

COMPARATIVE ECONOMIC POTENTIAL OF THE FREE WORLD  
VS. THE SOVIET BLOC

21 April 1955

COLONEL CONNER: Admiral Hague, General Niblo, members of the class and faculty, and our many guests: For the past seven weeks, or at least for the greater part of it, you members of the class have been studying the economies of nations of the world, trying to assess their economic capabilities for a general war. It has been only within the last few days that you have gotten into the phase of this Economic Potential Unit whereby you try to add up the individual capabilities, if you want to call it that, and try to arrive at a comparison of the economic potential for war of the Soviet Bloc on the one hand versus the Free World on the other. Needless for me to tell you in the class that this has not been an easy task.

In visiting the various committees I must admit that I didn't see any fist fights; but, judging from the heated discussions, I would say that you are taking full advantage of the college's policy of academic freedom and your right and constitutional privilege of free speech.

I frankly don't know how close one can come to an answer to this problem of trying to make this comparison, if indeed there is any. I am not going to intimate that our speaker this morning has an approved solution. I would certainly not want to put him on the spot. Nevertheless, because of his qualifications--you have read his biography--in the fields of economics, education, and governmental service, and because of his present position as Director of the Center for International Studies, MIT, we certainly respect his views. So we are very much interested and are looking forward to hearing his assessment, his comparison, of the economic potentials for war of the Free World and the Soviet Bloc, and some of the problems involved in trying to make such an estimate.

Dr. Millikan, it is indeed a pleasure and a privilege to welcome you to the Industrial College and present you to this audience.

DR. MILLIKAN: Thank you, Colonel Conner.

Admiral Hague and gentlemen: I have a number of rather tough problems this morning. In the first place, you have all been studying this subject intensively for the last few weeks. My assignment, as given to me, was to make a broad survey of it which would summarize the general outlines of the field. Since I don't know exactly what you have been studying, whether what I will say will summarize it is somewhat of an open question.

A further problem is the location of my lecture in the course. The first lecture in the course was, of course, the introduction; and the last one is the summary. All of the real meat usually comes in the middle somewhere. So you will have to excuse me if some of the things I say in hitting the highlights and in summarizing are things that are apparent to you from your intensive recent work.

I had another problem in designing my remarks today as to how I could limit what I have to say to things that I know something about. It is a peculiarly difficult problem when you are talking about economic potential for war, because there is a great tendency for economic capability for war to merge gradually into general capability for war and for the "economic" to be left out. As a matter of fact, it is my conviction that the economic part is really a relatively small part of the total problem of capability for war. However, it is the only part that I know anything about. Therefore I have to try to define this subject in such a way as to exclude all the really important things that people who are concerned with estimating war potential have to know.

A study of the economic capability of a country or group of countries can set some outside limits on what countries or groups of countries can do, but it certainly can't tell us in any sense who will win. It doesn't tell us, of course, how good the equipment will be on the two sides. It doesn't tell us how hard the two armies will fight. It doesn't tell us how good the soldiers are. It doesn't tell us anything about the morale of the civilian population. It doesn't tell us anything about any of the objectives of the leadership, which determine in what direction they will fight or under what terms they will surrender and so on.

Much more important than any of these things is that economic capability for war, as I propose to define it, doesn't tell us anything about what the military potential of the two countries is to start with--about the stock of military goods and equipment on hand on both sides at the beginning of the conflict. Of course, if it is a short conflict,

this is likely to be the only thing that makes very much difference. Anyone who had tried to estimate the length or difficulty of World War II by making an estimate of the economic capability of the two sides in advance would have stubbed his toes very badly, because the economic capability of the Axis countries was a very small fraction of the economic capability of the Allied World. Nonetheless, the thing was a pretty close show at times, as we all are aware.

There are certain kinds of wars in which economic capability is completely irrelevant. I would like to suggest that there is perhaps a higher probability of that kind of war today with our modern weapons than we have ever been faced with in the past.

Let me outline one such war. Suppose the war starts tomorrow, and suppose it is an intercontinental atomic war. Suppose it lasts a week or two weeks or a month. It is not at all inconceivable that the possible level of destruction is now, or will at some fairly early date be, such that the two parties will neither be able nor willing to continue such intercontinental atomic warfare for, say, more than a month. For a conflict of this kind an analysis of economic capability just has nothing to do with the problem, because the only thing that matters is the relative military capabilities of the two sides at the beginning of the conflict. A large capacity after the war starts to go on producing military output is just totally irrelevant to the problem.

Now, take a different situation. Suppose a war starts in the year 1960 or later and again is a very short war. It is still true, of course, that economic capability is irrelevant to the progress of the war once it has started. There is, however, a sense in which the economic capability of the two sides during the interim period before the war starts is relevant since it sets limits to the stockpile of military goods and equipment which each can accumulate before the war starts. How relevant it is, however, may still be something of a question, because the cost of manufacturing nuclear weapons is not a very significant economic drain on the total capacity of modern industrial states. There is a major economic drain in the production and maintenance of the methods of delivery of atomic weapons.

But even if we concede that economic capability has something to do with the degree to which the two sides can get ready for this kind of conflict, starting, say, in five or more years, their economic capability still tells us very little about whether they will in fact get ready. In other words, an estimate of economic capabilities can tell us what the

Free World can do if it knows in advance that a war will start in five years, and can tell us what the Soviet Bloc can do if it wants to; but such an estimate can tell us nothing about whether the Free World will in fact do this. So in using a comparison of economic potentials, it is important to keep in mind that they reflect only one of many factors entering into military potential.

There are two sorts of problems relating to situations in which economic capabilities are important that I want to talk about and one sort of problem that I don't want to talk about. There is a problem of long-term economic capabilities and a problem of short-term capabilities. The long-term problem, which is what I want to spend most of my time and attention on, is the problem of how much of its total resources an economy can devote to its military effort--to the production of the equipment which the military machine needs and the maintenance and supply of its military forces.

For an analysis of this long-term problem we regard resources as fairly substitutable. That is, we assume there is plenty of time to adapt the particular resources of a country to the particular kinds of production that are going to be relevant to the military effort. In other words, we neglect the bottleneck problem, the problem of how rapid a rate of mobilization is possible.

The second problem then is the shorter-term problem of how quickly the economy can shift from a civilian pattern of allocation of output to the pattern of allocation which is optimum for military purposes.

Either of these two sets of conditions may set limits which may become the crucial limits to the military production of the power in question. They may not be the crucial limits, but they are possible ceilings in the first place, on the ultimate capability that a country can achieve; and in the second place, on the rate at which it can achieve that capability.

There is one final complication that I want to exclude, in order to make this problem manageable and therefore not very realistic or very helpful. All the realistic and important problems are quite unmanageable analytically. This final complication is the whole critical area of vulnerability of an economy to atomic attack. In other words, I don't want to go into the problem this morning of the capability of an economy to continue to exist in the face of an atomic attack. At the present

time this is perhaps the most important part of economic capability. But I can't talk about it, first, because I am technically ignorant as to what an atomic attack can accomplish, and, second, because I am militarily ignorant of what the delivery capabilities of each of the two sides are with respect to atomic weapons. So I want to concentrate entirely on the capacity of an economy to maintain and supply the military forces in being in the face of a reasonable level of attrition.

Now that I have thrown most of the baby of war capability out with the bathwater of nonessentials, I can concentrate happily on the severed limb which can be treated to some degree by purely economic analysis. I want to begin with some very simple and for that reason probably unsatisfactory measures of economic capability. But I want to add that I think we will come out with the conclusion that they are perhaps not as unsatisfactory as at first guess we might suppose.

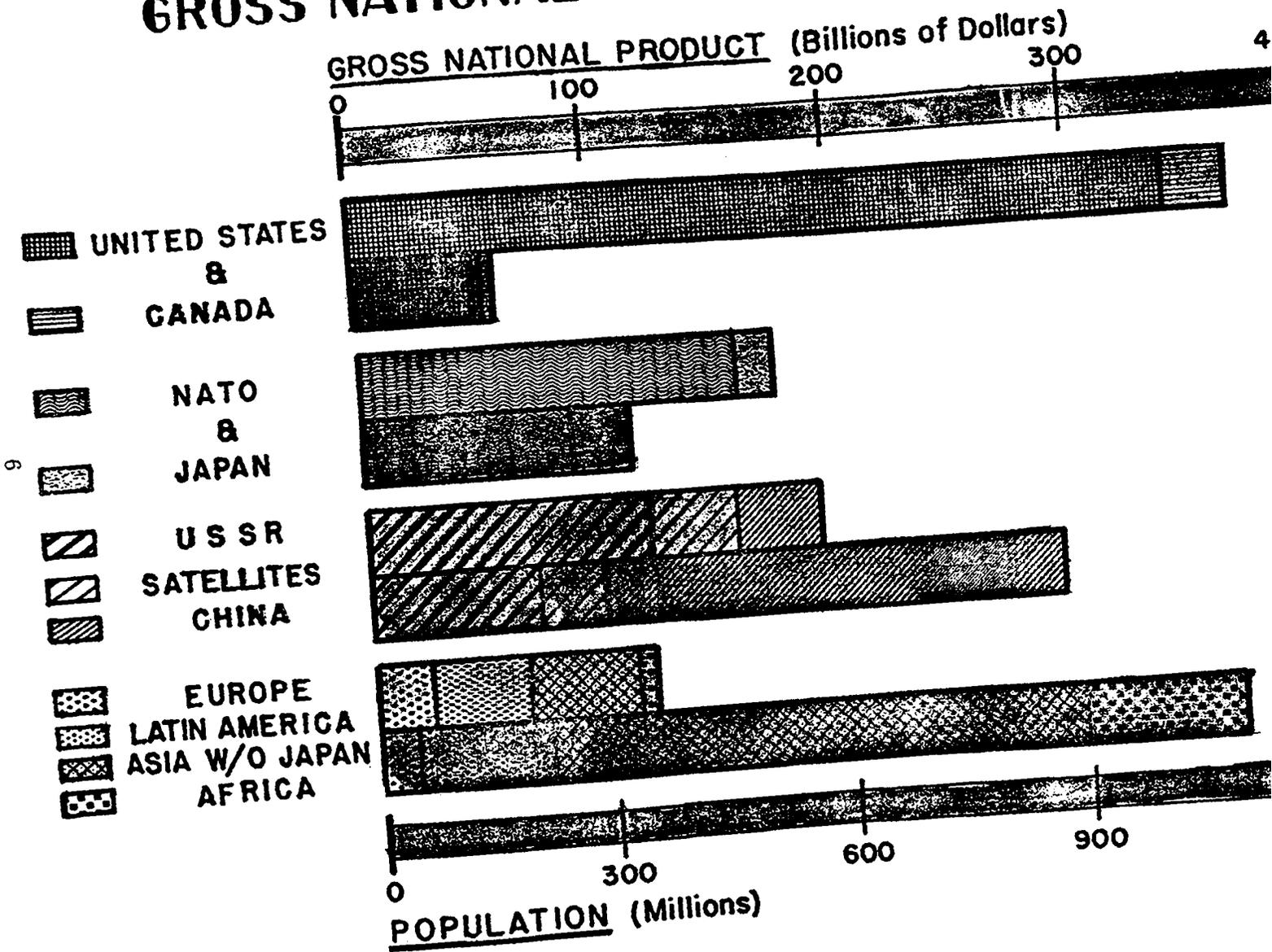
The procedure that I suggest we follow is this: first we construct some measure of the total resources of an economy; second, we make an estimate of the proportion of those resources that could under various circumstances be allocated to the military sector of the economy; and, third, we look at how rapidly the conversion of these resources for military purposes can be undertaken and what the limits to the necessary shifts may be.

I would like to issue one statistical warning in advance. Any conclusion I state which would be altered if you raised or lowered any of the figures by 20 percent is a conclusion which cannot be supported. We are talking about orders of magnitude here and not about precise and exact quantities.

Chart 1, page 6. --This first chart is a very rough, overall approximate measure of the present total output in the major areas of the world. The economist calls this measure the gross national product. It is a rough index of the total value of all the goods and services produced in an economy in a given period.

Now, let us forget for the moment the yellow bars on this chart and concentrate on the green ones, which represent estimates of gross national product for a number of areas of the world. The scale against which these bars are plotted is at the top of the chart, but the actual numbers are less important than the relations between the bars exhibited in this chart.

# CHART 1 GROSS NATIONAL PRODUCT & POPULATION-1



As you can see, I have separated out four groups of countries: the United States and Canada, which will almost certainly in any future major war operate as a unit; NATO and Japan; the whole Soviet Bloc area; and the balance of the world. The last is made up of non-NATO Europe, which includes mainly the European neutrals--Sweden, Switzerland, Austria, Iceland, and Spain; Latin America, which we may or may not be able to count upon in a future conflict as part of the Free World; all of Free Asia, excluding Japan; and all of Africa. These figures are as of 1952.

Now, as you can see from this rough overall measure of the gross national product of these areas in 1952, the United States and Canada, had a total volume of output over twice that of the entire Soviet Bloc, and also over twice that of the NATO countries plus Japan.

You can see that the Soviet Bloc without China has a little less than the NATO countries. If you throw China in, it has a very small margin of superiority. Actually, if we had the 1955 figures, this margin would be somewhat greater because the rate of growth of the Soviet Bloc is substantially greater than the rate of growth of Western Europe and Japan.

You note that although Africa may have enormous potential resources, what we are here looking at is the present level of output; and for all practical purposes Africa can be neglected, because its total output is so relatively small.

That can't quite be said of Free Asia, although its total output is not very great. Free Asia's total output is of the same order of magnitude as that of the European satellites and China taken together. We will see in a moment that there is good reason why if we are talking about economic potential for war, we can also neglect the bulk of Free Asia as a major factor in the picture.

One final comment about the composition of Western Europe: Three-quarters of this NATO economic capability is in the three countries England, France, and Germany. They constitute about 75 percent of the gross national product of the NATO countries. Italy has another 10 percent, leaving 15 percent for a number of smaller powers.

The first question we want to ask about this measure is whether it is an appropriate measure of the maximum flow of resources which

these areas can develop. One qualification is important. These are all peacetime figures. There ought to be some allowance made for the additional effort which an economy can put forth in wartime.

In the United States during World War II we were able to achieve at the peak of the war something like 25 percent higher gross national product than what could have been regarded as the normal peacetime trend. Our maximum output was more than 25 percent above 1941. But, if you were to project the way in which you might reasonably have expected the gross product to grow in the United States if we had had peace the figure for the year of peak wartime output would have been about 25 percent below what we actually achieved. We were able to reach this higher level by virtually eliminating unemployment, by expanding the hours of work of the labor force, and by drawing a lot of people into the labor force who would not normally be in it such as housewives and the like. So if we are using these bars as indices of economic capability for war, we should extend them somewhat to allow for the stretch that wartime circumstances make possible.

The economic advantage of the United States and the NATO powers over the USSR is probably understated by the 1952 figures since the USSR was probably closer to its maximum level of output than we were in that year. In the United States 1952 was a good year, something that most economists would call a full-employment year. So we don't have the problem of unusual slack in peacetime activity to consider. There is slack when this figure is compared with wartime capabilities. But the gross picture of relative capabilities is not much affected by this consideration. Perhaps the relative capability of the West in economic terms should be increased a little over what you would get from looking at the peacetime gross product figures by themselves.

Now, the second approximation of what we are trying to get at is this: So far we have looked at the total volume of goods and services, but we haven't brought in people at all. Now, people are a mixed blessing to a war economy. They have their advantages and they have their disadvantages. Their principal advantage from a military point of view is that people can be soldiers. Their principal disadvantage from a military point of view is that people have to be fed and clothed, and that economic activity devoted to feeding and clothing them is economic activity diverted from more direct military purposes.

The first thing we want to look at is what the distribution of people is as compared to the distribution of total output. You note that whereas Chart 1 is so designed that the total output goes down as you go down the chart, you get exactly the reverse situation in the yellow bars, which represent population measured on the bottom scale. The population goes in just the opposite direction. Whereas China, whose gross product is represented by the small green square, really has a very small fraction of the total product of the West, China's population is greater than that of the United States and the NATO powers put together. And, of course, when you get down to the other parts of the world, you find that the population of Free Asia is even substantially larger than the population of China.

Now, what is significant about people in relation to economic capability? On the one hand, we can make soldiers of them; and on the other hand they have to be fed.

At one extreme when the ratio of the gross product to population is at its smallest, we can neglect gross product as a source of economic war potential, because when the per capita income gets below a certain level, all the resources of the country are essentially required simply to keep the people alive and there are very few resources left over for employment in modern warfare. Certainly this is the case with respect to China, with respect to the whole of Free Asia, and with respect to Africa, where the comparisons of the gross product and the population are such that the annual per capita income, as I will show you in a moment, comes out well below 100 dollars.

For these purposes we really have to neglect the gross products of those countries with populations so great that their per capita levels of income are below 100 dollars a head, let us say, or something of this sort.

Now, this statement is always challenged, because people don't understand what it means. It doesn't mean that these countries aren't militarily important. What it does mean is that their contribution to economic capability for war can be regarded as negligible.

Obviously it would be ridiculous to say at the present time, with the state of the news being what it is, that China can be written off as though it didn't exist at all on the international scene. On the other hand, I would suggest that if we are talking only about economic

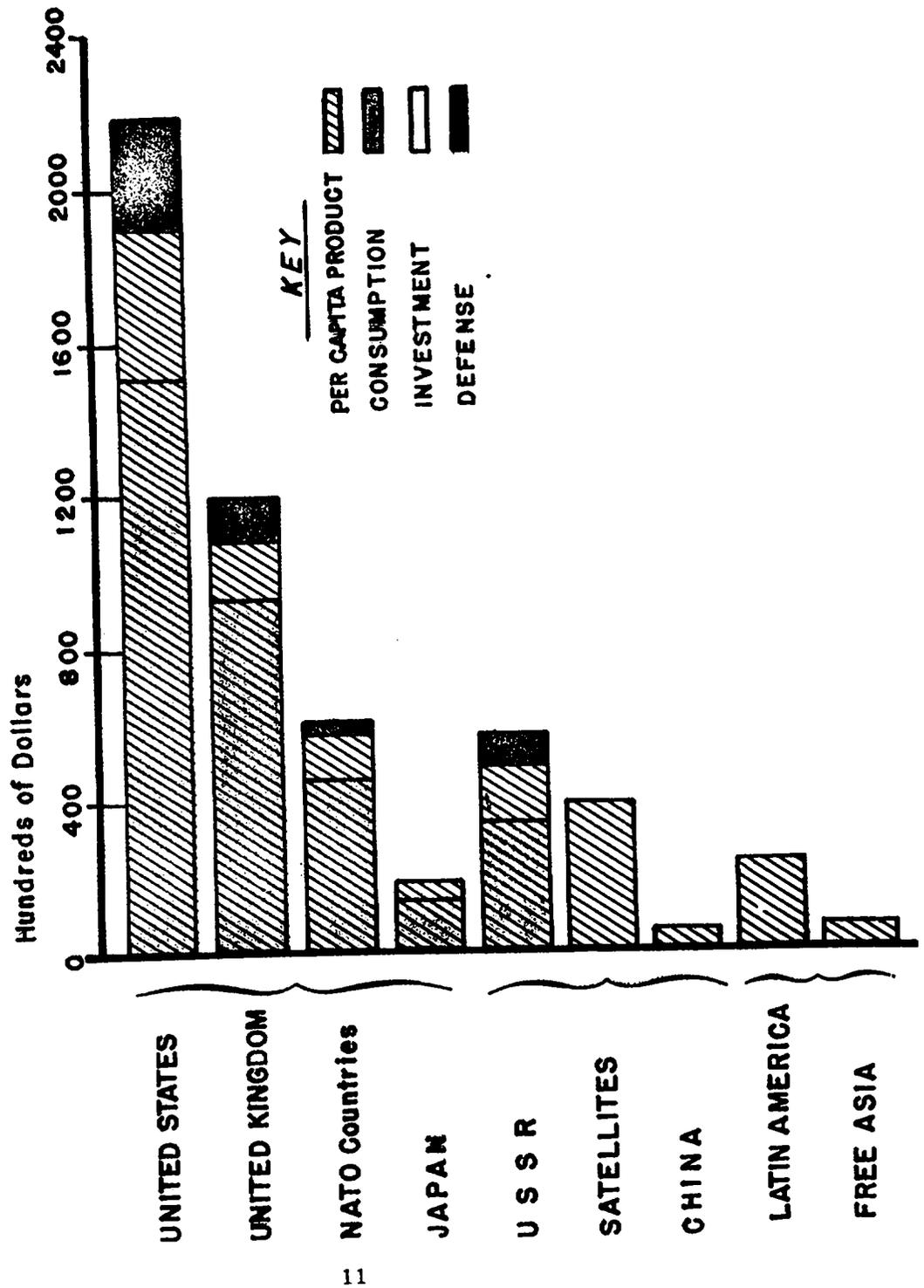
capability for war, China can be written off. The reason China was able to put up such a very effective fight in North Korea against the American military machine was in very considerable part that China was supplied with its economic sinews from the Soviet Union. If China had been dependent on her own supplies, her potential would have been very much lower.

That doesn't mean that it would necessarily have been an easy job to beat the Chinese in Korea, because, as I said before, economic potential is only one part of the story. If you do not include military manpower as a part of economic potential--and I wouldn't so include it, then obviously you leave out a major military element important in any conflict, which doesn't happen to come under the rubric of economic capability.

In what follows, I propose to neglect the European neutrals, Latin America, Free Asia, and Africa for a variety of reasons. Actually, the European neutrals probably ought to be thrown into the NATO portion, because, if there were a real world conflict, the chances that the Swedes and the Swiss would be able to stay out of it are very small. Latin America we can leave out, partly because its resources are limited, except for a few particular commodities and partly because politically we simply don't know where it will stand in this kind of conflict. Asia (including the Middle East) and Africa I am leaving out, on the ground that their per capita income is so low that their economic contribution to a modern military effort is inevitably going to be quite insignificant, except for one or two commodities like oil.

Chart 2, page 11.--Chart 2 shows us the figures reduced to a per capita basis. Neglect the colors for the moment and simply look at the overall length of the bars, which represent in terms of dollars per head of the population in 1952 the per capita gross product of these areas. This, I think, demonstrates very clearly why China and Free Asia can be neglected for the time being. I haven't even bothered to put Africa on the chart, because it is lower than any of these. The satellites are insignificant, even though the European satellites have a per capita product which is above that of a number of the Southern European countries, such as Spain, southern Italy and Greece. The NATO countries have an average per capita income which is a little above that of the USSR, though both gross product and population are so nearly the same that the difference is not significant. On the other hand, there is great variation among the NATO countries. The United

**CHART 2**  
**USE OF PER CAPITA GROSS PRODUCT,  
 SELECTED COUNTRIES, 1952**



Kingdom has a per capita income very much larger than the others, being about half that of the United States.

Now we come to the question of what proportion of this total gross product can be devoted to military activity. We have taken as our first approximation to a measure of economic capability the gross product. How do we have to adjust this measure, to allow for the fact that only part of gross product is available for military use?

There is a line of argument, which is very tempting here, which would lead us to the conclusion that the West has a very much greater edge than the gross product figures would suggest. This line of argument runs somewhat as follows: There is a minimum level of civilian consumption which you can achieve in any economy. It is reasonable to assume that the Soviet Union has achieved pretty close to this minimum level of consumption, because that has been their stated objective to maximize capital formation and investment in military equipment, and to hold the civilian standard of living down to the necessities. Not only is it their stated objective, but they have been extraordinarily successful in reaching this objective.

Now, it is tempting to say: Why don't we take this level, represented by the pink part of the bar for the Soviet Union, as indicating the minimum to which any industrial civilian population's per capita consumption can be reduced? Why not say that it always takes something of the order of 325 or 350 dollars per head in any industrial society to maintain a minimum standard of consumption for the civilian population and that all of a country's gross national product above this can be applied to military purposes?

If this were true, if all other countries could be squeezed down to somewhere near this level, there would be an enormous advantage for the United States. If you could cut civilian consumption down this far, you could release a very large portion of the gross national product of the United States for military purposes. In the United Kingdom, if you could cut civilians to a similar level, you could release a very substantial amount. In the NATO countries it would be the same. You would be able to release for military purposes in the NATO countries on the average a larger fraction than could be released in the USSR.

The United States, as you see, could make something like five-sixths of its total national product available for military purposes if

this assumption were valid, and the United Kingdom about two-thirds of its total national product.

Unfortunately, this assumption is not an acceptable one, for reasons which I want to explain. Civilian consumption cannot be cut in advanced countries with high standards of living to the same level which obtains in countries with substantially lower standards of living. I would like to state a general rule which, since there is no other basis for it than the fact that I assert it, I am going to call "Millikan's Law." Millikan's Law is that for economic reasons you can never reduce the proportion of the national product of an industrial country devoted to consumption below 50 percent.

The margin of error in the application of this rule is undoubtedly great. Nevertheless, I think I can defend both on historical evidence and on analytical grounds the rough rule of thumb that 50 percent of the peacetime gross product is about as far as you can squeeze civilian consumption.

Let me elaborate further on the limits to which the nonmilitary uses of the gross product can be reduced in wartime. In the first place, you will note (see chart 2) that these bars are divided into three colors. The pink is consumption; the blue is investment, by which, of course, we mean not investment as the Wall Street financier uses the term, but that part of the resources of a country that goes into capital equipment, into plant, and into expansion of inventory; and the yellow is, of course, defense.

I should say for those of you who are familiar with national income studies that I have taken the nondefense government expenditures and divided them into two categories:

(1) Those Government expenditures which can be described as public consumption such as maintaining services to the public are included in the consumption figures.

(2) Those Government expenditures which involve additions to plant--postoffices, schools, highways--are in the blue investment figures

Now, let's look at these two kinds of nonmilitary uses of gross product and consider first the factors which affect the capacity of any

country in the long run to cut back these uses in favor of military uses; and, second, the factors which affect short-run flexibility--the degree to which the resources that might be released could in the short run be applied immediately to military production.

I am going to talk entirely here about economic limits, not political or psychological limits to what is possible. Millikan's Law is not based on any assumption about what is politically bearable in a country, what the people will take, or what is required to maintain morale. It is based, rather, on some economic considerations. Some of these considerations suggest that the United States is at a disadvantage compared to Russia in cutting consumption. Others suggest reasons why it may be easier for us than for them to make such cuts.

One limit in an advanced society like the United States is placed by the fact that the high level of civilian consumption in this country does not simply represent a lot of luxuries that we could cut off tomorrow if we were willing to live on a more sparse and limited scale. In part this high level reflect the fundamental organization of our whole economic means of carrying on the productive process. To reduce this level sharply to the levels which are presently current in the USSR would require a complete reorganization of our economy, a reorganization which would involve entirely different capital assets than those we now have as well as a wholly different social and economic structure. Let me give you a couple of fairly simple examples.

Take automobile transportation. Virtually nobody except commissars ride in automobiles in the USSR at the present time. But the whole pattern of distribution of work places and living places in the United States is based upon an assumption of the availability of large amounts of automobile transportation. People have to have automobile transportation to get to work in the United States. If we were to start from scratch and had twenty years time in which to rearrange our pattern of living, we could move people back from the suburbs to which they have moved, into the center of the cities, rebuild all the trolley lines that have been allowed to go to pieces, and develop a great many more trolley lines than we ever had before. That is one of the readjustments we could make if we had a great deal of time. But the simple fact of the matter is that in any kind of reasonable period, automobile transportation is not just a luxury. It is the way we do business in this country.

There are a lot of other examples. The relation between clothing and the availability of heating is one. If we were Eskimos accustomed to living in a cold climate without heat, with the kind of clothes this requires, we could cut out coal for heating. But we can't do this. We could cut down fuel consumption for heating to some degree, as we did during the war, but we couldn't cut it out entirely in the United States in a short period, with our present pattern of house construction, of clothing, et cetera, all of which are based on the assumption that these facilities will be available.

Take the refrigeration of food. Our whole food distribution pattern, the kinds of food we have available, the way in which we keep it and handle it, are all based on the existence of refrigeration. We couldn't move to the kind of food distribution economics in this industrial country that the Soviet Union has at present, even if we wanted to and were willing to take it, because our whole productive mechanism is not geared to it.

This is the principal economic limitation on the degree to which you can cut consumption in an advanced country--the fact that certain consumption patterns are built right into the production structure. They are not simply luxuries, but things that have become essential to carrying on important economic activities. You can reduce some of them, but you can't cut them out altogether.

Now, on the favorable side, there is a different point. A large proportion of the consumer part of the bar here in the United States is the production of consumer durables. In a sense a large proportion of this bar really ought to be in the blue investment sector rather than the pink consumption sector. Automobiles, houses, dishwashers, all kinds of household equipment, are not things that are in fact consumed in the same year in which they are produced. They are things that yield service over a period of time. Therefore it is possible to stop or gradually reduce the production of these things in any given year without stopping the services these things yield. During the war we were able for example, virtually to halt automobile production without by any means halting automobile transportation.

Here we have a great advantage. We have an advantage over the NATO powers, and the NATO powers have an advantage over the USSR, in that the proportion of durables in our total consumption is very much higher than it is in Europe; and the proportion in Europe is very much

higher than it is in the USSR. Thus for a short period at least we can cut back our resources devoted to the production of durables much farther than the bars would suggest, much farther proportionately than could be done in the Soviet Bloc countries.

Now for a general conclusion with respect to the conversion of consumption goods. In the first place, Soviet consumption can be cut very, very little, I would guess, below its present level--unless for an extremely short period--without reducing markedly the productivity of the labor force and of the military machine. United States consumption expenditure could be cut back--I am making a pure guess now--to maybe 55 percent of our present per capita output of consumption goods and services or to a level about three times the level presently obtaining in the Soviet Union. European production could perhaps be cut back to something like 55 percent of its present level or to a level that is about twice that obtaining in the Soviet Union.

If this estimate is correct what we come out with is that roughly the same proportion of the gross product of each of these three sets of countries is required for wartime consumption in each case. If this is valid we emerge with the conclusion that from this point of view gross national product is not too bad an index of economic war potential. If the proportion that has to be devoted to consumption activities is roughly the same in all of these countries, the index of relative strength will be the same whether you take gross national product or gross national product less minimum consumption.

Now, let's look for a minute at the blue bars, the investment component. In the first place, it is important to make one point with respect to the USSR. For that country the distinction between the blue investment bar and the yellow military bar is a very, very difficult one to make. The Soviets have so designed their program of plant construction that a large part of what goes on in the USSR in that blue investment sector of the economy is for plant and equipment which could more or less directly serve military ends.

Thus, in the USSR even those capital goods and equipment which are devoted to nonmilitary investment--to tractor manufacture, for example--are ingeniously so designed that their conversion to military uses could be undertaken with an absolute minimum of cost and effort. A tractor plant is always made in such a way that it can be turned into a tank plant very rapidly and very easily. The same is true of other

kinds of plants producing civilian types of equipment. In fact, it may well be that one of the main reasons Malenkov was defeated in his attempt to increase consumer goods production in the USSR as a way of increasing morale was the fact that if the USSR were really to turn its attention to the production of consumer durables this would require a kind of investment which would be very much less usable for military purposes than the kinds presently being undertaken. We can, I think, assume that virtually the entire section of the Soviet bar that is in the blue investment area could be devoted to military production of one kind or another fairly easily on the outbreak of war.

For a time, very much the same sort of thing could be done here. The United States did cut civilian investment down to a very small percentage of the gross product during World War II. It would take us a little longer to make the conversion, but the conversion by and large is possible in the United States. A very large part of the fraction of our gross national product which now goes into private investment of one kind or another could be switched to military uses. The same is true of the United Kingdom.

But there is for us a significant limit on this. If the war goes on too long, we may get caught short by diverting too many of our resources to military output. The very fact that our consumption patterns depend very largely on the availability of certain durable goods means that in the long run--ten years, for instance--we are under a much greater necessity of devoting resources to civilian investment simply to maintain our minimum standard of living than is the Soviet Union.

Thus, if you take a period of two, three, or four years, we are quite well off with respect to the Soviet Union. If you take a period of one year, we are worse off, because they are ready to make the conversion more quickly than we. If you take a period of more than five years, we are probably worse off, because we begin to run into requirements for replacement of our whole stock of capital; and, since the stock of capital on which we rely is so very much greater per capita than the stock of capital on which the USSR relies, over the long run the problem of stopping civilian investment would be very much more serious.

Our conclusion then, with respect to investment, is that for a period of something like two to seven years our GNP measure is still not so bad, because the bulk of our civilian investment could, like

that of the Russians be converted to military production. We have seen that we could cut the consumption sector back to very nearly the same proportion of GNP as in the USSR. So we conclude that for a period of two to seven years it would be possible for the West to devote somewhere around 45 percent of its total product to military purposes, or about the same proportion as could be achieved by the Soviet Bloc, excluding China.

If we were to take a shorter period, a GNP index overstates the western capability, because it would take us longer to convert. If you take a longer period, a GNP index probably also overstates the West's advantage, because we would be required to devote a larger portion of our resources in the long run to maintain the stock of civilian capital than would be necessary in the USSR.

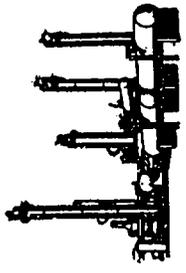
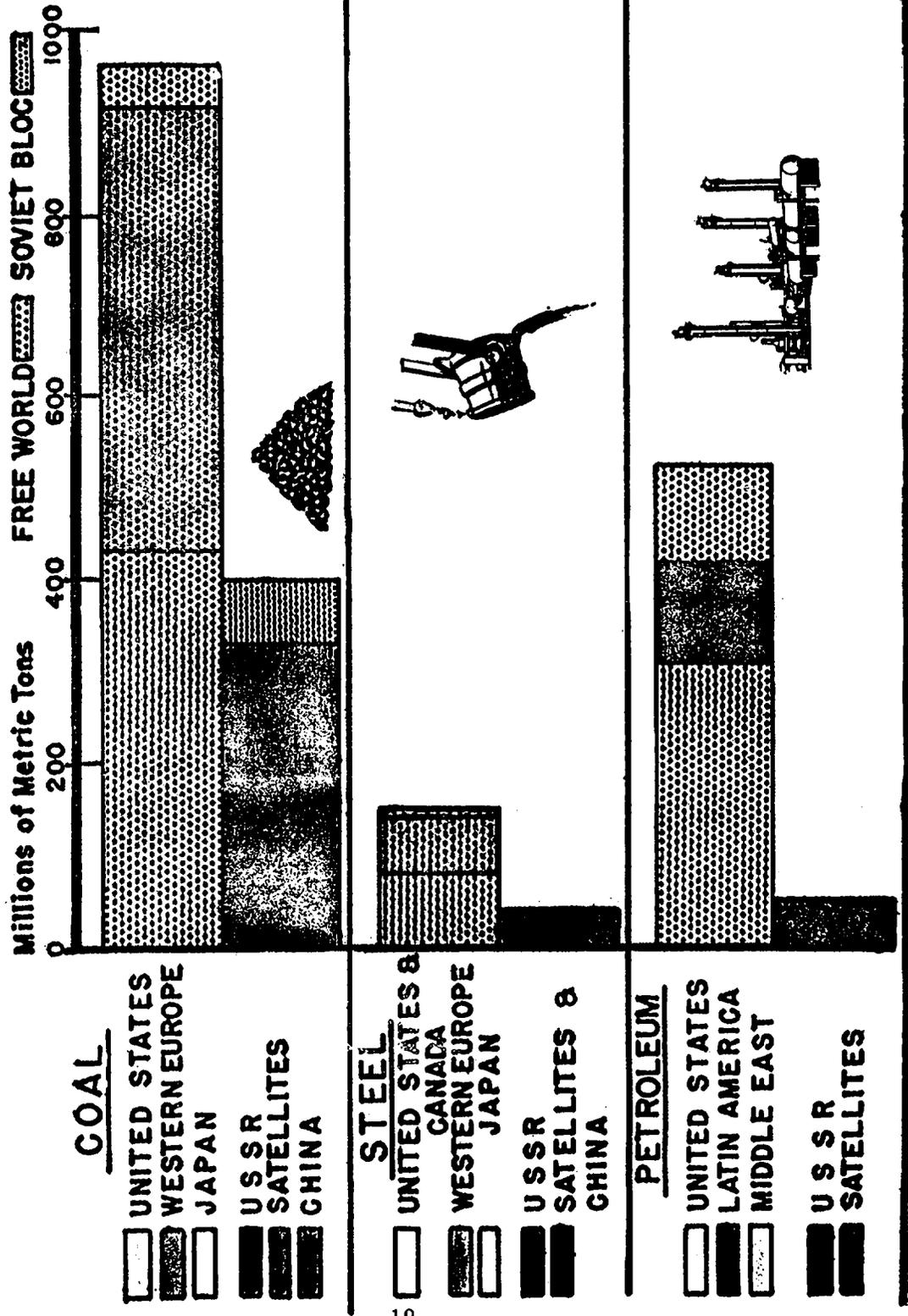
I now want to say a few words about how the picture of relative capabilities based upon GNP comparisons is affected when we look at the particular sorts of resources that are especially appropriate to military production.

I have already indicated that in the very short run the USSR has an advantage in the fact that because of the way it has its investment planned, it is ready to make the conversion quickly. On the other hand, if we look at a series of selected individual commodities, we can see that our GNP measure may underestimate the advantage of the West in terms of the kinds of production which are particularly relevant to military activity.

Chart 3, page 19. --Here we have the production of coal in the United States, Western Europe, Japan, the USSR, the satellites, and China. Here the relative proportions of output are much the same as the GNP proportions. Our index does not need modification in this case.

When we look at the next commodity, steel, we find that the West has an advantage which is proportionately considerably greater than its GNP advantage. This is particularly true in the Western European countries, where you will remember that the GNP is about the same as in the Soviet Union, but where steel production is very substantially greater. There is a special reason for that, about which I want to talk in a moment.

# CHART 3 PRODUCTION OF SELECTED COMMODITIES, FREE WORLD AND SOVIET BLOC



When we look at petroleum, the advantage of the West, of course, expands enormously. This is largely because we have had to develop great petroleum supplies for our petroleum-based transportation system in the United States, and to a smaller degree in Western Europe. The green bar represents the contribution of the Middle East, and the brown bar that of Latin America, to our petroleum supplies. It indicates that, even if we lost those two important areas, we would still have a petroleum advantage which would be very much greater than our GNP advantage. On the other hand--and this is precisely the point I made earlier--our whole civilization is based on petroleum using transportation equipment and we can't cut civilian uses of petroleum back to anything like the same level as the USSR. Nonetheless, we have here an advantage greater than the GNP advantage would indicate.

Chart 4, page 21.--When we look at electric power, which is a good index of the overall energy available for productive purposes, we find that the comparison is even more dramatic. We see that the West and particularly Western Europe has a very much greater advantage over the USSR than the GNP figures would indicate.

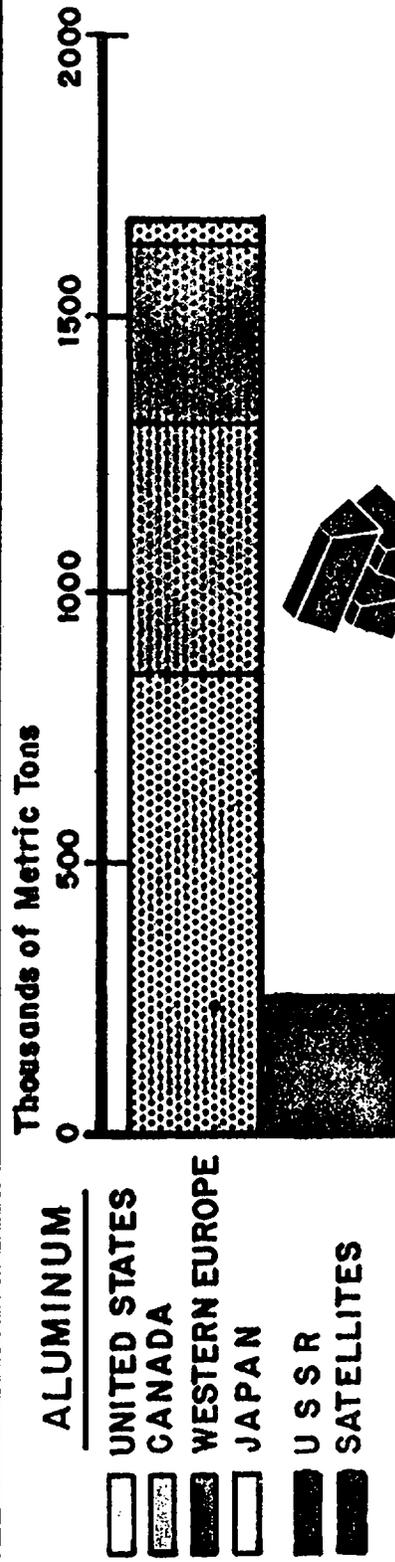
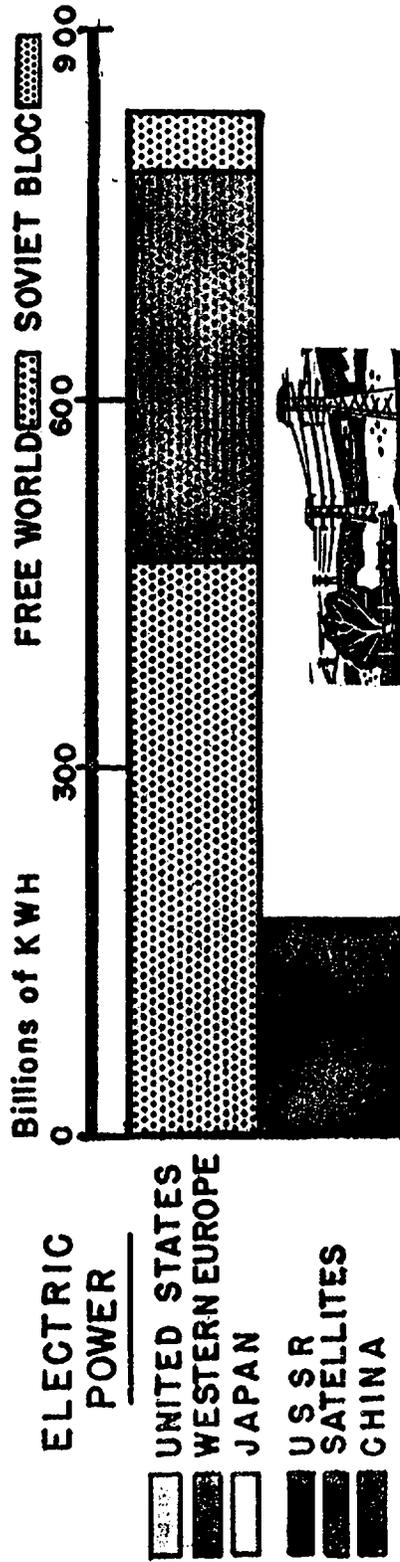
And when you look at aluminum, you find that the picture is, if anything, still more dramatic.

Now, there is one reason why the European picture looks so much better when you look at it in terms of these specific commodities that are appropriate to military production than when you look at it in gross product terms. That reason is a very important one. It is that Europe has trade available to it, and therefore the pattern of output in Europe is quite different from the pattern of consumption in Europe. The pattern of output in Europe is very much larger in the industrial and very much smaller in the agricultural components than the pattern of consumption. Europe produces machinery and durable goods which it exchanges for its food supply. This means that in terms of the convertibility of the economy to military purposes, the European economy is much more convertible than it would be if it were entirely self-contained, because it has a much larger proportion of its resources in those sectors of the economy which are relevant to military production.

The net conclusion of this very quick look at specific individual commodities is that our gross national product measure perhaps to some degree underestimates the middle-term economic advantage of the West over the Soviet Bloc countries.

CHART 4

# PRODUCTION OF SELECTED COMMODITIES, FREE WORLD AND SOVIET BLOC



I would like at this point, however, to raise one caution, which I think it is very important to keep in mind if we are going to look farther forward than the next two or three years. That is, what is likely to happen through time to this picture of relative economic capability?

I think any sort of smug self-satisfaction one can derive from looking at the present state of affairs is very rapidly dispelled if one looks at relative growth rates. As you are probably aware, the economic capabilities of the Soviet Union, as measured by GNP, have been increasing over the last five years at something like twice the rate of growth of the industrial Free World. The Soviet growth rate is somewhere between 5 and 6 percent. The Free World's growth rate is somewhere between 2 and 3 percent per year. In those industries which are particularly relevant to military production--heavy industries--the Soviet growth rate is even more dramatic.

The question then as to the future is whether the Free World will be able to speed up its rate of growth of economic capability so as to prevent the Soviet Bloc from overtaking us in the long run. This is very largely a political question, a cultural question, and a morale question. Since, therefore, it is a question entirely outside my competence, this is an appropriate moment for me to stop.

COLONEL CONNER: Dr. Millikan is ready for your questions.

QUESTION: My question refers to the comment on which you ended your talk--the one about the outlook for the future. It seems to me that the whole compound interest bar is pretty much the one that applies here. That is, in considering these rates of increase of the GNP, if we start out with a principal that is roughly three to one versus the Russians, and they make a gain on us which is, as far as the rate of increase goes, of the same size--three to one--the advantage is in inverse ratio. If we are increasing at a rate of 3 percent per year and have a principal three times greater than theirs, in order for them ultimately to increase equally with ours, they would have to increase at the rate of 9 percent per year. This I don't think they can do. They might do it in selective instances for a while, but right now they are having difficulty in squeezing everything out in order to get more capital formation. I just wondered whether they could actually close this gap as long as we continue to go ahead.

DR. MILLIKAN: There is a little problem in simple mathematics here. The absolute increase each year, if their growth rate is twice ours, will obviously be greater for us. It will be so until they reach half of our gross product. They could do that fairly soon. In 25 years they could approach a product which would be twice the Western Europe product. Their product is now something like 33 percent of ours. I can't compute in my head how long it will take them with a growth rate twice ours to reach 50 percent of our product, but it wouldn't be a terribly long time in terms of years.

The really important thing is the relative percentage rate, not the relative absolute rate. It is true that we are growing still by an absolute amount that is greater than the absolute amount by which they are growing. The additional flood of products each year is greater for the West than it is for them. But that difference is narrowing all the time. They will reach a point before so very long where they wipe out our advantage in absolute growth rate, and where their average product will begin to exceed ours.

The whole problem of whether they will slow down or not is the subject of another lecture. There are a great many things to consider. A great many writers believe, on the one hand, that the Soviet growth rate will of necessity slow down somewhat in the next decade. But it is a question of whether it will necessarily slow down to the level at which the European and American growth rates now stand, and of whether we can speed up the growth rates in the West.

QUESTION: Doctor, would you care to comment a little more on the impact of food production in the two blocs?

DR. MILLIKAN: Yes. I am sorry. I meant to say something about this when I was talking about specific commodities; but, because I didn't happen to have a chart on it, it slipped my mind.

It is certainly true, as I have intimated in the course of my talk, that the whole Soviet Bloc system has an Achilles' heel in specific commodities; but it has no real bottleneck which prevents it from moving ahead in any individual item probably in the long run except possibly in the whole sector of agriculture. The per capita food output for the Soviet Union is still no higher than it was in czarist days. In both the USSR and in Communist China and Eastern Europe the problem of maintaining the present agricultural output, and particularly the problem of increasing it, is a desperately serious problem.

~~2241~~ Now, let us suppose that the Russians can do no better than keep their agricultural output expanding at the same rate as their population. I think the Chinese problem then would be a real problem. Let us suppose that the Russians keep their agricultural output expanding at the rate by which their population is growing, and the Chinese can stand the starvation, or whatever else happens as a result of their failure to do that, what impact does this have on the military potential of the Bloc?

This is a question that I have never seen anybody really systematically analyze. Obviously, if you have widespread starvation, if your food output drops sharply, then you have a serious impact on military potential, because you can't feed your soldiers, let alone your civilian population. But suppose you can maintain a minimum diet; you just can't advance it very much. What is the impact of this on the military potential? I am not, of course, sure that it has any very serious impact. But it may. I haven't seen an adequate analysis of this.

QUESTION: Dr. Millikan, you mentioned early in your talk that you made, I think you said, a pretty similar analysis to this of the Axis Powers versus the Allies in World War I. If you did, I would like to know about how these same things compared.

DR. MILLIKAN: No, I didn't, I think, mention that I had made a similar analysis, which I have not done. I am perfectly certain that if we had done this, we would have come out with the conclusion that the Axis Powers had a GNP potentially devotable to military activities certainly no greater than a quarter of that of the Allies; and I would guess probably that it would be substantially less. At the present time West Germany's gross product runs around 30 billion dollars, and Japan's around 16 billion dollars. West Germany's product at the pre-war level, at 1952 prices, must have been above this, but probably not significantly above it. Japan's level was probably above it, but again not terribly much. They probably didn't have more than 40 or 50 billion total GNP in those two--Japan and Germany. Italy wouldn't have had more than another 5 or 10 billion at the outside. The United States product at that time, in 1952 prices, was running around 325 billion or something like that, and the European product couldn't have been much over 100 billion. So they certainly had no more than 20 percent, I would judge, economic capability in the Axis of what we had in the West.

I think that is a very important point. I wish I could have brought figures on it, because I think that might emphasize one terrible danger in regarding economic capability as anything more than a kind of ceiling, the terrible danger in regarding that as a kind of direct measure of what a country can do.

**QUESTION:** Would you give your evaluation of the adequacy of the petroleum resources of the Soviet Bloc to carry on a war for a four- or five-year period?

**DR. MILLIKAN:** I am not a petroleum expert. From what I know of the situation, my hunch would be that the Soviet Bloc can do this, but it can probably just barely do it if it has an all-out war.

Now, you may ask, How is that possible when their total petroleum supply is so much smaller than ours? The answer, of course, is that their civilian uses of petroleum are very, very small. They are such that the civilian uses can be eliminated fairly easily. Having done that, they can apply the whole peak that they have, 40 million tons or thereabouts, of petroleum output to military purposes. And their military uses are essentially less than ours.

Now, what will happen to this as their military use of petroleum in aircraft develops even more than it has developed I don't know. Of course, their use of aircraft is going to be as high as ours. But their use of petroleum at the current moment is substantially lower. That is because for so many years we have had such an abundance of petroleum resources that in a sense we tend to be quite wasteful both militarily and in civilian uses. This prejudices the comparison.

But my general appraisal of what I think which is not an expert appraisal, is that they can get by; but they can't do much better than that.

**QUESTION:** Doctor, you have blithely written off Africa's potential economic capability as negligible. I have heard quite a few speakers say that Africa's critical raw materials are quite an aid to military production. Would you care to comment on what the loss of these resources might mean to the Free World?

**DR. MILLIKAN:** Well, I think perhaps I wrote Africa off too blithely. This is one of the major respects in which the GNP index has to be corrected for specific situations.

There are resources in Africa which are valuable--mineral resources primarily--uranium supplies and other things. They are not resources which are essential in the sense that, if you had time to adjust to their loss, you would suffer any really very major cut in your economic capability. They make the cost of supporting the military equipment lower than it would be in the absence of these resources. But, whereas I would perhaps adjust my evaluation a little, I wouldn't adjust it very much in saying that the current output of Africa is not a highly critical element in the economic capability of the West.

Now, in the future this may be different. The United States is probably going to rely more heavily in the future than it has in the past on African iron ore and other things. The raw material resources of the developed nations are running out relative to the need, and they are going to have to go to the more undeveloped areas and develop their natural resources. So another ten or fifteen years from now may make quite a difference in Africa's importance. But right at the moment, if all economic intercourse with Africa were shut off, this would be tough in some ways, particularly tough on a number of supplies like food-stuffs, like groundnuts and cocoa and that sort of thing; but it could be absorbed, I think.

QUESTION: On the question of the interpretation of national policy with respect to digging in for the long pull, I wonder if you would care to go into the contest that probably will evolve between the Soviet Bloc and the Free World in terms of their relative economic potential and what will happen to their potentials comparatively.

DR. MILLIKAN: This is essentially the same question that was asked earlier--"What is the prognosis as to rates of growth?" I couldn't say very much more than I have said without a very much more extended lecture on the subject.

My own personal hunch would be that the decline in the Soviet growth rates, which I think will occur, will come about somewhat as follows: I think they will have an agricultural crisis that will be really tougher than they expect. Their situation is tough enough now. I think what they will do is this: That it will become rather obviously important both for the USSR and China to allocate more resources to attempting to increase agricultural production, and that this in turn will compete with resources required for military purposes. They will have to allocate more resources to fertilizer and to earth-moving machinery if the

Soviets continue to develop their agriculture in the way they are now developing it--by trying to open up new, relatively low-productivity land with quite expensive agricultural machinery. This is going to mean that more of the Soviet flow of investment will have to go into maintaining and increasing food production. This will detract from the investment resources available for continuing to expand heavy industry and the industrial side of the economy. So that I think there is a chance at least that the Soviet growth rate will be forced by these considerations into slowing down very considerably.

There is also another factor that, if you are going to look twenty years ahead, may be quite important. I think, whereas we wrote off Free Asia, for example, for the moment and the Middle East, that if we take a twenty-year look, it is entirely possible that these will become quite important economically and will have to be reckoned with in terms of world powers. There are very large resources in those countries, and there is some effort to increase them. So it might not be at all out of the question that the Free World's economic resources will expand by an increase in the rate of growth in these areas that have been so long allowed to stagnate.

COLONEL CONNER: Dr. Millikan, I would like to thank you on behalf of the college for closing this Economic Potential Unit for us in such a fine fashion. You have given us a lot of interesting data and something that will stay with us for a long time. Thank you.

(8 Sep 1955--750)B/ekh