
**REVIEWING TRADITIONAL APPROACHES
TO MEASURING NATIONAL POWER**

Given that power is central to international politics, it is not surprising to find most theorists of international relations advancing some means or another of measuring national capability.¹ Indeed, among all modern treatises on the subject, George Liska's *The Ways of Power* is perhaps exceptional in that it does not attempt any systematic definition of either the sources or the manifestations of national power.² Kenneth Waltz seems to strike a middle ground: he proposes that power "be defined in terms of the distribution of capabilities"³ but does not specify too clearly what the components that make up each data point in the distribution ought to be, except that they should encompass "all of the following items: size of population and territory, resource endowment, economic capability, military strength, political stability and competence."⁴ Hans Morgenthau is perhaps the most systematic of all modern theorists in this respect, and his approach has been followed by numerous other theorists since his work *Politics Among Nations* was first published in 1948. In

¹This chapter is drawn substantially from four sources: Richard L. Merritt and Dina A. Zinnes, "Validity of Power Indices," *International Interactions*, Vol. 14, No. 2 (1988), pp. 141–151; Richard L. Merritt and Dina A. Zinnes, "Alternative Indexes of National Power," in Richard J. Stoll and Michael D. Ward (eds.), *Power in World Politics* (Boulder: Lynne Rienner, 1989), pp. 11–28; Charles S. Taber, "Power Capability Indexes in the Third World," in Stoll and Ward, op. cit., pp. 29–48; and Jacek Kugler and Marina Arbetman, "Choosing Among Measures of Power: A Review of the Empirical Record," in Stoll and Ward, op. cit., pp. 49–78.

²George Liska, *The Ways of Power* (Oxford: Basil Blackwell, 1990).

³Kenneth N. Waltz, *Theory of International Politics* (Reading, MA: Addison-Wesley, 1979), p. 192.

⁴*Ibid.*, p. 131.

describing the “elements of national power,” he systematically includes and assesses geography, natural resources (especially food and raw materials), industrial capacity, military preparedness (especially technology, leadership, and quantity and quality of the armed forces), population (especially the distribution and trends), national character, national morale, and the quality of diplomacy and government,⁵ while warning against, among other things, efforts to attribute “to a[ny] single factor an overriding importance”⁶ in the measurement of power.

This tradition of attempting to systematically assess the national power of countries continued after Morgenthau, though the difficulty of comprehensively assessing power in the manner he believed necessary has resulted in a widespread violation of his stipulation that single-factor approaches are to be avoided. In an excellent survey of various traditional approaches to measuring power, Richard L. Merritt and Dina Zinnes describe several distinctive attempts to measure power that have sought to avoid the complexity of the problem by simply focusing on a single aggregate variable. These single variables are usually intended primarily as proxies for overall national power, and their users make no effort to pretend that the variables chosen are in fact comprehensive indicators of national power. In most cases, the variables chosen have been primarily a function of convenience or because of the easy availability of data.

SINGLE-VARIABLE APPROACHES TO MEASURING NATIONAL POWER

Many analysts seeking to assess current national capabilities have focused on gross military capability as their proxy for national power: they include the political scientists Inis Claude⁷ and Karl Deutsch.⁸ Others like Norman Alcock and Alan Newcombe have used military

⁵Hans Morgenthau, *Politics Among Nations*, 4th ed. (New York: Alfred A. Knopf, 1967), pp. 106–158.

⁶*Ibid.*, 153.

⁷Inis L. Claude, *Power and International Relations* (New York: Random House, 1962).

⁸Karl W. Deutsch, *The Analysis of International Relations* (Englewood Cliffs: Prentice-Hall, 1968).

expenditures,⁹ and still others have used specific military forces: George Modelski and William Thompson, for instance, have used the size of naval forces as an indicator of projectible national power in their historical studies on the “long cycle” in international politics.¹⁰

In addition to military capabilities, economic indicators have also been used widely as a single-variable indicator of power, especially by those, like Klaus Knorr,¹¹ who have been concerned with long-term trends and shifts in capabilities. Among economic indicators, national income has been favored by the demographer Kingsley Davis¹² and by A.F.K. Organski,¹³ a political scientist, as “the best index of power available,”¹⁴ while Charles Hitch and Roland McKean have advocated the usage of a variant index, namely a country’s total output or GNP.¹⁵ After a fairly careful survey of many such alternatives, the scholar Bruce Russett¹⁶ concluded that the total consumption of fuel and electric energy was the best single-variable measure of national power, a conclusion affirmed by Oskar Morgenstern¹⁷ and others.

The popularity of such single-variable indicators derives mainly from their simplicity and ease of use. Those who favor them are usually not convinced about the value of multivariable indices, especially since the accompanying “theory of power” that would make such

⁹Norman Z. Alcock and Alan G. Newcombe, “The Perception of National Power,” *Journal of Conflict Resolution*, Vol. 14 (1970), pp. 335–343.

¹⁰George Modelski and William R. Thompson, *Seapower in Global Politics, 1494–1983* (Seattle: University of Washington Press, 1987).

¹¹Klaus Knorr, *The War Potential of Nations* (Princeton: Princeton University Press, 1956).

¹²Kingsley Davis, “The Demographic Foundations of National Power,” in Morrow Berger et al. (eds.), *Freedom and Control in Modern Society* (New York: Farrar, Straus & Giroux, 1954), pp. 206–242.

¹³A.F.K. Organski, *World Politics* (New York: Knopf, 1958).

¹⁴*Ibid.*, p. 436.

¹⁵Charles Hitch and Roland McKean, *The Economics of Defense in the Nuclear Age* (Cambridge: Harvard University Press, 1960).

¹⁶Bruce M. Russett, “Is There a Long-Run Trend Towards Concentration in the International System?” *Comparative Political Studies*, Vol. 1 (1968), pp. 103–122.

¹⁷Oskar Morgenstern et al., *Long Term Projections of Political and Military Power* (Cambridge: Ballinger, 1973).

measures meaningful is often either not advanced or, even when advanced, fails to command widespread acceptance. Given this perception, most advocates of single-variable indices appear to be satisfied that their measures are sufficient for the purposes to which they are directed, mainly a rank ordering of countries according to national capacity. Despite their widespread popularity, single-variable indicators are nonetheless often criticized, especially by mathematically sophisticated scholars, for their lack of realism. Not surprisingly, therefore, several multivariable approaches to measuring national power have also been advanced over the years.

MULTIVARIABLE APPROACHES TO MEASURING NATIONAL POWER

The earliest and perhaps most influential multivariable measure was advanced in 1956 by Klaus Knorr in his classic work, *The War Potential of Nations*. Seeking to ascertain the ability of a country “to provide quantities of military manpower and supplies in the event of war,”¹⁸ Knorr was drawn to a wide variety of factors that could be summarized by the categories of economic capacity, administrative competence, and motivation for war. Despite identifying numerous critical ingredients under each of these categories, Knorr did not provide any “model” to suggest how these factors might be combined. His work was nonetheless seminal in that it provided the foundations on which several theorists would later develop alternate solutions.

A complex nonlinear multivariable index that attempted to both identify discrete variables and specify their interrelationships came in 1960 with the work of Clifford German, who produced a world power index that took the following form:

$$G = \text{national power} = N(L + P + I + M),$$

where N is nuclear capability, L is land, P is population, I is the industrial base, and M is military size.¹⁹ Each of these variables was

¹⁸Knorr, op. cit., p. 41.

¹⁹F. Clifford German, “A Tentative Evaluation of World Power,” *Journal of Conflict Resolution*, Vol. 4 (1960) pp. 138–144.

further broken down into a series of factors, each of which was scored by a variety of criteria pertinent to the factor concerned. After reviewing this model, Merritt and Zinnes concluded that “of all the power indexes considered, the German index is the most complex. It consists of a multitude of variables, both summational and syntality, a series of scoring schemes, and several instances in which judgments must be made.”²⁰ A similar nonlinear (but somewhat simpler) multivariable index was subsequently proposed by Wilhelm Fucks in 1965, who sought to derive national power from three summational variables—population size (p), energy production (z), and steel production (z_1)—arranged in one of nine formulas for measuring national power (M), all of which were variants of one another and took the form of $M = p^2z$, $M = p^{3/2}z$, etc.²¹

In contrast to the nonlinear measures of German and Fucks, Norman Alcock and Alan Newcombe in 1970 advanced a straightforward linear index of popular perceptions of national power that also utilized multiple variables. Using regression analyses on three variables, per-capita GNP, population, and population density, they attempted to rank the relative power of scores of countries in the context of popular perceptions of national strength. A similar linear index of capabilities, but one focusing on real national assets as opposed to the perception of those assets, was devised by J. David Singer’s Correlates of War project and published in 1972.²² Here too, population (understood both in terms of total and levels of urban population), industrial capacity (understood in terms of energy consumption and iron and steel production), and military capabilities (understood in terms of military expenditures and force size) were added up to provide values for a particular country, which were then assessed as a percentage of the global total. Another effort along similar lines was pursued by Wayne Ferris, who constructed an index in 1973 that sought to “provide scores on the capabilities of nearly all states in the

²⁰Merritt and Zinnes (1989), op. cit., p. 22.

²¹Wilhelm Fucks, *Formeln zur Macht: Prognosen über Volker, Wirtschaft Potentiale* (Verlags-Anstalt, 1965).

²²J. David Singer et al., “Capability Distribution, Uncertainty, and Major-Power War,” in Bruce Russett (ed.), *Peace, War and Numbers* (Beverly Hills: Sage, 1972), pp. 19–48. See also Stuart A. Bremer, “National Capabilities and War Proneness,” in J. David Singer (ed.), *The Correlates of War II: Testing Some Realpolitik Models* (New York: Free Press, 1980).

system relative to nearly all other states"²³ during the period 1850–1966. This effort focused on six variables—land area, total population, government revenue, defense expenditures, value of international trade, and the size of the armed forces—in an effort to produce a historical comparison of international power for literally scores of countries.

Finally, among the more widely recognized indexes of national power was the one devised by Ray Cline in 1975. This nonlinear, multivariable index attempted to integrate both capabilities and commitment to create a formula that would rank order the perceived power of states. Cline's formula was

$$P_p = (C + E + M) (S + W),$$

where *C* is critical mass (including population and territory), *E* is economic capacity (including income plus energy plus nonfuel minerals plus manufacturing plus food plus trade), *M* is military capacity (including the strategic balance plus combat capabilities plus a bonus for effort), *S* is the national strategy coefficient, and *W* is national will (including the level of national integration, the strength of leadership, and the relevance of strategy to the national interest). The formula won a wide readership both in academia and within the defense community, and some variants of it were used to develop the U.S. Army's estimates of long-range trends in the international system.

A SUMMARY OF TRADITIONAL APPROACHES TO MEASURING NATIONAL POWER

Clearly, this brief survey suggests that there have been numerous efforts to measure the aggregate power of states throughout the postwar period. These efforts no doubt seem to have been concentrated during the 1960s and the 1970s, when the social sciences in general and political science in particular appeared to be maturing as disciplines in the United States. Since the late 1970s, no new attempts at developing aggregate power measures of the kinds illus-

²³W. Ferris, *The Power Capabilities of Nation-States* (Lexington: Lexington, 1973), p. 58.

trated above have materialized (or at least none have received widespread visibility), in part because such aggregate measures have been perceived as having reached the limits of their success. Scholarship since then seems to have focused on either using the preexisting measures of power to answer other questions—like, for example, those relating to the onset of war, the problems of escalation, and the relationships between capability and the outcomes of conflicts—or to refine the preexisting measures through better quantitative techniques. Only recently has a younger group of scholars like Jacek Kugler, William Domke, and Lewis Snider begun to revisit the vexing question of power, but their pathbreaking work has focused not on creating aggregate indices of national power per se—as the scholars of the 1960s and 1970s had done—but rather on deepening the notion of national power to include measures of capacity relating to the societal realm. Before their work is reviewed and integrated, however, it is worth summarizing what the scholarship of the earlier generation set out to do in its measures of national power and what it achieved.

The traditional approaches to measuring national power may be summarized in the following way.

First, most traditional approaches of the sort identified above sought to *rank order* the status of countries in terms of their capacity for war. The objective in most cases, thus, consisted of charting the international warrant of precedence, or the hierarchy of capabilities in the international system, based on the premise that the capacity for war was what ultimately distinguished the power of one country from another. At least one approach—Singer's *Correlates of War*—sought to correlate national capability with certain kinds of political outcomes, but this work is the exception to the above rule.

Second, while the various indexes can be distinguished in terms of the number of variables employed and how these relate internally, the most conspicuous characteristic of the traditional approaches is their diversity. That is, each index differs from the others in terms of the number of states assessed, the time frames of comparison, and the complexity of formulae employed.

Third, most indexes incorporate only summational elements, that is, material elements that can be simply added, in various combina-

tions. In large part, this is because “syntality” variables that measure qualitative issues like the characteristics of groups or elites are difficult to capture in a uniform and systematic way, though Cline’s world power formula certainly stands out as an exception.

Fourth, most of the indexes focus mainly on the “country” as the appropriate unit of analysis. The country here is treated as a “resource container”²⁴ possessing certain measurable contents which, if appropriately identified and measured, yield an understanding of its inherent capability. With the exception again of Cline’s index, which seeks to capture dimensions of national integration and leadership strength, no traditional approach descended “below” the subnational level to examine either political institutions or ideational ethos.

Fifth, most of the indices used in the traditional indexes of power are invariably gross indices. Even measures of military capability largely consist of gross measures like the size of inventory or the numbers of specific pieces of equipment. Both the assets counted and the resources identified as salient are clearly those that acquired significance in the industrial age, when variables like the level of steel production, the extent of energy consumed, and the size of food stocks mattered much more than they had before.

Assessing these approaches synoptically with a view to discerning whether there are any significant differences in their results, Merritt and Zinnes reach some interesting conclusions.²⁵ To begin with, they find that most studies yield similar findings in terms of their rank ordering of national capabilities. Thus, irrespective of the variables measured or the formula of measurement employed, the most powerful countries in the system turn out to be the same across all indexes. Further, when some of the approaches attempt to measure the absolute amounts of power possessed by countries, the findings across studies seem to be even more congruent than the findings

²⁴For an analysis of the limitations of the traditional realist view of countries as “resource containers,” see Ashley J. Tellis, *The Drive to Domination: Towards a Pure Realist Theory of Politics*, Vol. II, unpublished Ph.D. dissertation, p. 259ff. For a survey of how territoriality has been understood by several modern schools in political science, see also Gary Goertz and Paul F. Diehl, *Territorial Changes and International Conflict* (London: Routledge, 1992), pp. 1–32.

²⁵Merritt and Zinnes (1989), *op. cit.*, pp. 23–26.

based on rank-ordered scores. In all cases, however, the similarity of findings is greatest for the developed world and least for the developing world—an outcome generally attributed to analysts' greater interest in and familiarity with the great powers as opposed to the underdeveloped countries. Charles Taber suggests, however, that this lack of a "good fit" for developing countries may arise because of structural reasons, like an oversimplification of some attributes, the noncomparability of some indicators for theoretical or empirical reasons, the greater fluctuations in the developing world with respect to some attributes, and perhaps even the unreliability of data in some instances.²⁶ Finally, and most fascinatingly, no essential difference is discerned in the findings between single-variable and multivariable indexes. This leads to the stark, but devastating, conclusion reached by Merritt and Zinnes that, in several of the indexes reviewed, "needless additional data and arithmetic computation have been introduced without an[y] increase in payoff."²⁷

This conclusion delivers a cautionary reminder to all future efforts at reconceptualizing national power. The following chapter will briefly assess the limitations and the value of these traditional approaches as a prelude to elaborating a revised view of how national power ought to be conceived for the specific purpose of creating the standardized power profile through which a small number of candidate great powers may be synchronically and diachronically compared.

²⁶Taber, *op. cit.*, pp. 42–44.

²⁷Merritt and Zinnes (1989), *op. cit.*, p. 26.