

# What Grows the Economy? Innovation, Investment in Human Capital, and Advances in Science and Technology. NOT Tax Cuts.

Lester Thurow, in his recent book *Fortune Favors the Bold*, identifies three industrial revolutions. The innovations listed below led directly to the first, second, and third industrial revolutions. Each not only grew the economy, it *revolutionized* the economy.

**Steam Engine.** The first industrial revolution was led by the steam engine, developed in 1769 by James Watt, soldier, scientist, and university professor. Watt didn't get a tax cut.

**Electricity.** The second industrial revolution was led by electricity, developed first through the 1746 work of Benjamin Franklin, then through the early 1800s work of scientist Humphrey Davy, and finally by Thomas Edison, who built the first light bulb in 1879. None of these men got tax cuts.

**Telephone.** The seeds of telecommunication, a key element of the third industrial revolution, were planted when Alexander Graham Bell, teacher, mathematician, and university physicist, invented the telephone. He founded the Bell Telephone Company in 1877, which didn't get a tax cut.

**Radio.** This key innovation, which drove the telecommunications aspect of the third industrial revolution, was invented by Guglielmo Marconi in 1895. Marconi was a scientist and Nobel laureate in physics in 1909. He didn't get a tax cut.

**Airplane.** The airplane was invented by Wilbur and Orville Wright in 1903. Family circumstances prevented the Wright brothers from attending college, but through their research and hard work they achieved the highest educational levels and were made honorary members of the National Academy of Sciences. They didn't get tax cuts.

**Computer.** Computer technology was a major step forward in the third industrial revolution. Konrad Zuse made the first computer in 1936, John Baucus later created FORTRAN, the computer programming language, and then Bill Gates developed disk operating system MS-DOS in 1980. University work done by Jack Kilby and Robert Noyce led to a microchip for storing information, which resulted in microprocessors and personal computers. None of this came from tax cuts.

**The Internet.** Another key driver of the third industrial revolution has been the Internet, which first emerged in 1969 as a result of the Advanced Research Project's connecting computers at UCLA, UC-Santa Barbara, Stanford, and the University of Utah. Later applications came from the U.S. military, then Tim Berners-Lee's 1989–91 work gave us hypertext markup language (HTML), the hypertext transfer protocol (HTTP), and the universal resource locator (URL), foundations of the present-day World Wide Web. No tax cuts were involved.

**Genetic Engineering.** The 1972 research of UC-San Francisco biochemist Stanley Cohen and Stanford professor Herbert Boyer drove today's biotechnology, especially human genome, revolution. Neither got a tax cut.

Did *any* of these world-changing innovations come from tax cuts or subsidies? In a word: No.

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