Secular Stagnation: New Challenges for the Industrialized Countries in the 21st Century

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Abstract

This paper attempts to provide an overview of the main challenges facing the industrialized countries in a context of secular stagnation. There is no consensus on the meaning of this concept and various alternative views coexist. We present the key issues in the debates today, accounting for phenomena like the slowdown in factor productivity, liquidity and safety traps, the decline of natural interest rates, the historical downward trend of potential growths and low inflation rates. We provide a bird's eye survey of the available literature on the causes of secular stagnation from a historical perspective, the symptoms, the main causes as well as some policies proposed to overcome it. We give some illustrations for the United Kingdom, the United States, the euro area and Japan.

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1. Introduction

This article proposes a survey of the debates on secular stagnation in the macroeconomic literature and in the macroeconomic policy arena. The 2008 financial crisis and the Great Recession have led to the reemergence of this historical concept dating back from the 1930's. At that time, many people fear that the US capitalist economy would not recover from the Great Depression and this brought leading economists to interpret the prolonged recession as a crisis of capitalism. During the 1940s and 1950s many scholars explored the theoretical and historical reasons why capitalism can generate scarcity, deflation, resource depletion, ramping inequalities and economic disorders like financial bubbles, banking crises and high debt levels. By the end of the 1950s, these debates were gradually eclipsed. Apart from specialists in the field of history of economic thought, the doctrines of secular stagnation were no longer taught. As explained by Backhouse and Boianovsky (2016), the concept has even been considered as a macroeconomic "heresy".

The 2008 financial turmoil and the Great Recession brought back doubts about the ability of capitalism to survive large-scale shocks. Where does this fear come from? How does it modify our representation of the functioning of capitalism? The current debates on secular stagnation are part of longstanding discussions on long-term steady states in economics. Historically, there have been several conceptions of what an economic steady state looks like.

An optimistic vision has been proposed by Keynes in 1928. In several talks given at Cambridge, he described a steady state as an era of opulence where growth is no longer quantitative but consists of an improvement in the quality of life, a situation where a society provides satisfactory public services to all citizens (education, health, infrastructure), a society where no one lacks anything (see Keynes, 2010). In his mind, such a stationary state occurs when an economy is on the highest technological frontier that can be reached in the world and consumers are at a level of satiety where all their needs are satisfied. This vision of a "mature" capitalism was challenged by Schumpeter (1942) according to whom such a situation could not occur because companies permanently have new investment opportunities and entrepreneurs always attempt to change the routine of production through new innovations.

The secular stagnation hypothesis is part of a tradition of economic thought questioning the assumption of perpetual growth. The Classical economists believed that the distribution of income hampers capital accumulation in the long-run. Marx thought that the end of growth would come with the excessive concentration of capital depriving capitalists of the possibility of extracting additional value from the labor force. This pessimistic view of the Classical economists was picked up by some of the

Neoclassical economists linking stationary long-term growth to the diminishing marginal productivity of capital and labor. During the years following the Great Depression, some "stagnationist" economists like Pigou (1943) thought that economic growth could remain low over a long period if the natural interest rate of the economy - which balances savings and investment - was negative, while the money market interest rate was very low but "stuck" above zero. Klein (1947) supported this interpretation by arguing that the real interest rate is inelastic with respect to investment and savings. Again, Schumpeter opposed this idea. According to him, through creative destruction and the interaction between inventions and innovations, organizational and productive transformations give rise to new products and services that prevent the engine of growth from running out of steam. This article proposes a survey of the discussions raised by the re-emergence of the debate on secular stagnation in the industrialized capitalist countries.

An interesting feature of the literature on secular stagnation is to offer a diversity of arguments stemming from different schools of thought. Neo-Keynesian interpretations of long-term market failures emphasize, first and foremost, the heterogeneity of savings and investment behavior over the life cycle to account for excess savings and low investment rates that induce low long-term interest rates. Post-Keynesian-inspired works flourished by discussing the role played by the financial sector in the sharing of national income and explain how this can generate crises (bubbles, over-indebtedness). In the neoclassical tradition, secular stagnation mainly reflects a low long-term steady state equilibrium, due to slower productivity gains and the demographic aging of the industrialized countries. In the Schumpeterian tradition, some economists say that secular stagnation is a transitional state reflecting a phenomenon of creative destruction. Finally, according to the New-Keynesian approaches, the phenomena of prolonged stagnation comes from price rigidities and imperfections in the financial markets.

In the plethora of diverse theoretical and empirical works that have been done over the last decade, this paper attempts to provide a survey of some key ideas that are most debated today.

Secular stagnation can be viewed as a long-lasting under-employment equilibrium, which is difficult to tackle given the macroeconomic environment: many economies are currently experiencing a situation of liquidity trap, the capitalist economies have entered a new regime of secular disinflation and potential growth is on a downward trend almost everywhere. This situation is aggravated by the fact that some countries are confronted to a downward rigidity of the real interest rate and to a higher inelasticity of desired investment and desired savings to changes in the real interest rate. This rate should be at very low and negative levels to discourage excess savings and boost investment. The economists are debating on the causes of such rigidities.

Real interest rates are struggling to come down to the level that would allow the economies to reach full employment, because inflation expectations are very low. This is the case for two reasons: (i) expectations will remain anchored to their level of the so-called "Great moderation", as long as central banks pursue inflation targeting policies (this is why Japan has recently moved to price targeting policy); (ii) capitalism is now entering a new regime of disinflation because the productive structure has changed. Indeed, most of the value chains are now globalized and the emergent economies' appetite for competitiveness drive the general level of prices and cost down. Moreover, there seems to be a higher disconnection between inflation and the situation of the labor market (weaker bargaining power of the workers and Phillips curves have flatter slopes).

The reasons why savings and investment have become less sensitive to changes in the real interest rate are also examined. The main argument is that there are variables whose influence on excess savings is greater than that of the real interest rate: (i) the scarcity of safe assets and current account surpluses in emerging countries lead to the accumulation of precautionary savings at the global level, (ii) Since life expectancy is increasing, the retired-age generations take time before transferring wealth to the working-age generations. Savings and investment therefore depends on agents' preferences; (iii) Both non-financial and financial corporates are devoted to the creation of shareholder value and thereby fail to invest in long-term investments that are the basis of medium-term growth.

In addition to understanding the causes of interest rate rigidities and the inelasticity of savings and investment to the latter, a number of works try to find some explanations to the downward trend in potential growth: (i) demographic slowdown and historical decline in factor productivity; (ii) hysteresis effects, since a prolonged recession that leaves unused production capacity for a long time and increases long-term unemployment affects medium-term growth; (ii) several structural factors exert downward pressures on aggregate demand (income and wealth inequalities, liquidity constraints, the deterioration of balance sheets).

To explain why secular stagnation can arise as steady state (stable) macroeconomic equilibrium, a new literature has also emerged which contribute to the revival of the "Cambridge economics" (Pasinetti, Kaldor, Joan Robinson, Kaldor and in general post-Keynesian economists that have attempted to rely growth to income distribution). Today, participants in the productive process are not always paid according to their marginal contribution to production, but according to their bargaining power. In addition to firms and workers, shareholders participate to the bargains on the income share and they derive utility from holding financial assets. Their behavior can drive the economy into a trap of under-

consumption and deflation. Indeed, there are periods of over-accumulation of financial capital leading to financial bubbles that eventually burst and induce debt-overhang crises that weigh on the private agents.

Our paper proposes to overview all these arguments in details, although we present some key ideas that are widely debated today. We stick to an informal presentation and refer the reader to seminal papers for technical details on both the theoretical and empirical models.

The remainder of the paper is organized as follows. Section 2 presents the historical roots begins with a historical perspective, since the today technical models have their roots in former issues discussed during the 1940s and 1950s. In Section 3, we present some central ideas of the theories and economic policies that are discussed today about secular stagnation. Section 4 presents some empirical illustrations of secular stagnation in the industrialized countries. Finally, Section 5 concludes.

2. Secular stagnation: historical roots of a concept

Most of the current conceptual and methodological issues about secular stagnation are inherited from the older contributions in the literature of the 1930s to the end 1960s. Hansen (1939) is considered as the pioneer of this expression. He meant that, after the Great Depression of the 1930s, the American economy would return to a growth regime identical to that observed between 1815 and 1915 (a long downward phase of a Kondratiev cycle characterized by low growth rates and low inflation). Summers (2014) re-used this term to describe the recent macroeconomic situation of the United States after the 2008 financial crisis.

To fully understand the features that the theoretical models of today's secular stagnation borrow from the debates of the 1940s and 1950s, we must bear in mind that the massive unemployment observed in the wake of the US crisis of 1928 led two types of concerns. On the one hand, some economists sought to theoretically explain the underemployment equilibrium from a short-term perspective. Not only Keynes, but also business cycle theorists focused on the explanation of short-term recessions. On the other hand, other economists were thinking about the structural causes that could account for long-term underemployment equilibria. The debates on secular stagnation were fueled by this second perspective. We highlight here some ideas that are the backbones of the recent technical models.

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Although the American crisis of the 1930s is often referred to as the historical source behind the idea that a violent economic crisis can leave a bloated economy with abundant unemployment for a long time (this was Hansen's thought), another episode of crisis (the British Great Depression from 1873 to 1896)

led Hobson in 1909 to interpret such crises as a failure of free market capitalism. Hobson thought that one of the contradictions of the industrial system was to generate strong inequalities in societies, because of excessive concentration of capital leading to under-consumption and over-investment.

Like many "stagnationists" (including Henderson, Higgins, Kalecki, Kaldor, Lange, Lerner, Nathan, Steindl, Sweezy), Hansen believed that the US economic growth would remain weak for decades after the Great Depression of the 1930s. These economists argued that the normal functioning of capitalism gave rise to Juglar and Kondratiev cycles regularly bringing situations of economic depression. According to them, depressions were created by endogenous factors keeping savings above investment: slowing population growth, end of territorial expansions, end of the discovery of new natural resources, or a discrepancy between actual income and potential GDP causing a deflationary gap. Without denying the importance of technical progress, their viewpoint was that innovations and technical progress led to "save" capital and not to increase investment. They also said that periods of rising national income resulted in a sharp increase in institutional and corporate savings.

These trends had been observed in the United States, long before the crisis of 1929. The stagnationists concluded that when capitalism reaches a certain maturity these factors lead to situations of massive unemployment. Hence the idea of adopting specific measures to increase the standard of living of people (fiscal policy, housing infrastructure spending, low interest rates to increase credit, external debt to stimulate trade); and to stimulate investment by promoting competition or increasing public capital spending and private investment.

An important point to remember is that these debates were part of an American "historical experience". At the time of the crisis of the 1930s, one had in mind that the factors that led to the economic golden age between the end of the American Civil War in 1877 and 1913 had disappeared. The mid-nineteenth century was marked by an external colonial expansion in Latin America and Asia, an internal territorial expansion by the Indian wars, a movement of industrial concentration (then slowed by anti-trust policies), waves of migration within the country and from abroad (limited later by the introduction of quotas) and the discovery of precious metals and new lands (which ended with the end of Western conquests). These elements led to the idea that instead of extensive growth, the country would now rely on intensive growth supported by technical progress and innovation. The theorists of secular stagnation, therefore, did not deny that new innovations and inventions could lead to productivity gains increasing the productive capacity of the US economy. Their argument was that there was no guarantee that an increase in the capacity of production would be accompanied by an increase in demand. And, when demand is low, unused production capacity during a prolonged period leads to a decline in potential growth. The

economy is then trapped in a deflation trap or in an unemployment trap. Higgins (1948) is undoubtedly the author who best expressed this idea. This argument helped explain the downward trend in the US growth rate since the late nineteenth century.

An additional contribution of the literature of the 1940s and 1950s has been to analyze the secular stagnation equilibrium by using the concept of negative natural interest rate (though the pioneer of this concept, Wicksell, was not himself interested in secular stagnation). Pigou (1943) introduced a formulation of secular stagnation as an equilibrium for which the real interest rate that balances savings and investment at full employment is negative. This result was new because, since Böhm-Bawerk and Fisher, the economists generally admitted that a balanced interest rate could only be positive. They evoked the practical impossibility for market rates to be negative to explain the difficulty to rescue from prolonged stagnation, especially if the economic crises occurred in a context of low inflation. Many recent theoretical models of secular stagnation rely on this concept of the existence of a negative natural interest rate at the steady macroeconomic equilibrium.

During the period of the 1940s and 1950s, we therefore had several competing views about the causes of secular stagnation. Some authors thought that the sources were exogenous (demography, technical progress, resource endowments). Others viewed the situation as an illustration of a market failure, an illustration of the fact that relative prices could not always allow feasible macroeconomic equilibria. In this case, quantity adjustments were necessary to achieve the desired equilibrium. Some precursors of the institutionalist economists thought that a prolonged period of recession was the consequence of the long-run structural movements of capitalism. The arguments led to divergent viewpoints between the Marxian economists (like Sweezy) and Schumpeter. According to Sweezy, imbalances between savings and investment are endemic to capitalism because of overaccumulation and excessive concentration of capital, because entrepreneurs do not consume excessive capital. According to Schumpeter, the supply of savings necessarily adapts to new investment opportunities. He thought that the existence of monopolies allowed capitalism to stabilize.

3.- Recent issues on secular stagnation

3.1.- Demand-side explanations of secular stagnation: excess saving or financial instability?

According to some economists, secular stagnation is primarily a demand-side problem (see, for example, Krugman 2014, Summers 2016). The current theoretical models take Pigou's approach as a way of illustrating a situation of secular stagnation through the theoretical existence of a negative natural

interest rate. One of the criticisms addressed to Pigou's arguments was that he obtained a negative rate using a representative agent model only at the expense of arbitrary assumptions on the agent's rate of time preference adjusted by some societal determinants of desired savings. Otherwise, one would obtain an indeterminate equilibrium (see Boianovsky 2017). A way out of this difficulty is to use a heterogeneous agent model, which motivates the recent authors to use three generation overlapping generation models in which aggregate savings depends on the decisions of successive cohorts on individuals at different periods of their life cycle (for an illustration, see Eggertsson et al., 2017). Therefore, the current theoretical models of demand-side secular stagnation are Marshallian or Samuelsonian rather than Pigouvian[2].

In such a framework, there are various factors causing the negative natural interest rates and several arguments explain the excess savings. According to Eggertsson and Krugman (2012), this occurs after a shock of deleveraging that follows a downturn of the financial cycle bringing down aggregate demand. The existence of a liquidity trap paves the way to a vicious circle of debt-deflation phenomenon *à la* Fisher. Caballero and Farhi (2015) and Caballero et al. (2016) consider that the scarcity of non-risky assets is a cause of global imbalances that lead to a situation of excess savings. According to the authors, when investors in the financial markets find it difficult to buy safe assets in which to invest their savings, the latter becomes high and lowers long-term rates. These rates cannot "break through" the zero barrier (they cannot stay negative during a long period). In this case, it is the output (instead of the interest rate) that need to adjust to balance savings and investment. In the open economy, if the interest rates cannot be lowered, governments can prevent production from falling by adjusting their exchange rate, which leads to competitive devaluations. Another explanation of excess saving, given by Eggertsson et al. (2016), is that when real interest rates cannot fall, aggregated demand takes an unusual form (it has a positive slope) that prevents the economies from adjusting in the right direction after a shock. Thus, some factors that are usually seen as a positive source of growth in representative agent models can trigger persistent recessions. Indeed, the following factors explains the negativity of the equilibrium interest rate: a slowdown in population growth, higher savings and higher factor productivity. If the zero lower bound is binding, then a permanent shortfall of the output from its potential is observed.

Figure 1 shows a simple illustration of a macroeconomic equilibrium obtained from a secular stagnation model proposed by Eggertsson et al. (2016). The aggregate supply function has the usual form and has a kink at the level of production corresponding to full employment. In contrast, the aggregate

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[2] Marshal in 1895 showed that heterogeneous agents and life cycle saving can lead to a negative equilibrium real exchange rate. Samuelson in 1958 suggested the possibility of a negative real interest rate under zero population growth.

demand function has an unusual form. When the monetary authorities can lower real interest rates, it has a negative slope. In this case, a negative demand shock reduces both production and prices. The central bank reacts by lowering its nominal interest rate. If inflation is high enough, the real interest rate goes down, which stimulates the economic activity. The economy can then move towards full employment (point A). However, if inflation is too low, the fall in the nominal interest rate may not be enough to induce a decrease in the real rate. In such a situation, where nominal rates are already very low (close to zero), the negative demand shock leads to a rise in the real rate, since prices are falling. The economy then enters in a vicious circle: the output declines, which further lowers prices; then demand declines again, and so on. An equilibrium of secular stagnation occurs when the economy moves away from the full employment level of production. This mechanism occurs because aggregate demand function intersects aggregate supply function on its positive slope and leads to a deflation steady state (point B).

Figure 1. Illustration of a secular stagnation equilibrium
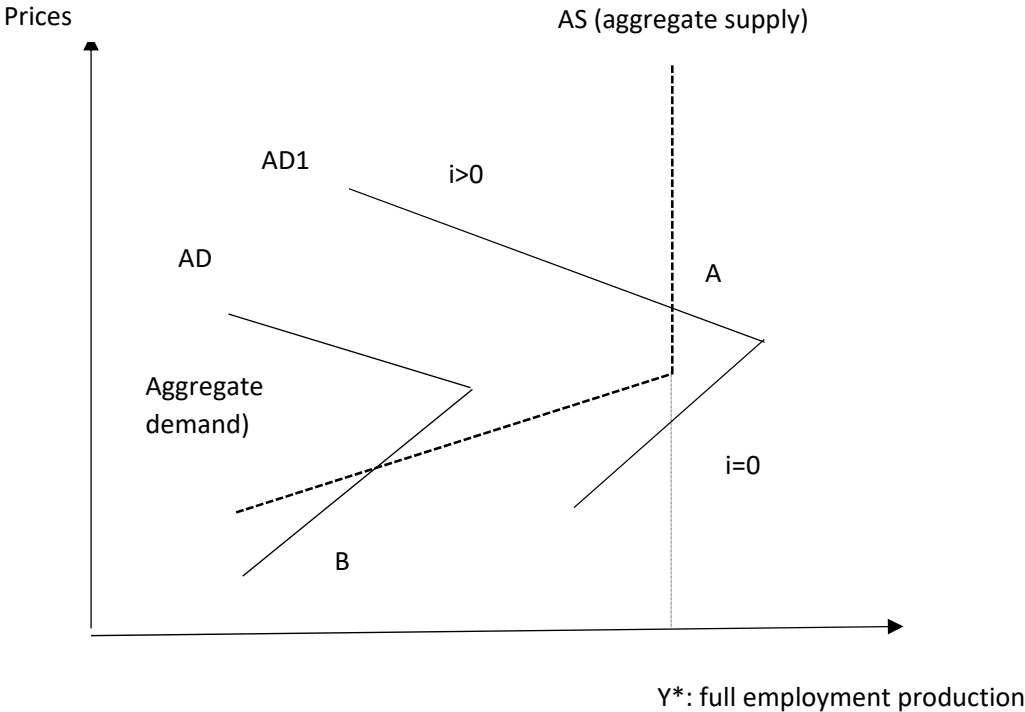
The three generation OLG models of secular stagnation allow the study of the role of financial markets in triggering a secular stagnation. The financial cycles can maintain an economy in a stagnation trap after a debt deleveraging shock or after a financial bubble burst. When the borrowers pay back their debt, this induces a permanent decrease in the real interest rate because deleveraging implies an increase in the borrowers' capacity of savings that surpasses the increase in spending by the lenders. As explained by Eggertsson et al. (2014), following a negative financial shock, the agents borrow less today, save more in future periods and this leads a decrease in the supply of credit and in the natural interest rate.

Interestingly, in parallel with the theoretical development, a growing empirical literature has shown that the developments in stock markets, real estate and credit markets is key to correctly estimate long-term potential growth and the output-gaps (see, for instance, Borio 2014, Borio et al. 2017a, Borio et al. 2017b). During credit booms, rising real estate/asset prices, the actual GDP approaches potential GDP. When bubbles burst, the observed GDP falls below and moves away from potential GDP. These results suggest that the so-called "debt super cycle" and secular stagnation are not alternative explanations of prolonged recessions because the build-up of financial imbalances are inherent sources of instability in modern capitalism. This interpretation is, however, still controversial in the literature. Rogoff (2016) argue that, unlike secular stagnation, the debt super cycle is not forever. However, there are strong empirical evidence suggesting that the financial cycle downturns that induce prolonged stagnation are caused by bubbles and excess indebtedness (leverage effects, depreciation of the value of collaterals, securitization). This finding links the theories of secular stagnation with Minsky's hypothesis of financial instability. This impacts the way in which finance is introduced in macroeconomic models, because wealth transfers over time are not only done with non-risky assets, but also with risky securities. Banks' and financial institutions' behaviors are thus key transmission channels between financial shocks and deep and lasting recessions.

Two types of formal models have been proposed to show that the predominance of finance (banks, private debt, bubbles, firm governance based on shareholding, liquidity constraints) can leads to prolonged stagnation.

A first theoretical framework is the OLG model that captures the role of demand for intergenerational loans and lending/borrowing possibilities of different generations. As shown in Figure 2a, the life cycle of an agent is assumed to be divided into three periods of time. During the first period she borrows money, repays the money borrowed in the second period, and finally consumes her wealth in the third part of her life cycle. Loans and borrowings are made between people at different times of their life cycle. These

may be loans in the strict sense or collaterals (provided for example by parents for their children when young people enter the labor market). In each period, the equilibrium between savings and investment is obtained by the intersection of the supply of and demand for loans.

Figure 2a. Structure of a three period OLG models with loans and credit
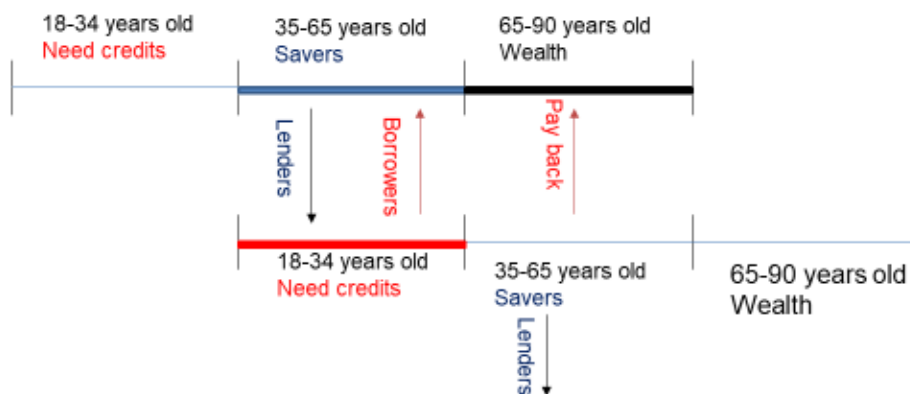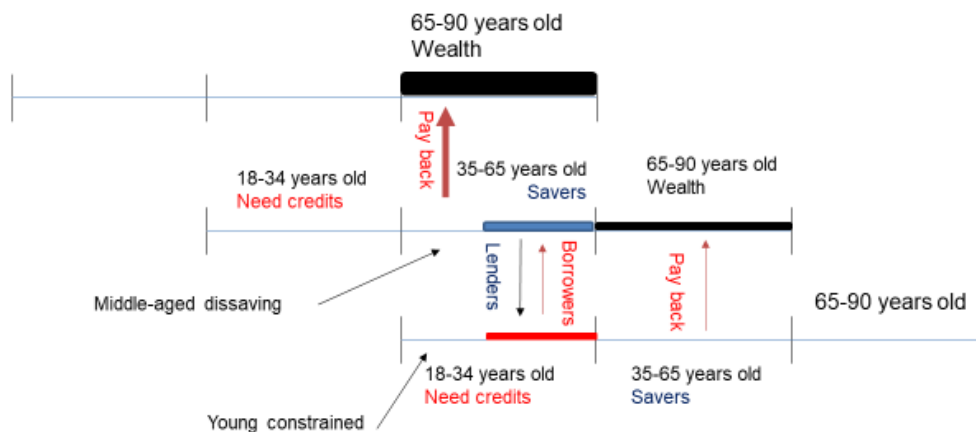

Figure 2b. Effect of a shock of debt deleveraging

What happens after a reversal of the financial cycle? The effect is identical to that of a deleveraging shock (Figure 2b). Middle-aged agents dissave and more money is paid back to the old-aged agents of the preceding generation. Therefore, less savings remains for the young generation. In turn, the latter become credit constrained. The combination of high wealth of retired people and lower consumption of a fraction

of the young and middle-aged agents make the interest rate fall (the propensity to consume of retired people is lower than youngest agents).

An alternative strand of the literature considers the institutional factors to account for the role of inequalities caused by the developments in the financial sector on aggregate demand, specifically power relationships between firms, workers, banks, financial institutions and shareholders. New frameworks in the tradition of the Cambridge models of income distribution à la Kaldor/Pasinetti/Robinson have been proposed. Why do companies' profits reach high levels, while at the same time investment remains low? What role does shareholding play? Wray (2009) and Yellen (2009) show that, when potential growth is low, investing in financial assets rather than in productive sectors allow shareholders to secure a greater share of income sharing. Post-Keynesian economists link secular stagnation to secular wage stagnation (see, for example, Lavoie and Stockhammer, 2013). They interpret secular stagnation as an illustration of internal contradictions of capitalism (see Foster and Halleman 2010, Foster and Magdoff 2013, and Foster and Szlajfer 2009). In a context of financial globalization, stakeholders search to maximize the stock market value of companies rather than their fundamental values. This growing share of wealth to shareholders is a long-lasting phenomenon insofar as bubbles and the debt cycle help to regularly eliminate the over-accumulation of financial wealth. When financial bubbles collapse or when over-indebtedness crises occur, losses allow financial prices to their fundamental value. And this provides a new start for the companies' stock market value to deviate once more from their fundamental value, until the next crisis. This happens at the cost of deep and prolonged recessions and periods of price deflation in the real sector.

In the same line of research, new approaches have been proposed which can be considered as a modern version of former approaches of income share by the economists of the so-called "school of Cambridge". Inequalities are related to prolonged recessions through an analysis of the determination of labor's and capital's income share in the new context of an increase of financialization. Dünhupt (2016) provides some stylized facts showing that the decrease in the wage share is related to increasing dividends and interest payments of non-financial corporations to the financial institutions, and to lower bargaining power of workers. Kumhof et al. (2015) propose a model where leverage and crises (two phenomena that go together with secular stagnation) emerge endogenously in a context of growing income share of high-income households and increase in debt leverage of low- and middle-income households.

3.2.- Supply-side explanations of secular stagnation

There have also been attempts in the literature to relate the possibility of a negative natural rate to supply-side factors, specifically to demographics and total factor productivity. The latter are referred to as "structural" factors of secular stagnation in the sense that prolonged recessions occur through their effect on the cost of capital and production capacity of the economy.

The idea that the age structure of the population is a potential explanation of secular stagnation, again can be traced back to Hansen (1939). He thought that the demographic transition (from high birth/death rates to lower birth/death rates) affected the determination of aggregate consumption/saving behavior. Two reasons why the demographic argument in receiving some attention in the recent literature on secular stagnation, is the following. Firstly, rretired people today in the industrialized countries, belong to the baby boom generation. This fraction of the population, of course, consumes their retirement income. But they also hold a large share of savings in the form of housing wealth (accumulated after the second World War when nominal interest rates were low and inflation high) and financial wealth (after the liberalization of capital markets from the mid-1980s onwards). In addition, wealth transfers to previous generations take place later and later due to longer life expectancy. Secondly, retirement systems in the developed countries are increasingly based on private pension assets since many pay-as-you-go pension schemes suffer from potential financial sustainability problems. This implies that middle-age workers must save more with the perspective of a prolonged period of retirement. Therefore, adding the middle-aged and retired people, the fraction of people that save tends to dominate that of those who dissave (this situation contradicts an assumption usually made in standard models that old people are net dissavers while young adults save for their future retirement). This implies a high desire of savings and a fall in the real interest rate that equilibrates savings and investment in capital market (insofar as investment is insufficiently elastic to the interest rate).

Concomitantly, the excess net desired saving prevents the improvement of technological progress incorporated in new capital goods (under-investment rises the average age of capital and reduces the quality of investment goods) and thereby slows the growth rate of potential output. This in turn generates persistent expectations of low inflation rates. Since the real rate is the sum of the nominal rate and inflation expectations, the combination of a declining long-term nominal growth and the downward sloping of inflation expectations explain why it became difficult for the policymakers to set the real rates at (lower) levels that would have been necessary to discourage savings and encourage consumption up to a full-employment equilibrium. The excess savings not absorbed by new capital fuels the surge in prices in financial asset markets. The magnitude of demographics on net saving, on potential growth and on the

nominal and real interest rates in the developed countries is an empirical issue. The interested reader can refer to the papers by Akso et al. (2016), Carvalho et al. (2016), Favero and Gallasso (2016), Favero et al. (2016, 2017), Ikeda and Sato (2014).

One reason why the desired of new investment has been so low could be that the return on capital has been decaying and not high enough since the last three decades. But this argument is challenged by measurement issues, depending upon whether returns on government debt or returns on productive capital is used to measure whether there are investment opportunities (see Gomme et al. 2011). An alternative explanation may be that low corporate investment is driven by other factors than the cost of capital. Gutierrez and Philippon (2017) show that a key factor is the lower degree of competition in markets and in industries that leads firms to spend their cash flow in buying back their shares. Therefore, the excess saving may reflect a "secular stagnation in investment".

A last explanation suggests that the rate of return of investment in innovations has been regularly decreasing since the last three decades. According to Gordon (2012, 2016), and Clark (2016) the slowdown in technical innovations and total productivity explains the secular stagnation in potential GDP growth. The new technological revolution (digital revolution, robotics, bio- and nanotechnologies) does not lead productivity gains as high as the NTICs of the 1980s and 1990s, not to mention the high productivity gains induced by the industrial revolutions of the 19th century.

Figure 3 shows the evolution of total factor productivity since 1890 in the euro area, the United States, the United Kingdom and Japan. We see the leadership of the United States from the beginning 1930s until the 1950s. The gap is progressively reduced following a catch-up by Japan and Europe during the post-WWII years. Then, Europe and Japan halt their catch-up process as soon as the US productivity growth starts to slow (from the mid-1980s onwards). The sources of slow productivity growth are the following: i) lower labor productivity growth (educational achievement and outcomes have stagnated since the end 1970s), ii) in some service sectors a rapid technical progress is not possible (law, personal services, education), iii) productivity gains are concentrated in a few sectors (information, electronics, medical services and health care, transportation, telecommunication).

Figure 3. Total factor productivity growth in some industrialized countries since 1890
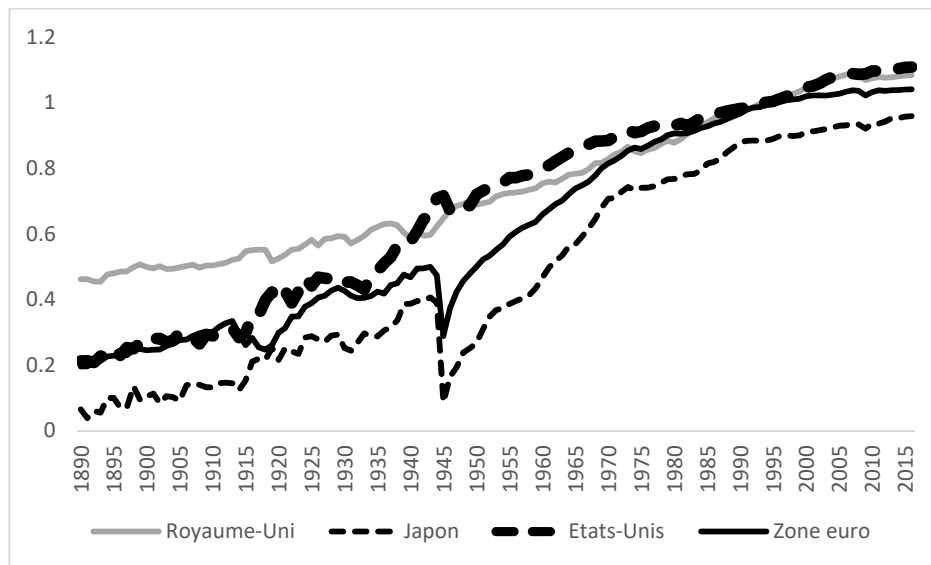
Source: Bergeaud et al., 2016

Although this view is sometimes portrayed as pessimistic, the recent arguments on the supply-side origin of secular stagnation echo some earlier viewpoints by Baumol et al. 1984 and Wolf 2002. What matters is the proportion of sectors experiencing rapid productivity gains from technical progress, compared with others where productivity growth is not a key driver of their activity. This leads to what Baumol and his co-authors call an "asymptotic stagnancy" (the predominance of activities with low rates of productivity growth). Technical progress at the aggregate level depends upon how structural changes impact the respective shares of the sectors, upon cross-sector linkages, and upon the proportion of skill-intensive activities. If there are no disruptive innovations, there asymptotically exists some configurations of regimes of productivity growth where the activities in the laggard sectors surpass those of the technological-driven sectors. The discussions in the literature have focused on the fact that innovations in the agricultural, manufacturing and industry sectors have a much greater impact on the increase of productivity at the aggregate level than those in the sector of services. Secular stagnation may be the result of a continuation of deindustrialization in the developed economies over the last three decades, a decline of employment in the industry and manufacturing sectors, and a higher contribution of the services sector to economic growth.

Gordon's view about secular stagnation and the idea of productivity stagnancy is criticized by the Schumpeterian economists (see, among others, Aghion 2016, Starbatty and Stark 2017). They argue that

the industrialized countries still have their destiny in hand thanks to their entrepreneurs, emblematic figures of capitalism and its regulation. They only perceive secular stagnation as a transient, inevitable and inherent phenomenon of capitalism, reflecting the repetition of long cycles of innovation. The entrepreneur (helped by the financial sector) creates, innovates, invents; and accepts a form of natural Darwinism referred to as "creative destruction": when new activities appear, naturally others disappear. Historically, since the beginning of the 20th century, the industrialized countries have experienced several cycles of innovation that correspond to various growth regimes.

The Fordist growth regime extended from 1900 to 1973. Except the years of war, this regime has lasted 60 years, with several characteristics: the rise of trade and transport, abundant production, a scientific organization of labor and a process of standardization in the production process. This period had its golden ages characterized by high growth rates, a decrease in the number of poor and less pronounced inequalities in a context of changing lifestyles (between 1900 and 1913, between 1920 and 1938 and 1950 to 1973). These years are those of industrial revolutions.

A second growth regime appeared between 1995 and 2005. It was driven by the "knowledge economy" and characterized by the expansion of globalization and financial markets. This period, of new innovations has given birth to a new golden age that lasted about ten years: internet, microprocessors, laser, fiber optical, satellite technologies, electronics.

A new growth regime should appear around 2020, when some innovations underway will be fully exploitable: digital technologies, artificial intelligence, nanotechnologies, technologies related to ecology, robotics, automation.

During the periods that separate two waves of innovations unemployment increases and some skills are "downgraded" by the current technological changes. These are also periods of rising inequalities because the new wealth goes to those who innovate. During the transition phases, the relationship between labor and technology changes. When old activities disappear, labor and technology are substitutable (in other words, new machines gradually replace men). But as soon as a new system emerge, we see technologies that are complementary to the workforce.

The Schumpeterian approach is helpful to understand why productivity can fall; at least, why, in the statistics, technical progress may indicate a slowdown, even when we see innovations. 3D printers exist, but they will only be used by many people in a few years. Driverless trucks do exist, but they will not be widely used in logistics activities until a few years from now. The combination of innovations in robotics, automatics and computers allows new performances in heath activities, but just a few persons can afford

the new services today. Gordon's observation of slower productivity growth simply reflects a transition phase between two innovation regimes. The Schumpeterian' viewpoint about secular stagnation is that this corresponds to a transient equilibrium, appearing mainly during periods of changes in capitalism.

3.3.- Implications for fiscal and monetary policies

The role of fiscal policy in a context of secular stagnation has been debated in the recent context of public debt crises in the euro area. In 2010 the idea prevailed that weak growth performance and deflationary upsurges were primarily a consequence of the reversal of a super-cycle of debt that has turned around. The exit from economic stagnation therefore necessarily involved short-term fiscal consolidation policies and the use of public finances geared towards improving the competitiveness of the medium/long-term economies to increase potential growth. Public expenditure needed to be oriented towards support for research and development activities, improvement of infrastructures in the digital sector, biotechnology and robotization, development of in-service training in companies to fight against the deskilling of the workforce. The opportunity for a country to proceed in this way, however, has given rise to debates.

Indeed, some empirical works had supported the argument that reducing budget deficits has the potential to increase long-term growth through anti-Keynesian effects (see, for example, Almeida et al., 2013). But, more recently, some economists have drawn attention to the fact that fiscal consolidations maintained a vicious circle of weak growth, because fiscal multipliers are high during recessions (Blanchard and Leigh, 2013). Others have pointed out that an increase in public expenditure financed by additional debt could raise the natural interest rates (Eggertsson et al., 2016). Others have also emphasized the deflationary effects of structural reforms (Martins, 2015). Another justification for the use of fiscal policy to overcome secular stagnation is that, in a context where private demand is low, public spending and its debt financing can absorb excess savings and reduce the risk of financial bubbles.

On the monetary policy side, secular stagnation is sometimes viewed as a liquidity trap equilibrium. Zero lower-bound interest rates keep the economy economically inefficient, as real interest rates are below the real GDP growth rate. The result is a low investment rate and the occurrence of financial bubbles. Low real interest rates reflect both low inflation rate expectations and low nominal interest rates. The first challenge for central banks is to overcome the disinflation spiral which is one of the symptoms of secular stagnation. In the euro area, inflation has fallen steadily since 2012, sometimes becoming negative. For example, the annual growth rate of the HICP (harmonized index of consumer prices) was −0.2% in February 2016, 0% in March 2016, −0.2% in April 2016, −0, 1% in May 2016. The monthly rate in July 2016 was −0.6%. Deflation has been one of the most striking stylized facts of the Japanese

economy since 1990. After a pronounced disinflation between 1990 and 1994, deflation settled on a lasting basis between 1999 and 2012, averaging around −0.3 % over this period. In 2015, deflation was −0.8%. In both Europe and Japan, these periods of low inflation and deflation have been accompanied by economic recessions or moderate growth rates. Japan's historical example shows that it can be difficult to fight disinflation and deflation once they have started, as this country has experienced a vicious circle of "deflationary recession".

Central banks have several tools to bring an economy out of a situation of secular stagnation. They may first seek to "break through" the zero lower-bound by setting negative short-term nominal interest rates (some historical examples are the ECB, the central banks of Denmark, Switzerland and Sweden). They can also bring long-term rates into negative territory directly through massive bond buyback policies (the case of unconventional monetary policies). One of their target is to change the inflation expectations by the private sector. Historical evidence shows that attempts to activate the "signal channel" of unconventional policies (forward guidance) do not always work when the framework of monetary policy is inflation targeting. The credibility of central banks in creating more inflation could be achieved through alternative solutions: by choosing a nominal target such as the nominal GDP, by targeting the level of prices or the entire yield curve.

4.- Some examples of secular stagnation in the industrialized countries

4.1.- Real interest rates and secular stagnation: illustration for the US, UK and euro area

The historical decline in natural interest rates and the fact that they have become nil and sometimes negative is a well-established stylized fact for the developed countries. Whether or not such an indicator refers to a short-term or a long-term concept is still a subject of discussion in the literature. We adopt here the medium/long term interpretation. Though unobserved, one can think that the natural rate is an attractor for the real interest rates observed in the economies at medium to long-term maturity dates.

Figure 4 shows the 10-year and 5-year real ex-ante interest rates in the United States and the euro area over the last two decades. The ex-ante rate is computed as the difference between government nominal bond yields and inflation expectations from the Survey of Professional Forecasters. It evolves along downward trajectories and, since 2011, fluctuates between negative and positive values around zero in the US. In the euro area, it stands at below zero since 2013 and has fallen more sharply than in the US. The difference in the downtrend between the euro area and the US (from 2013 onwards) reflects higher risk premia asked by investors to compensate higher inflation uncertainty and liquidity risk in the bond

markets. Indeed, they have been less confident about the European economic outlook in a context of fiscal consolidation and less accommodative monetary policy compared with the US.

Estimates of the natural rate of interest can also be obtained using the Holston-Laubach-William methodology. Figure 5 (upper left- and right-hand corners) shows the path of the natural rates and of potential growths (they are estimated jointly) in the US, the UK and the euro area since 1980. We see that the potential growth trend rates at which the economies are expanding have been decreasing over time, but at different speeds. The euro area experiments a regular decline since 1995, while the path of the US and the UK suggests some "breaks" in the dynamics of potential growth (in the former these breaks are observed at the beginning 2000s and at the 2008 subprime crisis, while in the latter a break is observed in the wake of the financial crisis). This suggests that shifts in the natural interest rates are likely to stem from structural factors in the euro area, while short-term factors were also at play in the other two countries.

Figure 4: Real ex-ante government bond yields (%): USA and euro area
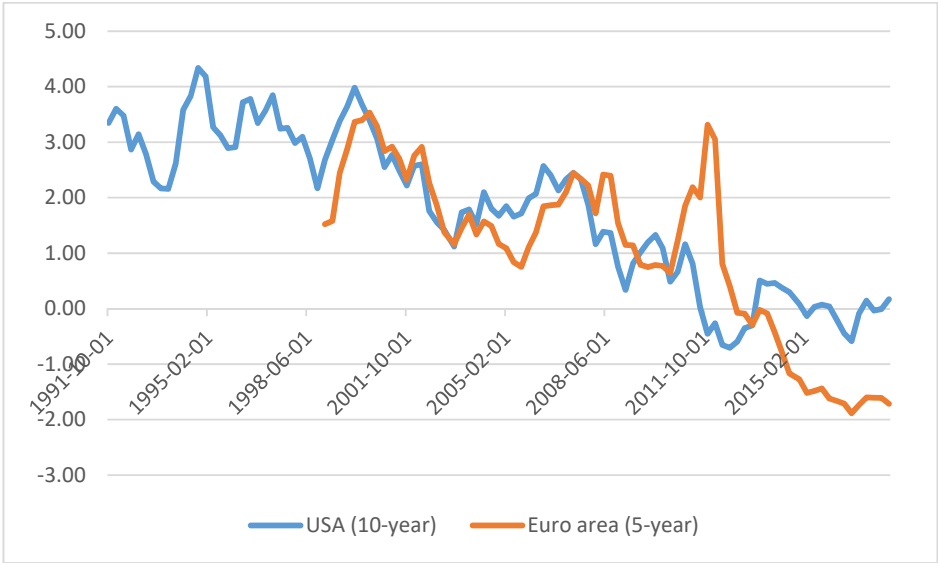
Note: The real rate is computed as the nominal yield minus inflation expectations. For the USA, the nominal yield is 10-year government bond (source: FRED Database, Fed of Saint-Louis) and we consider the 10-year CPI inflation rate expectations (source: Survey of Professional forecasters, Fed of Philadelphia) from 1991 to 2017. For the Euro area, the nominal rate is the euro area 5-year government benchmark bond yield and we consider 5-year forward inflation expectations from the Survey

of Professional forecasters. Both data come from ECB over the period from 1999 to 2017. The data are taken at a quarterly frequency.

This is shown by the output-gap (lower left-hand corner in Figure 5). Since 1980, the latter has remained almost always negative in Europe (its dynamics is highly persistent and recession episodes are deeper), while it has alternated between positive and negative values in the UK and in the US. Since 2014 these two countries have succeeded in surpassing their pre-crisis performances.

The natural rate mirrors what we observe on the dynamics of potential growth. It falls below zero in the euro area from 2013 onwards, stands at small values below 1% in the US and around 1.5% in the UK. The current negative natural rate in Europe makes the secular stagnation feature stronger than in the other countries since this means that a policy rate close to zero is not enough to escape the stagnation trap.

A reason why the euro area's output gap has been so negative and why the natural rate of interest has dropped into a negative territory since 2013 can be illustrated by looking at the saving-investment balance (lower right-hand corner in Figure 5). Over the period when data is available (from 2002 onwards), one can see that the euro area has most of the time experienced a situation of excess saving, with an accentuation of the gap after 2008 between private gross saving and private gross investment. One may wonder whether there is an issue about dynamic inefficiency here, because since 2002 potential growth has very often exceeded the natural rate of interest. Dynamic inefficiency would imply that there has been an over-accumulation of capital in the European economies. This can be assessed in several ways. One way is to consider the difference between the profit share of the private sector (gross operating surplus over gross valued added of non-financial and financial corporations) and investment rate (gross capital formation over gross value added of non-financial and financial corporations). This indicator is positive for the euro area over the whole period. Another way is to look at the difference between the return to capital (the ratio of net operating surplus over total net liabilities) and potential growth. Figure 6 shows that the former lies always above the latter, thereby suggesting that a prolonged situation of stagnation is not incompatible with dynamic efficiency Europe.

The lower right-hand part of Figure 5 shows that the euro area always had either a balanced or negative current account. In addition, government deficits have been limited and started to diminish after the 2010 European debt crisis. In this situation, it is difficult to resolve the excess saving problem through current account surpluses or through the financing of public deficits.

Besides, international lending has some limits. A great part of capital flows take place inside Europe and relying on foreign residents to buy European assets is not sufficient to absorb the extra saving (some reasons are the fear of exchange rate risk and a preference to hold assets denominated in US dollars). In this situation, where intending savings surpasses intended borrowing by governments and foreign investors, the macroeconomic equilibrium is achieved through a decrease in GDP. This explains the persistent negative output.

In Figures 7a and 7b, we draw a scatterplot of pairs of core inflation and short-term nominal rate series in the US, UK and the euro area between 1997 and 2007. The equilibrium value of the nominal interest rate is obtained at the intersection of a line and a curve. The line is a proxy of the Fisher relation obtained by making a regression of the nominal rate on a constant and core inflation. Considering historical inflation instead of inflation expectations does not make any difference for our arguments and the constant captured the average of the unobserved real interest rate over the period under examination. We further adjust a convex curve to the scatterplot representing a nonlinear Taylor rule.

Figure 5. Natural rate of interest and potential growth: USA, euro area and UK (1980-2017)
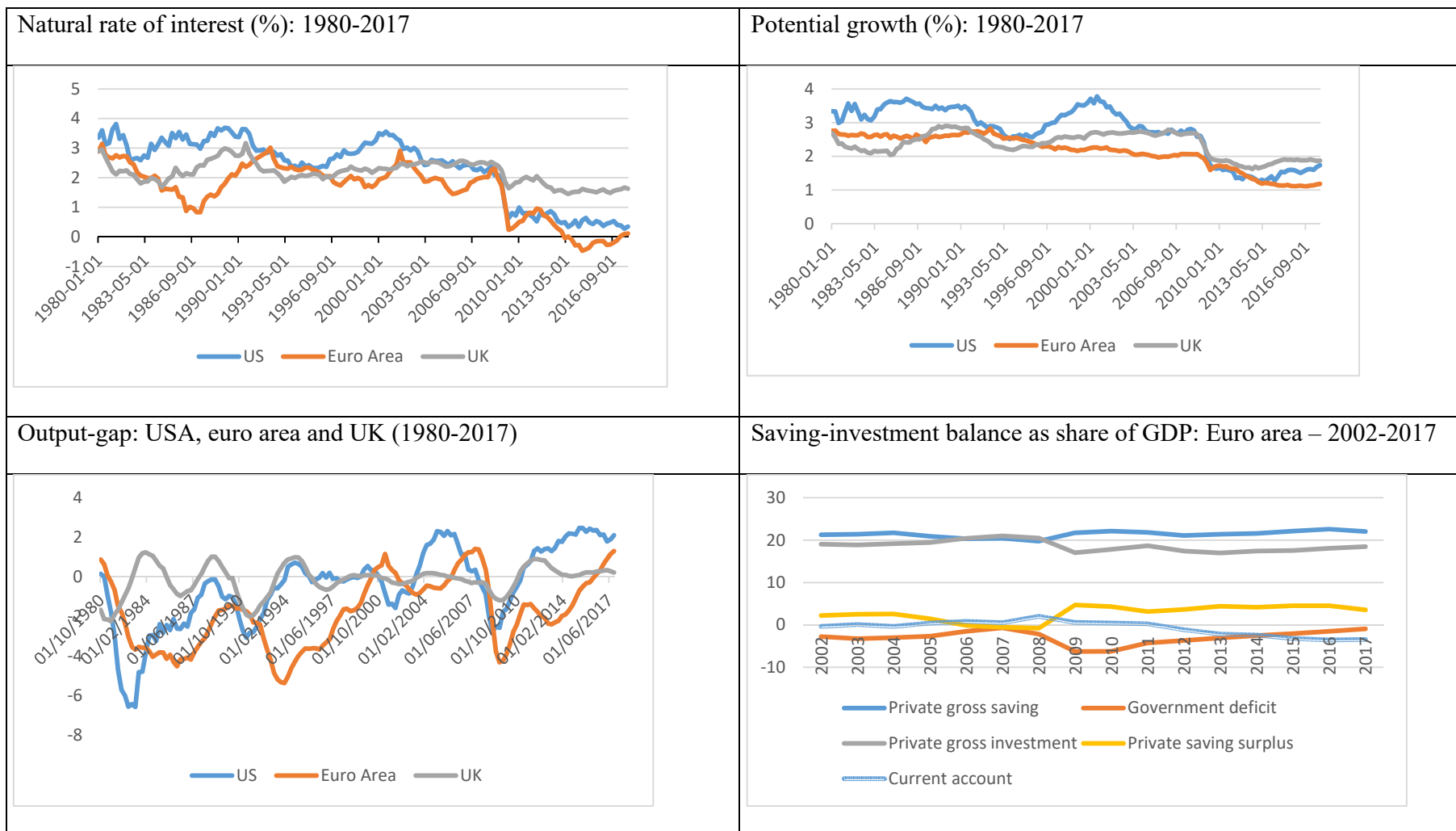
Note: Natural interest rate, potential growth and output-gap come from the database by Holston et al. (2017). The saving-investment balance (in % of nominal GDP) graph is obtained using data on quarterly accounts by institutional sector (Eurostat). "Private" refers to non-financial corporations + financial corporations + households.

Figure 6. Comparing net return on capital and potential growth
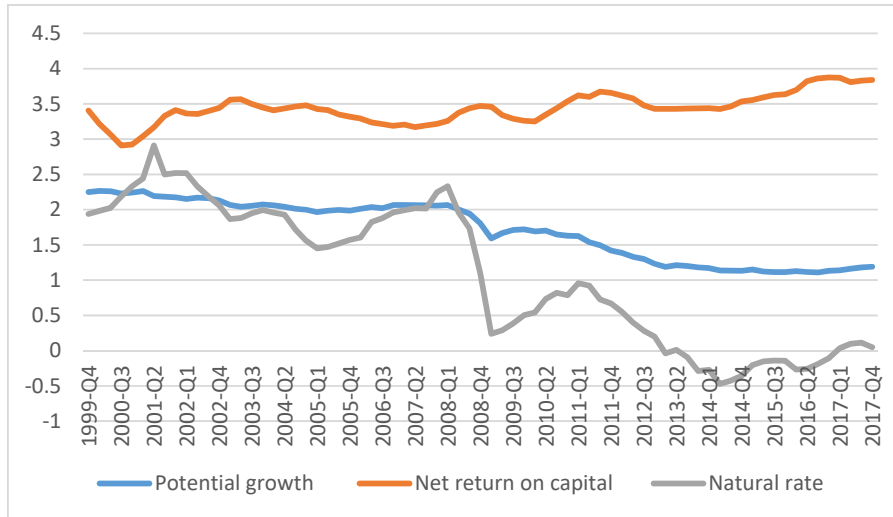
Note: *quarterly accounts by institutional sector (Eurostat)*

The convexity is motivated by the Taylor principle (the central banks adjust the policy rate following an increase in inflation by more than one for one).

The graphs suggest that we have two regimes. One consists of the observations that are "attracted" by the lower equilibrium, when inflation is below 2%. The second regime is represented by the set of points for which the upper equilibrium is an attractor inflation rate above 2%. For the three countries, we see that the nominal rate that the central banks should target to achieve full employment is negative, while the actual minimum rates were at the zero lower-bound. This bound can be considered as a binding constraint when the inflation rates are lower than or equal to 1.4%. This is an additional reason why outputs have remained below their full-employment levels.
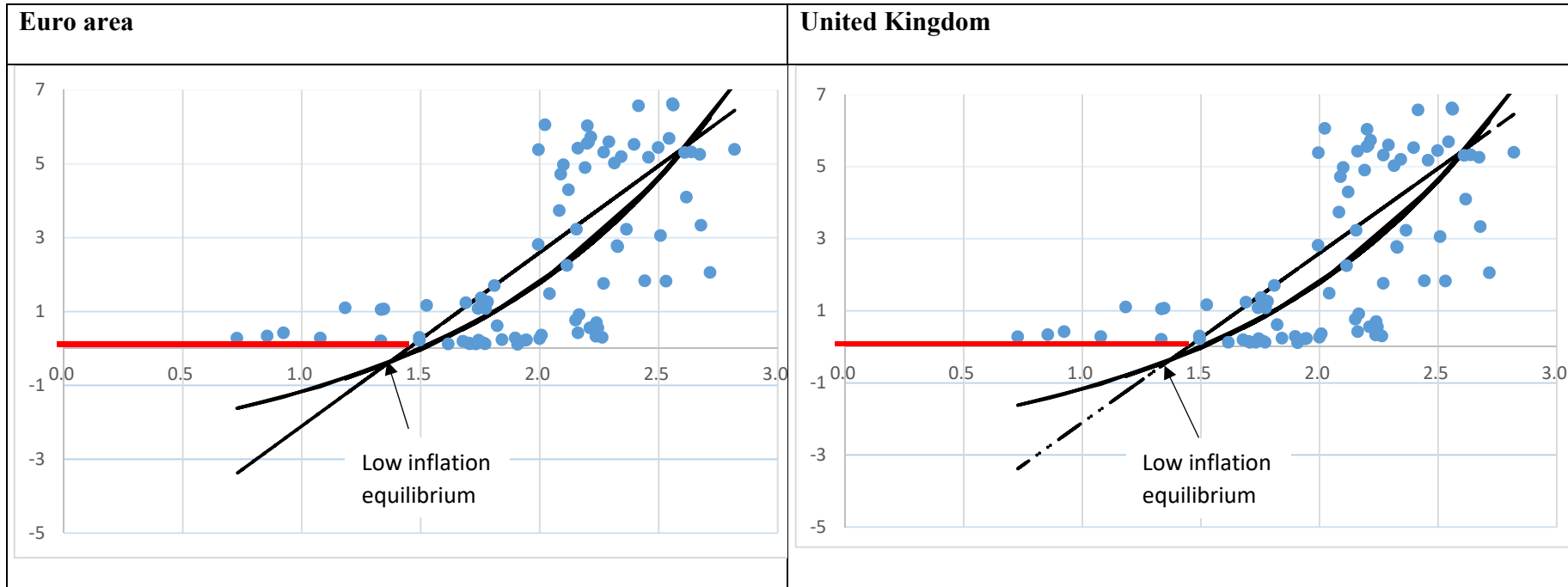
Figure 7a. Short-term interest rate and inflation United States (1997-2017)
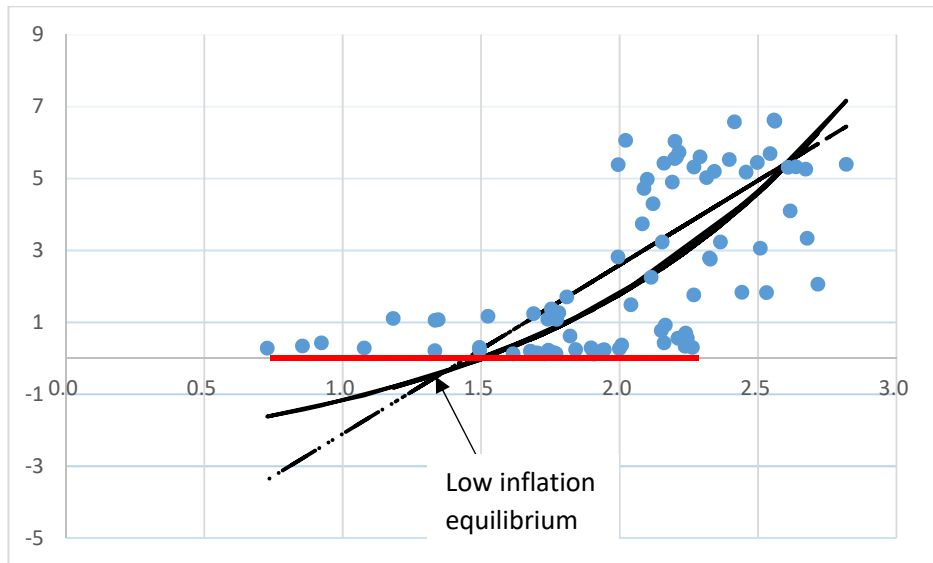
Note: Horizontal axis: inflation rate in % (source OECD, all items non-food and non-energy), vertical axis: short-term interest rates in % (source: OECD). The red line is the zero lower-bound for the short-term nominal interest rate (ZLB). The line with positive constant slope describes a Fisher relation obtained by the regression of the nominal short-term rate on inflation. The convex curve is a nonlinear Taylor rule obtained by estimating $R = Aexp(B\ infl) - C$, where R is the nominal rate, infl is inflation and A, C, C are real parameters. The intersections show two steady state with the secular stagnation steady state below the ZLB.

Figure 7a. Steady states short-term rates: Euro area and United Kingdom (1997-2017)

Note: Horizontal axis: inflation rate in % (source OECD, all items non-food and non-energy), vertical axis: short-term interest rates in % (source: OECD). The red line is the zero lower-bound for the short-term nominal interest rate. The line with positive constant slope describes a Fisher relation obtained by the regression of the nominal short-term rate on inflation. The convex curve is a nonlinear Taylor rule obtained by estimating $R = A exp(B\, infl) - C$, where R is the nominal rate, infl is inflation and A, C, C are real parameters. The intersections show two steady state with the secular stagnation steady state below the ZLB.

4.2.- Secular stagnation in Japan: the role of demography and finance

Japan is, no doubt, the country among the industrialized economies that have had marked signs of prolonged stagnation since the 1980s. The financial bubble burst in 1991 led to the so-called "lost decades", thereby illustrating that the Japanese economy has suffered from many symptoms of secular stagnation: a prolonged recession, a spiral of deflation and low inflation, a slowdown in the growth rate of total factor productivity, a demographic slowdown, a decline in capital formation and a "saving glut". Moreover, inflation expectations have been persistently low, thereby making hard a decrease in the real interest rate at low levels. An abundant literature has been published on these topics. Our aim here is not to discuss the whole range of papers that have been written, but we intend to emphasize some key points that make Japan a specific case in comparison with the other industrialized countries. The reader interested by a complete survey of the literature can refer to Cho et al. (2018), Fukao et al. (2015), Okazaki and Sudo (2018). According to us, two issues are useful to be explored for future works: one concerns the demographic effects of secular stagnation, the other is related to the monetary and financial interpretation of the natural interest rates.

Effects of an aging population on medium-term growth

Let us look at Japan's structure of age since 1960 as shown in Table 1. Data for 2035 are predictions. We see that the old-age dependency rate has steadily increased from less than 99% in 1960 to more than 50% projected in 2035. At the same time the young and working population is projected to decrease (persons below 15 and between 15 and 64 years old). Furthermore, the population will decrease by 2015. The picture is both a decline of population and a higher share of old-aged persons out of total population. These trends are primarily due to the combination of a drop in the fertility rate since the 1960s and increasing longevity. Moreover, the replacement migration is very low.

Table 1. Population age structure: Japan (1960-2035)

	1960	1985	2010	2035
Population (millions)	93,42	121,05	128,06	112,12
Young (%) 0-14 years old	28.07	26.03	16.84	11.29
Working age (%) 15-64 years old	60	82.51	81.73	63.43
Elderly (%) > 65 years old	5.35	12.47	29.48	37.41
Elderly (%) > 75 years old	1.63	4.71	14.19	22.78
Elderly dependency ratio	8.9	15.1	26.1	59.0

Source : IPSS's population projections for Japan ; National Institute of Population ; Population Census of Japan.

The long-term effects of the Japanese demographic trends are ambiguous. First, the decline in the working-age and the aging population put upward pressure on the real interest rate (a smaller number of people save for their future retirement). Secondly, with a higher fraction of older people, one can expect higher savings and thus lower interest rate. Thirdly, longevity is increasing in Japan. And so does the rate of dissaving, thereby putting upward pressure on the real interest rate. Fourthly, in a context low labor market participation rate and slowing labor productivity, the decline in the working-age population reduces the labor force leads to a decline in medium-term growth and real interest rate. The total effect is therefore indeterminate. This suggests that, in the case of Japan, the households' ex-ante desired savings is not the key determinant of the secular decline and low level of the natural interest rate. Gross household saving rate have fallen in Japan since the mid-1990s. The increase in desired savings comes from other reasons than demographic: i) financial factors (balance sheet channel), ii) in a context of slower growth and deflation, corporates reduce their debt and therefore increase their saving (deleveraging effect).

The effects of the Japanese demographic structure on the capacity of production in the medium term are unambiguous. Theoretically, one expects the following consequences. First, a decrease in productivity

for two reasons. One is that labor productivity and the acquisition of human capital are age-specific. They gradually decline as workers become older. Secondly, the contribution of aggregate labor supply to growth is likely to decrease as the average hours worked per persons tend to diminish with the elderly dependence ratio. These theoretical arguments are confirmed by the empirical stylized facts observed in Japan.

Figure 8 shows potential GDP growth estimated using the production function approach and its main contributing factors since the mid-1950s (graph on the left). We also show the evolution of labor productivity as well as employment and population growth rates (figure on the right). We see that potential growth has regularly fallen since the mid-1980s, from a peak of 3.7% in 1984 to 2% in 2014. The decomposition shows that the decline is driven by a decrease in the contribution of the capital coefficient and labor. More specifically, from 1993 onwards, the contribution has been often negative for labor. The factors behind the negative contribution of labor are twice. First, labor productivity has dropped from 3% growth in 1990 to 0.11% in 2014. Second, the deceleration of population has become an "attractor" for the growth rate of employment. The latter has therefore evolved around a downward trend. The causes of the declines in employment are related to the decline in the working-age population and in the average working hours per worker (direct consequences of the demographic changes). What need to be understood now is: which policies could be adopted to counter the negative effect of the demography on potential growth? The solutions go beyond re-augmenting the fertility rate or compensating the weak working-age population by a higher immigration rate. Indeed, these trends are probably difficult to reverse on a short-time scale. Japan's labor market structures have changed: open-ended jobs in the same company is no longer the rule, the participation rate is low for some categories of people (women) and jobs (there is a job polarization between high-skilled technological jobs and the lower-skilled jobs in the sector of services, the share of full-time employment has decreased, and atypical jobs are on the rise.

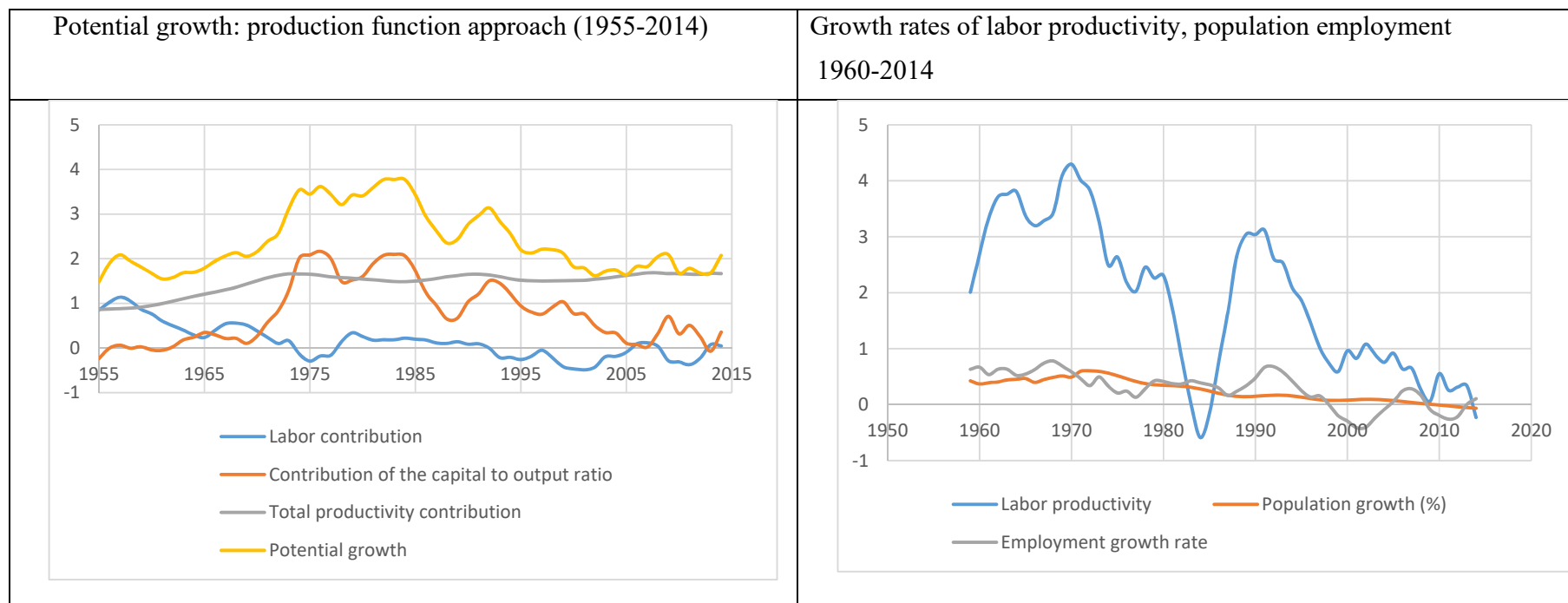*The natural interest rate and the financial sector*

Many studies so far in the literature find an estimate of the Japanese natural interest rate below the actual real rates (short- or -long-term rates). This is a puzzle, since the nominal rates have reached the zero lower bound a long time ago once the BOJ had decided to adopt the so-called unconventional monetary policies: zero interest rate policy (ZIRP) from February 1999 to June 2000, quantitative easing policy from March 2001 to February 2006, Comprehensive monetary easing policy from October 2010 to

March 2013, quantitative and qualitative (QQE) easing policy between April 2013 and September 2016, and yield curve control since then. The question is: why have the natural rate and actual real rates been divergent?

Maybe we are not measuring correctly the "true" natural rate. Indeed, instead of the "real" interpretation (according to which the natural rate is the equilibrium price of the demand for and supply of loanable funds), market rates are primarily driven by monetary and financial factors. The literature shows that, in Japan, market rates have been strongly influenced by the expansive monetary policies and by the development in the financial markets. This country shares a common feature with the other industrialized countries: financial and banking crises deteriorated and pushed the nominal interest rate to low values over extended periods of time (see Gourinchas and Rey 2017 for a worldwide survey). In the case of Japan, it took time for the monetary and regulatory authorities to resolve banks' non-performing loans difficulties and repair the damages caused to balance sheets in the financial sector. The reasons why it is important to consider the financial approach to the low interest rate problem is the following. During booms and bursts, financial savings is different from gross savings captured by the institutional agents' national accounts. Indeed, the financial institutions and banks can create liquidity and money not injected in the real economy. And during financial crises, a high amount of liquidity is destroyed, and this accentuates the financial constraints. Consequently, during financial booms the global savings captured by the national accounts is likely to be under-estimated, while in the aftermath of a financial crisis or when a bubble collapses, global savings is probably overestimated. In other terms, the usual estimates of the natural interest rate during the decade following a financial turmoil are likely to be biased "estimators" of the true rate and the bias is negative (in the sense that we overestimate the amount of savings available in the economy). The real interest rate should thereby not only reflect differences between savings and investment, but also between the supply of and demand for liquidity in the financial sector.

We estimate the natural rate in Japan, since the beginning 1990s, by using a model à la Holston et al. (2017) augmented with an interest rate rule and the financial cycle (captured here by changes in the ratio of credit to the private sector as share of GDP and changes in real housing prices). The measurement equations are the following. The IS curve relates the current output gap to past output gaps, to world demand and to the variables that capture the influence of the financial cycle. The financial cycle variables themselves are a function of the central bank's policy rate gap (which is defined as the difference between the actual policy rate and the natural rate).

Figure 8. Impact of demographic structure on potential growth – Japan

Potential growth: production function approach (1955-2014)	Growth rates of labor productivity, population employment 1960-2014

Note: The graph on the left is obtained using the national account decomposition of GDP growth according to the production function approach. Data used comes from the Penn World Table (Pwt 9.0). Potential growth is computed as the sum of 3 components:

$$y^{pot} = (n + l) + \frac{\alpha}{(1-\alpha)}(k - y) + \frac{tfp}{1-\alpha}$$ The variables are growth rates. y^{pot} is potential growth, n is the number of population engaged, l is the average annual hours worked per person engaged, *tfp* is total factor productivity, k is capital, $1 - \alpha$ is the share of labor compensation in GDP. The growth rate of labor productivity is obtained as the sum of the growth rate of output per capital (in log) and capital-labor ratio (in log), where labor is the product of employment and average hours worked per person. The 3 components and the resulting potential growth are smoothed (4-quarter moving average).

We further consider an interest rate rule in which the short-term real interest rate depends upon the natural rate as the central bank's target rate and upon the inflation gap and output gap. The aggregate supply curve is standard and relates changes in inflation to unemployment gap. We consider several state equations for potential GDP (unit root with a time-varying drift), potential growth (mean reverting autoregressive process) and the natural rate defined as a function of potential growth and unobservable supply and/or demand shocks[3].

Figure 9 shows estimates of the natural interest rate of the output gap. The natural rate began to decline from the beginning 1990s. It sometimes and briefly fell below zero (during the financial crises of the late 1990s and the years of aggressive QQE policy). But we see that it has been very often about and above zero. The graph suggests that, since the middle 1990s, monetary policy can be judged to be highly accommodative since the natural rate has been a strong "attractor" of the actual real rates (both curves are near each other). We see on the graph in the left-hand side that, despite this, the output gap has been negative over long periods until 2014. This suggests that there were other factors at work than monetary policy to account for the discrepancy, for instance fiscal policy.

5.- Conclusion

The economists' recent attention to secular stagnation occurs in a context of renewal of the economic thought about the mutations of capitalism. In simple terms, secular stagnation describes a stable underemployment equilibrium in which the developed countries are "trapped", characterized by a liquidity trap, low inflation rates, a slowdown in productivity, a prolonged economic stagnation and a demographic decline. Compared with our knowledge of a similar phenomenon in the 1940s and 1950s, the novelty today concerns the role of the financial markets. Leverage behaviors facilitate the abundance of liquidity and contribute to a saving glut. The former works by Fisher or Minsky was already devoted to the study of the links between finance and recessions and they are finding a new echo in the recent literature (see for example Atif and Sufi 2014, Borio et al., 2017, Eggertsson and Krugman 2012).

A common wisdom view about secular stagnation is that it reflects a macroeconomic imbalance caused by a gap between the natural interest rate and the real interest rate observed. The latter is not at the level where it should be to close the gap between intended savings and investment. This comes from several elements: a liquidity trap, safety traps, deflationary traps, or financing constraints that bind on households

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[3] The detailed estimated equations are available upon request to the authors.

and firms. This view is, however, challenged by a second interpretation in terms of endogenous changes occurring in capitalism: ramping inequalities, technological and demographic changes, debt cycle, secular decline in prices.

Another aspect of the discussions is related to determining the conditions (parameter configurations) under which a secular stagnation equilibrium can or cannot be considered as an unintended equilibrium (for an overview of these discussions, the reader can refer to Bullard 2010, Schmitt-Grohé and Uribe 2009, 2017, Arifovic et al., 2018). For instance, the observation that the natural interest rate of an economy can be negative has given rise to two opposite viewpoints. On the one hand, it is considered as an odd outcome incompatible with the stability of capitalism. Those who defend this view argue that such a macroeconomic equilibrium induces bubbles, that the negative natural equilibrium rate could create situations of dynamic inefficiency, that the theoretical models are based on specific demographic structure - overlapping generations - (see Pichelmann 2015). An alternative view is to consider that negative natural rates can be observed when the economies are stuck in low demand trap. A persistent low aggregate demand induces a continuously lowering potential GDP. In such a situation, an anti-stagnation policy goes beyond fiscal and/or monetary stimulus. Institutional reforms are also needed, notably policies aiming at reducing income and wealth inequalities, stabilizing the debt cycle or redefining the links between finance and the real economy (see Hein 2015 for an illustration).

Figure 9. Japan: potential GDP and natural interest rate since the beginning 1990s

| Potential GDP and output gap | Natural interest rate |
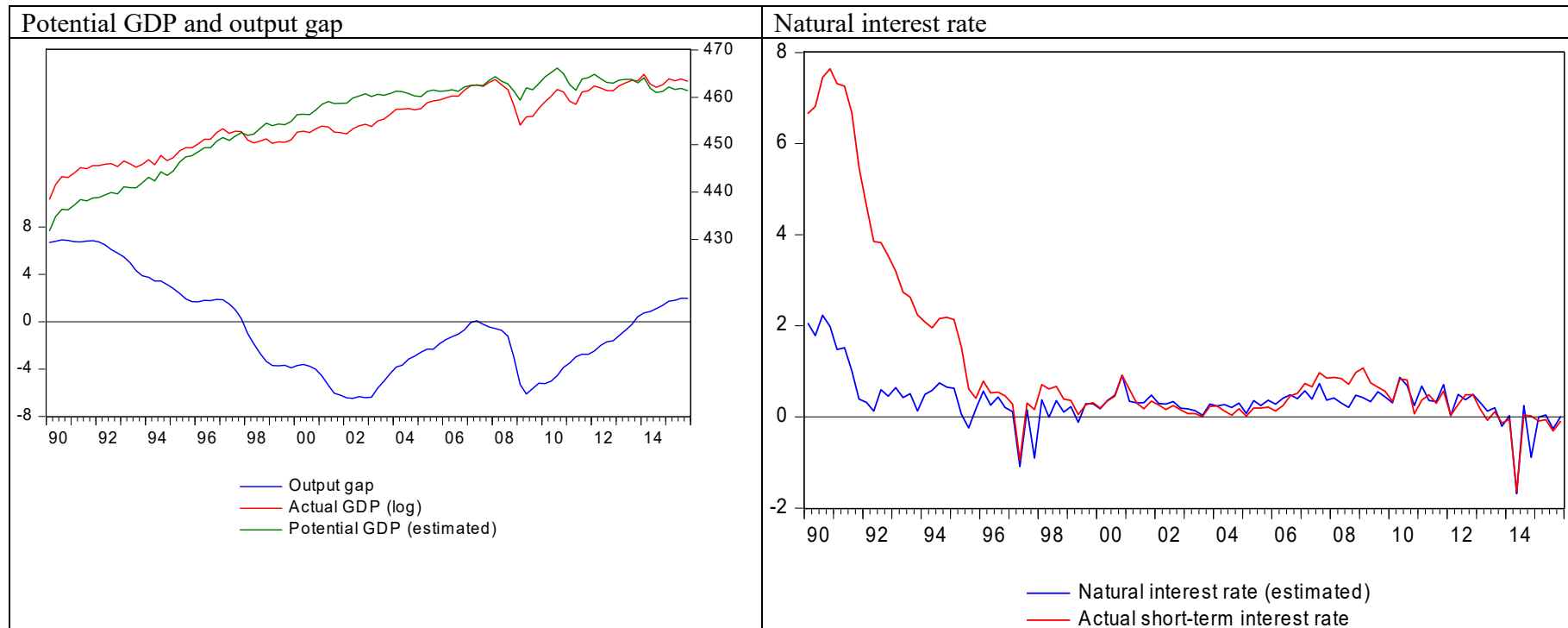
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