallness of the sample, it seemed wise to explore, as deeply and broadly as possible, how important subsets of the total sample behaved. It is important to note that while each of the partitions of the

Japan's War Economy (Washington, D.C.: Government Printing Office, 1946).

[26] Two works argue at length that there are enormous permanent losses as a result of war. See Norman Angell, *The Great Illusion* (New York: Putnam, 1933), and John Nef, *War and Human Progress* (Cambridge, Mass.: Harvard University Press, 1950).

[27] For the effects of war on belligerent populations, see United Nations, *The World Population Situation in 1970*, Population Studies No. 49 (New York: United Nations, 1971).

total sample is separately and discretely observed, they are not independent, since the sample is identical for all.

The first partitions permit us to see the behavior of all nations in both wars. Only three of our analytic groups (active belligerent winners, active belligerent losers, and nonbelligerents) are considered. Occupied belligerent winners and losers are excluded because, by our definition, there were no occupied countries during World War I.

The results (Figure 3) show that in the first two postwar years, belligerent winners and nonbelligerents lose from 1.5 to 3.5 years. The deviation of both groups from expected performance is minimal. Active belligerent losers, however, suffer losses in a comparable period of 20.4 to 21.6 years. The difference between the two groups is substantial: 19 years.

In the long run, the nonbelligerent nations retain growth rates characteristic of their prewar performances. Active winners incur an average deviation of about three years from the zero line, indicating that losses suffered after postwar demobilization are maintained. Among active belligerent losers, however, the Phoenix phenomenon manifests itself. Losers begin and maintain a steadily accelerating recovery rate after the war and overtake the winners in the eighteenth year of the postwar period. At the conclusion of that period, differences in power distribution among all groups have been eradicated; levels of power return to points one would have anticipated had no war occurred.

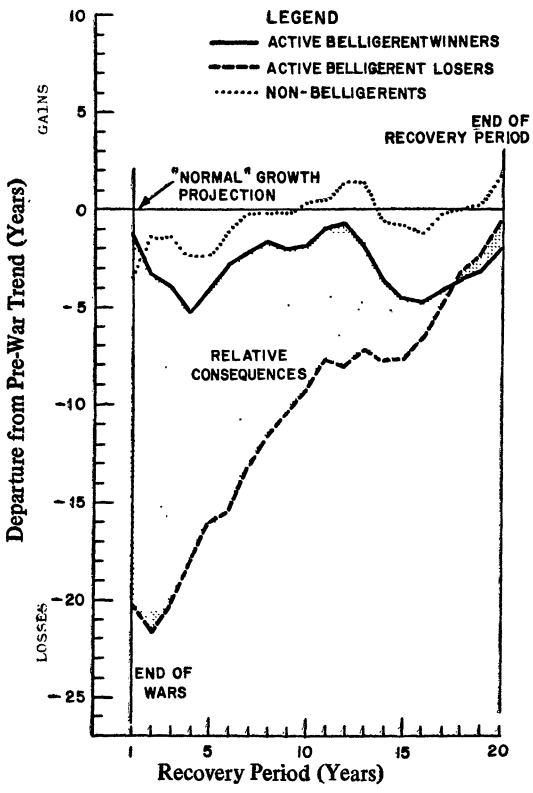

Figure 3. Partition I: General Consequences
Sample: All Nations, Both Wars

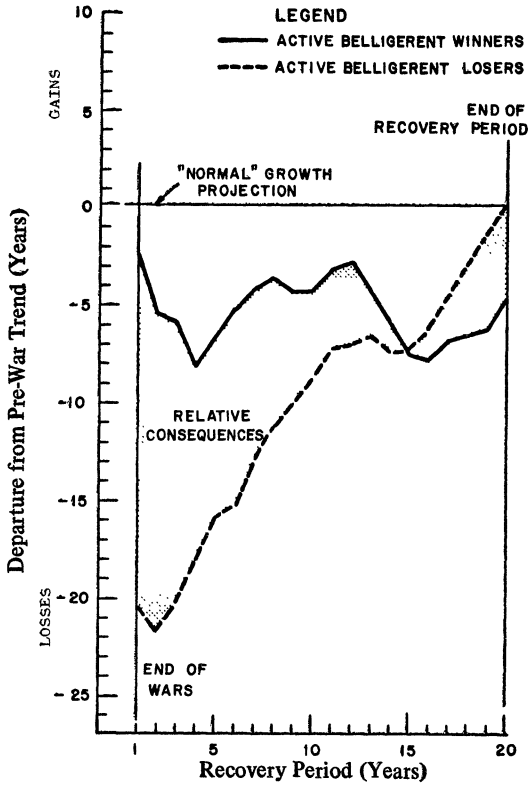

Figure 4. Partition II:
Major Power Consequences
Sample: Major Powers, Both Wars

Thus, the results we obtained strongly support hypotheses two and six.

In testing the second subset of actors in our breakdown, the behavior of the great power system over two wars, the results are very much the same (see Figure 4). Only active belligerent winners and losers are considered, for none of the great powers was neutral in World War II. Active winners begin with a two-year loss immediately after the war, then recover briefly, only to slide away once more. Overall, their performance is below expected levels and is heavily influenced by depressions in the interwar period. However, the trajectory as a whole reveals no loss in relation to prewar capabilities.

The active belligerent losers, on the other hand, suffer a 20-year loss immediately after the war, but recover rapidly, overtaking the winners in the fifteenth year. After this point, both groups resume previous patterns.

Hypotheses two and six are confirmed again by a study of the composite data of the great powers for both wars. In our next four operations, we partitioned our sample to show the performance of the entire system and the subsystem of great powers for each world war.

Our third partition permits us to observe the behavior of the entire system after World War I (see Figure 5). In the short run, nonbelligerents appear slightly affected during the first year after the war, but remain within one year of the zero line during the second. The active belligerent winners incur losses of from five to seven years right after the conflict. Active belligerent losers suffer losses of from 21 to 25 years. Winners lose, but losers suffer four times more severely. There can be no doubt that in the short run, there are serious power consequences both to winners and losers of major wars. Again, the evidence in large part supports hypothesis two, although active belligerent winners do suffer markedly.

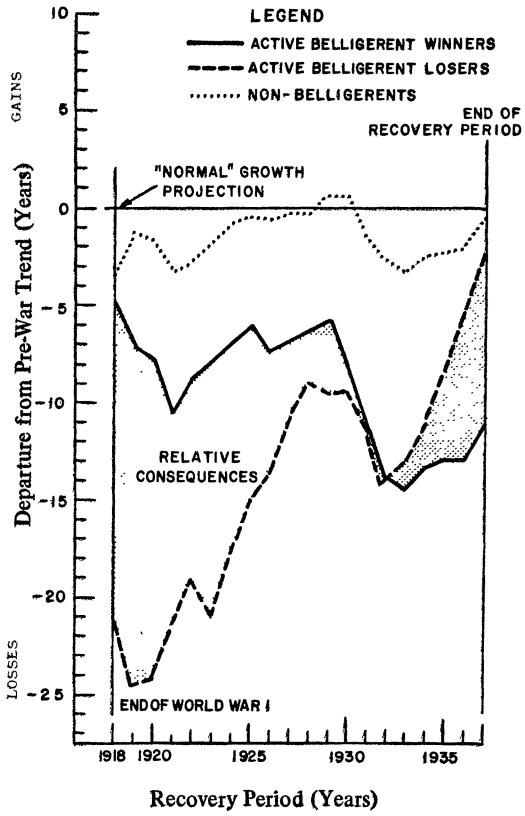

Figure 5. Partition III: World War I Consequences Sample: All Nations, World War I

The evaluation of long-term consequences is intimately related to the effects of economic depression. Consider first the initial 12-year period after World War I. The characteristics described in hypothesis six are supported. Active belligerent winners recover very slowly from war effects; nonbelligerents retain previous growth patterns; active belligerent losers, after the immediate postwar period of heavy loss, display a substantially faster rate of recovery than winners. Then the Great Depression strikes and, within two years, performances of all groups are diminished. Belligerents, however, seem to suffer more than nonbelligerents. After 1933, predepression trends reestablish themselves, but the subsequent period is too short for adequate evaluation.

The great power system during World War I behaves in much the same way described for the sample as a whole (see Figure 6). Active belligerent winners fare slightly worse than the whole sample, but differences are so marginal that we feel secure in concluding again that the results support hypotheses two and six. We draw this conclusion despite the disruption caused by the depression. The graph shows the depression to be a major factor in distorting the recovery patterns of all countries taken together, not merely for World War I but for both conflicts. Moreover, the depression is also a major reason why our projections for the period following World War II are so weak, underestimating egregiously the growth trends (see Figure 7).

In our fifth partition, all major analytic groups are represented for World War II. Some of these representations, however, are so tentative that one needs to take the information they convey with caution.

The consequences of World War II on power distribution, in its immediate aftermath, are much as expected. In the first year, active belligerent winners are slightly ahead, but move toward the zero line in the second year. Nonbelligerents are slightly below the zero line but move to points within tolerance limits (two years for this partition) in the second year. Active belligerent losers suffer substantial losses, between 16 and 17 years, in the first 24 months after the war, and the occupied belligerent winners lose from 11 to 14 years in the same period. The differences of loss between

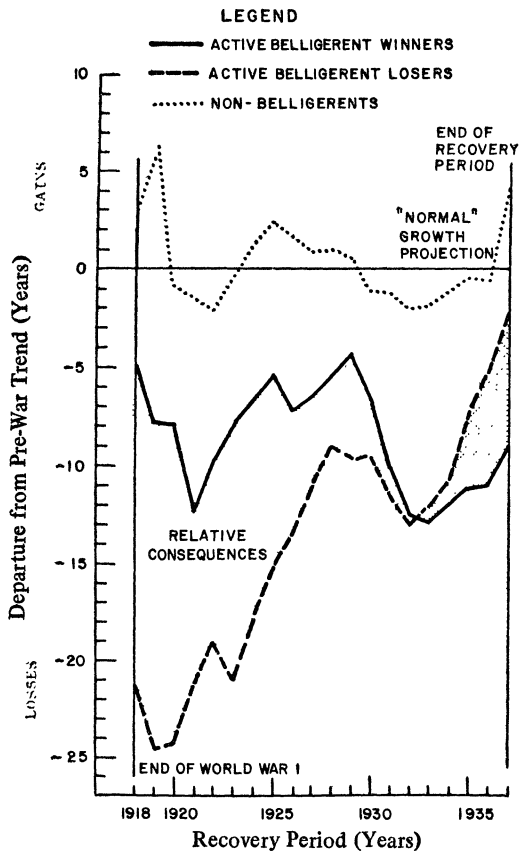

Figure 6. Partition IV:
World War I Major Power Consequences
Sample: Major Powers, World War I

active winners and active losers range from 21 to 23 years in the initial period.

In the long-run analysis we find, for the first time, evidence to support the proposition that the gap between winners and losers can continue instead of closing.

A number of points should be made. The logarithmic projections seriously underestimate the growth of the system. An indication of this is to be seen in the fact that nonbelligerents make increasing gains over time, indicating that prewar patterns distorted by the depression are not a good indicator of the behavior of the group as a whole in the period after World War II. In some part, however, as Kuznets suggests, economic growth since 1945 is due to a liberalization of trade in the industrial world and is therefore unexpected.[28] It is our impression that a more accurate projection of growth trends would place the zero line approximately where one finds the trajectory for the nonbelligerents. In any event, our main concern is with active winners and losers, and we must first establish that distortions in the pattern do not, in that respect, affect relative calculations. Over the entire period, the active belligerent winners maintain a constant but slight edge over nonbelligerents amounting to about three years. Absolute differences between winners and losers are not distorted by the acceleration of recovery rates.

One should note that here, too, active losers enjoy a sharply accelerated recovery pattern and regain the prewar level of growth within the stipulated period. They do not actually close the gap between themselves and the winners because of: (1) the acceleration of the entire system; (2) a decided deceleration in recovery in the last five years of the period,

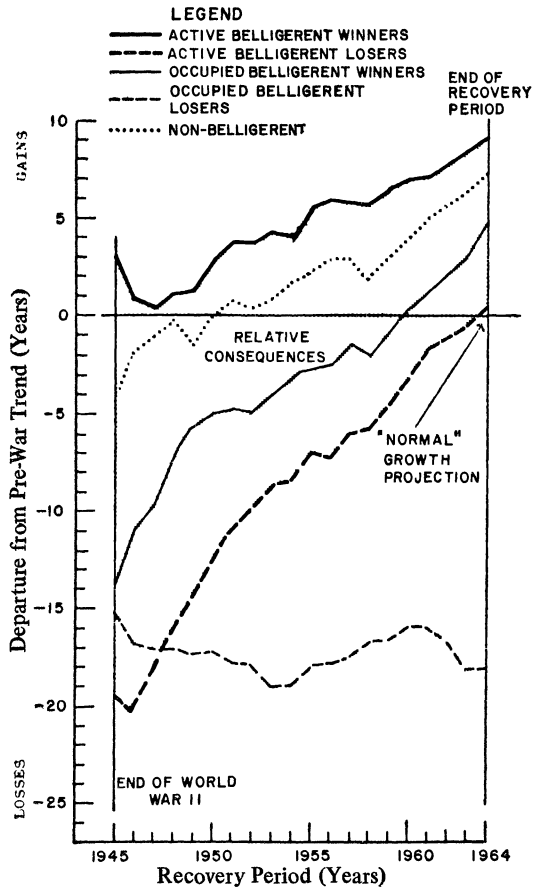

Figure 7. Partition V:
World War II Consequences
Sample: All Nations, World War II

[28] Kuznets, p. 43.

which may have caused an absolute loss of from five to eight years.

Nevertheless, a gap of roughly nine years remains at the end of the recovery period, and one might argue that we have, as a result, evidence supporting hypothesis seven, that winners maintain the advantage they gain from victory over the long-run.

The remaining analytic groups behave in interesting ways. The performance of occupied belligerent winners is somewhere between that of active winners and losers and follows closely the performance of the former. Occupied belligerent winners regain prewar rates in 15 years, surpass them, and come close to convergence with winners at the end of the recovery period.

Since only Czechoslovakia falls into the category of occupied belligerent losers, one obviously cannot refer to "findings" in observing the behavior of one country. But one should note that the matter merits investigation when sufficient data become available; for if other occupied belligerent losers behave as does Czechoslovakia, we may have identified the real losers in major wars—the nations which do not recover. It is possible that we have also identified the conditions necessary to support an alternative hypothesis to those advanced here. This may be significant. In all the analyses so far offered, we have discerned only marginal differences in the long-range consequences of victory and defeat on the power distribution of the system. However, if the case of Czechoslovakia is a true indication of what obtains for other occupied belligerent losers, it would then be clear that had the victors insisted on occupation, exploitation, and repression of defeated populations, our findings would be dramatically different. It may be that victors can delay the recovery of the vanquished by occupation and repression. For example, if Hitler, with his plans to depopulate and exploit his victims, had won the war, the vanquished might not have recovered. Had Hitler been victorious, hypothesis five might have been sustained.

Be that as it may, the results of the fifth partition should not be viewed separately, but rather must be compared with those of partition six (see Figure 8) for the deviations disappear when one observes only the subsystem of great powers in World War II, which behaves entirely in consonance with the expectations of hypotheses two and six. In the short term, active belligerent winners suffer no loss, occupied belligerent winners and active belligerent losers, suffer a loss of 20 years of "normal" growth in the first two years after the war's

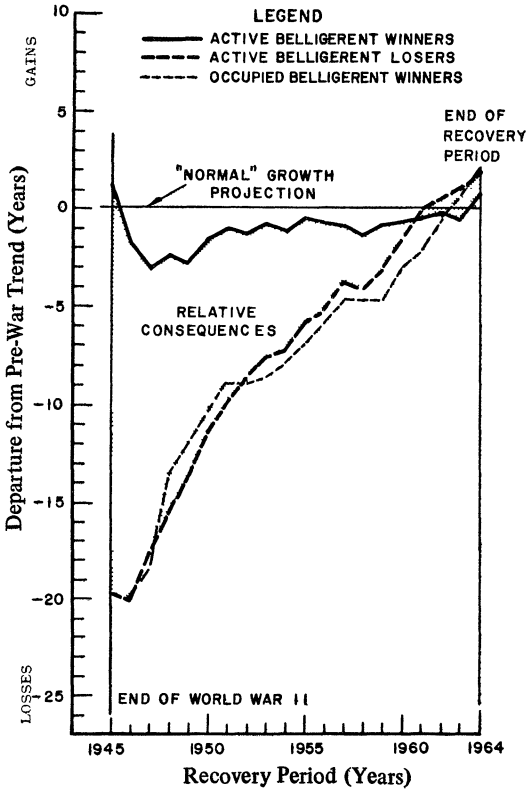

Figure 8. Partition VI: World War II Major Power Consequences Sample: Major Powers, World War II

end. The relative differences between active winners and the latter two categories in this period are 20.9 and 18.1 years respectively. Evidence on long-term effects fully supports hypothesis six. Active winners maintain expected growth patterns, while active losers accelerate recovery rates and overtake winners in the sixteenth postwar year.

How is one to reconcile these results with those obtained when examining the behavior of the total sample? Some explanatory points should be considered: the differences noted across the two partitions are not rooted in the behavior of all our analytic groups. The behavior of the active losers and occupied winners changes only slightly from one partition to the other. It is also plain that the logarithmic model we chose projected accurately the performance of great powers in the period after World War II. Not projected accurately, therefore, are the behaviors of the smaller winners. Their unprecedentedly rapid growth inflates the performance of the entire sample.

The Phoenix Factor

Most unexpected and interesting is the discovery that after wars the active losers catch up with winners in comparatively short order, and that the system of international power begins to behave as one would have anticipated had no war occurred. We cannot explain the phenomenon; we do not know why losers rise from the ashes as they appear to do.

We can, however, make some surmises. It is plausible to believe that structural elements may play a part. For example, favorable occupational distributions may help to accelerate recovery rates, as may the destruction of obsolescent plants and industrial equipment. It is probable that attitudinal factors may also play a significant role in increasing the pace of recovery. A defeated but economically developed population living in the midst of destruction will recall the antebellum status quo and be motivated to rebuild. So motivated a populace would have the technology to make an economic system function well. It is also plausible that the defeated population would exert a greater effort to recover than that of a victorious country—the latter more intent on enjoying the spoils of war. The necessity for work and sacrifice is evident to all members of a vanquished society. Charles Tilly found, for instance, substantially fewer strikes in Italy and Germany for a time after World War II than in England and France.[29]

These reasons are credible, but we have no assurance that any of them is accurately to be judged responsible for hastening the recovery rates of defeated nations. We do know, however, that one aspect widely believed to be influential had little if any effect. Losers do not rise from the ashes because winners pick them up and help them to their feet. Were this true, it would completely overturn the results we have obtained. For if losers could not recoup their losses without aid, the gap between them and winners would remain if an active winner refused this kind of assistance. This would support the continuing-gap proposition, one of the possibilities previously hypothesized. The point was of major concern, and we tested it with two propositions. First, we were interested to discover whether or not aid was positively associated with the recovery of the recipient and, second, whether or not a large-scale foreign assistance effort does start recovery on its way, as some economists believe.

[29]Charles Tilly, personal communication to the senior author.

Our test was simple: since the United States was the major source of aid after World War II, and since such help was dispensed annually between 1948 and 1961, we compared the amounts of aid given by the United States, in totals and per capita, with the relative growth rates of the recipients—Japan, Germany, Italy, the United Kingdom, and France.[30]

Had there been a direct relationship between aid and recovery, and if one controlled for population, growth rates would show increases as a result of aid. Had aid intensity been a factor one would also expect that growth rates would show strong gains after those years when recipients received particularly large gifts. Because we are dealing with time series data we replicated each evaluation controlling for possible linear influences of time. Table 3 displays the connection between United States aid and the recovery rates of the beneficiaries.

From a consideration of the above figures, we can determine only the weakest association between external aid and recovery; the variance explained by the coefficient of determination is always below .1, indicating that growth and foreign aid, totals or per capita, are almost wholly independent of each other. Such relationship as may exist is negative: the countries that received most of the aid for the longest period performed worst. The United Kingdom received much more aid on a total and per

[30]One would expect the growth rates of aid recipients to show effects of the foreign help a year after aid had been received. We tested our assumptions of time response by lagging aid and recovery rates for 2 and 3 years and our results remained unchanged. We calculated the recovery rates of each recipient by subtracting the growth rate in the year aid was received from the growth rates posted in the following year. For example, if a nation posted −15 years of growth in 1948 and −13 years of growth in the following year the recovery rate was adjudged 2 years. It should be emphasized that negative numbers do not necessarily indicate a lack of growth but rather a lack of recovery.

Recovery rates were calculated as follows:

$$\text{Recovery Rate} = \text{Relative Growth}_{i+1} - \text{Relative Growth}_{i}$$

Where i = Recovery Years

Data on aid was obtained from the Agency for International Development, Office of Statistics and Reports, *U.S. Economic Assistance Programs Administered by the Agency for International Development and Predecessor Agencies, April 3, 1942-June 30, 1971* (Washington, D.C.: AID, 1972), pp. 46, 68–76; population figures from Arthur Banks, *Cross-Polity Time-Series Data* (Cambridge, Mass.: MIT Press, 1971), Segment 1, pp. 3–54; our sample included only West Germany, Japan, France, and the United Kingdom as we were only interested in major power behavior. No data on Soviet aid was available.

Table 3. Correlation of U.S. Aid With Recovery of Recipients, 1948–1961[a]

	Aid Years	Aid	Aid Partialed on Time	Aid Per Capita	Aid Per Capita Partialed on Time
Recovery Rate	1948–1961	−.01 (N = 63)	−.17 (N = 63)	−.01 (N = 63)	−.15 (N = 63)
	1948–1953	−.33 (N = 23)	−.21 (N = 23)	−.18 (N = 23)	−.30 (N = 23)

[a]The correlation coefficient R is used to indicate positive or negative influences, but R^2 is never above .1.

capita basis than France; France received much more than Italy; Italy much more than Germany; and Germany much more than Japan.[31] Yet it was Japan that enjoyed the more rapid rate of recovery, followed by Germany, Italy, and France, with the United Kingdom bringing up the rear. It is, therefore, very hard to credit the conviction that foreign assistance and recovery are closely associated.

These particular findings are not completely unexpected.[32] Many economists have questioned the efficacy of this kind of aid.[33] What the figures underscore is that foreign assistance, as a form of investment in the economy of another country intended to incline it toward faster recovery, is not very effective. The variables truly important to recovery lie within the devastated nations themselves. Previous patterns of performance are far more significant than external aid.

Conclusions

We began this inquiry with a number of questions: Does the outcome of a major war reshape the distribution of international power? Does it make a real difference—in power terms—whether a country wins or loses a major war? How long can winners hold on to their advantages? How long do losers stay behind?

Let us begin with a simple list of what we have found.

1. Systematic patterns in the distribution of power (as measured by gross national product) are registered after major conflicts.

2. The power levels of winners and neutrals are affected only marginally by the conflict.

3. Nations defeated in war suffer intense short-term losses; the outcome makes much difference to them in the short run, especially in terms of power levels.

4. In the long run (from 15 to 20 years), the effects of war are dissipated, because losers accelerate their recovery and resume antebellum rates; they may even overtake winners. Soon, the power distribution in the system returns to levels anticipated had the war not occurred. We have evidence that this happens and we can speculate about the explanation, but we have no definitive solution. There is substantial research remaining to be done.

If one wishes to forecast the behavior of a country 15 or 20 years after the end of a war, one should not refer to the outcomes of that war, whether the country in question participated in it or not, whether it was a winner or a loser. The best indicator of the power posture of a nation less than a generation after the conclusion of a war is its performance before that conflict.

One other finding should be mentioned. It is clear that the assistance offered by winners to losers is not a significant factor in the losers' recovery rate.

We are tempted to suggest that the outcomes of war, insofar as international power is concerned, make no difference. We cannot forget, however, that we have found a tracing which indicates that we may have heard only part of the story. While winners cannot help losers to recovery by contributing aid, whatever the quantity, winners may be able to prevent or

[31]Kugler, pp. 196–202.

[32]The literature on aid is immense; an excellent review is available in I. M. D. Little and J. M. Clifford, *International Aid* (London: Allen and Unwin, 1968). The "big push" proposition was derived from Paul Rosenstein-Rodan, "International Aid for Underdeveloped Countries," *Review of Economics and Statistics,* 43 (May 1961), 107–38, and his classic arguments on the "big push" proposition in "Problems of Industrialization of Eastern and South Eastern Europe," *The Economic Journal,* 53 (June 1943), 204–07, elaborated in "Notes on the Theory of the 'Big Push'" in *Economic Development for Latin America,* ed. Howard Willis (New York: St. Martin's Press, 1961), pp. 57–66.

[33]For a classic discussion of the uses of foreign aid see Milton Friedman, "Foreign Economic Aid: Means and Objectives," and Charles Wolf, Jr., "Economic Aid Reconsidered," in *The United States and the Developing Economies,* ed. Gustav Ranis, rev. ed. (New York: Norton, 1973), pp. 250–78.

delay the recovery of losers. If the behavior of Czechoslovakia is an accurate indication, the victor may retard the recovery of the loser by occupation and exploitation. Adequate information on this aspect of the question is not available; there are merely hints on which to base speculation.

Such findings are clearly tentative. In this case, however, the tentative nature of the conclusions should be stressed once more because we have been plagued with data problems. If our findings are confirmed through comparable and more exhaustive researches, the implications for study strategies could be substantial.

If the distributions of international power and changes in that distribution are shaped by differential rates of growth across critical sectors of a nation's life and across nations of that system, and in the long term such rates cannot be altered even by the most violent international interactions, such as major wars, then what must be studied are the causes of such alterations and not the interaction of countries. Thus, independent variables in international relations are *not* found in international relations, but in the growth of the units that comprise the system. Some scholars already study international politics in this fashion, but this is still a very different conception of the field from that traditionally held.