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The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War

by **Robert J. Gordon**

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The new book by Robert J. Gordon, published as a contribution to the Princeton Economic History of the Western World series, seems like a daunting task, both for the author (analysing in detail the past century and a half of economic history of what is still the most significant economy in the World) and for the reader (762 pages, including the index). Nonetheless, if the reluctance to immerse oneself in such a book is overcome, the reader's benefits are immense: an incredible amount of delicious food for thought about crucial issues related to economic growth.

As Robert J. Gordon (2016) pointed out himself, one of the main points of the book is that economic growth is not a steady process. Indeed, there was very little economic growth for a substantial part of human history, up until the end of the 18th century, with some growth in the early 19th century, followed by an exceptional century for the United States from 1870 until 1970. The century was unique in the US history, which Gordon repeatedly confuses with human history, as if the rest of the World did not exist, pointing out that it is unrepeatabe because so many of its achievements could happen only once. And since one of the central theses of the book is that "some inventions are more important than others", the extraordinary century of dynamic economic growth was made possible by the "Great Inventions", all of them based on the two pillars of the Second Industrial Revolution: electric power and the internal combustion engine. Since the achievements of the "special century" are one-off, i.e. unrepeatabe accomplishments, it was quite expected that the US economic growth would slow down significantly after the century, since 1970.

In every historical study of the economic growth, especially long-term growth, the crucial decisions for the research is how to divide the period under consideration. Since the topic is the growth since the American Civil War, then 50-year segments (with a somewhat shorter period after 1970) seem reasonable. The problem is that the very first figure in the book, Figure 1-1 (p. 14) provides evidence against its main claim of the "special century". The average annual growth rate of the output per person (i.e. *GDP per capita*) in the recent period (1970-2014) was only marginally smaller than the rate in the first period (1870-1920) of the special century (between 1.77 and 1.84 percent). It was the second part of the "special century" (1920-1950) that really made a difference regarding the *GDP per capita* growth rate (2.41 per-

cent), especially taking into account that the number of working hours per person dropped during that period (-0,41 percent). One would think that these unrepeatable achievements occurred only in the half-century starting immediately after the Great War. Furthermore, Nicholas Crafts (2016) segmented the time after the Civil War differently (30-year periods) and the last one ends before the Great Depression, the average annual growth rate of GDP *per capita* in the recent period (1970-2007) is higher (2.17 percent) than in the first sixty years of the special century: 1.93 percent between 1870 and 1900, and 1.65 percent between 1900 and 1929. This is another perspective of Gordon's insight of the slowing of US economic growth after the "special century", undermining his pessimism.

For the purpose of organisation of content of the book, Gordon divides the whole period that he looks at (1870-2015) into Part I (1870-1940), as the period in which "the great inventions create a revolution inside and outside home", and Part II (1940-2015) as "the golden age and the early warnings of slower growth". Part I of the book is perhaps the book at its best: a painstaking and meticulous description and analysis of the US economic history as the history of private life. The eight brilliant chapters of historical narrative cover the starting point (life and work in 1870), nutrition and clothing (what they ate and wore), housing (from dark and isolated to bright and networked), transportation (motors overtake horses and rail), communications and entertainment (from telegraph to talkies), health (illness and early death), working conditions (both on the job and at home) and, finally, finance and risks (consumer credit, insurance and the government).

However, the crucial insight for the first 50 years considered is not the growth rates of the GDP *per capita* during that period, but rather that the recorded growth rates underestimate the rise in the US standard of living, since, according to the subtitle of the book, it is the standard of living that matters. Gordon provides four crucial reasons for this. The first one is that the real growth rate of the GDP is underestimated because of the inaccurate price indexes used during that period, especially in the case of the new products and increased quality of existing products. Hence the deflation of the nominal GDP growth was not accurate in the way that it was over-deflated. This flaw has been reduced in the second half of the 20th century, meaning that the over-deflation bias was greater in the early period. The second one is that the real GDP *per capita* growth rate, even if properly calculated, is not a good measure of change of the consumer surplus, the proper indicator of consumer welfare. New products, improved quality of existing products, and decreased prices due to the surge of total-factor productivity (TFP) provided an increase in consumer welfare well beyond the GDP *per capita* growth rates. Furthermore, increased consumer welfare, a more technical term for standard of living, due to the improved working conditions, the end of backbreaking toil, especially regarding labour at home, and increased leisure time, together with higher quality of life due to better healthcare, is not encapsulated in economic growth rates. Finally, perhaps the most important synthetic indicator of the improving standard of living is the life expectancy surge. Technically considered, increased life-years increases the integrated utility appropriated by consumers during their lifetime. Applying the William D. Nordhaus (2002) methodology for estimating monetary value from additional life-years, Gordon points

out that adjusted GDP growth rates are 4.20 percent from the period 1900-1950, as opposed to 2.05 percent for conventional GDP, as life expectancy at birth rose from 45.4 years in 1870 to 70.8 years in 1970.

In summing up the elements of improvement of the standard of living in the US from 1870 to 1940, Gordon emphasises that the GDP growth rates do not value all the improvements of the life of Americans during that period: improvement in food variety, the invention of modern urban department stores, the removal of horse droppings and urine from cities, the birth of the new industry called “personal travel”, the advent of motor car and the epochal decline of its price and improvement of its quality, the introduction of instant communication by telephone, and reproduction of music by phonograph, the availability of clean water at in-home taps and electrical lighting, the replacement of the toil of back-breaking outdoor jobs with new indoor jobs that were not as physically demanding, etc. All these and many more improvements of the US standard of living between 1870 and 1940 are meticulously described in the Part I of the book, with sometime painstaking details. Though Tyler Cowen (2016) considers that those details are not necessary and that “the book could have been at least a hundred pages shorter, with no loss and some gains”; it seems that an anxious reader can always skip as many pages as he/she likes, leaving those who like historiography to enjoy them.

The main point that Gordon makes regarding improvements in the 1870-1940 period is that these are one-off achievements, and therefore not repeatable: urbanisation cannot be repeated, all the houses are now connected to electricity, gas, telephony, running water and sewer, so no improvement in these areas can be achieved, motor car transportation has been fully introduced, so it cannot be introduced again; infant mortality has been brought to about 1 percent and cannot be further reduced. Most of the innovations in that period, though not all, are the contributions of the Second Industrial Revolution and the extended implementing of its legacy over decades. Those are inventions that Gordon considers as those that are more important than the others, as they “freed households from an unremitting daily grind of painful manual labor, household drudgery, darkness, isolation and early death”. Accordingly, period from 1870 to 1940 was “a singular interval of rapid growth that will not be repeated”. Point well taken, though one should not overestimate its impact when considering future economic growth in 21st century.

The lack of being repeatable is the central thesis in Part II of the book, the one which covers the 1940-2015 period. There is another inconsistency in the time frame: only the first 30 years of that period belong to the Gordon’s “special century”. One way or the other, the reader again goes through the details of the private life of the citizens of the US. This time, it is six very good but definitely not brilliant chapters covering nutrition, clothing and housing (fast food, synthetic fibres and split-level subdivisions), transportation (Chevrolet or plane flying high above), entertainment and communications (from Milton Berle to iPhone), computers and the Internet (from the mainframe to Facebook), health protection (antibiotics, CT scans and the evolution of medicine) and general living conditions (work, youth and retirement at home and on the job). Some of the analyses in these chapters are rather shallow, more like a superficial description lacking understanding, or at least an explanation

of the mechanism that brought about the described development. A typical example of this approach is the topic of air transportation, with wrong statistical sources (Historical Statistics of the United States with missing data and interpolation) used to demonstrate that deregulation did not lead to price decrease in air travel – an insight that contradicts the conventional wisdoms of the industry. Had Gordon used an appropriate source (United States Department of Transportation Statistics) he would have provided evidence that inflation adjusted passenger per mile price dropped in real terms by 56 percent between 1980 and 2013¹. His Figure 11-10 (p. 401) demonstrates that the price had not changed at all. The problem is that Gordon considers the developments in the airline industry obviously from his own passenger flying experience (“...since 1970 there has been no improvement in passenger experience of air travel”), rather horrible these days for many in the US, hence the bias in evaluation of the whole industry. This is not a serious approach. The problem is that credibility of other findings in the book, particularly in Part II, is undermined by serious flaws of the analysis of one industry and its development. Historical distance is an essential prerequisite for unbiased insights, and lack of personal experience is a strong incentive for serious research of the past.

The bottom line of all these chapters is that the Third Industrial Revolution, focused on communication and information technologies, which produced the personal computer, Internet, smart phone, and digital entertainment did not change life as much as the contributions of the Second Industrial Revolution (electricity and the internal combustion engine), and that the innovations based on this industrial revolution produced a rather limited increase of productivity. As Robert M. Solow (1987) pointed out in the middle of the Third Industrial Revolution: “We can see the computer age everywhere but in the productivity statistics”.

In an attempt to link the effects of the two different industrial revolutions on the increase of total factor productivity (TFP), Gordon specifies that in the 1920-1970 period the average annual TFP growth rate was 1.89 percent, only to decline to 0.57 percent for the period 1970-1994, then surge to 1.03 percent in the period 1994-2004, and finally drop to 0.40 percent during 2004-2014 period. This simple data comparison over time is enough for Gordon to conclude that the TFP growth due to the Third Industrial Revolution occurred as a one-off surge of the TFP in the decade between 1994 and 2004, on account of the substitution of paper for electronic, non-paper business operations.

For Gordon the period after 1970 is not only a period of slower economic growth, both in terms of GDP *per capita* and the TFP, but a period of inevitable slowdown due to the lack of innovations important for increasing productivity. According to Gordon, the Third Industrial Revolution, the communication and information technology revolution, is perhaps already over, and its impact (“distinguishing between the *pace* of innovation and the *impact* of innovation on the growth rates of labor productivity and TFP”) on productivity and the standard of living is moderate, especially compared with the fundamental changes in technology prior to 1940, as well as before 1970, and also compared to the great expectations. In the words of

¹ http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_03_20.html.

Peter Thiel, an entrepreneur and cofounder of PayPal: “We wanted flying cars, instead we got 140 characters”.

There is an interesting observation by Gordon regarding the innovation change – a specific U shaped innovation history. At the beginning of the considered period, in the late 19th and early 20th century, it was individual entrepreneurs who were the most important innovators in the US economy, e.g. Thomas A. Edison, Alexander G. Bell, the Wright brothers etc. The mid-20th century was dominated by the laboratories and R&D departments of corporations such as GM, General Electric, IBM, RCA, Bell labs, Boeing etc. Nonetheless, at the end of 20th and the beginning of the 21st century it is back to individuals as entrepreneurs and innovators, people like Bill Gates, Paul Allen, Steve Jobs, Jeff Bezos, and Mark Zuckerberg, all of them in information technologies, though a level such as in the late 19th century has not been recorded yet. The shifting of cutting-edge technology progress to capital-intensive areas, such as chemistry and electricity, can explain the decline of individual innovators, while another shift to information technologies can explain their comeback. Gordon is certain that individual inventors flourished in the US at least in part because of the democratic nature of the patent system.

The most novel aspect of the historiographical portion of the book is the suggestion that both the Great Depression and World War II significantly contributed to the great leap in the US productivity and consequently the standard of living. Gordon is positive that the New Deal, as the government reaction to the Great Depression, with its NIRA and Wagner Act, promoted unionisation and that this “directly and indirectly contributed to the sharp rise in real wages and a shrink age in average weekly hours”. That in turn produced substitution of labour for capital, capital deepening and boosting productivity. Capital deepening is evident by many proxies, but the causality link is not convincing, since there is no information about the technological shift and relative cost of capital equipment during that period. Furthermore, since the main task is to explain the increased TFP, not labour productivity, for a given GDP growth, capital deepening growth decreases TFP growth (an insight achieved though standard growth accounting methodology), so it is a bit counterintuitive. It does not help that in the text of that very chapter Gordon uses the word “productivity” without specifying whether it implies labour productivity or the TFP. This would be a great moment for the introduction counterfactual reasoning, so widespread in modern historiography, and to ask the following question: Would an increase in the TFP have occurred without the Great Depression? Unfortunately, Gordon does not ask such a question and even its mild formulation by Crafts (2016) leads to the conclusion that the productivity growth in the 1930s occurred despite and not because of the Great Depression.

Aware that his first line of arguments is not bulletproof, Gordon points out that a more subtle positive effect of the Great Depression may have been in the reorganisation of businesses, after the sharp drop in output at the end of the 1920s, as many of these measures reflected new ideas and techniques for efficiency, many of them carried over from the 1920s. This suggestion cannot stand the counterfactual test. In a market economy with ample competitive pressure, such as the US economy was at the time, the competitive pressure would have produced incentives for effi-

ciency and improvement of production, irrespective of whether a sharp drop in output had occurred. Thus, it seems that the TFP surge during the 1930s would have occurred even without the Great Depression.

In Gordon's own words, the explanation of the productivity surge during World War II is less speculative. The argument goes as follows: the huge pressure to increase productivity and meet production targets, set not by economic but rather by military pressure to win the war against Germany and Japan, produced incentives to adopt intensive learning by doing, described very well by Robert E. Lucas (1988) in the case of the production of Liberty ships, massive government investments in new production plants that enabled the number of machine tools to double in the US between 1940 and 1945, producing substantial capital deepening, and capital equipment purchased by the government and used in production, was more modern and productive than the stock of privately owned capital equipment owned by the private sector, which led to a surge in productivity. When the war was over, all these improvements did not disappear. Definitely more convincing than the positive impact of the Great Depression, but the devil is, as usual, in the detail. As pointed out by Crafts (2016) calculation of the real GDP during war is extremely unreliable, because of the unreliable price indexes for war production. Another problem is measuring capital input in these war production public-private partnerships, as expressed by modern vocabulary. Accordingly, Crafts (2016) demonstrates that the estimates of the average annual TFP growth rates vary from 0.9 percent to 2.8 percent. Furthermore, as suggested by Alexander J. Field (2011), it is probably that World War II diverted research efforts and learning from commercial relevant activities and R&D, which is crucial for increasing the TFP.

Finally, in Part III Gordon spells out his view of the US growth in the future as an inevitable slowdown from most of the 20th century to a modest GDP *per capita* growth of 0.8 percent annually, during the period 2015-2040. He specifies a few "headwinds" for productivity growth and growth of GDP *per capita* in the decades to come. The first of these headwinds is the lack of growth-relevant innovations, i.e. technological progress that would increase the TFP. Of course, predicting the future is tricky; in many cases in history technological progress and inventions came out of blue in areas where nobody expected, and Gordon tries to focus on inventions that are presently forecastable: medical and pharmaceutical advances, small robots and 3D printing, big data and artificial intelligence, and driverless cars. Contrary to the techno-optimist, like Erik Brynjolfsson and Andrew McAfee (2014), Gordon does not think that the improvements that can be expected in these areas will have a significant impact on productivity growth. Of course, one can argue the estimated impact of foreseeable innovations, as well as the impact of those that are not foreseeable at the moment, but could be expected.

An additional problem regarding TFP growth is the structure of the US GDP, with services accounting for around 80 percent of the output. Gregory Clark (2016) reinforces Gordon's pessimism, pointing out that there is no room for productivity increase in most, though not all services, as "a surprising share of modern jobs are timeless ones of the pre-industrial era – cooking, serving food, cleaning, gardening, selling, monitoring, imprisoning...". Furthermore, most of the R&D activity, the

mother of invention, is concentrated in manufacturing, which is a declining sector of the economy. Although there are some services in which productivity can grow, there are full-blown symptoms of Baumol's disease.

Nonetheless, it seems that it is more important to discuss structural headwinds for future US economic growth; perhaps they are less exogenous than technical progress. The first one is inequality. The reader would expect that Gordon has a theory about how higher and increased inequality slows down economic growth, the one that Thomas Piketty (2014) never formulated, but at the end of this chapter the reader has learned nothing more than the insight that for a given growth rate of the GDP *per capita*, an increase in inequality will decrease the median disposable income *per capita* growth – rather trivial accounting deduction. Other structural headwinds to growth are much more serious. The achieved level of education is the other one. The unrepeatable surge in attainment of university and high school education following World War II produced attainment levels that cannot be increased. Hence the achieved high level of human capital provides very little room for an increase in this capital and very little room for increased productivity stemming from the its improvement. The female labour participation rate also reached it maximum in the early 2000s and has started to decline. A similar decline is observed for male labour participation, though this level is somewhat higher than the female one. Accordingly, a gap still exists between the male and female labour participation rates, though it is not likely that it will be closed. Both structural changes are one-off changes and cannot be repeated – they cannot contribute to future economic growth. The retirement of the baby boomers, which can be expected in the coming decades, will be the most important demographic change, as the number of working hours per person will inevitably go down, by -0.4 percent per year, according to some estimates mentioned by Gordon. Strange enough, there is no information on whether this projection includes labour immigration. Finally, the US sovereign debt will rise steadily in the decades to come (according to the Congressional Budget Office it will stabilise at 100 percent of the GDP by 2038). Gordon estimated that this projection is conservative and that it substantially underestimates future debt, so he presents a projection of roughly 125 percent. Servicing such an increased debt means that taxes will have to grow faster and transfer payment to decrease, or rise slower than the GDP.

Strange enough, Gordon does not mention regulatory headwind – a clear case of increased rent-seeking. The US is dropping rather fast in economic freedom ranking. John Chochrane (2016) believes that extensive and growing business regulation is the crucial growth headwind and that its reduction and simplification can substantially speed-up the US economic growth.

Based on those headwinds (rent seeking one not taken into account) Gordon projects that, with an anticipated increase of the TFP and projected labour productivity of 1.20 percent (average annual growth rate) for the 2015-2040 period, the decrease of hours per person will be -0.40 percent per year (for demographic reasons), and the real growth rate of GDP per person will be 0.80 percent. Due to the increased inequality (the ratio between median and average income per person will decrease by -0.40 percent), the median income will grow by only 0.40 percent per year and the median disposable income will rise at an average annual rate at 0.30 percent, due to

increased taxation. A rather grim projection, especially since, as Benjamin M. Friedman (2016) points out, at most of the time and in most places “rising living standard, broadly shared in the population, have led to expansion of opportunity and generosity, increased tolerance and stronger democracy. High standard of living *per se* is no guarantee against perverse social, political and moral consequences of stagnation”. Although, as Nordhaus (2016) has pointed out, Gordon does not predict that the US standard of living will decline, its growth rate will decline compared with the rates recorded in the past. This is a very important point, as Paul Krugman (2016) wrongly implies that Gordon projects “another generation of stagnation or decline in working-class incomes”.

Facing this rather grim projection, Gordon recommends a set of policy measures “to boost productivity and combat the headwinds”. Alas, most of them are in the area of redistribution (progressivity of the tax system, minimum wage increases, etc.), and although regressive business regulation is mentioned as the way to counter the slowing down of economic growth, it is not noted that the two contradict each other, as measures in the area of enhanced redistribution are not good for growth. Some of the proposals are interesting by themselves, e.g. reduced incarceration through reform of criminal justice policies and drug legalisation, and could even have some impact of the GDP level and its transitory growth, only it is not clear how that would combat the headwinds.

The reviewed book is about the supply-side story. Gordon is interested in potential growth, in long-term “secular” trends, not short-term fluctuations: a good, fresh way of thinking about economic growth, abandoning policies focused to demand management and miracle changes of macroeconomic policies that will provide wonders without any effort or lag. Nonetheless, the book is not well founded in contemporary theory of economic growth. It provides only a very simple growth accounting framework, without going deeper into the issues of measurement, let alone the sources of increased TFP.

Perhaps the most important flaw regarding the contemporary growth theory is that there is no analysis of institutional development, especially the link between institutions and technological changes, i.e. innovations. As pointed out by Daron Acemoglu, Jacob Moscona, and James A. Robinson (2016), technological change is endogenous due to R&D investment and innovation decisions of entrepreneurs depending on the institutional environment through the security of property rights, patents laws, the educational system and general competition policy. Very few words in Gordon’s book are about institutions and institutional development; it seems like technological progress is exogenous for him. There are none, for example, about US competition policy (antitrust) and its developments affecting the intensity of competitive pressure, as the main incentive for innovation and efficiency. The regulatory burden of US businesses is mentioned only at the very end, as one of the areas for policy reform, and the reader does not learn, at least not from the Gordon’s book, what is wrong with it.

Gordon definitely considers competition to be something bad, especially the last boot of globalisation, which, due to free trade and other countries cost advantages, left the US without many manufacturing industries (e.g. textile and leather)

and rather well-paid jobs for the middle class. He claims that the high tariff wall from 1930s to 1960s allowed American manufacturing to introduce all available innovations, and points out the harm done by outsourcing jobs to countries with labour costs advantages. This is a rather strange departure not only from the comparative advantage theorem, but also from his own approach in the book – that it is consumer surplus that matters, not the GDP level and growth, as if cheap manufacturing goods imported from China *et al.* do not increase the consumer surplus of Americans, and do not contribute to the rise of the US standard of living, stemming from globalisation. Furthermore, the consumer surplus standard was not used in the evaluation of the impact of the Third Industrial Revolution (communications and information technology, very much horizontal innovations, not replacing incumbent technology), the way it was used in the case of the second one.

The book is about American growth, therefore, it is natural that the US economy has a central place in it. Nonetheless, the reader might get the impression that the rest of the World does not exist, apart from the US job losses due to outsourcing. This is particularly evident in the consideration of technological change and innovations. It is true that the US is on the cutting-edge technology frontiers in many industries, but it should not be ruled out that some innovations will inevitably be imported to the US

As to the analytical tools used, there is virtually no counterfactual narrative, which is a very useful test of whether some of the recorded developments would have occurred without the observed historical set-up or preceding events. Ian W. McLean (2013), producing an excellent economic history of Australia, vividly demonstrated the power of this approach, testing whether there was causality and avoiding *post hoc ergo propter hoc* fallacy. Such an approach would have been very helpful in the case of the proposition that the Great Depression caused the surge of productivity.

All flaws considered, this is an excellent book that provides a thrilling reading experience. As to its conclusions, they should be taken with caution. Aiming to provide one sentence about the book, Cowen (2016) points out: “In a nutshell, Gordon is probably right about the past, but wrong about the future”. Well, Gordon is definitely right about some things about the past, wrong about some, and too early to call for the rest. As to the future, no one can know *ex ante* whether Gordon is wrong. Not even Tyler Cowen!

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