

ECONOMIC STABILIZATION

9 February 1950

CONTENTS

	<u>Page</u>
INTRODUCTION--Colonel Thomas G. McCulloch, FD, Chief, Procurement Branch, ICAF.....	1
SPEAKER--Dr. Harold G. Moulton, President of Brookings Institution..	1
GENERAL DISCUSSION:.....	12

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COLONEL McCULLOCH: Gentlemen, it would, indeed, be presumptuous of me, and, in fact, an insult to your intelligence, if I should attempt an explanation, however brief, as to the relation between the subject of our lecture today, "Economic Stabilization," and our course on Economic Mobilization.

Further, when one has the honor of introducing a speaker who has achieved national and international fame as an educator, an author, a businessman, as President of Brookings Institution, and an expert in his field, all one needs to do is add our welcome to the College. Therefore, it is a pleasure, a privilege, and an honor to introduce Dr. Harold G. Moulton. Dr. Moulton.

DR. MOULTON: Gentlemen, I am not sure that my talk is going to be exactly on the subject of "Economic Stabilization," but it is related, on the whole, to some of the basic problems in which you are interested. I am going to begin by a discussion of the position of our economic system as a whole.

I have recently published a book which I called "Controlling Factors in Economic Development," which represents six or seven years of concentrated work and is, in a sense, an outgrowth of all the things I have been concerned with over the years as a professional student of economics.

I have called the first half of the book "Looking Backward," and the second half, "Looking Forward." The reason I look backward first was to survey the developments of the last century with a view to getting criteria by which to judge the possibilities of the future. I would like to discuss first with you, in general terms, this question: Do we have adequate fundamental material resources with which to continue a very prosperous and expanding economy?

I will begin by stating that 100 years ago the professional economists had a very dismal outlook with respect to the future. They based that on two factors. The first was what they called the scarcity of resources and the law of diminishing returns: You can grow more products on a given piece of good land, but beyond a certain point you do not get a proportionate return.

The second basic factor was that population tended to increase with great rapidity and, in consequence, the masses of mankind were doomed to

perpetually low standards of living. They foresaw at best a stationary society in the not-too-distant future.

Well, now, the century that followed was one of extraordinary development, not only in the United States but in most of the world. There were, of course, a few obvious exceptions. But there was extraordinary development in all of western Europe, Japan, numerous other countries, and in the United States as well.

By and large, I think we can say that we increased man-hour output roughly fourfold in the 100 years from 1850 to 1950. It was that increase in man-hour output which made possible the rapidly rising standard of living. All this resulted from a combination of factors which the older economists could not foresee.

This vast development was not due chiefly to the discovery of new land because our great Midwest was already opened up by that time. It was due primarily to our developments in the realm of science and technology which made it possible to produce more efficiently.

In recent years, as you are all aware, new concern has been manifested from more than one quarter with respect to our economic future as governed by our basic natural resources. As a result of two great wars in a single generation, have we not substantially undermined the foundations of industrialism?

I want first to consider foodstuffs because that is one of the basic problems with which you gentlemen are necessarily concerned as you plan for the years ahead. I will make my remarks with respect to foodstuffs very brief.

My studies--and they have been very intensive ones--indicate we do not have need for concern over the adequacy of food supplies resources. I put the problem in these terms: Could we support, say a century hence, so far as foodstuffs are concerned, a population twice that which we now have, and give the people a more adequate diet? My answer to this question is an unqualified, yes. And we can produce those foodstuffs under conditions of increasing rather than diminishing returns; that is, with ever-increasing efficiency of output, with lower unit cost.

When people think about the future of agriculture, they usually think, first and foremost, in terms of availability of more lands that might be brought under cultivation. We do have some additional land; but that is a minor factor in determining our food-producing capacity.

The very important and vital factor is our ability to produce more food from existing resources. I would put the problem in a nutshell in these terms: It has been commonly assumed by nearly all of us, I think, that virgin soils are somehow the best soils; and that whenever we pass the stage of having any virgin lands, we necessarily have lower productivity in agriculture. The truth of the matter is that it has been demonstrated in recent times that long cultivated soils can be very much more productive than virgin soils. Many virgin soils lack some particular food-producing elements. For instance, there may be a lack of lime, or a lack of potash, or a lack of phosphate. Modern scientific agriculture supplies the limiting factor. I will illustrate by a personal experience which I think can show it to you most concretely.

In my boyhood we could grow on virgin land perhaps 30 to 40 bushels of corn to the acre—that is shelled corn measurement. In the Shenandoah Valley of Virginia, in recent years, by better scientific management, I increased, in successive years, the yields from 70 bushels to 85 to 109 to 125 bushels without anything like a proportional increase in cost.

That is an illustration that can be multiplied, many times, not only in connection with corn but all sorts of crops. The fact of the case is that with the knowledge we now have, if it were universally applied, we could readily increase our food production 100 percent from the existing acreage now used.

I move now to a problem which I think will be of direct interest to you gentlemen; that is, the adequacy of our mineral and metal resources. In brief we can overcome such deficiencies as we have in certain metals in a variety of ways:

First, systematic exploration constantly opens new sources. We have had numerous significant discoveries in recent years.

Second, imports from other countries may continue to meet our needs. Fortunately, adjacent Canada is one of the world's largest ore-producing regions and is even now the greatest metal-exporting country in the world, ranking first in the production of nickel and platinum; second in uranium and asbestos; third in cobalt, copper, mercury, silver, and zinc; and fourth in lead. The far North of this continent, including Labrador and Alaska, as well as northern Canada, appears, on the basis of preliminary surveys, rich in promise with respect to such metals as iron, tin, tungsten, lead, chromium, mercury, and titanium.

Third, technology in the laboratories and pilot plants is constantly developing methods for using manganese, chromium, titanium, and other metals from low-grade domestic ores. Moreover, scientific advances are making possible the ready substitution of one metal for another, as aluminum for

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copper and steel, and manganese for nickel, and the development of new alloys, such as titanium with aluminum, magnesium, and iron.

Fourth, chemical discoveries make possible the substitution of synthetic materials for natural mineral substances. It has been demonstrated that most of these synthetic products are as satisfactory as natural minerals, while in some cases they are decidedly superior.

Now, the crucial problem in this realm is, of course, the adequacy of the iron and steel resources. Modern industrialism has been built primarily on the foundation of iron and steel. So, the question there is one of vital importance.

In the past, of course, the United States has been self-sufficient with respect to iron ore and coke. However, because of the enormous consumption in recent decades, and especially since 1940, much concern has naturally arisen over the existing reserves. To the end of 1943 as much as 2 billion 125 million tons of high-grade ore containing as much as 50 percent iron had been mined in the United States, chiefly in the Mesabi Range of the Lake Superior region. These combined reserves of measured and indicated ore--that is the term being used--would last for about 40 years at the continued rate of production equal to that of wartime.

The Lake Superior ranges also extend into Canada and substantial reserves of near-by ore are thus available to the United States on an import basis. And, more important, has been the recent discovery of iron ore in the Labrador region. There transportation costs may present a commercial problem, but not necessarily a problem from the military point of view.

We are not, however, dependent upon ores that are very rich in iron content. Considerable quantities of ore containing from 25 to 35 percent iron have been mined in the United States. In the Lake Superior region alone there are stupendous deposits of low-grade ore which have not as yet been drawn upon.

Low-grade ores, called taconite, would last for a very long period of time. Taconite requires a different processing from high-grade ore and new plants would be required for crushing and agglomerating operations. Although such preparation of the ore would add somewhat to the cost, it is contended even now by some that this would be offset largely, if not wholly, by economies in subsequent stages, flowing from the fact that the concentration is in purer form.

In this connection I think we need to bear in mind that the iron ore resources used by other countries for vast military developments have not usually been of the high quality of those of the Lake Superior region. It has been demonstrated that if we do not worry too much about the possible added cost, other ores can be used. I refer to both Germany and Japan.

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So I reach the conclusion that, while iron resources present something of a problem, the prospect is reassuring when we take account of the Western Hemisphere as a whole.

In the case of other metals (I will not stop to discuss those specifically) used for war activities, the prospect is better than it is in the case of iron and steel if one takes account of the possibilities of substitutes. In general, we reached the conclusion that we do possess the required minerals for a continued development of our industrial system over a long period of time.

The next question is the supply of fuel and energy resources. In summary:

The sources of electric energy are superabundant. Taking account of both hydroelectric and steam power, we need have no concern about the adequacy of electric energy.

The reserves of coal are almost unlimited—it would be conservative to say the coal reserves are adequate for hundreds of years. This is very interesting in view of the fact that I can remember 30 or 40 years ago there was a vast concern in this country about the future of our coal supplies. The development of substitutes, improved mining methods, and so forth, have given us a problem of surpluses rather than deficiencies.

The oil supply is, of course, the crucial issue in this field. So I want to go into that just a little bit more thoroughly. Oil has two primary uses—as a lubricant and as a fuel. Without lubrication industrial civilization is impossible. It began to be employed in a large way as a lubricant with the development of the machine industry in the early part of the nineteenth century. But its extensive use as fuel waited upon the development of the internal combustion engine near the close of the century.

The supply of oil for the future will depend upon three factors: (1) The extent of the oil resources, (2) the efficiency with which the oil is extracted and used, and (3) the development of synthetic substitutes. I would like to go back just a little here because things have been happening in this realm which I think we all need to bear in mind.

A special committee of the American Petroleum Institute, reporting in 1936, stated:

"The Oil to be discovered in the future is so concealed from observation that an estimate of ultimate reserves is obviously impracticable. However, we do have definite, although incomplete, knowledge of geologic factors which are favorable to the occurrence of oil. This gives reason to expect that ample discoveries will be made to meet national requirements for a period of indeterminate length."

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That was a very optimistic statement in view of the tremendous concern that existed after the end of the First World War, when we were told that the proved reserves of this country would last for only a decade or so. Well, after 25 years, including another world war, our reserves were three times as big as they were at the conclusion of the First World War.

But the statement made in 1936 was regarded as hopeful. Then, at about the same time, the president of the American Association of Petroleum Geologists, after reviewing recent developments in stratigraphic analysis, concluded that: "The day of geology, as applied to the practical problem of discovering a continuing oil reserve for our Nation, is just dawning."

The soundness of these observations has been evidenced by the vast new oil resources which have been opened up in the last decade. Important new fields have been discovered in various parts of the United States, and old fields have been greatly extended. Moreover, extensive deposits have been disclosed offshore, under the continental shelf of the Atlantic and Pacific Oceans, the Gulf of Mexico, and also more recently in Canada. The amount of oil discoveries and developments in these last 15 years has astounded even the most optimistic geologist.

The supply of oil is also constantly being increased, in effect by technological developments in extracting, refining, and utilization processes. New methods of extraction make possible great extensions of existing fields, both horizontally and vertically. Some of the greatest pools have been opened at a depth of several miles.

Improved refining processes and conservation practices serve to increase the quantity and improve the quality of gasoline and other high-grade fuels. Improvements in engine design make a given amount of fuel go much further. The new gas turbines developed during World War II have been characterized as perhaps the most important discovery in this field since the steam engine. These highly efficient turbines require much less fuel and can also use fuel of a cheaper quality. Thus far, they have been effectively used only in large installations, but when materials have been developed which will resist temperatures of from 2,000 to 3,000 degrees, it is believed that a small gas turbine engine the size of a dial telephone may be used in automobiles. Finally, of course, we now have synthetic oil and gasoline, which have great potentialities.

In concluding this section on oil, I want to read a statement that was made by Dr. Joseph H. Pogue, one of the most distinguished petroleum geologists, the problem is stated, it seems to me, in a most effective and convincing manner. He says:

RESTRICTED

"It may be argued that this process of multiplication of oil and oil wells must have limits and cannot proceed indefinitely, yet it is hazardous to set bounds to a force so dynamic, so rich in past accomplishment, and whose potency has been so enormously stimulated by the emphasis of the war upon technological progress. Conservation procedures, in turn, make possible the fuller application of the fruits of technology, guarding the benefits against the inroads of waste and intemperate development. While the sources of oil are restricted by Nature, the availability of oil is subject to almost indefinite extension under the impact of (what he calls) dynamic techniques."

In addition to this, of course, we have had a vast development of natural gas in recent years. The deeper we go in drilling for oil, the greater the gas supply that is opened up because of the intensity of the pressure. Gas is only on the threshold of its future.

So I reach the conclusion that, while we cannot be profligate in the use of oil, we are reasonably assured of oil without depending upon the resources of other parts of the world for quite a long period to come.

When we think in terms of economic efficiency, we have to think these days in terms of the significance of what has to come to be called electronics. Recent developments in the realm of physics are of far-reaching significance in relation to the future of industry and our ability to satisfy our economic needs. These developments include atomic fission, ultrasonics (or inaudible sound), and a wide range of phenomena which are comprehended in the general term "electronics". This term relates to the phenomenon of electrons passing through space in a vacuum tube. You are all familiar with such commonplace instruments as the radio, talking picture, television, neon signs, electric eye, radar, and so forth. It is also used in a very extensive way in industry. Electronic devices make it possible to locate imperfections in metals, such as in sheets that pass through the rolling machine. They can be immediately spotted, a signal is given to indicate their appearance and their location is accurately indicated. The heat of molten metal is now precisely controlled by chemical analysis and the electronic recording of the light given off.

Another development has to do with induction heating and resistance welding. The heat thus produced is so nearly instantaneous that it can be limited to a small spot on a piece of metal, producing a white heat in a fraction of a second, while only a few inches away the metal remains cool. By electronic vibration studies, the fatigue of metals can be measured precisely and the lifetime of a machine part accurately determined. In time, it will thus be possible to use much less material to obtain a given result and to build much less cumbersome factories, office buildings, industrial equipment, and automobiles.

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The X-ray is used in finding cracks in blow holes in metal castings and in exploring the completed welds for possible defects.

In many other ways electronic science is serving the need of society. I will not take the time to elaborate on them. But the significance of what I have tried to say here is that as we look forward and plan our future, from the standpoint of national security I think we can have a high degree of assurance with respect to the adequacy of our resources and our producing capacity. Our most difficult problems are of a different sort. I want to touch very briefly on a few of those.

The first problem I wish to call attention to is the difficulty that we constantly encounter in increasing the efficiency of production as much as mechanical advances make possible. To make-work and malingering policies of labor organization tend to offset, in some measure at least, the gains that are constantly being made by the introduction of labor-saving machinery and better industrial organization and management. That social type of problem—a personnel problem, if you wish—is of course of a very different character from the physical factors we have been discussing up to now.

The second problem I wish to briefly refer to is the role of government in connection with our economic life. As you all know, the role of government in this and other countries, everywhere, has very greatly expanded in the last 40 years, and very especially in the last 15 years. This expansion of the role of government is, in part, due to factors that grew out of the increasing size and complexity of business. It is partly due to the tremendous emphasis that has been placed in many countries on military preparedness and on war; the farther we go in that direction, the more necessary are certain types of government controls of materials.

The expansion of the role of government is, however, primarily an outgrowth of the depression of 1929 and 1933. That was not the worst depression in our recorded history, but its devastation was worse because of the vastly greater size of the urban population as compared with small town and rural population. The depression naturally gave rise—and again let me say this was true in all countries—to a great increase of government aid and government control.

Our country has been endeavoring to operate what I call a hybrid type of system in which we still rely on private enterprise to do the producing of commodities and also to take care of the marketing and distribution; while, on the other hand, the Government is supposed to hold the reins of control in order to make the private enterprise system work better. The fraction of government, thus conceived, is to supplement the system of private enterprise.

RESTRICTED

That is an extremely difficult undertaking--one of vast complexity. The results have been reasonably good in some areas, but quite unsuccessful in others. I cannot now go into the complex issues involved here because it would take much more time than I can give to it in this address. But a major policy involved is that of fiscal management, whereby it is believed that we can maintain full employment and keep everybody satisfied and happy.

I am sure you have all noted the continuous growth of the public indebtedness resulting from many years of unbalanced budgets and deficits. The fact of the case is the United States has had only two years since 1930 when we have had a balanced budget. It was of course to be expected that we could not make ends meet during the acute depression period of the thirties. But after the recovery of 1935 and 1936, it still continued and was about as high in the late thirties as in the depression years. We could expect a deficit again in the war period for vast requirements could not be met immediately by taxation. Then, after the war for a year or so, we had the problems of demobilization and rehabilitation, which cost much money.

Since then, we have had two fiscal years in which we had a surplus. During the super-boom period of 1947 and 1948, accompanied by very high prices, which yielded very large dollar income, we were able to balance the budget. Taxes--except for the excess-profits levy--meanwhile remained virtually at the wartime level.

At present, while still in a period of high prosperity, we are again faced with a prospective deficit officially estimated at 5 billion dollars.

This turn for the worse is in part due to the enlarged military expenditures forced on us by world conditions. In part it is also due to a shrinkage of revenue incident to a modest decline in business activities. I say "modest" because, after all, the recession of last year was very slight, as it turned out. In terms of the production index, the maximum decline was less than 15 percent, as I recall it. The average output for the year as a whole was less than 1 percent--for the decline was moderate in the early months of the year and business picked up sharply in the late summer.

Yet, this moderate and short-lived recession cut heavily into tax revenues. We are so geared, industrially speaking, that peak volume is indispensable to high profits. Our tax machinery is what has been called a highly-g geared system, which yields abundantly in periods of boom and superboom, and which yields poorly in periods of even moderate recession.

A 10 percent decline in the national income would produce something like a 15 billion dollar decline in tax receipts. A 20 to 30 percent decline is not inconceivable. You may be interested to know that the recession of 1937, as it was politely called, involved in a period of about

RESTRICTED

eight months a decline in the production index of over 30 percent. So, when we talk in terms of a 20 percent decline in the production index, and in the level of income generally, we are not talking about a depression like that of 1929 to 1933.

The fiscal situation is thus one of our basic problems. Can we continue definitely to have unbalanced budgets and keep piling up the public debt? It is my considered judgment, based on many years of study, that we are simply storing up troubles for the future.

I should perhaps add here that I do not hold to the collapse theory. Many people ask, "Aren't we going to collapse all of a sudden?" or have a blowup? My answer is no; we do not have a collapse with this sort of thing. Rather the confidence that is so essential to the operation of a profit-making economic system will be gradually undermined. This means that the assumption of risk will not be undertaken to the same degree. It means that the driving force which has been responsible for our great progress in the past will not be so strong. That means, in turn, that in trying to maintain full employment, the Government's sphere of activity will be steadily expanded. Such activities may provide employment but seldom do they provide tax money.

When I face this aspect of our problems, I am not optimistic about our ability to maintain a continuous stable economy. We are drifting in this direction. The longer deficits occur without any collapse or any disaster, the more people are inclined to think it doesn't make any difference. Well, you know it does make a difference when you come to pay your taxes. We are constantly encroaching upon our reserves for providing all sorts of support formerly done on a voluntary basis. Support for educational institutions of all kinds has been fundamentally undermined. As a result, everybody finds it necessary to get on the government pay roll; and thus our fiscal difficulties are intensified.

It is not too late to achieve and maintain fiscal stability. Thanks to the enormous expansion in the producing capacity of the United States during the last 25 years and the higher level of prices this Nation could balance its budget at the present juncture. Assuming a high level of business activity, we can raise the revenues essential to meet indispensable expenditures. Fortunately, our foundations have not as yet been completely undermined. But if the present drift continues for another 5 or 10 years, my answer would be very different.

Now, I turn to the problem of price stabilization in time of war. In my judgment, we can stabilize prices in time of war whether the budget is balanced or unbalanced. I want to point to two lessons in this connection. The first was that afforded by Germany. I do not know whether other speakers have called attention to this or not, but it happens to be something I followed very closely. I would like to mention it in passing.

RESTRICTED

At the beginning of the Hitler regime, Germany proceeded at once to lay the foundations for the control or stabilization of prices. The Germans struck at the foundations rather than trying to establish some high ceiling without paying attention to what was building up below.

The first thing Germany did was to establish control of prices of imported materials. Imported raw materials, you will recall, played a big role in the German economy. Consequently, control of import prices was a very important factor in their situation--much more important than it would be in ours, though not so much as it would be in the case of Great Britain.

Second, they proceeded to control wages. Third, they controlled prices of foodstuff--which was necessary if they were to control wages.

So, the basic elements of cost were subjected to control. I do not know what eventually happened in the later stages, but in all the earlier periods of preparation for the war, and in the early stages of it, they had a very effective control of prices.

In the United States we did not do that. We had too much confusion of minds and too many interests involved to permit that kind of effective control in the early stages. It was not until we adopted what came to be known as the "hold-the-line" policy--I think it was in the spring of 1943--that we struck at the roots of the problem. The essence of the "hold-the-line" policy was to "control the price of foodstuff and to control wages."

You can just put this down as absolute--unless you are willing to control wages from the very beginning, and also prices of foodstuff, where the demand suddenly becomes very much greater than before, you are not going to have control over prices. And the longer you wait, the more difficult the control will become to establish. Once an extension rise has occurred, but unevenly in different sectors of the economy, some sectors have to be subsidized in order to compensate for the difficulties that would be faced.

The time to begin is at the start. We will not get anywhere at all with price control unless we control first the basic elements of cost, which get passed along, inevitably, into prices. The price control authorities must keep war production moving. If it is necessary to raise the price in order to compensate for costs that have already risen, of course such increases are going to be permitted.

The problem was mitigated for us very considerably in the last war by the fact that we started at a period when we were operating at much less capacity. Typically speaking, American industry was operating somewhere around 70 or 80 percent in 1941. In some cases it was more than that; in others, it was considerably less. So when we began to produce at maximum

RESTRICTED

capacity the low unit cost involved often obviated the necessity of raising prices much, if any, even though some of these costs had risen.

But, as I say, the place to begin is with wages and prices. I leave this thought with you with all the emphasis I can possibly give it. I think it is crucial in your whole problem. If you once achieve that, you will not only expedite war production at lower costs, you will also achieve a social stability that we cannot otherwise possibly have. A rising cost of living affects the public in widely varying degrees, and is a primary source of suffering and discontent.

In conclusion, I repeat: Price stabilization cannot be maintained unless you begin where the source of the disturbance starts.

DR. KRESS: Gentlemen, Dr. Moulton has indicated his knowledge of a wide variety of subjects. You have many topics upon which to write papers, so now is your opportunity to get information from a top source.

QUESTION: Dr. Moulton, I believe you did not quite finish at one point. I am very much interested in hearing all of your comment that a 10 percent cut in the national income would reduce Federal revenue or receipts by about 15 billion dollars. But then you said that a 20 or 30 percent decline—you didn't quite finish.

DR. MOULTON: I said a 20 to 30 percent decline in production was not inconceivable. On the basis of a gross product of 220 billion dollars, a 25 percent reduction would mean over 50 billion dollars in terms of total income. In terms of taxable income the percentage cut would be much greater than 25 percent.

QUESTION: Dr. Moulton, in your discussion of this country's economic stabilization, you stated you do not subscribe to the collapse theory. You also stated you did not feel we would have perfect economic stabilization.

Now, there are some people in other countries who are inclined to predict an economic collapse in this country. I wonder if you would go out on a limb and give us your idea of the possibility of even a serious recession in the near future?

DR. MOULTON: That is quite a talk in itself. If you wish, I will comment briefly on the subject.

Of course, as all of you know, the great fear we have had, both from the standpoint of unemployment and social welfare and also from the standpoint of the world political situation, has been that we might have a postwar business collapse. I was not one of those who believed we would have a

RESTRICTED

collapse immediately after the war. You will recall that the planners, following the Keynes model, were quite sure we would have 10 million unemployed in 1946. Early in 1947 there were a great many forecasters who predicted that would be the year, and then again in 1948. Finally in 1949 when we did have a recession they were certain it would degenerate into a panic. It was possible it would degenerate into a severe crisis.

But there were two things that sustained us in 1949. For a short period of time we were having considerable recession in many lines; but in two lines the movement was in the opposite direction. The first of these was automobiles, which are of tremendous significance in the economy as a whole. Month by month the automobile production expanded in the first half or three-quarters of 1949. The other was in the field of housing. It happens that these are two very major industries and have a tremendously ramifying influence throughout the economy. Meanwhile, accumulated inventories in the other lines were being worked off. Consumer purchasing power and consumer buying continued at a high plane. By midsummer things began to pick up.

Now, take the present year. This year begins with a great deal of optimism. It is the first time since the war, as a matter of fact, that most forecasts have taken a rather strong stand in favor of prosperity throughout this year.

So far as the first six months are concerned, I think it is quite clear automobile production is sure to be on a very high plane; housing on a very high plane; and in most of the other lines the movement is forward.

A most important exception is that capital expenditures by industry for additional plant and equipment is tending to decline somewhat. We had exceptionally heavy capital outlays in 1947, in 1948, the first half of 1949 which accounted for the super-boom. These outlays have been declining somewhat and will continue to taper off without much question in the remainder of the year.

When we get beyond June, it is by no means certain that automobile production will continue at the same level. On the other hand, housing is practically certain to remain at a high level.

QUESTION: Dr. Moulton, you mentioned the resistance of organized labor to technological development. There is somewhat of a problem involved in this whole situation. I am wondering, if the machine replaces the man on the job, how does the man still participate or contribute to the production in order to be entitled to share in the profit? Looking at it as a rather long-range problem, would you comment on that?

DR. MOULTON: Looking backward first into the last century, this fear of technological unemployment has been with us ever since the beginning of technology. Our history is full of illustrations of men destroying machines of various kinds. This is true both in this and in other countries as well. Yet, the truth of the matter is, whatever might be true for a short period of time, over the years machinery has created more jobs than it has destroyed. It is the only means whereby advances in living standards have been achieved.

Take the case of agriculture, for example. For 2,000 years or more—in fact, until 1800—there was practically no change in agriculture producing methods. We had the simplest kinds of tools. For instance, there was the wooden plow that simply scraped the surface of the soil. Still, there was full employment in agriculture for everybody in the family.

The nineteenth century was marked by the development of labor-saving machinery. That did not affect yield sufficiently, but it did affect the amount of labor required. It did affect the cost per unit of the product.

In 1850, in this country of ours, there were seven farm families as against four other families. In other words, it took seven families on the farm to support themselves and four other families. By 1900, seven farm families could support about 18. By 1950, seven farm families can support 33 others in addition to themselves. That is what technological advancement in agriculture has accomplished in that century.

Now, are the farmers better off or worse off? Well, of course, in that period their real income has risen progressively. They are vastly better off than they were a century ago. That is one way of measuring the amount of technological progress in agriculture. In the last century it took seven farm families to support themselves and four others; now they support 33 others.

QUESTION: As to that problem of the machine making work for more people instead of taking it away, it seems to me there is a threat involved that has not been explained.

As we get more and more technology, it is true we can feed more people. But doesn't that tend toward a situation in which the skillful and productive element of the population could take care of themselves very nicely and get along without the others.

Would you discuss that?

DR. MOULTON: Yes, I would like to say a word or two about that.

The advantage accruing from increased efficiency we take out in part in the form of shorter work hours. In the United States between 1900 and 1930 there was a 13 percent reduction in the length of the average working day.

Increased efficiency also creates jobs. It permits higher wages and lower prices—and the improved ratio of wages to prices makes possible increased demands for more of all kinds of products, plus new products as well. We now have at the present time vastly more machinery than we had 15 years ago, or 10 years ago. We also have a greater percentage of the population gainfully employed.

Except in periods of depression, our history shows that the total number of workers, that is—total number of jobs available, has not been decreased as a result of the expansion of machinery. That comes about through giving constantly more product for the same money, which means expanded demands, which means more markets, which means more capital developments.

QUESTIONER: But a lot of these jobs are made jobs.

DR. MOULTON: At present, percentagewise, made jobs do not bulk very large. It still remains true that out of the 60 million people who have jobs in this country, the overwhelming majority of them are engaged in productive enterprises. The numbers that are in government have been constantly increasing. A part of that increase is necessary because of the expanding scope of the Government. On the other hand, there are in all lines—and I daresay it is true of the armed services as well—more workers than necessary to do the job in hand. We have had a tendency to have more people on the job than was necessary. That is a weakness of the Government. But that is not equally true of industry by any manner of means because it is facing more directly the profit and loss proposition. Industry gets rid of people whereas the Government does not.

DR. KRESS: Thank you very kindly, Dr. Moulton. You certainly have made a tremendous contribution to our thinking here this morning.

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