



# US economic growth in the gilded age

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## Abstract

In the immediate postwar period, Moses Abramovitz and Robert Solow both examined data on output and input growth from the first half of the 20th century and reached similar conclusions. In the 20th century, in contrast with the nineteenth, a much smaller fraction of real output growth could be swept back to the growth of inputs conventionally measured. The rise of the residual, they suggested, was an important distinguishing feature of 20th century growth. This paper identifies two difficulties with this claim. First, TFP growth virtually disappeared in the US between 1973 and 1995. Second, TFP growth was in fact quite robust between the end of the Civil War and 1906, as was in fact acknowledged by Abramovitz in his 1993 Economic History Association Presidential address. Developing a revised macroeconomic narrative is essential in reconciling our interpretation of these numbers with what we know about scientific, technological, and organizational change during the gilded age.

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## 1. Introduction

In the immediate postwar period, Moses Abramovitz and Robert Solow both examined data on output and input growth for the United States and reached striking and similar conclusions. The pattern of disembodied technical change in the United States appeared

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to be markedly different in the 20th century as compared with the nineteenth. In the 20th century, a much smaller fraction of real output growth could be swept back to the growth of inputs conventionally measured: the residual, correspondingly, was much larger. Abramovitz published his findings in 1956, Solow in 1957, and their generalization rapidly became accepted as identifying a permanent change in the sources of economic advance. At the end of his career, Abramovitz continued to characterize the 20th century as experiencing “Growth in the Era of Knowledge Based Progress”, distinguishing it from the nineteenth (Abramovitz and David, 2000).<sup>1</sup>

Solow’s 1957 study examined data covering the four decades between 1909 and 1949; Abramovitz’s 1956 study examined growth up through an end period that averaged data between 1944 and 1953. The big acceleration in TFP growth during the interwar years (see below) surely colored their conclusions. Yet, as an examination of the US growth experience during the last part of the 20th century makes clear, their generalization about the nature of 20th century growth was premature. After a lag during the war period (1941–48), TFP growth persisted at high although somewhat more modest rates during the golden age (1948–73). But it then ground to an almost complete halt between 1973 and 1995. Output per hour continued to rise, albeit much more slowly, but this was almost entirely attributable to physical capital deepening. Data are now available for the entire century, and it is no longer possible to interpret the high rate of TFP advance during the interwar years that prompted the Abramovitz/Solow generalization as a defining characteristic of the century as a whole.

The collapse of TFP growth after 1973 is, however, only one aspect of the difficulty with the Abramovitz/Solow claim. The other is that TFP growth in the last part of the 19th century was in fact robust relative to long run historical trends, and indeed, stronger than it was in the last part of the twentieth. It looks modest only in comparison with the exceptional performance in the second and third quarters of the 20th century, but that would be true of almost any other period held up for comparison. The available data simply do not support the suggestion that almost all growth in the last third of the 19th century can be swept back to inputs conventionally measured.

## 2. Data

The principal statistical source for this investigation is Kendrick (1961). Kendrick’s work has been the starting point for almost all modern research on US productivity

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<sup>1</sup> TFP advance is often equated with disembodied technological change, which in this context should be broadly interpreted. The residual captures growth in output not attributable to increase in inputs conventionally measured, or growth in output per hour not attributable to capital deepening. This may be the consequence not only of what we typically think of as new technology, but also of improvements or innovations largely organizational. It can also reflect shifts in the economy from sectors with lower to those with higher productivity, as well as quality improvements in inputs not otherwise accounted for. These latter considerations imply that TFP growth may overestimate the effect on output per hour of technological change. But it could also underestimate it to the degree the latter raises the return to capital, inducing higher saving, or, as the result of its biases, skews income to households with higher income and higher propensities to save, in either case leading to rises in capital labor ratios. Those who devote time to refining these estimates must, however, believe that they tell us something of interest about the sources of economic growth. Abramovitz was famous for characterizing TFP growth as a “measure of our ignorance,” but he also clearly felt that measures of the rate of advance of the residual bore same relationship to the growth of (useful) knowledge.

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