PRODUCTIVITY AND ECONOMIC GROWTH

Dr. John W. Kendrick

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Reporter: Ralph W. Bennett

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COL. REID: General Mundy, Gentlemen: To date so far in our Economic Section we have covered and heard lectures on the subjects of wages, the monetary system, national accounting, economic indicators, and the free market system. You have also read, and you're heard a lot said in the last two years about productivity and economic growth, particularly with respect to the United States vis-a-vis the Soviet Union.

Relative rates of economic growth are important in determining the power positions of the various nations. At the same time, it is also important that we understand what factors are influencing the growth rates of the various nations.

We shouldn't be too fatalistic about economic growth. It is, at least in part, subject to our own action, particularly if we understand what its causes and effects are.

To give you a better understanding of productivity and economic growth, we are fortunate to have as our lecturer today Dr. John W. Kendrick, who is well recognized as the pioneer in the field of the development of productivity measurement techniques. I might also add, he is one of our economics instructors during our Economics Section. He has a book, which is being published by the Princeton University Press, on "Productivity Trends in the United States." This book will be out sometime in January. I might also add that his biographical sketch lists him as an associate professor. Since the sketch was printed, he has been raised to the title of

full professor.

Dr. Kendrick, it's a pleasure to welcome you back for your second lecture at the Industrial College.

DR. KENDRICK: General Mundy, Gentlemen: It's a real honor to be invited back a second time in this year to address the Industrial College of the Armed Forces. This time also, as Colonel Reid said, I have the advantage of being a discussion leader, which gives me some idea as to what you have been learning about the economy, your background in this field, and also what you are interested in with respect to economic problems basically in the lively discussions I've been having with my particular group of sixteen over the past week.

Last January I spoke on productivity trends. This time the subject is broadened to comprise the broader field of economic growth generally. But since productivity advance is the most important element in economic growth, there will be much that is similar between these two lectures, in case any of you have looked at the transcript of the previous one.

This morning I plan to take about ten minutes each on four main topics: First, what is economic growth, and why is it probably the most important economic problem confronting us today? Second, what are the main elements and causal forces behind economic growth? Third, what is the growth record of the United States since the latter part of the 19th century, when our first relatively reliable estimates of national product begin? And, fourth, what is the outlook for economic growth over the next decade or two, given present trends; and what can we do to accelerate it,

if this is deemed desirable?

First, what is economic growth? Some economists, by biological analogy, look at it as the growth of the productive organism. They look at all of the plants, the machines, the cultivated land, the proven mineral reserves, and the people that operate these non-human resources and think of this as an organism which is gradually growing and increasing its power to produce, and would define economic growth in terms of the increase in the capacity to produce of this basic mechanism.

Now, obviously, you would have to measure the capacity in terms of its actual output potential. As we learned last week, perhaps the broadest measure of the final output of the economy is the gross national product. However, we're not interested in the price changes that influenced the gross product; so we take the gross product, adjusted to eliminate the effects of price change, that is, the real national product, and look at the growth of this measure over a period of years to get some idea as to the growth of basic productive capacity.

We know that you have fluctuations in the national product, in the percentage of capacity that is utilized. However, if you look at this national product measure in periods of high-level operation and utilization of capacity, this gives us the basic trend in the growth of the capacity itself, because, based on various measures we have, there has been no particular trend in the rate of utilization of capacity in high-level-prosperity years over the last century or so.

Also the real GNP itself is of interest in its own right, since actually

it's
the realized capacity that we are interested in. I mean, it's the amount of production we actually achieve out of this productive organism that gives us the material means for our phase of living, for our national security, and so on.

It's often pointed out that our real gross national product, the GNP, has to increase more than population if we really are progressing, if we are to be better off as individuals. However, this is a different measure, and often economists distinguish this from the growth measure by calling real product per capita a measure of economic progress, as distinguished from overall growth. But the measure I shall concentrate on this morning is the overall real GNP as the broadest measure of growth. However, we also want to see how it moves in relationship to population.

There is also interest in how the real product of the country moves in relationship to our basic resources, because insofar as we get more output out of the same resources, our efficiency is increasing. This is basically the idea behind the productivity measure; and this is another subsidiary measure of the overall national product that we will want to look at.

Now, in thinking about [redacted] economic growth, perhaps one of the first questions that arises is, What is a desirable or adequate growth rate? In answering this question we have to realize that you can't achieve a higher rate of growth than the existing one by waving a wand or some sort of magical incantation; that economic growth involves cost. Like everything else, it comes at a given sacrifice, as will develop further later. It involves both a sacrifice of current consumption, and the investment of

the saving in increments to population in the labor force and increments to productive facilities, including the development of natural resources, and investment in increasing the quality of the labor and the capital stocks of the country, which gives us our improvement in productive efficiency.

In a political democracy in which one man or a small group cannot decree a given growth objective and demand the necessary sacrifices from the community, the growth rate of the country will be determined on the basis of relevant decisions by millions of individuals--heads of families; heads of enterprises and non-profit institutions; representatives of the people in Federal, State, and local governments. These are the decisions related to disposition of time between work and leisure, the disposition of income between consumption and saving, the channeling of savings into investments and into productive assets, and decisions concerning the level and the composition of public taxation and expenditure.

To summarize what is an adequate growth rate, I would say that in a free society the adequate rate of economic growth is the one which reflects the composite decisions of the community over time with respect to the volume of resources that it will devote to current production, and the fraction of current output it is willing to invest to increase the future productive potential. These are not just individual decisions, but decisions we make through our representatives in government.

Now, in recent years there has grown an increasing demand for a higher rate of growth, which has been reflected this past summer in the platforms of both of our political parties. You remember, the Democratic

platform calls for an acceleration of our growth rate to 5 percent--the figure is mentioned--5 percent a year on average. The Republican platform also calls for a faster rate of economic growth, although a specific figure is not mentioned.

Why is it that we are concerned and want a higher rate of growth? Well, economic growth satisfies four major objectives that are important to us, which I can summarize as follows:

First of all, economic growth gives us an increasing material base for national security expenditures. If we had 5 percent growth in national product at our present level of a little over 500 billion, this would be a 25 billion increase in the national product, and about 30 percent of the increases in national product go into government tax revenues. Thus about 7 billion or so would be added to governmental revenues. Of course some of that would be used for non-security purposes. On the other hand, just the growth alone would provide for a very material increase in national security.

Some people will say that the growth isn't so important in that regard; that we can just increase the amount of our present national product going to defense outlays. However, we all know it is much more difficult for Congress to increase taxes, or to increase spending on a deficit basis. It would be much easier to provide for increasing national security and other needs of government out of substantial increases in the national product.

Secondly, economic growth gives us the basis for increasing our planes of living, which we can define as the real consumption outlays per capita. This is the basic goal of the economy, let us say, along with national security.

The increasing of our standards and our planes of living, and our increases in consumption per capita, over the last century or so have largely come out of increasing productivity, which is the main component of economic growth.

A third objective which we can satisfy through economic growth is a broadened program of foreign investment and aid. I emphasize foreign investment because this is of mutual benefit to us and to the recipient countries--to us because often rates of return on investment are attractive abroad, more so frequently than at home; benefits to the recipient countries because it helps them develop their resources. Often know-how goes along with the capital. Therefore the other countries receiving investments from this country enjoy a faster rate of economic development than they would if they had to finance it out of their own resources. Also it is basic policy in this country that by helping other countries develop economically, this contributes to stability in the rest of the world.

The fourth objective that is satisfied by economic growth is the provision for further growth. You remember, one of the major categories after consumption in the national product is the growth of private domestic investment. As the total gross product grows, so also can our domestic investment, which expands the plants and the equipment and the inventory necessary to increased production in the future.

Now I'd like to turn to the question of the causes of economic growth--the components in terms of which we can analyze it somewhat more precisely.

All of us remember from our first class here last week in economics

that output is a function of the land, labor, and capital resources that we have, and the efficiency with which these resources are used, which I will call "P" for "productivity." I didn't put down "land" separately. I include that in capital, lumping it together with the non-human resources at our disposal, because our basic resources can be divided this way, between the human and the non-human resources, although in the case of land, a certain amount is given, of course, although the amount that we develop varies. In the case of the capital resources that are manmade, these are reproducible and can be increased at will if we are willing to save from current consumption to devote resources to increasing capital facilities.

Now, the productivity component of growth, that is, the efficiency with which we use the resources, can be measured in terms of the ratio between output of real national product and the inputs of labor and capital, which I'll combine and just call "I" for "input." We can measure the labor input in terms of the man-hours worked in the economy. We can measure the capital resources in terms of the stocks of plant and equipment and machinery of different types and of our natural resources. And we can combine these two different types of resources in terms of their relative contribution to national income or product. Actually, the owners of capital receive about one-fourth of the national income, the workers of the country receive about three-quarters; so we can combine these two inputs about 75 percent-25 percent to get our overall input.

Productivity is the relationship of output to input in physical volume

terms; that is, after elimination of the effect of price change.

Often you have heard productivity referred to as the output per man-hour. Well, that's a partial productivity measure, because output per man-hour can rise merely as the result of increasing the capital equipment per worker, and not necessarily as a result of increasing productive efficiency generally. You have to take account of the capital costs involved in increasing the equipment per worker in order to see what the net savings in resources have been. So only by combining those types of input can you get the net savings of resources and thus the increase in productive efficiency. So in discussing the causes of economic growth, I would like to discuss it in terms of our basic input and in terms of productivity.

With respect to labor input, that is, man-hours worked, the basic element here, of course, is population growth, because the labor force of the country depends on population in the working age brackets of, let's say, 14 to 65, and the proportion of people, both men and women, in the various age brackets who are able and willing to work. Actually, over the last century, the proportion of the labor force to the population has gradually increased, surprisingly enough when you consider the fact that with more education, fewer and fewer people in the age brackets 14-24 are working. Also, due to earlier retirement, we have fewer people working over 65. But the decline in the labor force participation of these people has been more than offset by the increase in the proportion of women working. Particularly over 35, after having raised their families to a certain age, more and more women are coming in. So there has been a slight increase in the percentage

of the population working.

Over the long run the percentage of the labor force that is employed has been fairly constant. I mean, if you draw a trend through it and ignore the cyclical fluctuations, we can say that employment trends are parallel to labor force trends. On average, between 3 and 5 percent of the labor force is always unemployed, because this is the normal situation in a dynamic economy as people are between jobs, or are looking for jobs, or are temporarily laid off for seasonal or other reasons.

However, the increase in our population and labor force has been offset to some extent by the decline in average hours worked per week and per year. Back around 1900 the average work week was 60 hours. Now it's 40 hours. This has offset to quite an extent our growth in population and labor force. Nevertheless, we have had an increase in man-hours worked over this century of 1 1/2 percent or so. It would have been more if the work week had not fallen as fast. However, that's the choice that people have to make--the choice between more leisure and more goods--and we have chosen to take both--more goods and more leisure.

In other words, behind the growth in labor input you have the growth in population; and I submit that this depends, first, on people's free choice on the size of families; but it depends on investment, because all of us who are fathers here know that there is quite an investment involved in raising a child to working age. So this represents a type of family investment in increasing the population.

In the case of the capital resources, this is obviously a matter of

investment, because only by abstaining from current consumption and investing the savings in new plant, new equipment, and inventories, which are also necessary for production, can we increase our capital equipment and our capacity to produce. So the rate of increase in capital depends on the rate of savings and investment.

And, finally, what are the basic factors behind productivity change, increase in efficiency, obtaining more output for the same input? Well, this, too, is a matter of investment. It's a matter of investing resources in the activities that result in invention and in innovation.

Perhaps the best measure we have of such investment, intangible investment--it's not counted as investment by the Commerce Department, no more than the expenditures on children are counted as investment, but it is investment if you define investment as being any expenditure in the current period that yields results in future periods, which is how I would define investment. R and D is the same sort of investment, because you undertake research and development now in order to try to develop improved products, improved processes, cost-reducing equipment, machinery which will increase the efficiency of production in future periods. We all know that this research and development work has increased tremendously in this country. Back in 1920, less than 100 million dollars was spent on it. This year about 12 1/2 billion will be spent, which is an increase relative to the national product of from less than one tenth of one percent to over two percent, which is a very large relative increase and undoubtedly has been a major force leading to increased productivity.

Along with the increasing R & D has had to go expenditures to improve the quality of the labor force, first of all, to train the scientists and engineers that carry out the R & D; and, secondly, to increase the skills and education of the labor force generally, which has to operate this increasingly complex productive mechanism which is producing 500 billion dollars worth of goods and services.

I think these are basic to economic growth. And notice that in every case, saving and investment are involved--investment looking to the future, to increasing the future inputs and to increasing the efficiency with which those inputs are utilized, which requires abstaining from current consumption and putting resources with an eye to the future. And, of course, this is one of the things that distinguishes men from animals--our ability to look forward, to plan, and to sacrifice current satisfaction for future goals. And that is the basic cause behind economic growth.

Of course we need the inventives for this, and we need the institutions that make it possible. So, going deeper, I would say that the fact that in this country, for example, we have a deep desire for material progress, a willingness to adapt to the technological changes which our progress involves, and an interest in mechanical things, an interest in improving efficiency for its own sake as well as for its fruit--all of these things are important, plus the stability, the political stability, that enables a man to plan for the future in reasonable certitude that he will be able to enjoy the fruits of his savings at a future time. This is terribly important too, as under-developed countries are finding out. It's necessary to provide a certain basic social

and political stability before you can undertake the economic activity which results in growth.

Well, now, let's look at the growth record of the United States. I brought a series of five slides that I think will show this more graphically than I can indicate by words. So we'll take a look at what the figures show with respect to the increase in our input-output productivity.

(Chart 1)

This top line shows our real gross national product. You notice it's just the private/domestic economy, because it's very difficult to measure the output of government. If I had included the government output, measured in terms of the real earnings of government employees--what the Commerce Department does--you would have much the same curve--a little higher increase that government has grown relative to the private economy. But this is private economy.

The real national product over this period from 1889 to 1957 has been about 3 1/2 percent a year. You notice these periods of more rapid growth back here in the 1890's, when growth appeared to be much more rapid. During the 30's there was very little growth on net balance; and very rapid growth during the war and the immediate postwar period; and in the last few years, 1953, the rates of growth has been somewhat slower--only about 2 1/2 percent a year. But for the postwar period as a whole--1947-1959-- it has been 3 1/2 percent, right in line with our long-term rate.

I might mention that the '47-'53 rate was 4 1/2 percent. Since 1953 it has slowed down to 2 1/2, which is one reason for the concern that people

have about the rate of growth. That is why it got into both party platforms.

The fact that the rate of growth slowed down in '53--I do not want you to infer from my remarks that it was associated with a change of political parties at all, because actually we had fluctuations in the rates of growth throughout our history. In some periods we have had rapid growth, succeeded by periods of less rapid growth. I'm not referring to the business cycle and depression, but merely to the rates of growth between business cycle peaks, let us say. It has been quite normal to have faster and slower rates throughout our whole history.

Now, here we have our basic input. Capital input has grown at 2 1/2 percent a year over this period. Our labor input, which are man-hours weighted by average hour earnings of the major industries, have grown less rapidly--about 1 1/2 percent. In other words, capital per worker has grown about one percent a year, which is an important aspect of our growth.

When we combine these two inputs in proportion to their shares of national income, we get the growth of input, tangible input as a whole, which is about 1.7 percent. When we divide that into the real product, we get an increase of productivity of 1.7.

So that the growth of input and the growth of productivity have been about the same over this long period--1.7 percent each--thus each accounting for about half our growth in output as a whole.

But notice that the input growth was greater up through World War I, and it has been less since then; whereas productivity growth was less up to World War I and has been greater since 1919. In fact, productivity increase

has accelerated to 2.1 percent a year since 1919, over the last 40 years. Input has slowed down from 1.7 percent a year to 1.1 percent. In other words, inputs are increasing only about two-thirds as fast, whereas productivity is increasing over 50 percent faster than it did prior to 1919. Thus productivity has become a more important part of total growth. Since 1919 the GNP has gone up about 3.2 percent, and productivity 2.1. In other words, about two-thirds of our growth has been due to the increase in the efficiency with which we use our basic resources.

Just one other word on this chart before we leave it. The total output of real GNP has gone up 3 1/2 percent, but prices went up 2 percent a year on an average over this period. Thus at current dollars the GNP went up 5 1/2 percent. But we throw out the 2 percent due to price increase. So I think you might be interested in knowing the long-run rate of inflation. The quantity of money actually went up more than 2 percent. To tie in with our lecture on money supply, the money supply went up closer to 3 percent. But it was offset to some extent by decreased velocity of circulation, or, in other words, by an increase in liquid balances that people held relative to their income over this period. As people have become wealthier, they have chosen to hold part of their wealth, or an increasing part, in terms of liquid assets, surprisingly enough.

This merely shows the productivity ratio not only in relation to labor and capital, but in relation to labor alone and to capital alone. Output per man-hour, when you count all man-hours the same, has gone up about 2 1/2 percent a year over this long period. When you weight the man-hours

according to the average earnings in the base period of different types of occupations and in different industries, you find that this weighted man-hour measure goes up more than the unweighted man-hours, due to the shifts of workers toward higher-paying occupations and industries. In effect, this reflects increasing education and training on the part of the population. Since weighted man-hours have gone up more than unweighted, this second measure, output per weighted man-hour, has gone up less. It has gone up about 2 1/4 percent a year over the period. Output relative to capital alone has gone up a little over 1 percent a year less than output per unit of labor because of the fact that we have been increasing capital per worker. We have been substituting capital for labor.

Notice that there are fluctuations in productivity change. Recessions or depressions usually result in a slowing up or decline. Right after the war in/ the postwar readjustment there was a decline in productivity, plus the long-term trend has been up and up faster in recent decades than in the earlier ones.

(Chart 2)

This chart shows output on a per capita basis . Population over this seven-year period has risen about 1 1/2 percent a year. Thus real product per capita, which is this line, increased about 2 percent a year.

When you look at output on a per capita basis to get a measure of economic progress, you see that productivity has really accounted for all of the increase, because input per capita really has increased practically none at all. There is a little net increase, there was more increase up to

World War I, but then with the slowing down of population and labor force growth, we actually had a little decline in inputs relative to population. You notice that this tainted the man-hour side of it, largely due to some slowing down of population and labor force growth. But you will see soon, this curve will be picking up in the next decade or two, due to the baby boom of the 40's, which means more new people coming into the labor force in the 60's. Capital output has continued up on net balance despite the depressing influence of the great depression and World War II on private capital formation.

(Chart 3)

This chart I included to indicate that productivity increases at different rates in different industries. Here we have five major industry divisions. Our most rapid rates of productivity advance have come in communications and public utility, particularly the electric light and power utility. We have had increases of over 5 percent a year. Manufacturing has been about 2 1/2 percent a year, transportation 3 1/2 percent. Even the so-called "backward" railroads have done better than the national average in productivity advance. Their trouble is that the airlines, pipelines, truck lines, and bus lines have done better in increasing productivity than the railroads even.

In farming we did not have very much increase in the productivity up until the mid 30's. Then we had very rapid increase in productivity on the farm, which is one of the reasons for our farm problem--more and more output per farmer, which means that our needs can be satisfied with

fewer people in agriculture.

If I showed a chart showing productivity in several dozens of industries, you would find a big fanning out of rates sustained, ranging all the way from 6 percent a year on average down to virtually nothing. However, all of our industries have experienced some increase in efficiency over the long period down there, which begins in 1889.

Let me say one more thing about industry changes. The industries which have increased their productivity most have been able to reduce their prices relatively to other industries. This has increased their sales relative to industry sales generally, and enough so so that they have increased their employment of people. In general, then, our progressive industries have been the best employers of labor, the ones that have absorbed more capital, and have been getting an increase in the share of the market. So certainly, if this were a group of businessmen, I would advise them to look very carefully at their productivity records. And more and more companies are trying to measure their own productivity.

(Chart 4)

Now, the final chart in this series compares our increase of productivity with the increase in real average hourly earnings. This is manufacturing. This is our economy as a whole. You notice that real average earnings have gone up a little more than productivity. They have gone up about 2.8 percent. Output per man-hour has gone up about 2.6 percent, you may recall.

The only reason why real average earnings of labor have been able to

go up a little more than productivity is that the compensation of capital per unit has gone up a little less than the output per unit of capital, which has made it possible for workers to get a little more increase than their productivity.

A lot of people are surprised when I say this, because generally we think that wage increases, unless limited to the increase in output per man-hour, are inflationary. Well, that is basically true; but you can get a little more increase in wage rates than in output per man-hour to the extent that capital compensation does not rise as much as output per unit of capital rises. But this is a very small amount. I think we can say that, given our productivity trends, wage increases in excess of 3 percent definitely tend to push up prices from the cost side, assuming that the monetary authorities accommodate this by increasing the supply of money sufficiently to turn over the national product at the rising unit cost necessitated by wage increases in excess of 3 percent or so a year on average.

You perhaps will want to ask more questions about that. But I have to go on now, since time is getting short and I don't want to infringe on the question period, since often I think the question period is the most interesting.

Now, I want to go on to discuss the outlook with respect to our real national product in coming years.

The way that we predict, that we project, the real national product is, first of all, by projecting the population and the labor force, which gives us an idea of the trend in employment that is possible. We project average hours per week, usually assuming some further gradual decline,

which gives us an increase in man-hours available for work. Then we project the increase in output per man-hour. In other words, in this partial productivity measure, if I multiply output per man-hours times man-hours available for a future year, we come up with an estimate of national product. This is just in the long run, since over long periods it is the supply and productive efficiency that determine how much will be produced. In the short run we have to look at demand factors. And in my particular group I have been discussing the very definite indications of a coming recession. I think that quite likely in 1961 we will have a readjustment again. But this should pave the way for quite rapid economic growth over the next decade, because, first of all, we're going to have the larger increase in the labor force and thus in employment in man-hours, assuming our economic policies conduce to relatively full employment, which I'm sure they will, in the 1960's.

(Slide)

The first slide with respect to outlook shows the probable increase in population and labor force jumping from 1960 to 1980, which gives you a 20-year perspective here of population growth. It is now about 180 million and will grow to over 250 million in the next 20 years. This is not on my projection, but on projections of the Census Bureau, which has experts in demography making forecasts of population growth. Their forecasts formerly had been too low. Now they seem to be more realistic in their population projections. Projecting the labor force participation ratio, men and women, we come up with an increase of labor force from about 70 million at present to around 100 million in 1980.

Then if we project the real product of the workers--I didn't go through the intermediate steps of estimating hours and output per man-hour--but on a per worker basis you see that now we are about $7000 per worker, compared with less than 5 back in 1940; and assuming that the price trend is as in the past, we go up to around 11 or 11 1/2 thousand of 1959 dollars per worker. I say "1959 dollars" because, obviously, we want to eliminate the price factor. This is just based on past productivity trends that we get this increase in the real product per worker.

But, even using the past trends, you can see that we will have a very large increase in the national product over the next 20 years.

By the way, in this slide I didn't mean to show any cyclical fluctuation. That point should be about right here. But the 1980 figure is correct. This means that the national product in 1980 will be around 1 trillion 200 billion, compared with our present level of about 500 billion.

Now, this means a faster rate of growth in the next ten to twenty years than we have had in the last decade. As I said, our long-term rate, plus the rate of the postwar period, has been 3 1/2. This figure for 1980 implies about 4 1/4 percent per year growth. It is an acceleration. Even without special policies, due to this increase in the labor force, we will accelerate our economic growth.

However, many people feel that this is not enough. Mr. Berle yesterday mentioned that the Russian growth rate is in excess of 5 percent a year, probably between 5 and 6; and I've seen estimates of around 7. We know that many other countries have been growing faster than the United

States in the last ten or fifteen years, including our two former enemies Japan and Germany, as well as some of our former allies. The rate of growth has been high in many other countries. Our own has not looked very good.

Even the acceleration to 4 1/4 percent many people feel is not enough. As I said, the Democratic platform calls for at least 5 percent.

So as a final topic I'd like to ask, How can we get an even faster rate of growth? Well, the main way that we can get it is by accelerating our advance in productivity. Based on my earlier discussion, this means increasing our savings and investment in those activities which tend to increase productive efficiency. This particularly means increasing research and development expenditures. It also means a high rate of tangible capital formation, both by government in those areas in which the government has to do the building of highways, schools, and so forth; and in the private area.

With respect to private investment, it's important that the Government provide sufficient incentives to private industry to increase its investment, both tangible and intangible. I think this would mean the necessity of reducing certain types of taxes to provide stimulation. And with the increase in governmental revenues that I mentioned, of between 5 and 10 billion a year at present tax rates, I think there is the possibility certainly of decreasing certain types of taxes to increase incentives.

It also means that the Government will have to increase expenditures, all governments, for education, so that we get the more highly trained labor force to devise the innovations and inventions we need for greater

efficiency and to operate the increasingly complex productive mechanism.

It means increasing private and public expenditures for health, because this also bears on our personal efficiency.

I think also it means trying to keep the long-term interest rate from rising too high with respect to monetary policy, because the higher the interest rate--an increased interest rate tends to cut off investment; and probably by pursuing a monetary policy that keeps the interest rate on the lower side, we will get more basic investment, particularly in tangible assets.

Also we have to preserve the confidence of private industry in the ability of the Government to maaintain relatively full employment, and to maintain the necessary incentive for private investment.

Perhaps we can go further into this question of the necessary measures to accelerate growth in the discussion period. But I'd like to close the formal presentation with the thought that it is quite possible for us to accelerate our rate of economic growth if we have the will to do it.

COL. REID: Dr. Kendrick is ready for your questions.

QUESTION: In your chart which showed the increase of mechanization in most of our manufacturing areas, that tends, I believe, to cause further migration of such workers into white collar workers or into the overhead area. What is the degree of measure or what system do you use to measure the migration into the overhead area or the indirect versus direct in trying to find the saturation point, to find out whether our productivity is actually increasing or whether we are paying people standing

around? Will you comment on that a little?

DR. KENDRICK: Yes. I'll be glad to, because that has been a marked trend. Not only in the postwar period, but for decades before that, we have had a decreasing proportion of employees in the blue collar or production worker category, an increasing proportion in the white collar category, non-production workers, the engineers, technicians, administrative, research and development, sales, and so forth.

I think this reflects the increasing complexity of our technology, for one thing. For example, when you automate a plant, it cuts down on the production workers, but it increases on the maintenance workers and engineers. Usually more research is going on to further improve the products, and so on.

So that we have this trend toward more non-production workers relatively. This means that a productivity measure should not relate output to production worker man-hours, as some of the measures of the Labor Department do. I don't know whether anyone here is from the Labor Department. But there has been increasing objection to some of their measures of output per production worker man-hour, because this goes up faster than output relative to man-hours as a whole; and you can't ascribe this increase to any increase of efficiency necessarily of the production workers as such. It's due to the improvement of technology generally. But you have to take account of the increase in the non-production workers in the denominator of the productivity ratio. Also, I maintain, you have to take account of the additional/ capital that is being used. And when you take account of that, you have still

less increase in productive efficiency.

Of course, with automation you not only get a shift from production to non-production workers, but you get shifts among occupations and skills, and also among industries. This is the price for technological progress. You get displacement of labor in one place, but jobs are created elsewhere. This creates the problem of having to train labor when it is displaced, to work in another job.

I think one of the big issues in collective bargaining in the next decade--and I was pleased that Jules Backman backed me up on this one last week--in our discussion group we felt that job security, more than wage rate increases, was going to be important in the coming decade--workers seeking to get assurances from company management that they would be retrained or that there would be a severance pay that would enable them to go to school between jobs, or that unemployment compensation include extra allowances to cover cost of education and training if this is necessary, and so on. I think we do have to provide that, both through our private concerns and through public problems if private industry can't handle it.

QUESTION: You stated that the growth rate is determined by the collective decisions of individuals and the representatives of government; and that an adequate growth rate is one that reflects these decisions. It would seem that, unless we have a very tightly controlled economy, the net results of these decisions would be that there would be a shrinkage in the economy as well as a growth. Would you clarify that?

DR. KENDRICK: What I'm saying is that in a democracy this is the

proper growth rate. Maybe "adequate" was not quite the right word. The proper growth rate is one which reflects these decisions.

Now, it's true that if these decisions result in less saving and investment proportionally to the national output, our growth could slow down. However, my feeling is that in a democracy where we are informed as to the challenges facing the nation, people will make the decisions necessary to increase the investment required. And I think this is reflected in the party platforms, as I said. Regardless of which party comes in, probably the Republicans will put emphasis on creating an environment favorable to private interprise to a somewhat greater extent. The Democrats will probably put emphasis on maintaining high-level demand, if necessary through increasing Government purchases and expenditures sufficiently to give us the necessary growth. But, regardless of what the emphasis is, I think we're going to get the program.

As far as private saving investment is concerned, this depends on people's decisions in their private capacities. As consumers how much you save or as businessmen how much you pay out in dividends of net earnings, and thus how much you save, as pointed out yesterday--the majority of our saving is done by corporations who retain 40 percent of their earnings.

Well, there again all I can say is that if we are informed, and know what the problems are, I think that the decisions are going to be such as to meet the challenges. However, we have got to be informed.

QUESTION: Dr. Kendrick, you have mentioned that both of the parties,

Republican and Democratic, have written a plant in their platform calling for a higher rate of growth, and that the Democrats have written specifically 5 percent. In a recent speech Mr. Johnson stated that if the Democrats were elected, they would balance the budget. Would you care to address yourself to the feasibility and compatibility of a balanced budget and a sustained rate of 5 percent growth of national product?

DR. KENDRICK: Yes. I think I gave the basic ingredients of that earlier when I said that 5 percent at the present level of GNP--that change in the real GNP would be about 25 billion a year on average. About one-third of all of our increase in income goes to the government in taxes. And so our change in tax revenue is 7 1/2 billion.

Now, I think that 7 1/2 billion increase in governmental revenues should be enough to give us the necessary increases in defense and in non-defense, and perhaps even leave something over for tax reduction. The projections that I have seen of required government spending usually fall somewhere between 5 and 7 billion a year. I think there is even hope for not only a balanced budget, but a surplus. However, as we know, it's better that the surplus is run during the inflationary boom period, with perhaps temporary deficits during depression years helping to pump money into the system. But on balance I think we could actually run a surplus making possible tax reduction.

QUESTION: I find myself being a little bit concerned every time I hear somebody seriously suggest that a 30-hour work week is a likelihood. I wonder if you would indicate your thinking as to the possibility of such

a work week coming into effect.

DR. KENDRICK: Well, you are not alone in this concern. Governor Nelson Rockefeller himself advocated in one of his talks about the need for faster economic growth that the work week more or less be frozen; that we not continually cut it.

This would give us more output. It is true that the reduction in hours is sometimes offset in part by increase in output per hour. But I don't think this is very important any more. Maybe when we were working 72 and 60 hours in heavy industry, a reduction in hours meant more energy per hour that was actually being worked, and you got more output, which partly offset the effect. But at our present levels, certainly a reduction in hours means less output. And in view of our need for a fast rate of growth, I think there is a lot of merit in this.

Actually, the unions in the early postwar period were not asking for shorter work weeks. They didn't want to take increased efficiency in more leisure at that time; but, rather, wanted higher real earnings. In recent years in certain areas there has been a drive for the shorter week again.

So I think this is a real possibility. However, this would have to be accompanied by measures which lead to a full employment and high enough demand so that there is no concern about unemployment and therefore no drive to share the work. We had a big reduction in hours back in the 30's, as you recall, in an effort to share the limited amount of work among more people. So to slow down this trend toward a shorter week, I think we're going to need the high level demand of full employment.

While I'm on that, I might say that during the break General Mundy raised this question, How are we going to assure the demand necessary to absorb this tremendous increase in national product? I think the answer to that is that, in the first place, the increase in production creates a corresponding income, as we know, since costs are the opposite side of the revenue from sales. But the problem is that not all of the income arising from production is necessarily spent. There's a certain amount of saving that individuals and business concerns do. It is necessary that these savings get channeled into investment.

So the key to the continued increase in demand to absorb the increasing product that will be possible is a rising level of investment sufficiently to absorb the savings that people would choose to make at these rising income levels.

The most important factor here, I think, is continued invention and innovation, because as new equipment is developed that cuts costs, that creates a demand for it, since management wishes to cut its production costs and will buy new equipment if there is sufficient improvement. Also the development of new products has the same effect, since to produce the new product requires investment in new types of facilities.

So that's why I emphasize the need for greater research and development, since it helps to create the demand for investment that we need to maintain total demand. And, secondly, it increases the efficiency of our capital and our productive mechanism that gives us the faster productivity advance.

So it's really a two-edged sword. I don't think we can emphasize the need to train the scientists and the engineers or to spend the money on R&D enough. It is certainly central.

QUESTION: On the subject of the comparative growth rate of America and other countries, I wonder if you could identify for us why people are so concerned about the difference in rate when our national product is so much higher than that of these other countries.

DR. KENDRICK: Well, that perhaps is true in the short run. But, as you know, the power of compound interest is very great. The difference between, say, 5 percent and 2 1/2 percent, our recent rate of growth of 2 1/2 percent, is that at 5 percent we will double our national product in 15 years and at 2 1/2 percent it takes us 30 years to double it. And even though another country has only half of our national product per capita, if it is growing at a much faster rate, it is only a matter of time until the real product per capita will be as great--maybe a generation or so, when these lines cross--and that's what we are looking ahead to and why we think an aceeleration may be needed.

But let me say this: I don't think that these high growth rates of other countries are going to continue as high as they have been, because the 8 or 10 percent that Japan has been getting, the 6 or 7 percent that Russia has been getting, and so on have been due in part to the recovery from the devastation of their economies during the war, although probably the rebuilding was pretty well over within the first six or eight years. But then also you have the fact that these countries are behind us technologically,

and they can get big increases in productivity by borrowing our most advanced technology, which they do. They buy our latest machinery and send--not so much USSR but other countries--send their engineers over here to be trained. So they can get faster rates, because they are picking up some of our most advanced knowledge.

However, once they get closer to the frontiers of science and engineering, their growth will be harder to come by also, because more of it will have to be generated within their system by their own research and development work. The borrowing will be less important, you see. So that's going to slow it down too.

I would think that 5 percent is probably going to be adequate, because I think the other countries will be slowing down and we will be speeding up somewhat just due to the population factor. If we get a little more productivity increase, I think we'll be all right.

QUESTION: We have heard speakers hint at recession and some have gone on to make predictions. Would you care to comment on the underlying cause of possible recession?

DR. KENDRICK: Yes; I'd be happy to, even though this is not directly connected with the subject of long-term growth. Yet it is indirectly, since the trend really cuts through the cyclical fluctuations that we get, and the rate of growth does depend to some extent on how severe these cycles are. With more and more severe recession, our rate of growth tends to be slower.

At the present time, as you know, there is excess capacity in certain

industries, which means that there is less need for investment to expand facilities than there would be if these industries were operating at a high rate of capacity.

In the case of investment, expenditures are leveling off in the latter part of this year; and a survey by the National Industrial Conference Board indicates that corporate managements are appropriating less money for capital outlays in 1961. This suggests to me that we will definitely get a drop in domestic investment early next year.

Also consumer surveys show that consumers--that means all of us--are somewhat jittery about the economic outlook; and that consumers are cutting back somewhat on their plans to spend for durable goods. This also is a negative element.

As far as government spending is concerned, we have a feeling, based on the obligational authority--it's true that there has been some speed-up in the letting of contracts and orders by the Federal Government in the last few months, and this can temporarily pick us up. But this is limited until--I mean, there is a ceiling on this until Congress comes back and votes more money for governmental operations. This will take time. It will be next spring at the earliest before we get additional obligational authority from Congress. And in the meantime, if the private economy goes into a recession, it will be too sudden for government to do much about it, until, as I say, the spring or summer of next year. In the meantime we could have had a fairly sharp decline in activity; and I think that is what the stock market is foreshadowing by its decline since the end of last year,

of 15 percent or so, plus the more recent drop yesterday, which carries it through the further resistant point and definitely establishes a bear market. Investors are always trying to look ahead at what is going to happen to earnings in the economy. I think it's becoming clear to everyone that a recession is in the offing.

I believe that yesterday--I didn't hear him--but I understand Mr. Gainsbrugh indicated that there were some possibilties that we may avoid it, due to the fact that we have been going through certain adjustments. Inventories are more balanced relative to sales now than they were after the immediate build-up following the steel strike. There are some possibilities. But I think when you list the pluses and the minuses, you come out on the minus side. At least I do.

QUESTION: Looking at this booklet "Economic Indicators," at the chart on employment, see see that they have our labor force broken down into manufacturing, non-manufacturing, and government. In speaking of productivity, one gets the feeling that we are primarily concerned with the manufacturing group. Now, if this is the case, this involves only a third of the labor force, and then only a portion of that is, of course, in the actual production work. My question is, Is it only the manufacturing part of the labor force that we are concerned about?

DR. KENDRICK: Well, the answer to that is No. Although I cited an example of automation, I think in my chart I indicated that these produc-

tivity measures were for the entire private economy.

However, you bring up a good point--that most of our productivity gains have come in certain industries, particularly in manufacturing, and also in transportation and public utilities. But we have had quite a lag in productivity om / the financial and service industries. There has been some increase in efficiency, but at a much slower rate. The estimates of the National Bureau of Economic Research come out between 1 and 1 1/2 percent a year, which is well below the economy average.

However, I think that this situation is becoming corrected somewhat partly by automation. In the case of the banks, insurance companies, and the financial area, they are putting much of their record-keeping and accounting on electronic data-processing equipment, which is, for the first time in a long time, increasing productive efficiency in the banking and insurance sectors.

Also even in the area of services we are getting increases in efficiency. And in order to get an acceleration in our rate of productivity advance, we have to try to get efficiency gains in these areas that have been backward. Although, of course, we have to admit that it's harder to increase productive efficiency in the service area than it is in manufacturing, communications, utilities, and transportation, because of the nature of the process of production.

And, finally, let me say that, even while we can't measure productivity in government very effectively, it is also important to increase productivity of government workers. An attempt was made last year, reported

in Review of Economic Statistics of November, of measuring productivity ; and in government for about 70 percent of civilian government in agencies which perform fairly standardized types of operation--like the Veterans Administration, Internal Revenue Service-Social Security Administration, they have work measurement programs in which they measure the units of work of different types, which gives them an output measure, which they can relate to employment. This is also true of Postoffice--the number of pieces of mail handled relative to the postal employment.

So in these governmental areas you have increased productivity almost 2 percent a year. I was surprised to see that. But, based on these measures, it's not much below the private economy level of output per man-hour of 2 1/2 percent. And certainly we can do more to increase productive efficiency in the governmental service. This also will help.

COL. REID: Dr. Kendrick, we at the College are certainly very happy to have had you here to give us this analysis and explanation of productivity. It is easy for us to understand why economists who stop in here as speakers call you "Mr. Productivity."

DR. KENDRICK: Well, thank you very much.

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