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ECONOMIC POTENTIAL FOR WAR

25 April 1949

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## ECONOMIC POTENTIAL FOR WAR

25 April 1949

COLONEL HARLAN: The French delegates to the Paris Peace Conference of 1919 were afraid of Germany. At that time Germany was beaten and helpless; apparently she was in no position to threaten any other nation. The French, however, feared what they termed Germany's potentiel de guerre. They pointed out certain pertinent facts: Germany had a population of some 70 million, against France's 40 million; Germany possessed the greatest industrial plant in Europe, supported by superior mineral resources; the German people were industrious, capable and warlike.

The Treaty of Versailles contained many provisions designed to allay French fears: Germany lost territory and population. The territory contained more than half of her most important mineral resources--coal, iron, zinc, lead, and potash--and some 12 to 15 percent of her principal agricultural products. On the military side, Germany was reduced to an army of 100 thousand men and to an insignificant navy. Germany, however, lost only 10 percent of her manufacturing facilities.

In January 1923 Poincaré, did not hesitate to order the occupation of the Ruhr to guarantee the payment of German reparations in default. Belgium also cooperated in the occupation, but many nations, such as Great Britain and the United States, rather frowned upon this display of French military might. The German case received sympathetic consideration by the other allies, which was reflected in the Dawes Plan. The Ruhr was finally evacuated on 31 July 1925.

In March 1935 Hitler repudiated, with impunity, the military and naval restrictions of the Treaty of Versailles. This action merely regularized a situation that had obtained for many years; Germany had been rearming in secret. Just a year later Hitler repudiated both the Versailles and Locarno treaties, simultaneously sending German troops into the Rhineland. France wished to oppose this action by military means, but did not feel strong enough to do so without partially mobilizing, an action which would have cost so much that devaluation of the franc would have been inevitable.

The contrast between French-German positions in 1923 and in 1936 brings home two important lessons, the first of which is that military potential is no substitute for power in being. Germany's potential was of the same order of magnitude in 1923 as in 1936, but her power in being had enormously increased in the 13 year period. The second lesson is that sheer numbers of troops are no longer all-important in determining military power; the question of armament--which is primarily economic in nature--must be given due weight. The French forces still outnumbered the German troops in 1936, but the German equipment was more modern and the German industrial machine was more than a match for French industry.

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The discussion today will be confined to a consideration of economic potential for war. This term requires definition and some explanation. The definition we prefer is, "the capacity of a nation to support a war effort logistically." To put it into other words, this means the capacity to equip and supply armed forces operating against an enemy in the field.

Economic potential for war is, therefore, that part of the total possible production of goods and services that can be utilized for war purposes. Economic potential for war should not be confused with "war potential", which is the capacity of a nation to impose its will on an enemy by force. War potential varies according to a host of factors: the nature of the enemy, the location of the theater of war, the morale of the peoples involved--to mention but a few. Economic potential for war, on the other hand, may be estimated on the basis of normal peacetime conditions without making any strategic or tactical assumptions. Such an estimate is of value to the war planner, who fits it into his mosaic and then applies the assumptions to the whole.

Today, we shall take up first the elements of economic potential for war, which are, of course, the same as those of national economic strength. Secondly, we shall consider certain statistics reflecting national economic activity that can be used as indices of economic potential for war. Thirdly we shall look into the question of national material deficiencies, since these must be taken into account in dealing with economic indices. Finally we shall try to reach conclusions as to the validity of the economic indices suggested and as to the efficacy and limitations of various methods of overcoming material deficiencies, including stockpiling.

To this audience there is no need of emphasizing the importance of logistics in modern warfare; consequently it will not be necessary to demonstrate that the war-making power of a nation is limited by its capacity to provide its military forces with adequate quantities of the most efficient weapons, equipment, and supplies. The increasing importance of munitions in warfare is borne out by the fact that although munitions accounted for only 5 to 10 percent of the total cost of Franco-Prussian War, this figure rose to 30 to 35 percent in World War I, and to 70 to 75 percent in World War II.

#### Elements of Economic Potential for War

There are many methods of considering the elements of economic strength of nations. The method proposed today is one which has been used satisfactorily in the past and which appears to be sufficiently comprehensive for our purposes. We shall group these elements under three general headings: geography, population, and production resources, as shown in Figure 1 below.

Figure 1. Elements of economic potential for war.

1. Geography
  - a. Position
  - b. Size and shape
  - c. Topography
  - d. Climate
  - e. Natural resources
2. Population
  - a. Vital statistics
  - b. Education
  - c. Health
  - d. Population distribution by occupation
3. Production resources
  - a. Agriculture
  - b. Mining and manufacturing
  - c. Services

Under geography we shall take up "position" first. By this term we mean the location of a nation with respect to other nations, sources of supply, markets, and trade routes. Venice owed its affluence in the Middle Ages almost entirely to its position athwart the trade route from Europe to the East. The rise of both British and Japanese economic power at later dates was due in no small measure to their position on sea lanes. Today the United States is well placed with regard to certain essential imports that can be secured from the other nations of this hemisphere, but it is badly placed to assure the supply of other essentials that only the Eastern Hemisphere can provide.

The second geographical element is "size and shape." The economic development of France has been aided by its compact shape, while that of Italy has been hindered, especially in communications, by its elongated, irregular shape. The small size of such countries as Belgium and the Netherlands made it impossible for them to develop economically without help from their larger neighbors.

The third geographical element is "topography." The rugged terrain of such countries as Yugoslavia and Bulgaria has tended to keep them in a primitive state economically. The development of our own country was greatly aided by the existence of broad river valleys and enormous plains and the Great Lakes.

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The fourth geographical element is "climate." This is important both for its influence on people and on the physical environment. Extremes of either heat or cold militate against economic development. Almost half the area of the Soviet Union consists of frozen tundra, which can support but little life. On the other hand the hot, unhealthy conditions obtaining in central South American and central Africa have successfully defied man's attempts to extract, or even to explore adequately, the mineral riches of those regions. Low annual rainfall or excessive precipitation affect agriculture adversely.

The fifth geographical element is "natural resources." The deposits of coal and iron ore in Britain made possible the initiation of the Industrial Revolution in that country; the richer deposits in the United States permitted this country to assume the leadership of the world in industrial development. On the other hand, deficiencies in vital resources, such as fuels, have acted as brakes on the economies of nations: France and Italy are greatly handicapped in this industrial age by inadequate deposits of high-grade coal and an almost total lack of petroleum.

This brings us to those elements we have grouped under "population." The first of these we may call "vital statistics:" This is concerned with such matters as total numbers, age groups, birth rates, and death rates. Total population is obviously an important element of the economic strength of a nation, but numbers acquire greater significance when analyzed. Since females are somewhat less productive economically than males, and the very young and the aged are less productive than those of intermediate ages, the breakdown into sexes and age groups is enlightening. Population trends may be deduced from a study of birth rates and death rates; these trends have a considerable effect on national economies.

The second population element is "education." The economic productivity of a nation with a high level of literacy and technical skills is naturally greater than that of a nation similarly endowed with natural resources but whose people are less well educated.

The third population element is "health." Well-fed people, free from endemic diseases can obviously produce more than others not so fortunate.

The fourth population element is "population distribution by occupation by this is meant the division between those employed in primary, secondary, and tertiary industries--agriculture, mining and manufacturing, and service. It is axiomatic that nations, a large portion of whose people is engaged in agriculture, are incapable of a high rate of economic production; such nations have difficulty in accomplishing much more than feeding themselves. On the other hand, the nations, the majority of whose people derive their income from mining and manufacturing and services, have higher standards of living and greater economic potentials for war.

We now come to the series of elements classified as "production resources"--probably the most important group of all. They lend themselves to measurement. The first of these elements is "agriculture". The main consideration here is degree of self-sufficiency. The nation that cannot feed itself is at a great disadvantage.

The second element of this series is "mining and manufacturing". As armed forces depend upon mining and manufacturing industries to arm and supply them with all items except food, the importance of this element can hardly be overestimated.

The third and last element of this series is "services." The service industries comprise a vast range, including practically all the professions, from insurance to public utilities. It is to the service industries that we look for the additional personnel needed for war production, as it is possible to reduce the amount and number of services supplied civilians in wartime.

#### Indices of Economic Potential for War

These are the elements of economic strength. Many of them cannot be measured directly, but all of them are reflected in the economic production of a nation. We shall now explore the possibility of deriving statistics that may furnish indices of economic potential for war. The geographical elements of economic strength defy statistical treatment. We cannot assign numerical values that have any real meaning to "position", "size and shape", "topography", "climate", and "natural resources." Some of the population elements can, of course, be treated statistically. The "vital statistics", however, do not have so great a significance as some of the production indices that we shall examine later, so we shall pass these over for the moment. Neither "education" nor "health" is susceptible of measurement in economic terms, but the "occupational distribution" can be expressed in percentages of the total working population. Such a breakdown has the advantage of permitting direct comparison of one nation with another. A high percentage of the population in agriculture indicates an economy of a low order and consequently an almost total lack of capacity to equip and supply armed forces; a country such as Bulgaria, having some 85 percent of its people in agriculture, is a typical example. A nation having a relatively high percentage in mining and manufacturing has capacity for supporting armed forces, particularly if it possesses a reserve in the form of a large number of people in the service industries. The United States, with 33 percent in mining and manufacturing and 49 percent in services, is an example.

The statistics that are considered the most useful for purposes of estimating economic potential for war are shown in Figure 2:

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Figure 2. Indices of Economic Potential for War.

National Income  
 Total Energy Consumption  
 Total Mineral Production  
 Steel Production

Probably national income, which represents the total value of all goods and services produced, reflects the total economic activity of a nation better than any other statistic. It is always expressed in terms of money, which is a disadvantage as far as comparison between nations is concerned, since comparisons entail the use of exchange rates. The determination of real exchange rates is a difficult but not impossible problem. Methods of computation vary greatly between countries, making it necessary to adjust figures before making comparisons. National income can be broken down into income from agriculture, mining and manufacturing, and services, but the index figure for total national income can be used as a general guide if other indices are employed in connection with it.

Since economic production cannot take place without the expenditure of energy, the consumption of energy is indicative of total economic production. Indices derived from energy consumption statistics are particularly valuable in that they accentuate manufacturing. Energy production is also important, as a discrepancy between consumption and production usually indicates that the nation under consideration is either a net importer or exporter of fuel. Energy figures are expressed in physical units, which permits direct comparison of one nation with another.

Since modern industry is dependent upon minerals to a great degree, statistics relating to mineral production are highly significant. A German named Friedensburg developed in 1936 a system of weighting mineral according to their importance in World War I. The criteria used by Friedensburg in assigning weights were, to a considerable extent, subjective, but the system he devised is, with a few minor modifications, still in use. Only 16 of the most important minerals are considered, the heaviest weights being assigned to coal and petroleum. The metal given the heaviest weight is iron, as might be expected. The weighting method may be subject to a certain amount of criticism, but it possesses a very desirable feature: it permits all mineral production to be expressed in a single index figure.

Steel production is certainly one of the most significant indices of economic potential for war. Not only is steel essential for armaments and munitions, but it is essential to all industries--even agriculture. Steel production is usually the limiting factor in economic development

in peace as well as a limiting factor in war effort. The comparison of the steel production of one nation with that of another is a relatively simple matter, and the index thus obtained is of unquestioned validity.

Let us test the indices we have just discussed by comparing two nations, the United States and the U.S.S.R., whose economies are not too dissimilar. We can expect to find some agreement between the various ratios, at least in order of magnitude. Going back to 1937, the last year for which reasonably reliable statistics are available for Soviet Russia, we find that the total national income of the Soviet Union, including the Baltic States, was 32 percent of the United States figure; in both energy consumption and energy production, the Soviet figure was 24 percent; in total mineral production, 28 percent; in steel production, 33 percent. Since 1937 there have undoubtedly been some changes in the relative standings of the two nations, but the modifications are probably not very great.

It will be noted that no attempt has been made to determine what portion of the total national production can be devoted to war purposes. This is an exceedingly difficult task: in the first place, it is not easy to find a real distinction between military and civilian production. A locomotive purchased by the Armed Forces is classed as war materiel; the same locomotive put into service on a American railway would be classed as a civilian good, even though its use in this country might be essential to the war effort. According to a study made by the Combined Production and Resources Board, the maximum percentage of national income devoted to war purposes in World War II was 47 in the case of the United States and 55 in the case of the United Kingdom. Making due allowance for the decrease in production of consumer goods and services in Great Britain and for the increase in the United States, it can be shown that the war expenditures of these two nations at the peak were approximately in the same ratio as their national incomes in 1937.

#### Material Deficiencies

No index of economic strength, or of economic potential for war, has much meaning unless it is considered together with the material deficiencies that relate to it. For example, the United States is able to produce some 90 million tons of steel only because it is possible to import about a million and a half tons of manganese. Large quantities of nickel, chromite, and tungsten had to be imported to make alloy steels.

Material deficiencies must be overcome in some manner. The usual method employed in peacetime is importation, which is not always practicable in wartime. Other methods are substitution of materials, synthetics, and limitation of consumption. The United States limited the consumption of many metals in World War II, and substituted molybdenum for scarcer alloying elements. Germany was forced to rely to a large extent on synthetic liquid

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fuels, not an entirely satisfactory solution of the problem from the standpoint of economic cost--manpower and materials. The United Kingdom, on the other hand, had to depend upon imports for half of her food supply; there is no substitute for food, nor is it possible to limit its consumption to any great extent.

### Stockpiles

If adequate supplies of materials that must be imported cannot be assured in time of war and the deficiency cannot be overcome by substitution, synthetics, or limitation of consumption, stockpiling must be resorted to. A stockpile does not solve the supply problem for any material, but it does provide a cushion designed to protect the nation against a sudden interruption of supply in time of emergency. Stockpiling is a palliative and not a cure for a deficiency.

### Summary

We have examined various elements of economic potential for war groups under the headings geography, population, and production resources. We have concluded that the geographic elements do not lend themselves to measurement, although they are reflected in economic production. The population elements are also reflected adequately in economic production; one of these elements is, however, particularly useful in showing the type of economy--that is, the occupational breakdown into the three principal types of industries, agriculture, mining and manufacturing, and services. Certain very useful indices of economic production can be derived from statistics that are usually available: national income, energy consumption, mineral production, and steel production. National income is the broadest index of all, since it encompasses all economic production, but it does not lend itself to accurate comparison between nations because of the different currencies involved and different methods of computation. Energy consumption and mineral production indices accentuate industrial production, which is desirable. Steel production indices not only accentuate industrial production, but also the capacity for war production.

We have seen that indices of economic potential for war may be misleading unless they are considered in connection with material deficiencies. If material deficiencies cannot be overcome by assuring continued importation under war conditions, by substitution, by synthetics, or by limitation of consumption, the only recourse is stockpiling.

This nation never has possessed in a usable form certain materials, especially minerals, that are essential to modern warfare. Other materials, once thought to be plentiful, are now known to be inadequate for our present needs. The future promises supply problems of ever

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increasing difficulty. It is time that we begin to think seriously of measures of conservation of materials, of substitutes that are in plentiful supply, of synthetics utilizing agricultural products rather than minerals. We must remember that stockpiling is only an expedient to compensate for the lack of assured supply. Let us not retire mentally to a position behind a Maginot line of stockpiles.

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