The turtle's progress: Secular stagnation meets the headwinds[1]

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US real GDP has grown at a turtle-like pace of only 2.1% per year in the last four years, despite a rapid decline in the unemployment rate from 10% to 6%. This column argues that US economic growth will continue to be slow for the next 25 to 40 years – not because of a slowdown in technological growth, but rather because of four 'headwinds': demographics, education, inequality, and government debt.

1 Distinguishing between secular stagnation and slow long-term growth

No single image captures the present concern about secular stagnation and slowing long-term economic growth better than the *Economist* cover of 19 July 2014, showing a frustrated jockey dressed in the colours of the US flag frantically trying to get some movement from the gigantic turtle that he is riding. US real GDP growth has grown at a turtle-like pace of only 2.1% per year in the last four years, despite a rapid decline in the unemployment rate from 10% to 6%. Almost all of that improvement in the unemployment rate has been offset by an unprecedented decline in labour-force participation, so that the ratio of employment to the working-age population has hardly improved at all since the trough of the recession.

1 This contribution provides additional perspective on the debate about the future of economic growth in the US and in several dimensions goes beyond the main points of my recent NBER Working Paper (Gordon 2014a). Burke Evans contributed the graph and incisive suggestions about the exposition.

I have recently (Gordon 2014a) restated the case for slow growth over the long run of the next 25 to 40 years. At the same time, Larry Summers (2013) has signalled his alarm about a return of 'secular stagnation', a term associated with a famous 1938 Presidential Address to the American Economic Association by the Harvard economist Alvin Hansen (see also Hansen 1939). However, Summers and I are talking about different aspects of the current US growth dilemma. His analysis concerns the demand side, "about how we manage an economy in which the zero nominal interest rate is a chronic and systemic inhibitor of economic activity, holding our economies back below their potential".[2] In contrast, my version of slow future growth refers to potential output itself.

As the US unemployment rate declines toward the normal level consistent with steady non-accelerating inflation, by definition actual output catches up to potential output. I have provided (Gordon 2014b) a layman's guide to the numbers that link the performance of real GDP and the unemployment rate and have concluded that US potential real GDP over the next few years will grow at only 1.4 to 1.6% per year, a much slower rate that is built into current US government economic and budget projections. My analysis suggests that the gap of actual performance below potential that concerns Summers is currently quite narrow and that the slow growth he observes is more a problem of slow potential growth than a remaining gap.

Hansen's 1938 version of secular stagnation was written prior to the invention of the concept of potential GDP, and indeed of real GDP itself.[3] Because there was no comprehensive measure of real economic activity, there was no notion of aggregate productivity or its growth rate. When we look at today's statistical rendering of the US economy in the late 1930s, we see that Hansen was writing about an economy with

2 These are the final words from the transcript of his speech given last autumn at the IMF (see Summers 2013).
3 The term "secular stagnation" was introduced not in Hansen's Presidential Address, but rather four years earlier in Hansen (1934, p. 19).

healthy potential GDP growth but a large gap of roughly 20% separating the levels of actual and potential GDP.[4]

Some have dismissed Hansen's concerns by pointing to the rapid growth in productivity that was occurring as he wrote during what Alex Field (2003) has called the 20th century's "most technologically progressive decade". Some optimistic writers have pointed to the upsurge in productivity growth that occurred in the 1930s and 1940s as offering the possibility that history might repeat itself and lead to faster productivity growth over the next two decades than even during the productivity heyday of 1996-2004.[5]

The reality of 2014 is far grimmer than faced Hansen's US of 1938, because the US was about to receive a succession of lucky breaks that utterly transformed late 1930s gloom into post-war prosperity. Hitler's invasion of Poland created a doubling of export orders in the winter of 1939-40. After the fall of France, the US government pushed the ignition switch on the Arsenal of Democracy, and before Pearl Harbor the share of total government spending in GDP had doubled. Real GDP grew at an annual rate of 12.8% between 1939:Q4 and 1941:Q4. By 1944, real GDP had doubled from its 1939 level. Most amazingly, the economy did not slide back into depression conditions when this huge dose of fiscal stimulus was removed; labour productivity was actually higher in 1950 than in 1944.

4 Current NIPA data for nominal GDP register $104.6 billion in 1929, $57.2 in 1933, and $87.4 in 1938. Gordon and Krenn (2010) estimate the GDP gap for 1938:Q4 to be 23.1%, implying that nominal potential GDP was $113 billion in 1938. Potential GDP grew between 1928 and 1941 at 3.1% per year, and labour productivity grew at 2.7% per year, more than double the rate achieved in 2004-14.

5 Syverson (2013, Chart 1) cleverly displays the level of labour productivity with two horizontal axes, one extending from 1890 to 1940 and the other aligned 80 years later to extend from 1970 to 2020. This 80-year displacement implies a parallel between 1932 and 2012 and overtly suggests that productivity growth will speed up radically after 2012, as it did after 1932. He ignores the fact that much of the upsurge of productivity growth after 1932 was cyclical and related to the doubling of real GDP between 1939 and 1944.

2 The demise of growth originates in headwinds, not technology

My forecast of growth over the 25 to 40 years is measured from 2007, not from now. The sources of slow growth do not involve technological change, which I assume will continue at a rate similar to that of the last four decades. Instead, the source of the growth slowdown is a set of four headwinds, already blowing their gale-force to slow economic progress to that of the turtle. These four barriers to growth are demographics, education, inequality, and government debt. These will reduce growth for real GDP per capita from the 2.0% per year that prevailed during 1891-2007 to 0.9% per year from 2007 to 2032. Growth in the real disposable income of the bottom 99% of the income distribution is projected at an even lower 0.2% per year.

While many authors acknowledge the demographic headwind, its long-term quantitative impact on economic growth remains open to debate. By definition growth in output per capita equals growth in labour productivity times growth in hours per capita. The slowdown in productivity growth that began 40 years ago was partly offset between 1972 to 1996 by an increase in the labour-force participation rate of 0.4% per year, as females and baby-boom teenagers entered the labour force. In contrast during 2004-2014 the participation rate has declined at an annual rate of 0.5%, and over the shorter 2007-2014 interval at an annual rate of 0.8%. This transition from a 0.4% *increase* to a 0.8% *decline* accounts for a 1.2% reduction in the growth of per-capita real GDP for any given growth rate of labour productivity.

Recent research (Hall 2014) has shown that about half of the 2007-14 decline in participation is due to the ageing of the population as the baby-boom generation retires. The other half is due to declining participation within age groups, due in part to weak economic conditions. Even if the decline in participation slows from 0.8 to 0.4% per year, the portion attributable to baby-boom retirement, that is still enough to make it impossible for real GDP per capita to match productivity growth.

The second headwind is education. Throughout most of the 20th century, rising high-school completion rates permanently changed the productive capacity of US workers, but this transition was over by 1970. Further increases in high school completion rates are prevented by dropping out, especially of minority students, as the US slides to number 16 in an international league table of secondary school completion among developed countries. Similarly, the US is number 16 in college completion rates and there are new problems – over $1 trillion in student debt combined with the inability of 40% of college graduates to find jobs requiring a college education, spawning a new generation of indebted baristas and taxi drivers.

The third headwind is income inequality that continues to grow inexorably as salaries for CEOs and celebrities march ever upwards, augmented by the creation of trillions of dollars in stock market wealth. Below the 90th percentile, corporations are working overtime to reduce wages, reduce benefits, convert defined benefit pension plans to defined contribution, and to use Obamacare as an excuse to convert full-time jobs to part-time status.

The fourth headwind is the predicted upward creep in the ratio of federal government debt to GDP. The official CBO data greatly understate the gravity of the problem, because the CBO estimate of future potential GDP growth is out of touch with reality. Because potential real GDP growth is already much slower than the CBO estimates (Gordon 2014b), future tax revenue will grow more slowly, boosting the debt in the numerator of the debt/GDP ratio, while the denominator will grow more slowly, thus further increasing the ratio. The federal debt/GDP ratio could well reach 150% by the late 2030s, and this does not take into account the apparently intractable pension burdens in some of the largest state and local governments.

For the disposable (after tax) incomes of the bottom 99%, it is hard to find any room for growth at all. Indeed official measures of median wage and household income have not grown for several decades. While these measures may understate income growth, my exercise in taking the historical record of growth of real GDP per capita and then

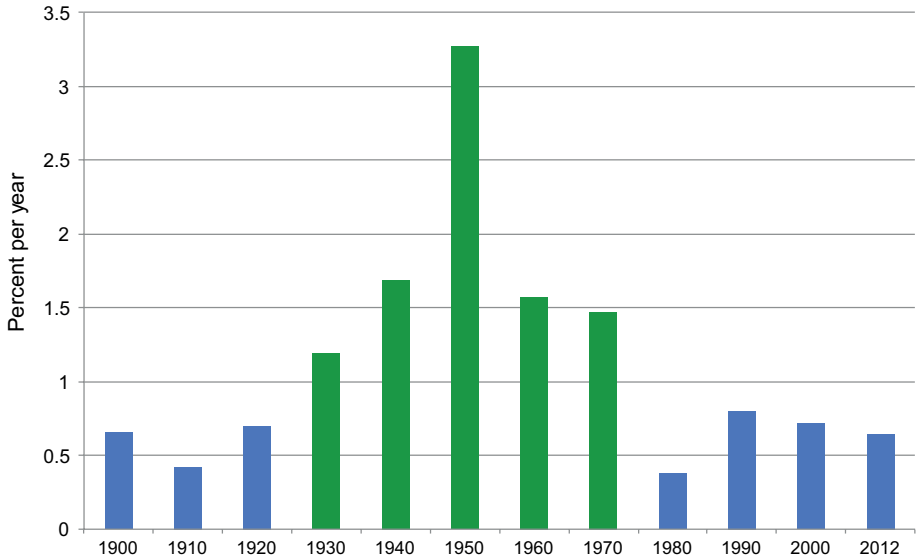
subjecting it to 'an exercise in subtraction' avoids the problem that some of the median wage and household income data exclude elements that are included in the data on GDP and personal disposable income.

3 Nobody debates the headwinds, instead they debate technological progress

My forecast of slow future growth after 2007 does not rely on any slowing of future technological change. My 'exercise in subtraction' deducts 1.2% from the realised 1891-2007 per-capita output growth rate of 2.0% for the combined impact of the four headwinds. Then I deduct an additional 0.6% for the fact that productivity change slowed markedly from the 80 years before 1972 to the 40+ years since 1972. *In my numbers, there is no forecast of a future technological slowdown – productivity growth adjusted for educational stagnation is predicted to be just as fast during 2007-2032 as during 1972-2007.*

Critics of my growth forecasts have largely ignored the fact that I am not suggesting that the pace of innovation will slow in the future compared to the achievements of 1972-2014. What the *Economist* cover called today's "loss of oomph" in the US economy occurred after 1972, that is, after the first century of implementing the rainbow of benefits from the inventions of the Second Industrial Revolution. In the early post-war years the spread of air conditioning, commercial air travel, and the interstate highway system represented the final implementation of technologies invented in the 1870s. After 1972 the slowdown was visible in the data and has continued to the present.

Figure 1 Annual growth rate of TFP for ten years preceding years shown, years ending in 1900 to 2012



For decades, macroeconomists struggled to understand the post-1970 productivity growth slowdown. But in fact our entire generation has been asking the wrong question. Instead of wondering why there was a productivity growth slowdown after 1972, we should have asked: "Can we explain the productivity miracle that occurred in the US economy between 1920 and 1970?" While I join most analysts in preferring to compare productivity growth data between years when unemployment and utilisation were 'normal', nevertheless it is interesting to look at the raw data for each of the 12 decades since 1890 (Figure 1). Any techno-optimist must look at this history with dismay. The future is not going to be better than the past, because the economy during 1920-70 achieved growth in total factor productivity (TFP) of a different order of magnitude in these 'green' decades than during the 'blue' decades before 1920 and since 1970.[6]

6 Total factor productivity (TFP) is defined as a weighted average of the ratio of output to labour input and the ratio of output to capital input, where both types of input are adjusted for quality changes. The TFP data displayed in Figure 1 are derived from scratch in Chapter 10 of my forthcoming book (Gordon 2015). They combine labour and GDP data from the BEA, BLS, and Kendrick (1961), but they are also revised to change the concept of capital input to allow for variable retirement ages and to include certain types of government-financed capital input.

A debate has raged over the past two years about the future of economic growth – will it speed up or slow down? The case for a revival in growth is made most emphatically by two MIT economists, Erik Brynjolfsson and Andrew McAfee (2013), and by my Northwestern colleague Joel Mokyr (2014). The techno-optimists focus entirely on their hopes and dreams of unprecedented future breakthroughs in technology that centre on the benefits of artificial intelligence, big data, small robots, medical miracles, and driverless cars and trucks. They ignore the headwinds and thereby have nothing to say about the core of my case that future disposable income growth for the bottom 99% will be slower than in the past, a slowdown that already began years ago when the headwinds began to gain momentum.

These techno-optimist forecasts are useful only along one dimension. They give us hope that innovation might proceed at the same pace in the next few decades as in the last four. Yet they are utterly unconvincing that the pace of technological change will be faster over the next 25 years than over the last 40. Consider what they are up against that has happened within the last 40 years since 1972: the mainframe era that eliminated routine clerical jobs of endlessly retyping contracts, bills, and legal briefs; the invention of the personal computer that allowed many professionals to write their papers without the aid of a secretary; the invention of game-changing technologies in the retail sector including the ATM machine, barcode scanning, self checkout, and airline automated check-in kiosks; Amazon and e-commerce; wiki and the availability of free information everywhere; the obsolescence of the hard-copy library catalogue, the auto parts catalogue, the print dictionary and encyclopaedia.

The pessimism in my forecasts of future economic growth is based on the headwinds, not a faltering of technology. I am dubious that the nirvana of artificial intelligence, big data, robots, driverless cars, and so on will match the achievements enumerated above of the last 40 years. By basing my productivity forecast on a continuation of the 1972-2014 pace of innovation, I am deliberately suppressing my skepticism.

The techno-optimists differ in the nature of their concerns. Brynjolfsson and McAfee (2013) are admirable in their social concern that their abundant robots and big data will eliminate millions of jobs. Mokyr is not interested in jobs or headwinds. He predicts hypothetical future breakthroughs without any contact with the historical data, a remarkable position for an economic historian. He does not appear to care about the drama shown in Figure 1 above of the TFP speed-up during the period 1920-70 and its subsequent relentless slowdown.

Mokyr's sole comment about the headwinds (2014, p. 14) is that the unprecedented decline in the labour-force participation rate is partly offset by an increase in leisure. However we have long known that leisure time during the working week experienced by the unemployed or by those who would prefer to work has far less value than leisure time on weekends and during vacations. Labour-force participation has been declining in large part because many people are forced to retire without adequate finances and others give up looking for jobs after a desperate and endless search. He punctuates his dismissal of declining hours per capita with a remarkable quote: "But it may well be that a leisurely life is the best 'monopoly profit'". He forgets his history – from the standpoint of the increasing marginal disutility of work, the real welfare-enhancing transition involving leisure occurred in the first half of the 20th century when the 60-hour manufacturing workweek of 1900 fell to 40 hours per week by 1950.[7]

The optimists, both Brynjolfsson and McAfee and Mokyr, share a common reaction to any display of historical productivity data such as contained in Figure 1. They claim that GDP is fundamentally flawed because it does not include the fact that information is now free due to the growth in internet sources such as Google and Wikipedia. A complementary statement is that numerous items have disappeared from GDP because they are already provided for free with a smart phone – not only the print dictionary or encyclopaedia, but the music-playing capability that makes the separate iPod obsolete,

7 Mokyr's claim that valuable leisure time partly or entirely offsets the lost income of the unemployed (and of those out of the labour force who would prefer to work) is sharply contradicted by a recent survey of the emotional well-being of the unemployed during the recent recession and slow recovery (see Krueger and Mueller 2011).

the restaurant locator that makes the printed Zagat guide obsolete, the growth in companies like Uber and Lyft that may make the urban taxi obsolete, and many more.

Two responses are appropriate about the unmeasured GDP made possible by the smart phone. The most obvious is that TFP growth sagged decades before the popularisation of smart phones and the internet. The most important event of the digital age was the marriage of personal computers and communications in the mid-to-late 1990s in the form of the internet, web browsing, and e-mail. Many of the sources of consumer surplus and free information were established more than a decade ago, including Amazon in 1994, Google in 1998, as well as Wikipedia and iTunes in 2001. While progress has continued in the past decade with smart phones, gmail, Google Maps, and other applications, these innovations are second-order inventions compared to the great marriage of computers and communication of the late 1990s, and the slow growth of TFP reflects that.

The much more important response is that GDP has *always* been understated. Henry Ford reduced the price of his Model T from $900 in 1910 to $265 in 1923 while improving its quality. Yet autos were not included in the CPI until 1935. Think of what GDP misses: the value of the transition from gas lights, that produced dim light and pollution and were a fire hazard, to much brighter electric lights turned on by the flick of a switch; the elevator that bypassed flights of stairs; the electric subway that could travel at 40mph compared to the 5mph of the horse-drawn streetcar; the replacement of the urban horse by the motor vehicle that emitted no manure; the end of disgusting jobs of human beings required to remove the manure; the networking of the home between 1870 and 1940 by five new types of connections (electricity, telephone, gas, water, and sewer); the invention of mass marketing through the department store and mail order catalogue; and the development of the American South made possible by the invention of air conditioning.

Perhaps the most important omission from real GDP was the conquest of infant mortality, which by one estimate added more unmeasured value to GDP in the 20th

century, particularly in its first half, than all measured consumption (Nordhaus 2003). The list goes on. The invention of air conditioning and commercial air travel may have created more consumer surplus for more people than the provision of free information over the internet.

While Mokyr is not concerned about the destruction of jobs implied by his hypothetical technological revolution, Brynjolfsson and McAfee are overly worried because they are too optimistic about the future reach of robots into the vast US service sector. Retail supermarkets are in stasis – the one-time benefit of the barcode scanner 30 years ago has not changed the need for a human checkout clerk, and supermarket shelves are still restocked by humans, not robots. The higher education sector has vastly inflated its costs by adding layers of administration without changing the nature of instruction. One wonders why the US needs 97,000 bank branches, but the 1977 invention of the ATM machine has apparently not eliminated them.

4 The future of growth in the United States

Larry Summers' "secular stagnation" concern with the inability of policymakers to close the gap between actual and potential real GDP is almost obsolete, because the gap is steadily shrinking. Now is the time to start trying to understand why the future pace of potential real GDP appears to be so slow, and whether anything can be done about the headwinds – particularly demography, inequality, and debt – that drag income growth for the bottom 99% down so far below the slowing rate of overall growth. The techno-optimists are whistling in the dark, ignoring the rise and fall of TFP growth over the past 120 years. The techno-optimists ignore the headwinds, seeming ostrich-like in their refusal to face reality.

The *Economist* of 19 July 2014 got it right. America is riding on a slow-moving turtle. There is little that politicians can do about it. My standard list of policy recommendations includes raising the retirement age in line with life expectancy, drastically raising the quotas for legal immigration, legalising drugs and emptying the prisons of non-violent

offenders, and learning from Canada how to finance higher education. The US would be a much better place with a medical system as a right of citizenship, a value-added tax to pay for it, a massive tax reform to eliminate the omnipresent loopholes, and an increase in the tax rate on dividends and capital gains back to the 1993-97 Clinton levels.

But hypothetical legislation, however politically improbable, has its limits. The headwinds that are slowing the pace of the US's future economic growth have been decades in the making, entrenched in many aspects of our society. The reduction of inequality and the eradication of roadblocks in our educational system defy the cure-all of any legislation signed at the stroke of a pen. Innovation, even at the pace of 1972-2014, cannot overcome the ongoing momentum of the headwinds. Future generations of Americans who by then will have become accustomed to turtle-like growth may marvel in retrospect that there was so much growth in the 200 years before 2007, especially in the core half century between 1920 and 1970 when the US created the modern age.

References

Brynjolfsson, E and A McAfee (2013), *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, New York and London: Norton.

Field, A J (2003), "The Most Technologically Progressive Decade of the Century", *American Economic Review* 93(4): 1399-1413.

Gordon, R J (2014a), "The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections", NBER Working Paper No. 19895.

Gordon, R J (2014b), "Current and Future Growth in Potential Real GDP: The Conundrum Posed by Declining Unemployment", initial draft, 19 July.

Gordon, R J (2015), *Beyond the Rainbow: The Rise and Fall of Growth in the American Standard of Living*, Princeton NJ: Princeton University Press, forthcoming.

Gordon, R J and R Krenn (2010), "The End of the Great Depression 1939-41: Fiscal Multipliers and Policy Contributions", NBER Working Paper No. 16380.

Hall, R E (2014), "Quantifying the Lasting Harm to the U.S. Economy from the Financial Crisis", NBER Working Paper No. 20183.

Hansen, A H (1934), "Capital Goods and the Restoration of Purchasing Power", *Proceedings of the Academy of Political Science* 16(1): 11-19.

Hansen, A H (1939), "Economic Progress and Declining Population Growth", *American Economic Review* 29(1): 1-15.

Kendrick, J W, assisted by M R Pech (1961), "Productivity Trends in the United States", National Bureau of Economic Research (NBER) General Series No. 71, Princeton, NJ: Princeton University Press.

Krueger, A B and A Mueller (2011), "Job Search, Emotional Well-Being, and Job Finding in a Period of Mass Unemployment: Evidence from High-Frequency Longitudinal Data", *Brookings Papers on Economic Activity* 42(1): 1-57.

Mokyr, J (2014), "The Next Age of Invention: Technology's Future Is Brighter Than Pessimists Allow", *City Journal* (Winter): 12-20.

Nordhaus, W D (2003), "The Health of Nations: The Contribution of Improved Health to Living Standards", in K M Murphy and R H Topel (eds), *Measuring the Gains from medical Research: An Economic Approach*, Chicago: University of Chicago Press for NBER, 9-40.

Summers, L (2013), "IMF Economic Forum: Policy Responses to Crises", speech at the IMF Fourteenth Annual Research Conference, Washington, DC, 9 November.

Syverson, C (2013), "Will History Repeat Itself? Comments on "Is the Information Technology Revolution Over?", *International Productivity Monitor* 25: 37-40.