ECONOMICS U$A

PROGRAM #12

ECONOMIC GROWTH: CAN WE KEEP UP THE PACE?

AUDIO PROGRAM TRANSCRIPT

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(MUSIC PLAYS)

Announcer: Funding for this program was provided by Annenberg Learner.

FRANK STASIO: This program was originally recorded in 1985. Though times have changed, the basic economic principles presented here remain as relevant today as they were when the series was produced. Also, please note that individuals interviewed on this program may no longer hold the same titles they held when this program was recorded.

(MUSIC PLAYS)

FRANK STASIO: Economics U$A. One of a series of programs designed to explore twentieth-century micro and macroeconomic principles. The subject of this edition is Economic Growth. Our guests are John Kendrick, Professor of Economics at George Washington University and adjunct scholar at the American Enterprise Institute, and Doctor John Morgan, Chief Staff Officer of the U.S. Bureau of Mines. I'm Frank Stasio

JOHN F. KENNEDY: "I'm not satisfied when the United States had last year the lowest rate of economic growth of any major industrialized society in the world."

JIMMY CARTER: "The actions that I'm announcing today meet this goal. First of all, they will loosen some of the stifling restraints that have been placed upon innovation by government. Secondly, they represent a first major step toward forging a public and private partnership, which will rally cooperative efforts to spur industrial growth."

RONALD REAGAN: "We have the highest percentage of outmoded industrial plant and equipment of any of the industrial nations. I stood in Ohio in a great empty shell of a building that was once a steel plant. The weeds are beginning to grow up. Closed, because they could not afford to modernize. And punitive taxes and those excessive regulations mandating additional costs on them have been responsible."

FRANK STASIO: The subject of economic growth has been a particularly important theme in American politics in recent decades. The vitality of the U.S. economy, fed by a combination of social, political, and technological factors, has promoted rapid growth and steady improvement in the nation's standard of living. The phrase "economic growth" may carry slightly different meanings depending on the context, but for our purposes, economic growth refers to "per capita increases in total output." A steady increase in the rate of growth, even if the percentage is tiny, can have an important effect on the nation's standard of living. John Kendrick is a Professor of Economics at George Washington University and an adjunct scholar at the American Enterprise Institute.

JOHN KENDRICK: "Due to the power of compound interest, three percent rate of increase means a doubling every twenty-four years, so that it is important. And the three percent increase in productivity, defined as 'output per labor hour' for this purpose, is somewhat greater than the increase in output per capita, per person. That's been about two percent, which means, our planes of living– our standards of living– double about every thirty-five years. So, these small numbers are…are quite important. Even point one is important. A tenth of a percent is important in thinking about growth rates because of the power of compounding."

FRANK STASIO: Today, most Americans have come to expect such improvements. But this optimism about the future is fairly recent. At the dawn of the Industrial Age, students of Western economies offered gloomy prospects for the generation who would follow. Thomas Malthus wrote convincingly at the turn of the nineteenth century about the perils of population growth. Malthus believed that a nation's productive capacity would eventually become

overwhelmed by the demands of an ever-increasing population. But the dire predictions of Malthus and others failed to take into account the dramatic increase in growth and productivity brought on by technological change. Indeed, technology didn't begin to have its exponential effects on man's knowledge and productive capacity until a century after Malthus' death. Changes in technology made it possible for more work to be done by fewer people, thus, increasing productivity as well as total output. Technological advances also made it possible for a large percentage of the population to leave farming for other kinds of work. Professor Kendrick explains that the changeover from an agricultural to a manufacturing economy creates long-term economic growth through improvements in productivity.

JOHN KENDRICK: "The shifts among industries in the economy have two effects, depending on the level of productivity… and then farm…and, then, on the rate of change in productivity. And then farming, the level of productivity, was quite a bit lower. As we know, farm workers are paid less than workers in manufacturing. And the farmer makes less profit than manufacturing. As a result, people have been shifting out of agriculture because it is not remunerated as well. So, that, as those people shift into areas where they get greater remuneration, as in manufacturing, that raises the level of productivity in the nation. Even though, in agriculture itself, productivity was growing, well, it still was below the level of productivity in other industries. That's why the shift out of agriculture, generally, has a favorable effect on productivity."

FRANK STASIO: The shift away from agriculture began to slow somewhat by the early nineteen seventies. This slowdown actually contributed to the sharp decline in productivity growth that was experienced during the period. In other words, once the transition away from farming was nearly complete, its favorable effect on the economy ended.

MALE VOICE: "Now, to make sure that this valve is working or not working, what we'll do, we'll eliminate the heater so that the hot water from the cooling system doesn't travel through your heater core."

FRANK STASIO: Americans today are better educated and trained than their parents and grandparents. And this, too, helps spur economic growth.

JOHN KENDRICK: "The average education and training of workers has been increasing gradually but significantly over the years, except for an apparent decline in the efficacy of the education experience. In other words, we all have heard about the decline in the Scholastic Aptitude Test scores over the last twenty years or so, both in verbal and in mathematical subjects. However, it is… it's heartening to note that these scores leveled out in the early eighties and…and now, have been rising for a couple of years. Of course, technical training's important, trade school, and so on. And I think there has been some expansion in that area, but they're probably apprenticeship-type programs, learning on the job, are particularly important. The Comprehensive Employment and Training Act has provided funds for more training of workers, particularly those who've been displaced due to technological advances, whose occupations have been eliminated, or demand for whose services have dropped. And those training programs, I think, do help productivity, by increasing mobility– making possible shifts of workers, from one occupation, or industry, or geographical region to another.

FRANK STASIO: America's abundant natural resources have played a large part in the nation's economic growth. But as the demand for those resources increased, fears began to grow that the U.S. might run out of some of its most vital raw materials. At the turn of the century, Teddy Roosevelt began his crusade to save the wilderness, to protect the nation's woodlands against the encroachment of a spreading population. More recently, we faced the prospect of a depletion of oil reserves.

FRANKLIN D. ROOSEVELT: "Conservation is a weapon in America's arsenal of defense. Conserve–before it's too late."

FRANK STASIO: In the early 1970s, a group of economists, calling themselves the "Club of Rome," wrote a number of articles, warning that the world would soon reach the limits of productive growth as it began to run out of natural resources. Like the theories of Malthus, the dire forecasts of the Club of Rome had a certain urgent appeal. But many economists, John Kendrick included, believe that such predictions fail to account for economic adjustments that occur as resources become scarce.

JOHN KENDRICK: "In terms of, say, materials shortages, that, obviously, would get reflected in a rise in prices. That rise in prices would encourage consumers to substitute cheaper goods for those that are rising in price. It would encourage research in the areas of scarcity, say, in the natural resource areas; it would encourage search or research to get substitutes or to increase the supply so that that would help to bring the price back down somewhat, assuming that that search and research were successful. So, I personally don't believe in the thesis of the Club of Rome that increasing resource scarcities are going to cripple growth because I believe the price system will operate in such a way that will tend to find and develop substitutes for the items that are becoming scarcer, or else find more of the scarcer materials. As you know, the petroleum reserves have grown over the years despite the periodic fears that we would run out of oil, and, similarly, with a good many other raw materials."

FRANK STASIO: At one time or another throughout this century, experts have predicted the United States would run out of copper. Because of its value as an electrical conductor, periodic predictions of the depletion of copper sent waves of anxiety across the country. But the worst never happened. Doctor John Morgan is the Chief Staff Officer at the U.S. Bureau of Mines. Doctor Morgan says there was never cause for alarm. And in fact, worldwide copper reserves today are greater than at any time in history.

JOHN MORGAN: "And the reason for this misunderstanding on the part of the general public is that most people don't understand the distinction between 'reserves' and 'resources,' as used in the field of minerals. By definition, a mineral reserve is a deposit that has been drilled with considerable accuracy, so that the content of the deposit is known with a degree of accuracy of probably eighty percent or greater. And, secondly, the material in that deposit must be

producible and yield a profit at the prices prevailing at the time the reserve is established. Now, therefore, the concept of reserve is a…a very viable, lively, movable quantity because, if the price goes up, known deposits that were not economic would become economic, and would be classified as reserves. And if the price goes down, currently classified reserves would be eliminated from the reserve category."

FRANK STASIO: So, scarcity almost automatically results in conservation as the price rises. At the same time, the higher price may mean less productive mines will be put back into production, or less concentrated ores will be profitable to mine. Ordinarily, a higher price acts as a signal to mine owners to turn out more minerals, although Doctor Morgan says that's not always the case, particularly when it comes to precious metals.

JOHN MORGAN: "Sometimes, on the very high-value mineral materials, you get less when the price goes up. And the reason for that is that the mine is looking to a long period of life, thirty, forty years, if possible, and they have varying degrades of ore in the mine. Some ores are richer, and some ores are poorer, and they know where they are, but they have to also maintain some orderly mining system in order to keep the mine from caving in, in order to protect the shaft, and so forth. And, therefore, they try to maintain a constant throughput in the mill that processes the material of so many tons per day. If, now, the price of that particular metal is low, in order to make enough money to keep operating and at least break even, then, they tend to treat the higher-grade ores when the price is low. If the price of the metal goes real high, then, this gives them an opportunity to treat the lower-grade ores in the mine and maintain an orderly mining system because they will still make a profit treating the lower-grade ore with the same throughput in the mill when the price is higher

FRANK STASIO: All of this suggests that judging the availability of natural resources should not be left to intuition or superficial analysis. Doctor Morgan says that such simple comparisons between the amount of reserves and the current demand for a mineral would lead to the wrong conclusion about the likelihood of running out.

JOHN MORGAN: "For an example of how we measure reserves, the Bureau of Mines, in its latest publication, says that the world reserve base of copper is about five hundred million tons of copper. In comparison, the mine production in 1984 was somewhat under ten million tons of copper. Therefore, you might be tempted to take the five- hundred-million-ton reserve base, divide by the ten million tons of annual production and decide that we only had a fifty-year supply of copper in the world. But this would be a very erroneous interpretation of the statistics, for several reasons. One reason is that there's at least another billion tons of copper in known deposits on the surface of the earth, on dry land, that is not included in the reserve base because it hasn't been adequately defined or is uneconomic to produce, at the same, at the current price. Also, there is another half a billion tons of copper in deep-sea nodules out in the deep sea that aren't counted in at all. Now, in addition to that, a substantial amount of copper will be recycled over the years, so that we will not necessarily be relying on only mine production in the future. In addition, improvements in technology may permit some of the existing uneconomic deposits to be mined, and improvements in expiration and mining technology will undoubtedly uncover new copper deposits. So the…the short of it is, we're not running out of anything. There are more minerals in every category known today than any time in the past. And from every study we have made in the Bureau of Mines that will certainly continue to be the case, at least into the early next century."

FRANK STASIO: Technological changes in the mining industry itself can increase the supply of resources. Better efficiency means that ore previously not counted as reserves because of its low grade may now be dug out and refined.

JOHN MORGAN: "In this country, twenty-five or thirty years ago, a two or three-percent copper ore was a very good ore, and yielded a good return. Today, some of the U.S. mines are operating with a copper content of less than one half of one percent of copper. So, the improvements in technology over the last thirty years, improvements in…in blasting, improvements in…in moving the blasted rock (Where years ago a twenty-five- or a thirty-ton truck was a large truck, today a truck could be two hundred and fifty tons in size); the development of improved crushers; the development of improved mineral-separating systems,

the development of improved smelting and refining systems, all of these have made possible the treatment of copper ores going as low, as I indicated, a half percent."

FRANK STASIO: But technology can also change the way other industries use resources. So, it would not be useful to plot consumption trends too far into the future.

JOHN MORGAN: Take, for example, the automobile which… in the last ten years, they have reduced approximately a thousand pounds from the weight of the automobile. This results in a conservation of materials. The largest reduction's been in…in steel, common steel. On the other hand, if you look at the modern automobile, it probably has a plastic bumper, whereas, ten years ago it had a steel bumper, plated with chromium, and underneath the chromium plate was probably a copper and a nickel plate in order to let the chromium take hold. So there is a…is a conservation effort. Ten years ago, there was all kind of chromium plating around the windows and the doors, and so forth. Today that's…that's all plastic. Now keep in mind that plastics, too, are mineral-based materials in that they're made largely from petroleum and natural gas, so that we clearly substitute one mineral for another, or we find more efficient ways of doing the job. For example, in the case of long-line telephone communication, that used to be all done with copper wires. Then, they came up with radio transmission from the top of one mountain to another, which cut out the copper wires in between. More recently, they've come up with satellite communication in which radio signals are beamed to satellites and around the world. So, you don't need a copper cable. Now, the, one of the newest developments are glass fiber cables where a tiny cable, not much thicker than…than the ordinary fountain pen, can handle ninety thousand conversations, and it would take a…a cable, probably, a foot or more in diameter, with thousands of copper wires to handle the same amount of telephone communication."

FRANK STASIO: As Doctor Morgan has said, not all of the natural resources we use are newly- harvested. Much of the raw material for production comes from recycling. Recycling, Morgan says, is wholly a question of economics.

JOHN MORGAN: "If you notice that, aluminum beer and soft drink cans are recycled rather elaborately. And the price paid for those cans is of the order of twenty to twenty-five cents a pound when the price of virgin aluminum is of the order of fifty cents a pound. And there are two reasons why it pays to recycle the cans. One is that that is a very high grade of aluminum in the can that is segregated by grade and can be readily re-melded and used to make more cans. And the second thing is that a number of states and other municipalities have adopted laws against the throwaway article, and, therefore, by encouraging the…the recycling of the particular can, they are enabled to keep on bottling them or canning them in cans, which is a cheaper and easier way to handle the material. Every material will be recycled if money can be made by so doing. All you have to do is watch when they knock down an ordinary house, and the ordinary workmen who are there are usually smart enough to throw any pieces of brass or copper off to one side because they know that the junk dealer will pay them a reasonable price for the brass or copper, whereas the scrap iron, unless it's an unusually heavy grade of metal, goes onto the dump and…and is not recycled. So, every material has some group of people that knows how to recycle and at a profit, and that's what it takes."

FRANK STASIO: Does this have an important or…or a trivial impact on the overall supply and whether or not we're gonna run out of a given commodity?

JOHN MORGAN: "Oh, many of our commodities come in large measure from recycled materials. For example, in this country there is a great amount of platinum from converters, from catalysts in…in the petroleum industry that are regularly reworked as probably only a loss of less than one percent of the platinum and the reworking of the catalyst. Now they're beginning to talk of recycling catalytic converters from automobiles when the…when the catalytic converter is spent. Now you can do that 'cause platinum sells for two hundred or four hundred dollars an ounce. Steel, bulky items of steel, like steel rails or railroad car wheels, bridge sections, and so forth, are all recycled, and a major industry has been built up in the mini-steel mills which use nothing but scrap iron, and, in most cases, electric furnaces to turn out a variety of…of bar products, and so forth, which have impacted very greatly on the normal virgin steel business of the steel industry."

FRANK STASIO: Also, if we did face a real shortage in raw materials, both consumers and manufacturers might become more thoughtful about the way they use natural resources. As long as resources are plentiful, consumers can afford to be a bit more extravagant in their purchasing behavior. Remember the case in the decline in the Model-T, when consumers chose style over durability. For their part, manufacturers tend to encourage a certain amount of waste by building obsolescence into their products.

JOHN MORGAN: "For example, the value of the raw materials in an automobile is probably the order of five hundred dollars, yet, the automobile sells for ten thousand dollars or more. And the big increase in cost is in the value added by manufacturing rather than in the cost of the raw materials, per se. If they made the automobile body out of stainless steel and put a heavier engine in it, it, conceivably, would last for twenty or thirty years, but that way, they wouldn't sell many more new automobiles each year. If you want to use a good material you can design an article that'll last you a lifetime and beyond. Take, for example, in the normal kitchen, the copper-plated steel, stainless steel cook pots that are in almost universal use today. The copper bottom spreads the heat effectively over the entire surface of the pan, assuring that there are no hot spots, that the heat is uniformly distributed. A stainless steel is relatively unaffected by the various articles that are cooked in it, and such a pot, if you take any care of it, would last indefinitely. Now, unfortunately, most consumer articles, like washing machines, and automobiles and what, are deliberately designed not to last an extra long period of time because the people who make them want to sell more."

FRANK STASIO: As far as Doctor John Morgan of the U.S. Bureau of Mines is concerned, there is almost no chance of a long-term slowdown in economic growth. due solely to mineral shortages.

JOHN MORGAN: "In the first place, scientifically, the basic law of sciences that other and nuclear reactions, matter is neither created nor destroyed, so all of the material that…that is here is gonna be here. Secondly, however, we are finding more and more material and using more

material in more efficient ways. So that, over the past thirty years, the relative costs of most materials in constant dollars have tended to decline rather than to rise."

FRANK STASIO: Morgan and others believe that the continued availability of natural resources and improvements in technology and education will promote healthy, long-term growth well into the future. Let's review some of the key points in our discussion about economic growth. Economic growth is best measured by the increase of real gross national product per capita. Technological change and improvements in the nation's natural and human resources all help to determine the rate of economic growth. A group of economists called the Club of Rome warned in the 1970s that the nations of the world would soon reach the limits of their economic growth because they would run out of natural resources. This theory is challenged by other experts, who point out that, as resources become scarce, their price goes up, which encourages conservation or a shift to substitute resources. They also point out that, at least in the case of mineral resources, there are great quantities of undiscovered or untapped reserves. Technological changes can alter the way resources are used. And they can also improve the way they're harvested and processed.

(MUSIC PLAYS)

FRANK STASIO: You've been listening to Economics U$A, one of a series of programs on micro- and macroeconomic principles. Our guests have been John Kendrick, a Professor of Economics at George Washington University and adjunct scholar at the American Enterprise Institute, and Doctor John Morgan, Chief Staff Officer of the U.S. Bureau of Mines. Economics U$A has been produced by the Educational Film Center in Annandale, Virginia. I'm Frank Stasio.
(MUSIC ENDS)
Announcer: Funding for this program was provided by Annenberg Learner.