

MONETARY POLICY MONITOR

- **PRODUCTIVITY AND MONETARY POLICY**

- **CONVERSATION WITH KLAUS SCHMIDT-HEBBEL**

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PRODUCTIVITY AND MONETARY POLICY¹

Introduction

■ Laurence Meyer is a professor, an economic consultant, and a former member of the Federal Reserve Board of Governors. He served on the Board from June 1996 through January 2002. As he left the Board, Meyer started writing a book on his experience at the Fed. Entitled *A Term at the Fed – An Insider’s View*, the book came out in 2004. (Meyer, 2004).

The years Meyer spent at the Fed was a period of extraordinary prosperity for the American economy, a period generally referred to as the “New Economy”. Particularly from the point of view of those interested in theoretical aspects of monetary policy as well as in the conduction of such policy, those were very rich years. Besides the fact that the economy was booming for most of the time, there was the stock-market euphoria, widely known as the phase of “irrational exuberance”, followed by the bursting of the bubble. There was also the September 11 attack and the difficulties involved in managing the economy in the wake of the pricking of the bubble.

Among the several important economic episodes of that time, the one we wish to focus on at the introduction to this essay has to do with how the Fed dealt with the resumption of strong productivity gains, in the mid-1990s. In particular, it is our purpose to recall the monetary policy reaction to the signs of the new productivity boom, certainly the most important aspect behind the idea of the “new economy”. Especially relevant in this regard is to stress how things might have gone terribly wrong were it not for the correct diagnosis of what was going on in the economy and for the decision not to step on the monetary brakes at that occasion.

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For a few decades after World War II, the American economy had experienced a sort of a “golden age” of productivity growth. Between 1948 and 1973, and measured as GDP per hours worked, the rate of productivity growth in the United States was 2.7% per annum. From the early 1970s onward, productivity gains slowed down considerably, a phenomenon that lasted for more than two decades. The average annual rate of productivity growth between 1974 and 1994 was 1.5%. Robert Gordon argues that the golden age of productivity growth was the result of what he calls the Great Inventions of the past, particularly those associated with the Second Industrial Revolution (electricity, the internal combustion engine, indoor plumbing). The productivity slowdown of the 1970s came as the technological advance “started to show its age”, as Gordon puts it. (Gordon, 2016, p. 7).

Meyer joined the Fed’s Board at the time the first signs of a new phase of strong productivity expansion were showing up. He was a witness and an active participant on the discussions about the subject held at the Federal Open Market Committee (Fomc). Right at his first Fomc meeting, held in early July 1996, the discussion centered on what action the Fed should take in order to promote some sort of a soft landing of the economy, which at the time was apparently operating at or near full employment. In Meyer’s words, “the staff and some of the Committee members voiced their concern that the economy was ‘overheating’, reaching the point of growth and low unemployment that would trigger rising inflation”. (Meyer, 2004, pp. 34-35).

The mentioned discussion lasted for a considerable number of meetings, during which Chairman Greenspan held a sort of a minority (though predominant, given his position as Chair) view. According to the story told by Meyer, Greenspan believed that computers and other communications technologies were giving the economy “the ability to grow faster and to operate at higher output levels than ever before – without triggering an increase in inflation”. (Ibid., p. 35). Productivity was accelerating and there would be no need to engage into a tightening cycle. In fact, from the beginning of 1996 until the emergence of the Russian-default crisis, in September 1998, the fed funds rate moved up just once, by only 25 points, in March 1997.

Alan Greenspan figured out what later became known as the New Economy “before the rest of us”, says Meyer. (Ibid., p. 6). In *The Age of Turbulence*, the former Chairman of the Fed presented his own view of that episode. In the spring of 1996, the economy was growing “at a superhot rate of over 6 percent”, he wrote. “Something extraordinary was happening”, he added. (Greenspan, 2007, p. 171). The official productivity statistics still did not capture anything unusual, but the fact of the matter was that companies were reporting rising operating profit margins, yet only few had raised prices. Costs per unit of output were therefore contained, perhaps falling. To the extent that this was true, and given the fact that average hourly earnings were rising, Greenspan concluded that “it was an arithmetical certainty that if these data were accurate, the growth of output per hour must be on the rise; productivity was truly accelerating. And if so, then rising inflation would be unlikely”. (Ibid., p. 172). As stressed by the former Chairman himself, under those circumstances, raising the policy interest rate would have been a “mistake”. By avoiding such a misstep, “we helped clear the way for the postwar period’s longest economic boom”. (Ibid., pp. 171 and 174).

Greenspan has clearly focused on the supply side of economy. It is worth noticing, however, that when productivity growth changes considerably, we need to pay attention to the effects of such changes on the demand side of the economy as well. In fact, this is exactly what Ben Bernanke did when he analyzed the productivity issue in the context of the new economy.

Writing in the middle of the years 2000, Bernanke noted that the impact of the productivity boom (initiated some ten years earlier) on the demand side of the American economy was not uniform over that ten-year period. According to his analysis, “the rise in productivity growth after 1995 was accompanied by surges in both consumption and investment spending, supported by a booming stock market. Employment rose and unemployment fell, as the strength of aggregate demand induced employers to hire, the increases in productivity notwithstanding. Inflation remained fairly stable during this period, as upward pressures from increased aggregate demand were balanced by downward pressures on unit labor costs (for any

given level of wages) and by the increase in aggregate supply created by higher productivity”. (Bernanke, 2005, p.7).

“In contrast to the experience of the late 1990s – the argument continues -, during the early part of the new millennium the response of spending to rising productivity growth was comparatively weak. Investment spending was particularly slow to respond to the further increase in productivity growth [...]. Whatever the cause, the weaker response of spending in the more-recent period, coupled with impressive gains in productivity, helped generate both a pattern of slow job growth (the ‘jobless recovery’) and the worrisome decline in inflation in 2003”. (Ibid., p. 7).

Such a discussion highlights the importance of a good understanding of the behavior of productivity for the conduction of monetary policy. In recent years, once again, productivity moved into the spotlight. This time, however, rather than shifting up, productivity growth has gone down, reaching unprecedented low rates.

Innovation and productivity

Productivity is key to the process of economic growth. Economists have long arrived at such a consensus. Over the long run, productivity growth is what determines the pace of economic growth of any given economy or region. For an economy like the American one, which has defined and pushed outward the technological frontier of the world economy since the beginning of Industrial Revolution, it is also consensual that productivity depends on how fast technological innovations occur, and how deeply they pervade society as a whole.

Joseph Schumpeter defined innovation as “the market introduction of a technical or organizational novelty, not only its invention”. (Schumpeter, apud Brynjolfsson and McAfee, 2014, p. 214). He considered innovation “the outstanding fact in the economic history of capitalist society”. (Schumpeter, 1939, p. 82). How this “outstanding fact” has evolved in recent times is exactly what lies at the center of the debate on the possible causes of the present phase of productivity slowdown.

“Some inventions are more important than others”, says Robert Gordon. (Gordon, 2016, p. 2). Since (at least) the turn of the millennium, he has been showing skepticism on whether or not the New Economy merited treatment “as a basic Industrial Revolution of a magnitude and importance equivalent to the great inventions of the late 19th and early 20th century”. (Gordon, 2000, p. 4). In his recent book, *The Rise and Fall of American Growth*, Gordon reaffirmed his conviction that nothing will be like the second phase of the Industrial Revolution, initiated after the Civil War in the United States. In the following one hundred years, he says, “daily life had changed beyond recognition. Manual outdoor jobs were replaced by work in air-conditioned environments, housework was increasingly performed by electric appliances, darkness was replaced by light, and isolation was replaced not just by travel, but also by color television images bringing the world into the living room”. (Gordon, 2016, p. 1). Quite importantly, life expectancy at birth rose from age forty-five to age seventy-two. The economic revolution experienced from 1870 through 1970 was “unique in human history”. (Ibid, p.1). In contrast, – the argument continues –, the advances associated with the Third Industrial Revolution, which brought us the computer, the Internet, etc., “have tended to be channeled into a narrow sphere of human activity having to do with entertainment, communications, and the collection and processing of information”. (Ibid., p. 2). For sure, such an understanding is far from being consensual. Brynjolfsson and McAfee, for example, hold exactly the opposite view. Speaking of the technological advances observed in the past few years, they claim that they “are not the crowning achievements of the computer era. They’re the warm-up acts. As we move deeper into the second machine age we’ll see more and more such wonders, and they’ll become more and more impressive”. (Ibid., p. 90).

In his book, Gordon calls attention to the fact that over time productivity does not evolve in a regular fashion. In other words, productivity growth rates vary significantly. He also notes that such variability is closely associated with the pace and nature of previous innovations.

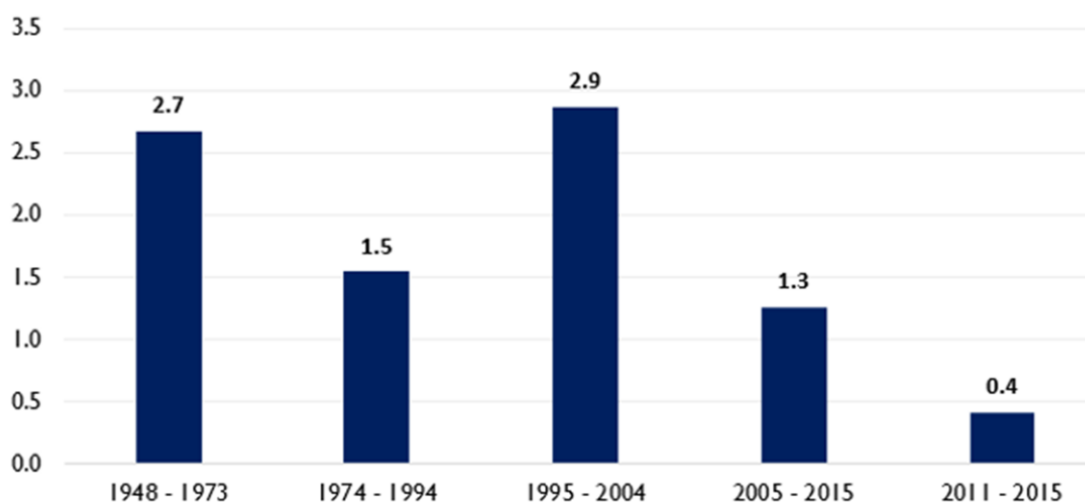
To illustrate his point, Gordon shows the behavior of labor productivity since 1870. In this exercise, he divides the whole period into three sub-periods. Output per hours worked grew at an average rate of 1.79% from 1870 until 1920, at a rate of 2.82% between 1920 and 1970, and at a rate of 1.62% in sub-period 1970-2014. The intermediate sub-period corresponds to the second half of what Gordon calls the “special century” of the American economic history (1870-1970), during which the fruits of the great inventions of the post-Civil War period appeared. Those fruits showed up with a lag in the statistics of productivity for the simple reason that the full benefits of innovations normally require a great deal of adaptation and complementary investments, never appearing immediately. The numbers clearly indicate that the decades between 1920 and 1970 experienced extraordinary productivity gains, considerably larger than the ones registered in the other sub-periods.

Gordon presents next a decomposition of the productivity gains, for the same sub-periods, except for the fact that the first sub-period starts in 1890. The idea now is to examine the behavior over time of the three components we normally divide labor productivity into: education attainment, capital deepening and total factor productivity (TFP), admittedly the main sources of growth in labor productivity. The exercise indicates that the contributions of rising educational attainment and more capital input per worker hour are practically the same in each of the three time intervals. What really made a difference and contributed most to the fastest growth rate of labor productivity was the jump in TFP growth rate, which in the 1920-1970 time interval was almost three times greater than the rates observed in the two other sub-periods. If we accept the usual hypothesis that the effects of innovation and technological change appear in our measures of TFP growth, Gordon’s exercise constitutes an evidence of the importance of the innovations of the “special century”. (Ibid, pp. 13-18).

Based on this line of reasoning, one can thus say that, as far as the country that represents the technological frontier of the world economy is concerned, any discussion on the behavior of productivity necessarily involves an analysis of innovation and technological change.

Graph 1 portrays the behavior of labor productivity in the United States (output per hours worked in the non-farm business sector) over the post-war period. The American economy experienced two phases of productivity slowdown. The first one in the 1970s, while the second in the mid-2000s. In the last case, the slowdown turned more pronounced after the Great Recession, perhaps a sign of some cyclical influence. In any case, the fact of the matter is that the rate of productivity growth has recently gone down to unprecedented low levels, reaching 0.4% per annum in the five-year period ending in 2015.

Graph 1: Rates of Growth of Labor Productivity in the US* (%)



*nonfarm business sector: productivity per hour worked. Source: Fed St. Louis.

The phenomenon of productivity slowdown is present in other advanced economies as well. Table 1 gathers information on the evolution of productivity in the eleven largest economies of the developed world, including the United States. To facilitate comparisons, the concept now is that of total output per hours worked, as informed by the Conference Board. In the 2011-2015 period, the average rate of productivity growth in the ten largest developed economies (other than the US) was 0.8% per annum, in sharp contrast with the average observed during the “golden years” of the 1951-1973 period (4.7%). The comparable figures for the US are 0.3% and 2.6%, respectively.

The numbers also show that the surge in productivity growth experienced by the American economy in the mid-1990s (the New Economy) did not happen elsewhere - in general, the experience of the other advanced economies is one of declining productivity growth since the first half of the 1970s.

Table 1: Rates of Growth of Labor Productivity in the 11 Major Advanced Economies* (%)

	1951 - 1973	1974 - 1994	1995 - 2004	2005 - 2015	2011 - 2015
U.S	2.6	1.3	2.3	1.0	0.3
Japan	7.3	3.2	2.0	0.8	0.4
Germany	6.1	3.1	1.7	0.8	0.8
United Kingdom	2.7	2.2	2.1	0.6	0.5
France	5.3	2.7	2.0	0.7	0.8
Italy	5.7	2.3	0.8	0.0	0.1
Canada	2.8	1.3	1.4	0.9	0.9
South Korea	4.1	5.6	5.2	3.2	1.5
Australia	2.9	1.6	2.1	1.3	1.4
Spain	6.1	3.8	0.4	1.2	1.3
Netherlands	4.1	2.1	1.5	0.7	0.6

*productivity = GDP per hour worked (Y/H). Source: The Conference Board.

Measurement problems

By definition, numerical estimates of productivity depend directly on estimates of GDP. To some extent, part of the current debate on the productivity slowdown involves a discussion on the imperfections associated with the construction of GDP statistics.

In the United States, during the Great Depression, the Roosevelt Administration had asked the National Bureau of Economic Research (NBER) to produce estimates of the national product that would allow a somewhat more accurate view of the state of the economy in a time in which it was hard to see the end of the recession. Simon Kuznets became the head of such project, while Colin Clark engaged in similar efforts in the United Kingdom.

Curiously enough, Kuznets, who would later receive a Nobel Prize, understood that his task was to work out a measure of national economic welfare, rather than output. “It would be of great value to have national income estimates that would remove from the total the elements which [...] represent dis-service rather than service”. (Kuznets, apud Coyle 2015, p. 13). In particular, Kuznets wanted to deduct from the estimates of the national income “all expenses on armament, most of the outlays on advertising, a great many of the expenses involved in financial and speculative activities”. And suggested the same procedure in regard to “all the gigantic expenditures in our urban civilization, subways, expensive housing, etc. [...] [that] do not really represent net services to the individuals comprising the nation but are [...] an evil necessary in order to be able to make a living”. (Id., *ibid.*, p. 14).

After intense debate, the conclusion was that the relevant task would be to develop a measure of the national output, not of the national well-being. Therefore, since the early days, GDP is a measure of the national product.

In spite of the consolidated notion that the objective of GDP estimates is to provide a measure of economic activity, economists and politicians in general commonly look at those estimates as indicators of national well-being. The reason for this might be the fact that although GDP is not a direct measure of welfare, estimates of GDP are highly correlated with variables that clearly reflect the well-being of a given society, like infant mortality, life expectancy, etc. Authors like Robert Gordon argue forcibly that the rate of growth of GDP per capita is “our best measure of the pace of advance of the standard of living” of a society. Many are ready to recognize, though, as Gordon himself does, that the growth of real per capita GDP understates enormously the true increase in the standard of living. (*Ibid.*, pp. 538 and 576).

The main reason for such underestimation has to do with the difficulties in expressing the value of new inventions. How to attribute value, for example, to the invention of antibiotics and vaccines in general? This means that it remains unknown the degree to which economic growth statistics underestimates the improvement in the quality of life produced by new inventions.

In reality, examples of inventions whose benefits never showed up in GDP official statistics are uncountable. To those already cited, we could add anesthetics, new surgical techniques, electric appliances, the air conditioning and heating systems, the smartphone, which puts together in a single product a series of others. Particularly important was the tremendous increase in life expectancy, which, in the US, and according to Gordon, experienced its greatest jump between 1890 and 1950. (Gordon 2016, p. 13).

Since the early days, the United Nations took the responsibility to define international standards of measurement. The first UN guide to the System of National Accounts, which all member nations are supposed to follow, appeared in 1953. (Coyle, 2015, p. 25). Notice that GDP numbers do not include goods and services generated in non-market activities, even if valued by members of the society. In other words, they only register monetary transactions. Obviously, estimates based on market prices give rise to statistics of nominal GDP. To transform them into estimates of real GDP, the concept that really matters in evaluating the performance of a given economy over time, there is need to resort to a price index. In general, it takes time before recently introduced products become part of an official price index. It is only after such time lag that it becomes possible to take account of the gains to society associated with the usual decline in price experienced by new products. Thus, not only the benefits brought about by new products never show up in the statistics, but it takes time for the gains derived from those price reductions to start being registered. To illustrate, room air conditioner and videocassette recorder (VCR) were first sold in the United States in 1951 and 1978, but were not included in the official price index until 1967 and 1987, respectively. (Gordon, 2016, p. 11).

Another problem related to the use of price indexes has to do with the so-called “quality bias”. The question here refers to the difficulties involved in constructing indexes that take into account the constant change in the quality of goods and services coming to the market per unit of time. This represents another source of underestimation of the benefits generated by technological advance.

Market activities remain underestimated when price indexes used to convert nominal values into real values overestimate the rates of inflation.

The difficulties involved in dealing with the introduction of new product within the framework of national account statistics and the imperfections of the criteria normally used in attempts to take into account changes in the quality of goods and services give room to great disputes. In fact, it is hard to tell how far the underestimation of benefits goes, for both particular consumers and society as a whole. When a modified product comes to the market for a new price, it is difficult to identify how much of the price variation is justifiable by the characteristics of the good and how much is a pure price correction.

Attempts to identify how much a given price variation can be attributed to change in the quality of a good or service involve what economists call hedonic indexes. Official agencies responsible for national account statistics make use of such type of index in only a restricted number of cases. In her already quoted book on the history of GDP, Diane Coyle explains how this is done in the case of computers.

The idea here is “to seek the price of certain characteristics that are bundled up in a computer. The statisticians take the actual price paid for personal computers of all kinds, and also gather data on the different characteristics of the machines people are buying”. (Coyle, 2015, p. 90). They look at memory size, resolution, screen size, etc. Based on the set of information regarding the various characteristics of the machines, a regression analysis gives the coefficients that indicate the impact of each feature on the price paid for the computer. The part of the price variation that appears unrelated to the specific improvements in the characteristics of computer corresponds to a pure price change. (Ibid., p. 91). Procedures like this one help us understand what Moses Abramovitz said several decades ago: “national income at market prices is a general index constructed as consistently as possible to reflect the significance of output to welfare”. (Abramovitz, 1959, p. 21).

Undeniably, societies of the past, of the time when the first estimates of output and national income were produced, were much less complex than more modern societies.

The productive system relied heavily on manufactured goods, which tend to be a lot easier to evaluate than services in general. Even so, measurement problems were present. The difficulties faced by official statisticians increased tremendously, though, as the service sector became predominant in modern economies, in particular with the advent of the Digital Revolution and the consequent explosion of intangibles. At the same time, it became harder and more necessary to make adjustments for quality change.

It seems important to bear in mind that, in recent times, the center of technological innovations has shifted from hardware to software and to apps in general. When technological advances appeared essentially as improvements in machines (computers), it was not that difficult to find an appropriate solution by means of hedonic indexes. More recently, though, the difficulties involved in evaluating the gains derived from improvement in already existing products increased considerably. Sometimes, what seems to be a simple improvement in the quality of a product is in reality something essentially new.

The difficulties do not stop there. Technological progress has brought us an uncountable number of free digital products, which, since they do not involve monetary transactions, they do not appear in the official GDP statistics, in spite of, in many cases, being highly valued by society members. The use of Skype is a good illustration. It is an activity which certainly adds value to people, but do not show up in GDP and productivity statistics. In sum, we seem to face a growing gap between what we effectively measure and what we value. Perhaps an old observation made by Abramovitz has never been more opportune: “we must be highly skeptical of the view that long-term changes in the rate of growth of welfare can be gauged even roughly from changes in the rate of growth of output”. (Ibid., p. 21).

Productivity slowdown: the two sides of the debate

Commercial use of computers began around the year 1960, marking the initial steps of the Third Industrial Revolution (computers, the Internet, smartphone).

As noted above, a little more than a decade later, the American economy entered into a phase of productivity slowdown. With the passage of time, and as the use of computers became widespread, it was only natural to expect the slowdown to be of a temporary nature, meaning that the handsome rates of productivity growth experienced during the previous decades would soon be resumed. Nevertheless, it took more than 20 years for the first results to show up, bringing up the idea of a “productivity paradox”, well expressed in the words of Robert Solow: “You can see the computer age everywhere but in the productivity statistics” (Solow, 1987).

In the United States, the results of the Digital Revolution finally appeared in the data in the mid-1990s. Productivity gains increased considerably, reaching rates slightly higher than those seen during the “golden years”. (Graph 1). Nevertheless, the renewed strengthening of productivity gains did not last long.

For many, the extraordinary number of inventions brought to us by the Digital Revolution does not match with the idea of a productivity slowdown. Not only that, but, as Jan Hatzius and Kris Dawsey put it May 2015, “profit margins have risen to record levels, inflation has mostly surprised on the downside, overall equity prices have surged, and technology stocks have performed even better than the broader market. None of this feels like a major IT-led productivity slowdown”. The productivity slowdown of the 1970s, they add, “featured declining profit margins, rising inflation, and declining equity valuations”. (Hatzius and Dawsey, 2015, pp.1 and 3). Would we be experiencing a second version of the productivity paradox?

Economists like Robert Gordon, who holds a more pessimistic view, call attention to the fact that there is no questioning about “the frenetic pace of innovative activity, particularly in the spheres of digital technology”. Nevertheless, it is necessary to make a clear distinction between the pace of innovation, on the one hand, and the effect of innovation on the rate of growth of productivity, on the other. (Gordon, 2016, p. 567).

The Twitter, for example, is a recent invention, but it is hard to argue that it has given an important contribution to the productive capacity of the economy. As observed by Alan Blinder, “some popular online services might even reduce productivity by

turning formerly productive work hours into disguised leisure or wasted time”. (Blinder, May 2015).

Robert Gordon and John Fernald argue that the greatest productivity gains from the Third Industrial Revolution came years ago. Gordon, for example, claims that “the boom of the late 1990s was driven by an unprecedented and never-repeated rate of decline in the price of computer speed and memory, and a never-since matched surge in the share of GDP devoted to information and communication technology (ICT) investment”. (Gordon, 2014, p. 20). Fernald, in turn, puts it this way: “by the mid-2000s, the low-hanging fruit of IT had been plucked”. (Fernald, 2014, p. 3). Alan Blinder holds a similar view, to the point of suggesting that we “compare Facebook with the Internet, or the Apple Watch with the personal computer. Maybe inventiveness has not waned, but the productivity-enhancing impacts of inventions have”. (Blinder, May 2015).

In a more recent paper, Byrne, Fernald and Reinsdorf say that a “plausible story is that it was the fast-growth 1995-2004 period that was the anomaly”. At that time, they argue, there would have been “a one-time upward shift in the level of productivity rather than a permanent increase in its growth rate”. (Byrne, Fernald and Reinsdorf, 2016, p. 49).

Looking forward, Gordon argues that, in comparison with the Second Industrial Revolution, nothing extraordinary will happen in the field of inventions in the foreseeable future. Such reasoning leads him to project productivity gains at the same pace observed since the mid-2000s. In other words, for him, productivity will grow at the modest pace registered in the 2004-2015 period. (Gordon, 2016, p. 568). “For now, says John Fernald, the IT revolution is a level effect on measured productivity that showed up for a time as exceptional growth. Going forward, productivity growth similar to its 1973-95 pace is a reasonable expectation”. (Fernald, 2014, p. 30). Since the rates of growth of productivity in the two above-mentioned periods were quite similar (1.3% and 1.5%, respectively), we can say that the lines of reasoning of the two experts coincide.

Tyler Cohen seems to agree with such thinking. “The American economy has enjoyed lots of low-hanging fruit since at least the seventeenth century, whether it be free land, lots of immigrant labor, or powerful new technologies. Yet during the last forty years, that low-hanging fruit started disappearing, and we started pretending it was still there. We have failed to recognize that we are at a technological plateau”. (Cohen, 2011, p. 7).

As already noted, many think exactly the opposite. Brynjolfsson and McAfee, for example, argue that the Digital Revolution, or the Second Machine Age, as they call it, has given rise to radically new forms of combining technologies. Combining and recombining technologies has proved to be of crucial relevance since the early days of the Industrial Revolution. For those authors, opportunities to continue doing so acquired renewed impetus with the advent of the new machine age. To illustrate, they often cite the case of Waze. “Waze is a recombination of a location sensor, data transmission device (that is, a phone), GPS system, and a social network. The team at Waze invented none of these technologies; they just put them together in a new way”. (Brynjolfsson and McAfee, 2014, p. 80).

On the role of science, as noted by Eduardo Giannetti, “the laws of thermodynamics which explain the modus operandi of the steam engine – the fulcrum of the First Industrial Revolution – were only discovered decades after the machine was invented by James Watt”. Likewise, he adds, none of the machines and techniques that gave rise to several other segments of the industrial era depended on previous scientific knowledge. “It was only from the final quarter of the nineteenth century onward, during the Second Industrial Revolution, that science started producing results liable to be incorporated by the productive system and to dictate the course of technological change”. (Giannetti, 2016, p. 56).

It is exactly on the relation between science and technology that Joel Mokyr bases his reasoning to offer an optimistic view. In his opinion, such a relation is a two-way street. “Technology, he says, can advance without a good scientific understanding of why techniques work the way they do”, but progress of this type is subject to diminishing returns. (Mokyr, 2014, p. 84).

In his understanding, “as science moves into new areas and solves issues that were not even imagined to be solvable, there are inventors, engineers, and entrepreneurs waiting in the wings to use the new knowledge and design new gizmos and processes based on it that mostly will continue to improve our lives”. The interplay between science and technology creates a self-reinforcing and apparently unbounded process. (Ibid., p. 87). For him, “the best is still to come”, there being no reason to be pessimistic. (Mokyr, 2013).

More objectively, there are two means of being optimistic. The first one has to do with the fact that in order to produce their full impact on productivity, new technologies require complementary investments, involving, in particular, adaptations and recombinations of previous processes and productive techniques. This demands time. The economic historian Paul David famously noted that in its initial 25 years the electrification of American factories (1890-1915) did not increase productivity significantly. It took that much time for entrepreneurs, engineers and managers to realize that, to be fully effective, the new technology required additional investments, particularly regarding changes in factory layout. Productivity increased considerably only after the adjustments. (David, 1989 and 1990, and Syverson, 2013). Based on this and other historical examples, the optimists believe that it is just a matter of time before productivity accelerates again.

The second way of being optimistic has its base on the idea that official statistics underestimates the growth rates of GDP and productivity, more especially so in recent times. As already noted, the benefits produced by the introduction of new products and improvements in the quality of existing goods and services are not adequately taken care of by official statisticians. In general, inflation indexes have an upward bias, this being the reason why GDP and productivity remain underestimated. This being the case, the phenomenon of productivity slowdown would be illusory.

It seems to us, however, that this type of discussion has more to do with the already-mentioned growing gap between what we effectively measure and what we value than with the issue of productivity. In fact, economists who seem sympathetic to the view expressed above tend to stress welfare-related aspects of the problem.

Hatzius and Dawsey, for example, show disagreement with the idea that “the standard of living is growing much more slowly than in the past”, while Martin Feldstein regrets the fact that official statistics “fail to reflect the remarkable innovations in everything from health care to Internet services to video entertainment that have made life better during these years”. (Hatzius and Dawsey, 2015, p. 1, and Feldstein, 2015). Observations such as these suggest a greater concern with the welfare aspects of the problem than with productivity properly.

Lack of support for the mismeasurement hypothesis

Is the mismeasurement hypothesis capable of explaining the recent phase of productivity slowdown in the United States? Chad Syverson examined this issue from four different angles. The conclusion does not favor the mentioned hypothesis. (Syverson, 2016).

To begin with, the slowdown affects not only the US but at least two dozens of other advanced economies as well, says the author. Additionally, one cannot show empirically that the productivity slowdown is associated with the importance (both in consumption and in production) of the information and communication technology in each country. The relevance of this has to do with the fact that, supposedly, in modern societies, measurement errors tend to be concentrated in that sector.

Second, the author attempts to estimate the output loss associated with the productivity slowdown in the US in the period between the years of the New Economy (1995-2004) and the third quarter of 2015. He concludes that the slowdown represented an output loss of US\$ 2.7 trillion per year, which is equivalent to US\$ 8,400 per capita. Accepting the hypothesis that the productivity slowdown is explainable by measurement errors is equivalent to assuming that, over the mentioned period, technological progress would have created US\$ 8,400 per person in incremental and unmeasured value over and above the consumer surplus supposedly present in the acquisition of goods and services in 2004.

Since it seems unlikely that many people would value this much their access to the digital economy, we have here one more reason not to consider credible the hypothesis under consideration.

The third angle explored by Syverson has to do with estimating the incremental value added generated by the group of industries most likely to produce the technologies normally associated with the most significant measurement errors. Between the end of 2004 and 2015, the value added by this set of industries rose by US\$ 545 billion, at prices of 2015. As argued by the author, for measurement errors associated with the products of those industries to explain the total US\$ 2.7 trillion output loss, the incremental consumer surplus generated by them would have to be five times their measured incremental value added. This is “an enormous amount of mismeasurement”, Syverson concludes. (Ibid., p. 14).

The fourth angle explores the statistical discrepancies normally observed between estimates of gross domestic income (GDI) and gross domestic product (GDP). Conceptually, these two variables are identically equal, but, in practice, their numbers tend to diverge, since their estimates rely on different sources of information.

In the United States, between 2004 and 2015, there has been a considerable increase in the statistical discrepancy between those two variables. Over that period, the observed cumulative gap between GDI and GDP reached US\$ 650 billion, in nominal terms, corresponding to an average gap of about 0.4% of GDP per year. Could we explain this by arguing that workers receive payments to make products that are freely distributed or sold to the public at discounted prices, thereby reducing measured spending on these products and therefore GDP?

Syverson sees no reason to believe so. First, because GDI gains over the period reflect growth in income accrued to capital, rather than growth in labor income. Second, because the gap started opening well before the phase of productivity slowdown. “GDI was larger than GDP in each of the seven years running from 1998 to 2004, all of which were a time of fast productivity growth”. (Ibid., pp. 17-18).

Implications for monetary policy

In the advanced world, real monetary policy rates have gone down quite substantially, in some cases reaching negative territory. The same is true for market rates (mid and long-term). In some countries, interest rates are negative in nominal terms. In general, central banks have resorted to a variety of policy instruments (both traditional and non-traditional) in their fight against very low rates of inflation and modest rates of economic growth. Government authorities and members of the private sector alike seem more and more convinced that such scenario will probably last for at least a few more years. For many, this is a sort of a “new normal”.

Important structural changes in the economic system are probably what explains the emergence of this new world. For years, economists have been debating the nature and characteristics of those changes. Ben Bernanke, for example, started talking about a saving glut in the mid-2000s. “Over the past decade, he says, a combination of diverse forces has created a significant increase in the global supply of saving – a global saving glut – which helps to explain both the increase in the U.S. current account deficit and the relatively low level of long-term real interest rates in the world today”. (Bernanke, 2005, p. 1). In his analysis, he stressed the factors that might explain the transformation of a large number of emerging economies from borrowers to net lenders in international capital markets.

At the time Bernanke made those remarks, financial integration was a reality, this being the main reason why it had become common to suppose that market interest rates were determined globally, responding to the global supply and demand for funds. Why market interest rates had been declining – a tendency that began in the early 1980s and persists until the present day – was already an issue.

At a later point, when Larry Summers revived the idea of secular stagnation (originally put forward by Alvin Hansen in the 1930s), he explicitly mentioned the possibility that structural changes involving shifts in savings and investment might have caused a decline in the long-run equilibrium real rate of interest. (Summers, 2013, 2014a).

Nowadays, discussions about the declining tendency of the long-run real equilibrium (or neutral) interest rate (defined as the inflation-adjusted short-term interest rate consistent with maintaining the economy's resources fully employed, on average, over time) are common among economists and analysts in general, and central bankers make open references to the subject. However, this was not so when that possibility started being debated by Summers - notice that Paul Krugman had shown similar thoughts, expressed in his New York Times blog. (Krugman, 2013).

Summers pointed out a severe policy dilemma posed by a declining equilibrium real rate of interest. In the presence of such a phenomenon, a central bank has two options. The first one is to recognize that the real neutral rate has fallen and reduce the real policy rate accordingly. A decision along this line tends to favor the economic activity and the level of employment, at the risk of stimulating the formation of bubbles, borrowing sprees and resource misallocation. The second option is to refuse to act in accordance with the perceived fall in the real neutral rate. In this case, it is possible to avoid the risks of the first choice, but at the cost of sacrificing employment and economic activity, and possibly allowing for undesirable deflationary pressures.

It is large the number of analysts who have heavily criticized central banks for having set their policy rates at considerably low levels in the years preceding the Great Financial Crisis. The main targets of those criticisms were the European Central Bank (ECB) and the Fed, in particular its former Chairman, Alan Greenspan.

In the 2002-2007 period, the real monetary policy rates were really set at quite low levels. In both the Eurozone and the United States, the average rate over that time span was below 0.5% per annum. For many, this was one of the main causes of the crisis, to the extent that those low rates stimulated excessive borrowing and gave rise to asset-price bubbles.

With the benefit of hindsight, we could argue that the critics failed to consider that the lowering of policy rates at that time was probably the result of a perception (by the monetary authorities) that the equilibrium interest rate was falling, being unwise to ignore that. Ignoring that might have implied rates above the equilibrium level, with adverse effects on the economic activity.

The policy dilemma discussed here has not disappeared. On the contrary, it is still present. Summers original words are perfectly applicable nowadays: “as the United States and other industrial economies are currently configured, simultaneous achievement of adequate growth, capacity utilization, and financial stability appears increasingly difficult”. (Summers, 2014a, p. 66).

In the US, the policy rate has been in negative territory since November 2009 - in real terms (deflated by the PCE), the average since that point has been minus 1.3% per annum. Such very low rates, maintained for so long, have brought about a sort of an eagerness to reduce monetary accommodation. In fact, several members of the Fomc have been voicing concern with the side effects of such policy, like the possibility of asset-price bubbles and resource misallocation. At the same time, though, the Fomc as a whole has seemed reluctant to raise the basic rate, for fear of making a premature movement and hurting the economy’s recovery.

A major present-day source of concern for economists, policy makers and politicians in general has to do with the fact that, not only in the US, but in other advanced nations as well, real output has been evolving along a much lower trajectory when compared to the growth trend observed until the Great Financial Crisis. Our own estimates indicate that real output in the United States is presently 9.0% below the level that would have been achieved, had the previous trajectory not been altered. The corresponding percentage for the Eurozone is 13.0%.

In recent years, in order to stimulate demand, central banks in industrial nations have resorted to different sorts of monetary instruments, attempting to promote not only faster rates of economic growth but higher rates of inflation as well. The above-mentioned gaps and the insistence on policies of the same nature suggest that those policies have not produced satisfactory results.

In his *The General Theory*, Keynes famously examined the possibility that an expansionary monetary policy might not produce the results envisaged by the monetary authorities. In his own words, “if [...] we are tempted to assert that money is the drink which stimulates the system to activity, we must remind ourselves that there may be several slips between the cup and the lip.

For whilst an increase in the quantity of money may be expected, *cet. par.*, to reduce the rate of interest, this will not happen if the liquidity-preferences of the public are increasing more than the quantity of money; and whilst a decline in the rate of interest may be expected, *cet. par.*, to increase the volume of investment, this will not happen if the schedule of the marginal efficiency of capital is falling more rapidly than the rate of interest; and whilst an increase in the volume of investment may be expected, *cet. par.*, to increase employment, this may not happen if the propensity to consume is falling off.” (Keynes, [1936] 1964, p. 173).

The relevant question now has to do with identifying the major factors that, in recent years, have been limiting the expansion of economic activity and the growth of prices, that is, the effectiveness of monetary policy. When Summers first spelled out his thinking on the secular stagnation hypothesis, he made a list of what he considered the main structural changes in savings and investment that might explain the possible decline in the equilibrium real rate of interest - notice that, in itself, such a decline is a sign of weak aggregate demand.

What factors could possibly produce shifts in savings and investment? The main candidates originally considered were: A) Aging populations, a phenomenon that tends to produce an increase in aggregate household saving, as the number of adults approaching retirement rise, this being a group with above-average saving rates. B) Significant changes in the distribution of labor income, with certain types of skilled workers being favored in comparison to the less skilled ones – such worsening in the distribution also tends to reduce the propensity to consume, that is, to increase the propensity to save. C) A worsening in the distribution of wealth, with the gains generated by the economic system accruing more to the owners of capital than to those who live on labor income, with similar consequences. D) A contraction in the demand for debt-financed investments associated with the fact that in the modern economy new ventures are much less capital intensive than they used to be. E) A diminished demand for capital goods due to slower population growth. F) A substantial decline in the relative price of business equipment, which implies less borrowing and investment spending.

It is relevant to note that when the discussions on the secular stagnation hypothesis sprang up, issues related to the recent phase of productivity slowdown were already on debate, centered on the studies conducted by Robert Gordon. Soon Gordon's ideas became part of the secular stagnation discussions, representing the view from the supply side. Gordon's studies did not refer to issues related to the behavior of the equilibrium real rate of interest.

In the introduction to this essay, we mentioned that significant changes in the rate of growth of productivity tends to affect both the supply and the demand side of the economy. No doubt, the fact that the growth rate of labor productivity has fallen so much in the United States (to an average of 0.4% per annum in the last five years) means that the potential rate of economic growth of the American economy declined considerably. In itself, this is an extremely important conclusion.

However, nowadays, inflationary pressures are absent in the industrial world, and the degree of spare capacity is still high. Therefore, the major (or immediate) problem seems to be a deficiency of demand, possibly a chronic one, which is the essence of the secular stagnation hypothesis. When Summers revived such a hypothesis, he opted to "take no stand" on the possibility that technological progress might have slowed. (Summers, 2014a, p. 69). But there are now important signs that the slowdown in productivity has been contributing to inhibit demand, somehow interfering in the conduction of monetary policy.

The fact that the productivity slowdown reduces the economy's potential rate of economic growth has important consequences for economic agents in general. At some point, consumers and entrepreneurs are bound to understand that their future real income will somehow suffer in consequence of a declining rate of productivity growth. Consumers, for example, will realize that their permanent income diminished, while entrepreneurs will imagine that something similar happened to their expected profits. To the extent that this is true, we can imagine that economic agents will spend less than they used to.

The slowdown in productivity has thus turned into another major factor contributing to the decline in the equilibrium real rate of interest.

Recognition of this fact did not come immediately, as already noted, but it is present nowadays, judging, for example, by what monetary policy makers have recently been saying in the United States and other advanced economies. Just to illustrate, Janet Yellen has recently observed that “smaller productivity gains in the advanced economies” have probably contributed to the “marked decline [...], both here and abroad, in the long-run neutral real rate of interest”. (Yellen, 2016, p.11).

Concerning investments, it is interesting to note the special relation that exists between productivity and investment. Such a relation is a sort of a two-way road. A decline in the rate of productivity growth tends to inhibit investment, and this in turn tends to lower productivity, as workers have less capital to work with.

As discussed above, the fall in the equilibrium real rate of interest brought about a serious dilemma for those responsible for monetary policy. But this is not the only problem associated with the mentioned phenomenon. The decline in the equilibrium rate leads the central bank to act accordingly, lowering its policy rate. Given the existing limits to how low the policy rate can go, the greater the fall in the neutral rate, the more difficult it becomes to practice an accommodative policy. This is presently a major source of concern, in particular when we think about whether central banks are well equipped or not to deal with the next recession, a topic discussed at the 2016 Jackson Hole Symposium.

Aside from that, we want to call attention to another kind of problem. This has to do with the extent to which very low and negative real interest rates really stimulate consumption and investment spending. In different countries, central bankers have lowered considerably their policy rates based on the idea that such policy induces people to consume more and to invest more.

However, years of negative real interest rates – more recently, in several economies, policy rates have turned negative even in nominal terms - have not been enough to allow for faster rates of economic growth and higher rates of inflation. This in itself justifies doubting the effectiveness of those policies. Putting it another way, such policies may be the best central banks can do in response to a declining real equilibrium rate, but maybe they are not a strong enough medicine to solve the problem of demand weakness.

Central bankers and former central bankers do not seem to discuss this frequently. Perhaps Mervyn King is an exception. In his recent book, *The End of Alchemy*, the former governor of the Bank of England explains his reasoning: “Monetary stimulus via low interest rates works largely by giving incentives to bring forward spending from the future to the present. But this is a short-term effect. After a time, tomorrow becomes today”. As time goes by – the argument continues - it becomes more and more difficult to persuade households and businesses to bring spending forward from a future that looks ever bleaker. Central banks in this position are “like cyclists pedaling up an ever steeper hill. They have to inject more and more monetary stimulus in order to maintain the same rate of growth of aggregate spending”. (King, 2016, pp. 46-48). In a few words, “after a point, monetary policy confronts diminishing returns. We have reached that point”. (Ibid., p. 48).

In a book on China, Nicholas Lardy argued that: “the response of households generally to a change in interest rates reflects the combination of offsetting substitution and income effects. While there is no theoretical presumption of which effect will dominate, empirically the substitution effect is usually larger. Thus a reduction in the real interest rate would be expected to lead to a lower household saving rate. However, if the primary motivation for savings is to achieve a certain target level of financial assets, the income effect would dominate, i. e., as the real return to savings declined, in order to achieve their target level of savings, households would save more (consume less) from their current income”. (Lardy, 2012, p. 80). Despite the fact that Lardy’s argument seems more applicable to a country like China, where the absence of an adequate social safety net (medical insurance and retirement plans, for example) tends to raise people’s propensity to save, there is no compelling reason to believe that that line of reasoning is not applicable to the present situation in advanced economies. Even if the income effect is not dominant in such economies, it may be strong enough to reduce the effectiveness of monetary policy.

Concluding remarks

In conclusion, very low rates of inflation (in some cases a real threat of deflation), an enormous volume of financial securities paying negative real interest rates (sometimes negative even in nominal terms), and below-par rates of economic growth are main features of the macroeconomic environment prevailing nowadays in the industrial world. Many analysts call this the “new normal”. Important structural changes in the economic system are likely to explain the emergence of such a world. Signs of those changes were already present in the years preceding the Great Financial Crisis. They affected considerably the behavior of global savings and global investments, giving rise to a world in which there are too many people willing to save and not too many willing to invest. This produced a considerable fall in the equilibrium real interest rates.

The productivity slowdown of recent years has turned into another major factor working in the very same direction – it is a real, not an illusory problem, as believed by many. The impact of that phenomenon on the nations’ potential rate of economic growth does not go unnoticed by economic agents, who tend to react to the perceived fall in their permanent income and expected profits by restraining consumption and investment spending, thus contributing to lowering the equilibrium real interest rates further.

There is no way central banks’ actions can directly produce a reversal of the mentioned shifts. The scenario is quite complex and no one can be sure about what the most adequate economic policy mix would be to deal with the present-day challenges. There is no doubt, however, that relying only on central banks’ actions is not the answer. Besides the difficulties involved in identifying the likely level of the real neutral interest rate (since it is not an observable variable) and in pushing the real policy rate deep enough into the negative territory, it is possible that aggregate demand (consumption and investment spending) is not as sensitive to monetary policy easing as central bankers usually believe.

Economists, in general, and central bankers, in particular, have certainly not figured out all the implications of living in a world of very low and negative interest rates.

J.J.S.

REFERENCES:

Abramovitz, Moses, “The Welfare Interpretation of Secular Trends in National Income and Product”. In *The Allocation of Economic Resources – Essays in Honor of Bernard Francis Haley*. Stanford, Ca.: Stanford University Press, 1959.

Bernanke, Ben S., “Productivity”. Speech delivered at the C. Peter McColough Roundtable Series on International Economics, Council on Foreign Relations. The Federal Reserve Board. January 19, 2005.

Bernanke, Ben S., “The Global Saving Glut and the U.S. Current Account Deficit”. The Federal Reserve Board. The Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia, March 10, 2005.

Blinder, Alan S., “The Unsettling Mystery of Productivity”. *The Wall Street Journal*, November 24, 2014.

Blinder, Alan S., “The Mystery of Declining Productivity Growth”. *The Wall Street Journal*, May 14, 2015.

Brynjolfsson, Erik and Andrew McAfee, *The Second Machine Age – Work, Progress and Prosperity in a Time of Brilliant Technologies*. New York, N.Y.: W.W.Norton & Company, 2014.

Byrne, David M., John G. Fernald, and Marshall B. Reinsdorf, “Does the United States Have a Productivity Slowdown or a Measurement Problem?”. *Brookings Papers on Economic Activity*, BPEA Conference Draft, March 10-11, 2016.

Coyle, Diane, *GDP – A Brief but Affectionate History*. Princeton, N.J.: Princeton University Press, 2015.

Cowen, Tyler, *The Great Stagnation: How America Ate All the Low-Hanging Fruits of Modern History, Got Sick, and Will (Eventually) Feel Better*. New York, N.Y.: Dutton, 2011.

David, Paul, A., “Computer and Dynamo: The Modern Productivity Paradox in a Not-Too-Distant Mirror”. *Center for Economic Policy Research*, no. 172. Stanford University, 1989.

David, Paul, A., “The Dynamo and the Computer: An Historical Perspective on the Modern Productivity Paradox”. *American Economic Review Papers and Proceedings*, May 1990.

Feldstein, Martin, “The U.S. Underestimates Growth”. *The Wall Street Journal*, May 18, 2015.

Fernald, John, “Productivity and Potential Output Before, During and After the Great Recession”. *NBER Working Paper* no. 20248, National Bureau of Economic Research, June 2014.

Giannetti, Eduardo, *Trópicos Utópicos*. São Paulo: Companhia das Letras, 2016.

Gordon, Robert J., “Does the ‘New Economy’ Measure up to the Great Inventions of the Past?” *NBER Working Paper* no. 7833, National Bureau of Economic Research, August 2000.

Gordon, Robert J., “The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections”. *NBER Working Paper* no. 19895, National Bureau of Economic Research, February 2014.

Gordon, Robert J., *The Rise and Fall of American Growth – The U.S. Standard of Living Since the Civil War*. Princeton and Oxford: Princeton University Press, 2016.

Greenspan, Alan, *The Age of Turbulence – Adventures in a New World*. New York, N.Y.: The Penguin Press, 2007.

Hatzius, Jan and Kris Dawsey, “Productivity Paradox v2.0”. *Goldman Sachs US Economics Analyst*, no. 15/21, May 23, 2015.

Keynes, John M., *The General Theory of Employment, Interest and Money*. New York, N.Y.: Harcourt Brace & World, [1936] 1964.

King, Mervyn, *The End of Alchemy – Money, Banking, and the Future of the Global Economy*. New York, N.Y.: W. W. Norton & Company, 2016.

Krugman, Paul, “Bubbles, Regulation and Secular Stagnation”. *The New York Times* blog, September 25, 2013.

Lardy, Nicholas R., *Sustaining China’s Economic Growth After the Global Financial Crisis*. Washington, D.C.: Peterson Institute for International Economics, 2012.

Meyer, Laurence H., *A Term at the Fed – An Insider’s View*. New York, N.Y.: Harper-Collins Publishers, 2004.

Mokyr, Joel, “Is Technological Progress a Thing of the Past?”. VOX, CEPR’S Policy Portal, September 8, 2013.

Mokyr, Joel, “Secular Stagnation? Not in Your Life”. In *Secular Stagnation: Facts, Causes and Cures*, Coen Teulings and Richard Baldwin (eds). London: CEPR Press, 2014.

Rodrik, Dani, “Innovation is Not Enough”. Project Syndicate, June 9, 2016.

Schumpeter, Joseph A., *Business Cycles – A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York, N.Y.: McGraw-Hill Book Company, 1939.

Senna, José Júlio, *Política Monetária – Ideias, Experiências e Evolução*. Rio de Janeiro, R.J.: Editora FGV, 2010.

Senna, José Júlio, *Essays and Conversations on Monetary Policy*. Instituto Brasileiro de Economia, Editora FGV, 2015.

Senna, José Júlio, “Inovação e Produtividade: A Controvérsia Recente”. In *A Anatomia da Produtividade no Brasil*, Bonelli, R, Pinheiro, A.C., e Veloso, F. (org.). Rio de Janeiro, R.J.: Elsevier-Ibre/FGV, (forthcoming).

Solow, Robert, “We’d Better Watch Out, *New York Times Book Review*, July 12, 1987.

Summers, Lawrence H., transcript of speech at *The IMF Economic Forum*, November 8, 2013.

Summers, Lawrence H., “U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound”. *Business Economics*, vol. 49, no. 2, National Association for Business Economics, February 24, 2014a.

Summers, Lawrence H., “Reflections on the ‘New Secular Stagnation Hypothesis’”. In *Secular Stagnation: Facts, Causes and Cures*, ed. by Coen Teulings and Richard Baldwin, A VoxEU.org Book, 2014b.

Syverson, Chad, “Will History Repeat Itself? Comments on “Is the Information Technology Revolution Over?””. *International Productivity Monitor*, no. 25, 2013.

Syverson, Chad, “Challenges to Mismeasurement Explanations for the U.S. Productivity Slowdown”. *NBER Working Paper* no. 21974, National Bureau of Economic Research, February 2016.

Yellen, Janet L., “The Federal Reserve’s Monetary Policy Toolkit: Past, Present, and Future”. Remarks at the *Designing Resilient Monetary Policy Frameworks for the Future*, a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 26, 2016.

■ Conversation with Klaus Schmidt-Hebbel

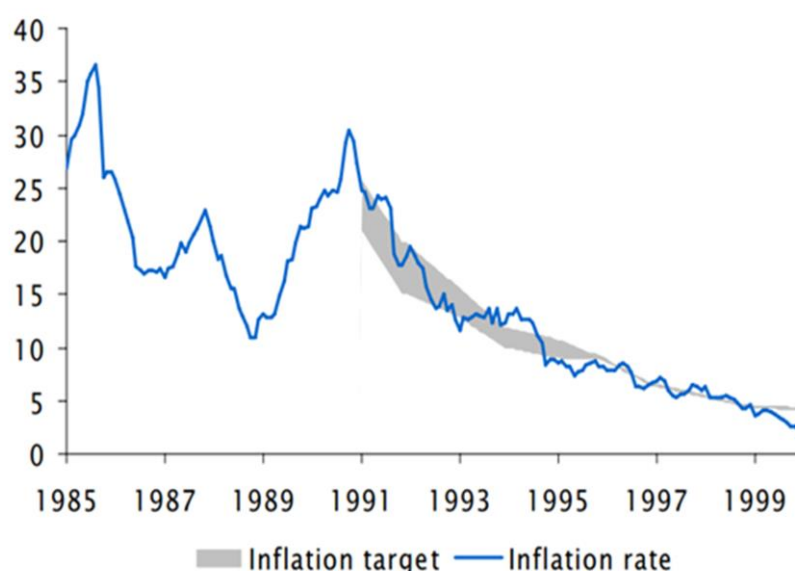
This conversation was held through an exchange of e-mails between J. J. Senna and Professor Klaus Schmidt-Hebbel in the first days of October 2016. Klaus Schmidt-Hebbel is Professor of Economics at the Catholic University of Chile, since 1998. He is also an international consultant and advisor (since 1996) and chairman (since 2011) and member (since 2009) of the Financial Advisory Committee of Chile's Sovereign Wealth Funds to the Minister of Finance. He was the chief economist of the OECD and director of the OECD Economics Department, in Paris (2008-2009). He was also division chief, economic research, at the Central Bank of Chile (1996-2008) and principal economist and senior economist at The World Bank, Washington, D.C., USA, 1988-1996. He obtained his Ph.D. from the MIT, in 1986.

The Chilean experience with inflation targeting

■ **Brazil adopted the inflation-targeting regime in 1999, when inflation was around 9%. Chile had done the same at the beginning of that decade, when inflation was above 20%. Right from the start Brazil became a full-fledged IT practitioner, while Chile followed a more gradual approach. In the Brazilian case, IT and flexible exchange rates replaced the exchange-rate anchor that had prevailed since the Real Plan. In Chile, for several years, there was an attempt to work with two targets at the same time, namely inflation targeting and a band for the exchange rate. It seems fair to say that if one the two countries had a higher chance of being successful, that would be Brazil. In reality, however, the Chilean experience seems a lot more satisfactory. In Chile, in 2002, inflation had already gone down to 3% (it is presently slightly above 4%), while in Brazil we have constantly missed the target. Just to illustrate, since 2005, the official target is 4.5%, while the average observed inflation rate is around 6%. The questions are: which factors would you indicate as the main determinants of Chile's success story? Apart from the quality of fiscal policy, what else would you stress?**

Chile's IT experience – similar to Israel's – combines two phases. During 1991-2000, the Central Bank of Chile (CBC) adopted partial IT, combining declining annual targets (both range and point targets) with a crawling exchange-rate band. However, when the targets for inflation and for the exchange rate were in conflict, the CBC favored attainment of the inflation target. This – plus a lot of luck – explains the exceptional success in meeting the inflation target year after year and bringing inflation down from 27% in 1990 to 3% in 2000 (see Fig. 1). To establish credibility and anchor inflation expectations to the forward-looking target levels, the CBC adopted a high interest rate policy during most of phase 1.

Fig 1: Chile's Inflation Targeting Phase 1: 1991-2000 (%)



In 1998-99, the CBC abolished the exchange-rate band and adopted a floating exchange rate, implying a clean float most of the time, with only exceptional intervention periods by the CBC. At the same time, the CBC abolished all remaining controls on capital inflows and outflows.

In 2001, the CBC adopted a full-fledged IT framework, including high levels of transparency and accountability of CBC operations and policy changes and a stationary target level of 3% - first as center point of a 2-4% IT band (in 2001-06) and

then a 3% point target with a plus-minus 1% deviation tolerance (since 2007) (see Fig. 2).

Fig 2: Chile's Inflation Targeting Phase 2: Since 2001



Fiscal support in the form of a very conservative fiscal policy in the 1990s and adoption of an explicit fiscal rule since 2001 provided a fundamental fiscal prerequisite for successful IT. In addition, a strongly independent central bank law, which provides strong de jure and de facto operational independence to the CBC, is the second main factor that ensured Chile's successful transition to stationary IT.

The “new normal” and the Chilean economy

■ Signs of a weakening of the world economy, particularly in its more advanced segment, were noticeable before the advent of the Great Financial Crisis (GFC). In fact, in the period between 2002 and 2007, the two most important central banks (the Fed and the ECB) had already lowered their policy rates quite considerably, to average levels lower than 0.5%, in real terms. Apparently, such action resulted from a perception by the central bankers that the equilibrium

real rates of interest had gone down, a phenomenon that acquired an even greater dimension after the GFC. We seem to be living in a world where, for various reasons, there are too many economic agents willing to save and too few desiring to invest. The questions are: what are the major challenges that this new environment presents to a small and open economy like Chile? What concerns you most?

One lesson of recent years is that emerging-economy central banks that set inflation targets at 3 or 4% are in better shapes than industrial-country central banks that set target levels at 1 or 2% because the former are less likely to suffer from deflation and therefore less likely to hit the lower bound.

However, like the rest of the world, small open emerging economies, like Chile's, face the risks from a world that faces very low short and long-term interest rates, which imply that individuals, corporations, and portfolio managers search for higher returns and therefore are taking excessive risk and hence feeding potential price bubbles in many asset classes, including stocks and bonds. In a financially integrated world, the likelihood of materialization of the corresponding risks, leading to another global financial crisis and world recession, grows with the length of the period of zero and negative interest rates. Therefore I am much more concerned about the financial-risk implications of low interest rates than about their monetary or inflation consequences.

Commodity dependence

■ It is widely understood that the Chilean economy depends heavily on the production and export of copper, which is equivalent to saying that its performance tends to be influenced by commodity-price cycles. If I understand correctly, a stabilization fund (the Economic and Social Stabilization Fund) has been created to help stabilize the fiscal accounts and the economy in the presence of commodity-price shocks. Could you please explain how it works and offer

your view on how helpful such mechanism has been from the point of view of the monetary policymakers?

The fiscal rule adopted de facto in 2001 and de jure in 2008 implies that the government spends each year according to the sum of cyclically-adjusted government revenue and a target level for the cyclically-adjusted budget deficit. Cyclical adjustment of revenue is based on independent projections for GDP and the price of copper (Chile's main export good), which are the two main determinants of government revenue.

There is some statistical evidence suggesting that adoption of this fiscal rule has contributed to reduce the volatility of Chile's government expenditure, output, employment, and exchange rate.

Inflation targeting being tested

■ ***Inflation Targets* is the title of a book published in the mid-1990s and edited by Leonardo Leiderman and Lars Svensson. In the introduction to that book, the authors stress the fact that “in most countries, the targets were adopted in periods of considerable slack in the economy”. In their opinion, at that time, the new regime had “not yet been tested”. Although what they had in mind was the turning of the cycle into a boom, the fact is that the commodity-price shock of the 2007-08 and the so-called Great Financial Crisis represented enormous challenges to the new regime. The questions are: in your opinion, how did inflation-targeting practitioners fare in the presence of those shocks? Do you think they passed the test?**

Inflation targeting worldwide was subjected to two major tests of opposite sign in 2007-2009. In 2007-08 CPI inflation worldwide shot up in response to booming food and energy prices. IT countries fared better than non-IT countries, in the sense that inflation rates and inflation expectations were better anchored in the former group of

countries, as discussed in my survey paper on the world's IT experience, presented at the Central Bank of Brazil in May 2016.

The second shock was the world financial crisis and deep recession of 2008-09, during which IT central banks cut policy rates more aggressively, contributing to lower output losses and less deflation than those experienced in non-IT countries, as surveyed in my paper, too.

Therefore, IT countries passed both tests with flying colors.

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