

ECONOMICS U\$A
PROGRAM #125

ECONOMICS GROWTH:
CAN WE KEEP UP THE PACE?

BY RICHARD THOMAS

AIRSCRIPT
NOVEMBER 6, 1985

25. ECONOMIC GROWTH: CAN WE KEEP UP THE PACE?

PURPOSE:

To show two of the major determinants of the economy's growth in the 20th century, and to examine whether the continuation of growth is threatened by the depletion of natural resources.

OBJECTIVES:

1. Approximately one-third of the growth in output per person is due to the increasing quantity of capital per worker and economies of scale.
2. Technological change may have accounted for half of the economy's growth.
3. Scarcity of natural resources may impede economic growth but such scarcities have been overcome in the past.
 - a) prices will increase for useful resources that become scarce, encouraging conservation, substitutes, and the utilization of high-cost sources of the scarce resources.
 - b) New technologies may reduce the economy's dependence on the depleted resources.

KEY ECONOMIC CONCEPTS:

technological change
forgone consumption
price incentives
capital/output ratio

capital investment
labor productivity
economies of scale

ILLUSTRATIVE EVENTS:

1. the development of the assembly line for auto manufacture in the early 1900s.
2. the adoption of CADM for airframe design and manufacture
3. the Club of Rome's Report on how the scarcity of many resources will limit growth

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ANNENBERG/CPB PROJECT (Logo and Music)

TEASER

DAVID SCHOUMACHER: 1914. From one man in one factory in Michigan came a global revolution. What did Henry Ford do that sparked productivity and economic growth? The revolution today is in communications. But when Space-Age technology comes down to earth, does it really drive economic growth? Some say the days of our economic growth are numbered...that soon there just won't be enough basic raw materials to go around. Are the prophets of doom correct? This has been America's century. Giant steps of economic growth have taken us from the buggies of the Auto Age to the infinity of the Space Age. Our real gross national product has increased tenfold. Or real income per person has tripled. Economic Growth: Can We Keep Up The Pace? With the help of analyst Richard Gill we'll examine that question on this edition of Economics U\$A. I'm David Schoumacher.

(MUSIC PLAYS - SERIES OPENING TITLES)

(ECONOMIC GROWTH: CAN WE KEEP UP THE PACE? appears on screen)

DAVID SCHOUMACHER: The improvement in our standard of living can be directly tied to the dramatic growth of our economy since the turn of the century. Three times as many goods are now enjoyed by the average American worker. All of this is because of a continuing increase in what economists call "productivity"...the engine of growth. Seventy years ago in the auto industry a productivity revolution took off. How did it begin? And why was it successful? Turn of the century autos were elegant playthings of

the rich. Their purpose, however, was not wholly clear. Perhaps they were best in static pose. Certainly auto industry growth was static. Dozens and dozens of models all designed and produced differently...the culmination of 19th century craftsmanship. But with buyers, like Astors, Vanderbilts, Whitneys and Winthrops setting the fashion, \$5,000 a car, \$50,000 in today's dollars seemed nothing extraordinary. In a Michigan machine shop there was another idea. Could you get a car on the road for under \$1,000? In 1905, most of these cars were in the \$2,000 range. Henry Ford, a junior partner in the firm, proposed a less expensive Model "N." His senior partners argued for the more expensive Model "K." Alexander Malcolmson and friends lost when Ford bought them out with borrowed money. Thereafter, the Ford would be self-financing, with Henry Ford totally in control. First, he designed the right car...the Model "T." Made for farmers, they would lurch through mud, ford streams, plow through the snow. But there were still only 200,000 cars in a country of 89,000,000 people. If Ford could get the price down to \$600, he knew he could tap that vast market. But how to do it...how to improve productivity? Auto industry historian, Steven Meyer...

STEPHEN MEYER III: 'Labor...labor turnover...approached 370%. The quit rate was 370% of the workforce. This meant that to maintain a workforce of 13,000, he had to hire something like 54,000 workers over the course of the year. And here is where we get the \$5.00 day...a nearly doubling of the unskilled workers' wages to provide the financial incentive for the worker to produce at much more faster rates and much more faster pace.'

DAVID SCHOUMACHER: Ford got a grip on labor by doubling his workers' wages, but he had to cut costs radically elsewhere. No longer would cars be built in one place from bottom up, with workers wandering in and out bringing parts. And the product and each of its parts would have to be standardized. Ford said he wanted to make automobiles come through the factory all alike, just like one pin is like another pin when it comes from the pin factory.

STEPHEN MEYER III: “The Model “T” Ford was a very, very complicated product. It had something like 5,000 parts in it. To produce that part, in large numbers especially, you could do it very, very cheaply if those parts never changed. So that once you accept the principle of a standard and unchanging model of an automobile, along with large runs of that automobile, then you can sit down and say, ‘OK, when I build my factory, I’m going to build the factory so that it can produce those parts over and over again.’ This is particularly important in terms of machine tools and equipment.”

DAVID SCHOUMACHER: By 1914, Henry Ford had completed his plan. Highland Park cost almost 4 million dollars, with an additional investment of 3 million for equipment and tools. The moving assembly line was the ultimate revolution. The line needed conveyor belts, with overhead drive shafts moving materials past the now stationary workers. For moving the chassis, there were endless chains and overhead cranes. And for final assembly, there were gravity slides and rollways. Today, it might look chaotic, Jeri-built, but what was the bottom line? The productivity shot up and was carefully noted by Ford managers.

STEPHEN MEYER III: “They discovered enormous increases throughout the entire plant. For example, the time for the production of the chassis...the main assembly line decreased from about 12 _ hours to 1 _ hours. The time for engine assembly also decreased from about 8 _ hours down to approximately 2 hours. Throughout the plant they discovered that there were increases of 200 all the way up to 800% in the productivity at the Ford Highland Park plant.”

DAVID SCHOUMACHER: Each worker now had more equipment around him. And though wages had doubled, output increased much more. In two years, production of the Model “T” rose from 78,000 to 500,000 and the price came down to \$600 a car...then in 1916 to \$360 a car. Here indeed was more than the farmers’ car...truly a car for every man. And the Ford revolution had massive impact beyond the Model “T.”

STEPHEN MEYER III: “What happens is that the Ford methods very rapidly diffused through Detroit. Then they moved from industry to industry. It becomes a national and in fact an international movement. There’s Fordism in Germany, Fordizotzia in the Soviet Union...Everybody is trying to copy this system of production that Ford had built.”

DAVID SCHOUMACHER: It might not look like much, this Tin Lizzie, but its meaning extended far beyond Detroit, far beyond the Auto Age. It will not be forgotten. Henry Ford supplied more than the Model “T”...He gave us a model of economic growth for the century. We asked economic analyst Richard Gill to discuss those factors that contribute to increased productivity in a growing society.

(MUSIC PLAYS - COMMENT AND ANALYSIS I)

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RICHARD GILL: All of us have heard the advertising slogan: “There’s a Ford in your future.” Certainly there was a prominent Ford in the American past. Henry Ford, in the first half of this century, gave us a textbook lesson on the factors that make for economic growth. In the first place, he showed us that, in many industries, bigger can be better. He took advantage of the large and rapidly growing American market to exploit what economists call economies of scale. As he increased his production runs, he found that his average costs per car fell. This enabled him to lower the price and expand production further. Secondly, he also increased labor productivity by expanding the amount of machinery, plant and equipment each laborer had to work with. This was an increase in the capital/labor ratio. It was exemplified in the Ford factory by all those cranes, chains, drilling machines and the like that his workers used. Thirdly, he did everything in new ways. He paid his workers more. He designed a basically different product. He introduced to the automobile industry a novel method of production: the assembly line. He was, in the terms of the great Austro-American economist, Joseph Schumpeter, an entrepreneur and an innovator. It has sometimes been said that “Yankee know-how” was what made this country great. Henry Ford was clearly one Yankee who did know how!

PART II

TECHNICIAN: “Three, two, one...”

DAVID SCHOUMACHER: Space. The race to reach beyond the limits of this planet captured the country’s imagination in the 1960s. For decades Americans have supported a major investment in the space program and all its accomplishments, like these first communications satellites. But with these satellites came the question: How does this far out technology come down to the simple dollars and cents of earthly business growth? Early this century, telecommunications went where the wires went. First, miraculously, across the street...later from city to city. Then the wire went into cables under the ocean and Europe was on our doorstep. By the late 50s, “busy” was the signal for international communications. Telstar 1962. Russian preeminence in space was more of a boost to Telstar than was economic demand. Yet, within three years, a hundred Transatlantic circuits were in use. By 1980, 20,000 circuits connected American business to all parts of the globe...and the cost of leasing a circuit had dropped to 1/7 of its original amount. Today, the private sector is having its own deployed. This one from Satellite Business Systems...What can all this do for productivity back on earth? Through video conferencing, for example, top corporate management here can now get a round table with their counterparts and their customers in Europe or Asia. Participants are just a bit in awe of the new opportunity. That the camera sees all is often forgotten. So sometimes it’s safest to stick to the old questions:

FEMALE TELECONFERENCE: What is your weather like?

MALE TELECONFERENCE: Well, it has brightened up a bit.

DAVID SCHOUMACHER: American banking is thoroughly at home with global technology, servicing American companies instantly wherever they may be. Support on

any one day, for an American multinational with subsidiaries in Europe and South America, is described by Chase Manhattan Banker, Michael Urkowitz:

MICHAEL URKOWITZ: “Without the technology...without the instantaneous availability of information, that corporation might have had idle funds sitting in its account in Frankfurt while, at the same time, sitting with possibly an overdraft on which it would pay substantial interest in Mexico. With this technology, the company can very efficiently fully deploy its financial resources around the world.”

DAVID SCHOUMACHER: And technology truly comes down to earth when it affects your own pocket. Linked with high-speed computers, satellite communication has an impact on the availability of personal credit.

MICHAEL URKOWITZ: “Just as I can use my Visa card to get a cash advance in the United States, I can use my Visa card while traveling overseas again to get a cash advance, but those activities required a telecommunications and technology network which allows the bank or the merchant to validate that that’s a good card with sufficient credit line behind it.”

DAVID SCHOUMACHER: So, in business management efficiency, in banking for both corporations and individuals, satellite technology is aiding productivity and growth. And how important is the overall field of communications to our national economic growth? Albert Halprin of the FCC...

ALBERT HALPRIN: “Telecommunications is a vital and central part of information transfer, which is a large and growing portion of what major companies have to do to operate. In fact, today, virtually 50% of the nation’s gross national product is involved directly or indirectly with information use and transfer.”

DAVID SCHOUMACHER: Advances in communications technology provides huge opportunities for growth in management productivity. Perhaps unwittingly, perhaps

politically, American business was launched into a new era by those early satellites of the 60s. Futuristic space technology has rebounded to earth to spur productivity in a number of ways. It has not only opened up the communications industry, it has also increased the potential of other businesses that rely on communications. In considering the benefits of this communications revolution, we keep coming across the phrase “new technology”...Satellite circuits, fiber optics, digital take, bytes and megabytes...Now, is this typical of economic growth? Does it always involve new technologies? We asked economic analyst Richard Gill to comment...

(MUSIC PLAYS - COMMENT AND ANALYSIS II)

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RICHARD GILL: New technologies do seem to be an extremely important factor in economic growth: not just in exotic cases like satellite technology but quite generally. One American economist who has studied this question in detail is Edward Denison. He made a list of all the factors that go into our growing GNP historically and then tried to weight them by their relative importance. For the period 1929 through 1969, he came to the following major conclusions: First, he found that U.S. GNP had grown over that 40-year period at an average annual rate of 3 and a third percent per year. About one and a third percent of this growth Denison attributed to the simple expansion of our population and labor force. Another half a percent, he attributed to an increase in the quantity of machines, tools, factories and equipment that the expanding labor force had to work with: capital accumulation. These two items represent, so to speak, the growth of inputs...capital and labor...and do not necessarily represent any new way of doing things. But notice that there is a big remaining item...nearly half of the total growth rate...which represents increased output per unit of input. This is really where “technological progress” in its broadest sense comes into play. Here we are characteristically dealing with new technologies, advances in knowledge, the increased education and skills of the labor force and so on. It is responsible for nearly half of our total growth and, on a per capita basis, perhaps something like 75 or 80 percent of our growth. So the case of satellite communications is not really exceptional. Ever since the

steam engine in the 18th century, new technology has been systematically revolutionizing our lives.

PART III

DAVID SCHOUMACHER: Growth. In many parts of the world growth means growth of population...growth in poverty...growth in the scarcity of resources. Today, in America, we take economic growth and our standard of living for granted. But what about the future? What if basic raw materials ran out? What if world population growth and pollution et out of hand? In 1972, a group of experts known as the Club of Rome issued a report called The Limits to Growth. It makes for gloomy reading. What did these growth-busters predict...and could they be right? On population...if current rates of growth continue, the number of people in the world will double by the year 2000. By the time our grandchildren are old the population will have doubled again. Consequent pressure on land and supplies of food would be tremendous. Widespread famine and malnutrition would be all pervasive. On industry...the report concluded that if minerals and metals were consumed at the American rate, global supplies would be exhausted in a few decades. They were called “The Club of Rome” only because they met there. In fact, the writers of The Limits to Growth book came from MIT. Professor Jay Forrester, a consultant to the group, summarized their conclusions.

JAY FORRESTER: “The message was that the forces are like an onion. You can peel off one layer and there will be another limit. You can peel off that layer and there will be another limit...that ultimately, there will be a combination of forces that make it impossible for the high growth rate of industrialization and the high growth rate of population to continue through as much as the next century.”

DAVID SCHOUMACHER: Population...Jay Forrester recounts their most dire predictions on the forces which will halt population growth.

JAY FORRESTER: “Those forces can be social perception that smaller families are necessary to long term high quality of life. Or it will come about by the sheer pressures of starvation...or the social instabilities that will precipitate an atomic war.”

HENRY C. WALLICH: “I thought, then, that there was a large scare element in it...”

DAVID SCHOUMACHER: While a professor at Yale, Henry Wallich began to confront the doomsayers point by point...On population

HENRY C. WALLICH: “Some years ago, I guess ten years ago, there were projections up to thirty billion people...I think they’ve gradually come down because population growth has diminished and has yielded to the effect of higher standards of living...”

DAVID SCHOUMACHER: With higher standards of living and government persuasion, population growth can level off. Disaster need not strike. On the matter of pollution, political considerations are also as important as economic ones. Anti-pollution technologies are available and the cost of cutting back emissions and cleaning up can be passed along to consumers who’d be willing to bear them. Another major subject in the limits to growth thesis involves basic resources...minerals and oil. “Shortages were imminent,” said the growth-busters and in the early ‘70s they got an immediate boost for their cause.

HENRY C. WALLICH: “One of the most striking things for the Club of Rome was...almost immediately after the book came out, the price of oil jumped up four times. So people said, ‘They’re right.’ Then, five or six years later, it jumped up several times more. So that seemed to be pretty good evidence. Well, now the price of oil is going down...People are not concerned about the basic shortages to the long distant future...The cartel is breaking apart...”

DAVID SCHOUMACHER: Surely, however, oil will run out in a few decades. No so, say oilmen. As long as there is a profit to be made, new exploration technology will be

developed to keep supplies flowing. Dr. Ed Davis is President of Exxon Research Corporation and a White House Science Advisor.

DR. EDWARD E. DAVID, JR.: “With respect to discovering more, geologists today believe that you can use tomographic techniques, which are similar to what was used in the cat scanner for diagnosing disease, for searching in the earth for new deposits of material. And there are all kinds of new exploration tools such as satellites.”

DAVID SCHOUMACHER: The impending exhaustion of energy and mineral supplies had been predicted many times before...in 1908, 1944, 1952...By now many minerals should be extinct. None is. A major survival factor has been substitution between metals and between alternative forms of energy. Such conservation will continue to prevent long run shortages. And, besides, the earth’s crust is thirty miles thick and we’ve barely scratched the surface. No wonder the doomsayers have been proved wrong decade after decade. In all it seems unlikely that economic growth will be stopped dead because of too many people, too much pollution, too few resources. Yet worldwide, there are vast differences between standards of living, and in the next century lower rates of economic growth may come to be accepted in America as the rest of the world catches up.

HENRY C. WALLICH: “Even though we’ve come to a slowdown, this is nothing fatal...not a collapse...as limits suggest. Low growth rate is not as good as a high one but it’s certainly better than stagnation.”

DR. EDWARD E. DAVID, JR.: “The real point of these models, I think, is that man can learn to control his own future. And I think that’s the important point to make. We do have an influence on our future...We can think about what we want it to be and push it in the directions that we think are profitable for our own activities and that will result in a world which is livable.”

DAVID SCHOUMACHER: Public prophesy about economic conditions fifty or one hundred years in the future is obviously difficult. Many experts believe that new

technologies and the motivations of the marketplace are likely to overcome the doom and gloom predictions of groups like the Club of Rome. We asked analyst Richard Gill what our economic past may imply about the future for our children and grandchildren.

(MUSIC PLAYS - COMMENT AND ANALYSIS III)

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RICHARD GILL: At the time of her industrial revolution, great Britain was running out of forests and timber. She responded by shifting to a coal technology, and production increased many times over. That has actually been the characteristic story of modern economic growth and we see it again today in the case of metals, like copper, and even energy sources, like oil. This scenario isn't accidental; it is built into the way the market mechanism works. We have first a growing shortage of some resource. The price of this scarce resource goes up. This sets in motion a series of responses. First it becomes profitable to try to find more of this scarce resource: We get added supply. It also becomes advisable to use as little of this now expensive resource as possible: We get conservation. Thirdly, it becomes desirable to focus our scientific and technological attention on developing new products and means of production that use other more plentiful resources: Alternative technologies. The results? Well, historically, there is little doubt about the matter. These responses have not only met the resource shortage problem but usually have overshot the mark by a great margin, leading to vast increases in our productive potentialities. In the cases of population growth and pollution, it is difficult to be quite so clear cut. In the matter of pollution, for example, as I've noted in earlier programs, the price system can't be counted on to solve the problem by itself. Here active preventative steps will have to be taken. Still, even in the case of pollution, new technology is likely to help us out considerably as time goes on. My personal conclusion: We may eventually choose to abandon a growth-oriented society; I doubt that we'll be forced to, certainly not in the years immediately ahead.

DAVID SCHOUMACHER: The recipe for economic growth. Henry Ford knew its ingredients. So do today's businessmen and entrepreneurs. And what has been true for

autos and communications will be true far into the future as we strive to maintain reasonable levels of growth on our planet, Earth. There must be technology and investment in it, balanced by a concern for protecting the environment...And then productivity can be safely increased to supply the growing demand of all our people. For Economics U\$A, I'm David Schoumacher.

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