MACROECONOMICS IN THE AGE OF SECULAR STAGNATION[1]

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The "Great Recession" that began in 2008 plunged the economy into long-lasting stagnation with high unemployment, depressed output and very low inflation. This crisis, whose exceptional duration is difficult to explain using the theoretical tools of contemporary macroeconomics, invites us to enrich fundamental analysis. Conceptualizing secular stagnation is then based on the introduction of market imperfections such as credit rationing on the financial market as well as nominal rigidities on the labour market. The resulting equilibrium is characterized by the underemployment of factors of production (high unemployment, low capital accumulation) associated with a fall in prices (deflation) and monetary policy that is inactive because of the zero lower bound constraint on the key rate. In a period of secular stagnation, the impact of economic policies is affected, and many Keynesian properties appear: a deflationary impact of supply policies, ineffective conventional monetary policy and a positive effect of public spending, although limited by the crowding out of private investment.

Keywords: secular stagnation, accumulation of capital, budget policy, zero lower bound.

The economic and financial crisis of 2008 caused a severe recession that has been characterized by an unusually slow recovery (Summers, 2013 and 2014; Rawdanowicz *et al.*, 2015). There are two types of issues posed about the causes of the insufficient recovery. First, potential growth has been weakened, reflecting a lack of supply. Second, the output gap might be abnormally persistent, that is to say, the economies are having difficulty absorbing demand deficits.

The weakening of potential growth could result from a lack of traditional factors (low productivity gains, rising social inequalities, aging of the active population, globalization, scarcity of raw materials, *etc.*) but also hysteresis effects (Keightley *et al.*, 2016) since the crisis could have "permanently damaged" the factors of production (destruction of productive capital, depreciation of the human capital of the unemployed, decrease in investment). As for the persistence of the output gap, this could reveal an inability to bring the economy towards full employment or at least towards the frictional unemployment rate, hence the hypothesis that stagnation has become sufficiently persistent to be deemed "secular".

The hypothesis of secular stagnation was first raised in 1938 in a speech by Hansen published in 1939 as an article entitled "Economic Progress and Declining Population Growth". This explored insufficient investment in the United States and a decline in the population after a long period of economic and demographic expansion. The secular stagnation hypothesis is interpreted as an abundance of savings that pushes the "natural" real interest rate (defined by Wicksell in 1898 as the real interest rate compatible with full employment) below zero. However, if the real interest rate remains above the natural rate over a long period, this results in a chronic deficit not only of global demand but also of investment, which depreciates the growth potential. The very weak inflation and even deflation observed since the beginning of the crisis underlines the relevance of the secular stagnation hypothesis in accounting for the current economic situation.

In support of this thesis, it should be noted that as a result of the 2008 crisis, public debts have increased significantly, rising from 62.5% to 106.1% in the United States and from 69% to 89% in the euro zone (from 68% to 96% in France, but just 65% to 68% in Germany after peaking at 81% in 2010). Long-term interest rates have nevertheless remained remarkably low, with 10-year yields on US, German and French government bonds averaging 2.2%, 0.38% and 0.75%, respectively, in the third quarter of 2017. The low level of long-term rates could mean that the markets do not anticipate an increase in inflation in the near future. With this in mind, Summers (2016) concluded that the state of stagnation will persist.

The purpose of this article is to present the concept of secular stagnation as a new field of macroeconomic analysis. The first section reviews the factual analysis, which raises the question of whether the

Great Recession caused a lasting change in the economy, thereby requiring a need to review the fundamentals of macroeconomic analysis. The second part examines how a secular stagnation equilibrium can be characterized from a theoretical point of view. The third part then considers how effective economic policy can be in an economy frozen in a state of secular stagnation. The final part offers a conclusion.

1. The Post-crisis Economy: A Lasting Change?

1.1. An abnormally slow recovery and blocked monetary policy

The economic crisis of 2008 has hit the developed countries hard (Le Garrec and Touzé, 2017a). It caused a fall in GDP relative to its potential level[2] (Chart 1). The difference with potential, i.e. the output gap, widened to 4.5% in the United States in 2009 compared with the euro zone's peak of 3.6% in 2013. The growth rate of potential GDP (Chart 2) has also deteriorated due not only to the disappearance of companies and a decline in investment but also to a reduction of the labour force in the United States. Before the crisis (1998-2007 period), the average growth rate of potential GDP was 2.7% in the United States and 1.9% in the euro zone. Following the crisis (2009-2018), the average has been only 1.6% in the United States and 0.8% in the euro zone, reflecting a lasting change.

Excess production has led to a significant decline in the inflation rate (Chart 3). On average over the period 1998-2007, it fluctuated around 2.7% in the United States and 2% in Europe. After the crisis, the inflation rate fell to almost zero before rising again very slowly. Over the period 2008-2018, the average inflation rate was down by an average of one point.

Before the crisis, the average unemployment rate (Chart 4) hovered around 4.9% in the United States and 8.8% in the euro zone. Employment paid a heavy price for the crisis. The unemployment rate rose to almost 10% in the United States and 12% in the euro zone. A change came earlier in the United States, where the unemployment rate began falling in 2011. This was achieved at the cost of a reduction in the labour force participation rate (Chart 5), which may well reflect long-term discouragement among a section of the working-age population.

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2. The measurement of potential output is a subject of debate – see in this regard Sterdyniak (2015).

The turnaround came later in Europe on average, from 2014, and has in contrast been accompanied by a rise in participation rates.
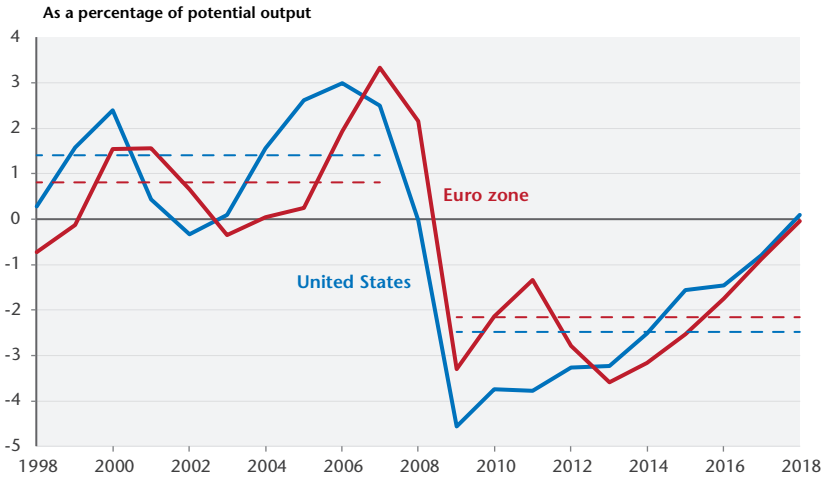
Chart 1. The output gap

As a percentage of potential output

Euro zone

United States

Dotted line: average for the period.
Source: Authors' calculations based on the Economic Outlook (OECD).

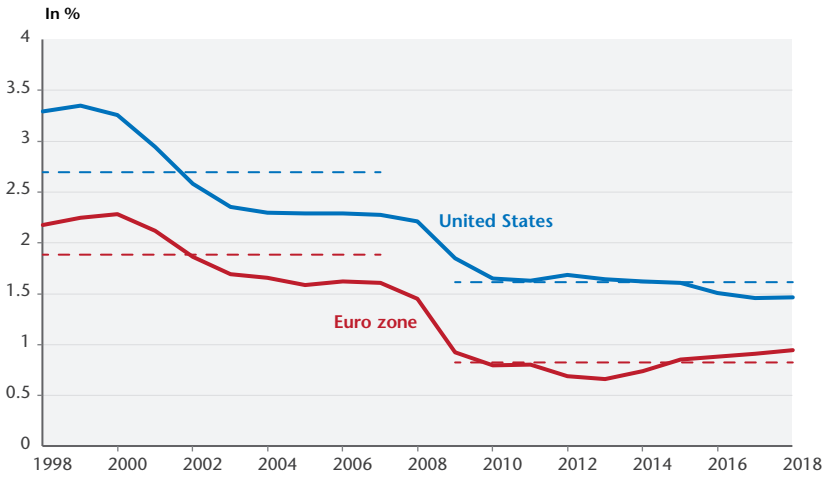**Chart 2. Growth rate of potential production**

In %

United States

Euro zone

Dotted line: average for the period.
Source: Authors' calculations based on the Economic Outlook (OECD).

Chart 3. Inflation rate

In %

United States

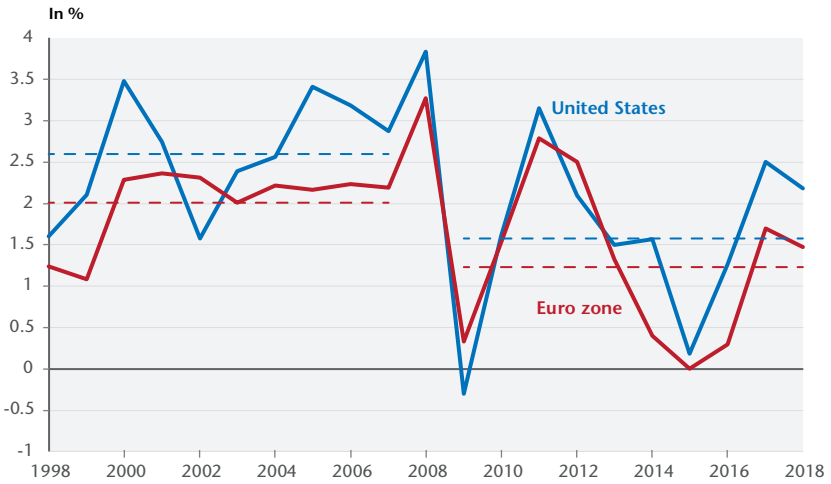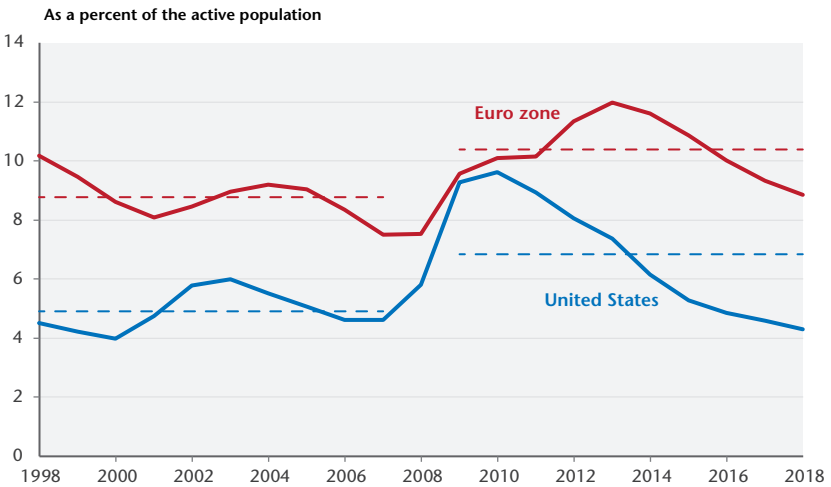Euro zone

Dotted line: average for the period.
Source: Authors' calculations based on the Economic Outlook (OECD).

Chart 4. Unemployment rates
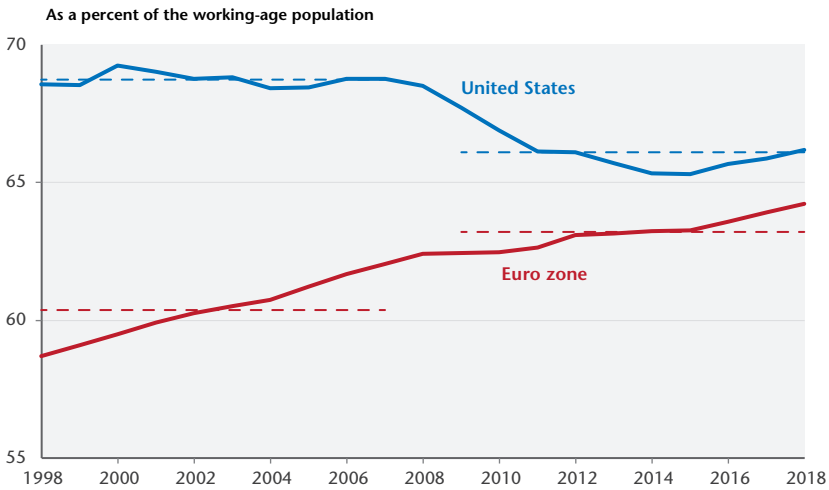
As a percent of the active population

Euro zone

United States

Dotted line: average for the period.
Source: Authors' calculations based on the Economic Outlook (OECD).

Chart 5. Participation rates

As a percent of the working-age population

Dotted line: average for the period.
*Source:* Authors' calculations based on the Economic Outlook (OECD).

Many developed countries have resorted to fiscal policy to deal with the crisis, first in automatic mode (increased social spending and lower tax revenues) and then in a voluntary way. The aim was to support economic activity, but also to protect the financial sector, which had been severely weakened by the depreciation of its assets. In a third phase, due to the high levels of public debts and public deficits and thus in order to protect their solvency, the States were compelled to increase compulsory contributions and tighten up public spending. The constraints were more pronounced in southern Europe because of fiscal rules and the sovereign debt crises that hit these countries, which led to soaring interest rates and a partial default on Greek debt.

In response to the financial crisis, the central banks lowered their key interest rates (Chart 6). The rate cut was sharp and quick in the United States. In Europe, it took place later and was initially a little more limited. Rates have reached a very low level. With the return of a low level of unemployment in the United States and a potential increase in production, the key interest rate has risen slightly there since December 2015, with the last rise in March 2018 putting the rate at 1.75%. In the euro zone, the key interest rate has been zero since March 2016. It is difficult for the European Central Bank (ECB) to go down any further as adopting a negative interest rate would mean that

the ECB would have to pay banks to borrow. Moreover, in the presence of negative rates, economic agents would be more inclined to keep their savings in a monetary form with zero interest rates. It is said in this situation that the nominal rate is constrained by a zero lower bond (ZLB). The heterogeneity existing between euro zone countries, particularly in terms of public debt and bank liabilities, has forced the ECB not to change the level of the key rate for a long time, even though some countries such as Germany and the Netherlands are seeing a return to full employment.

Chart 6. Key interest rates
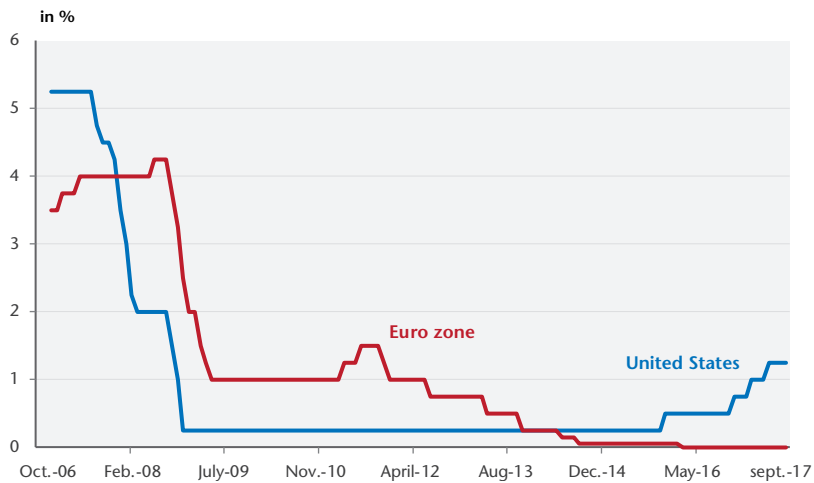
Source: US Fed and ECB.

1.2. Productivity underestimated?

The US economist Robert Gordon sees the 2008 crisis as a symptom of a downward trend in productivity that clearly pre-dates the crisis. According to his calculations (Gordon, 2003), hourly productivity grew at an annual rate of 2.7% in the United States during the period 1950-1973 (4.4% in Europe), while the rate came to only 1.4% in the period 1973-2000 (2.4% in Europe). Based on these downward trends in productivity growth, Gordon (2014) predicted that by 2100 the standard of living (measured by real per capita income) would be rising each year by only 0.2% per capita, i.e. a level of growth similar to that observed before the first industrial revolution, which began in the late eighteenth century.

Humans' innovative capacity is behind this change: after the steam engine, the automobile, electricity and digital technology, "break-through" technologies that are able to make deep transformations in the productive system have become rare. Robert Gordon brings in other causes for the decline in the growth rate of living standards: population aging, the stagnation of educational levels, increasing inequality and too much public debt. One could add the scarcity of natural resources (raw materials, natural resources) and negative externalities related to pollution and global warming.

Gordon's thesis is debated on several levels. First, the supposed weakness in productivity growth imposes, de facto, a constraint on supply, which should have an inflationary impact, whereas we observe very low inflation. In addition, he is accused of being overly pessimistic about the potential of future innovations. The technological changes associated with digital technology could herald new sources of growth. Certainly, any process of innovation plays a role in the destruction of the old models of production, which can generate difficult transitions as productive capital and job positions disappear. However, the emergence of more efficient production systems and vectors of new products is helping to boost productivity. Finally, to echo Solow's famous paradox in 1987 ("You can see the computer age everywhere but in the productivity statistics"), one can question the statistical robustness of Gordon's results. They could be linked to problems in measurement (Aghion and Antonin, 2018). While the nominal wealth produced can be calculated by summing up all the value added at current prices of the production units, the volume / price breakdown is more delicate. To do this, we generally rely on measures of value added at constant prices to deduce deflators. Even if the calculation is simple, the method may be biased. Indeed, for new products or products whose quality has been greatly improved, the choice of a past reference price is particularly complex.

Aghion *et al.* (2017) propose an alternative measure of productivity. They rely on a Schumpeterian model that incorporates a process of creative destruction. Using US data, they consider that productivity has been underestimated by an average of 0.6 point per year over the 1983-2013 period. This result is significant and can be interpreted to mean that the decline in productivity growth observed by Gordon is not fully proven.

Another interpretation of this result is that statistics overestimate inflation. In the context of secular stagnation, if the effective productivity growth is structurally stronger than what is measured, there must be concern about the consequences of inflation that is even lower than that measured, which reinforces the possibility of creeping deflation.

1.3. The dangers of deflation (or overly weak inflation)

The post-crisis period marks a singular economic episode since it contradicts the principle that an accommodating monetary policy should favour overheating and inflation (Le Garrec and Touzé, 2017a). The crisis has clearly provoked disinflationary and even deflationary pressure.

This weak inflation has, of course, resulted from an aggravated global context that has led to a fall in commodity prices. However, the deterioration of private and public sector balance sheets has also played an important role. On the one hand, with a growing risk of private defaults, banks have become more demanding with regard to the distribution of credit. On the other hand, companies have tried to clean up their balance sheets. They have notably been able to reduce their investments. This double contraction helped to trim the outlets for savings, which then became overabundant, thus favouring deflationary pressures as aggregate demand fell and savings shifted towards less risky assets (monetary deposits, government bonds and real estate). To explain these mechanisms, Koo (2011) developed an analysis of the recession based on balance sheets. Another approach to these mechanisms developed by Fisher in 1933 focused on "deflation by debt" to explain the Great Depression (Challe, 2000).

From the consumer's point of view, lower prices have the merit of boosting purchasing power. However, from the point of view of economic equilibrium, deflation or too little inflation are problematic because of the nominal rigidities resulting from exchange contracts defined in nominal terms. Indeed, a reasonably positive inflation allows for adjustment through prices. For example, for company managers, it is difficult, to reduce the nominal wages recorded for employee payrolls because these are fixed contractually. On the other hand, when there is inflation, it is easy to lower real wages by freezing the nominal amount or by indexing it below the level of inflation. Thus, as is seen in the results of Verdugo (2013), the wage rigidity observed in the French labour market partly explains the rise in unemployment

following the crisis. More specifically, estimates show that the real (constant composition) wage should have been 1.5% lower in 2011 to be consistent with past indexing.

In addition, low inflation has a significant fiscal cost. Indeed, the rate of inflation is a natural rate of depreciation of the public debt. As inflation increases, the real value of the public debt decreases, which reduces the need for fiscal efforts in the future.

Finally, deflation can render conventional monetary policy ineffective. Indeed, to maintain the level of inflation close to its target, the central bank could have to set its nominal policy rate at a negative level, which is hardly possible for the reasons previously mentioned. The key rate is then limited by the zero lower bound (ZLB).

1.4. The return of macroeconomic policies to support demand: towards an exit from the crisis?

Central banks had to be inventive both to boost the economy and to generate inflation, because they were constrained by an already very low key rate. They have implemented less conventional monetary policies than those based on the key rate, which sets the marginal price of liquidity or conventional refinancing operations. The abundance of liquidity has been made possible thanks to massive buybacks of debt securities. This policy has helped to reduce the liabilities of the private sector. These unconventional policies mean that the key rate is no longer the best indicator of the monetary facilities granted by the central bank. Wu and Xia (2015) calculated an implicit monetary policy rate by developing an extension of Black's (1995) financial model. The result is that the implicit rate has been negative in the United States since July 2008, and has been persistently negative in Europe since December 2011 (Chart 7). According to their calculations, unconventional monetary policies would thus have made it possible to circumvent the zero lower bound constraint on the nominal interest rate.

Despite the already deteriorated state of the public finances (high levels of debt accumulated even before the crisis, automatic stabilizers that aggravated public deficits), there was a turn to fiscal policy. In the United States, the 2009 Obama Plan injected nearly USD 800 billion of public spending, or about 5.5% of US GDP. The new president, Donald Trump, has announced that he wants to increase the public deficit. In Europe, since September 2015, the Juncker Plan to provide public support for investment projects has been part of a recovery process. At

the end of 2016, the European Commission asked Member States with budget margins to work towards an expansive fiscal policy. In October 2017, the French government announced a plan to boost investment by around 57 billion euros to finance the ecological transition, the training of young people with low skills, and the modernization of public activities, transport, agriculture and the health system. Policies to support public or private investment have the merit of strengthening demand in the short term, with inflationary effects, while increasing the long-term productive potential.

Chart 7. Implicit monetary rate (2006-2015)
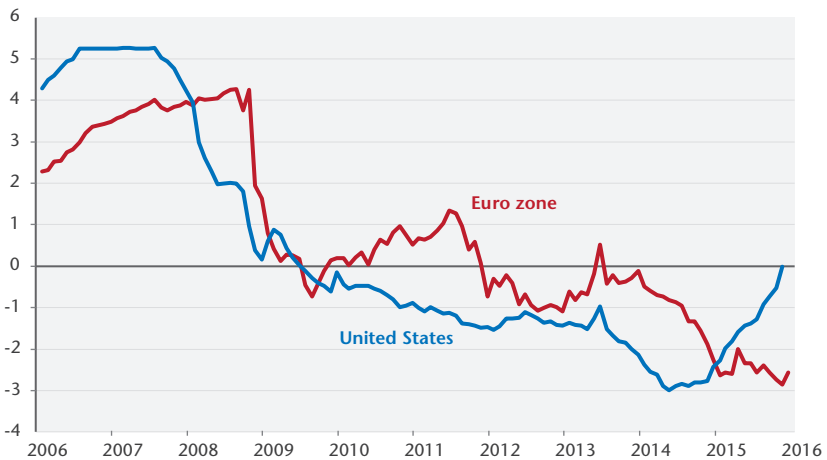
Source: Wu and Xia (2016).

These changes mark a turning point relative to the policies to support supply that gained some consensus prior to the crisis.

Numerous studies[3] show that the public expenditure multiplier is higher in times of crisis than in the upper phase of the economic cycle. An initial explanation would be that, in times of crisis, the financial fragility of part of the population translates into a higher propensity to consume, which makes demand support policies more effective. A second explanation is that, in times of secular stagnation, the over-abundance of savings contributes to the low natural interest rate in Wicksell's sense,[4] and that weak demand leads to disinflationary or

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3. For a review of the literature, see the survey by Le Garrec and Touzé (2017b).

even deflationary pressures. Another reason for the effectiveness of stimulus policies is their ability to raise inflation to a level sufficient to render nominal rigidities inactive.

According to the latest OECD forecasts, the United States and the euro zone are expected to return to a normal level of output in 2018 (Chart 1). However, this return to normal must be put in perspective, because it not only is relying on an increase in demand but also on a reduction of potential growth, and therefore of supply (Chart 2). In addition, low long-term interest rates do not point towards a quick return to normal inflation, which led Summers to say in 2017 that "secular stagnation is the defining economic problem of our time".

2. The Identification of the Secular Stagnation Equilibrium

2.1. The importance of modelling

The stakes for economic analysis are multiple. Although the post-Keynesian models of the 1960s and 1970s were not able to deal with post-oil crisis episodes of stagflation, it seems that the break made in the 1980s by the new applied macroeconomics, based on expecta-tions grounded in rational anticipations and microeconomics, has also left many disappointed hopes in terms of the predictability and anal-ysis of crises (Mankiw, 2006; Woodford, 2009). In particular, the standard approach of economic fluctuations focuses almost exclusively on local dynamics around a long-term equilibrium that is considered unique and stable. The long-term level of production is then guided by supply. In this kind of configuration, the solutions to support a produc-tive potential that is too low involve freeing up the factors of production by fighting rigidities and encouraging investment to boost productivity. Without going into detail, we could think of any policy favouring investment in R&D (Aghion and Howitt, 1998) or in human capital (education, training, apprenticeships – Lucas, 1988; Cohen and Soto, 2007).

The possibility that a demand shock may have a persistent effect is a major challenge for macroeconomics. Indeed, in its current consensus, long-term phenomena can be explained only by supply factors. More

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4. The natural interest rate in the sense of Wicksell (1989) is the one observed when there is a balance of supply and demand across all markets, and therefore full employment. When markets are not in equilibrium, the observed money rate is not equal to the natural interest rate.

precisely, the standard model places the accumulation of productive capital at the heart of the process of economic growth: the unutilized part of today's income is invested in the productive capital of tomorrow (Solow, 1956). It also highlights the importance of factor productivity. Therefore, if we admit that the economic crisis may have permanently damaged this productivity, then this will also generate a fall in investment and accumulated capital. We immediately see the limits of this explanation for dealing with key issues in the 2008 crisis. Indeed, the weakness of supply should have an inflationary effect, whereas we are seeing low inflation. Moreover, if we characterize the crisis in the standard model by a negative demand shock that is capable of retranscribing the weakness of inflation, this effect can only be transitory since a demand shock can only initiate temporary fluctuations around a stationary equilibrium, which is assumed to be unique and stable. The persistence of the crisis is left unexplained. In the end, the symptoms of the 2008 economic crisis argue for approaches that are based on the existence of multiple equilibria and / or regime switching. In models like this, the crisis would consist of a transition from a full employment equilibrium to a notoriously inefficient equilibrium that would translate into a lower long-term level of production, weak inflation and high unemployment.

The long stagnation arising from the crisis thus highlights both a macroeconomics based on numerous market imperfections to provide the basis for macroeconomic imbalances (Benassy, 2003) as well as the need to understand the mechanisms underlying global macrodynamics to go beyond purely local approaches. This change of perspective is especially important as economic policy recommendations can be affected

2.2. The Eggertsson and Mehrotra model (2014)

The model developed by Eggertsson and Mehrotra (2014) is part of this conceptual renewal aimed at understanding the multiplicity of equilibria and the persistence of crises. In addition to the full employment equilibrium, they highlight what is called a secular stagnation equilibrium that is characterized by a persistent output gap and deflation. Their model is based on the consumption and savings behaviours of agents with finite lives in a context of a rationed credit market and nominal wage rigidity. To this end, they use an overlapping generations model (Samuelson, 1958; Diamond, 1965; Galor, 1992). In this

economy, households live in three periods: in the first period, they borrow to consume; in the second, they work, consume, repay their credit and save; in the third, they consume their savings and income. As for the monetary policy conducted by the central bank, it consists in setting the nominal interest rate according to a Taylor rule. This theoretical framework makes it possible to go beyond the model of Eggertsson and Krugman (2012) with agents with infinite life horizons, which is not able to explain the persistence of the crisis. Eggertsson and Mehrotra (2014) then show how taking into account agents who are positioned differently in their life cycles, in a context of credit rationing and nominal rigidity, makes it possible to obtain a stationary, and therefore lasting, secular stagnation-type equilibrium.

Their model has the great merit of explaining the mechanisms for the descent into secular stagnation. According to this approach, secular stagnation was initiated by the 2008 economic and financial crisis. The crisis was associated with households' excess debt, which was reflected during the crisis by credit rationing to these same households. In this context, credit rationing led to a fall in demand and excess savings. As a result, the equilibrium real interest rate falls. To counter the low inflation associated with depressed demand, the monetary authorities must then reduce their key rate, but such a policy is possible of course only when the nominal rate associated with ensuring that the inflation target can be hit is positive, that is, if the equilibrium interest rate is not too negative. If this is not the case, then conventional monetary policy becomes inactive as it comes up against the zero lower bound constraint (ZLB) on the nominal rate. In this configuration, it is no longer possible to hit the inflation target, leading the economy into a zone of low inflation, or even deflation. In this latter case, nominal downward wage rigidity translates into higher real labour costs and thus lower labour demand from firms. As a result, unemployment steadily rises. The interaction between deflation and nominal wage rigidity is at the heart of the result obtained, and explains why there is no force pushing back towards a full employment equilibrium.

2.3. Accumulation of capital and transition dynamics (Le Garrec and Touzé, 2015 and 2016b)

In the model proposed by Eggertsson and Mehrotra (2014), there is no accumulation of capital. Therefore, the underlying dynamics is characterized by adjustments without transition from one stationary

equilibrium to another (full employment towards secular stagnation if a credit crunch, and vice versa if the credit constraint is loosened).

To extend their analysis, we considered (Le Garrec and Touzé, 2015 and 2016b) the accumulation of physical capital as a prerequisite for any productive activity. More specifically, individuals are expected to borrow when they are young (first period of life) to invest in a productive activity that will be effective in the next period (second period of life). This way of modelling the accumulation of capital fits into the standard framework of growth models (Samuelson, 1958; Solow, 1956). In this way, the overall dynamics of the economy is characterized by a predetermined variable, capital, and a free variable, inflation.

The dynamics of capital is based on a Solow-type (1956) accumulation mechanism,[5] while the level of inflation is determined by Fisher's equation (1933). The latter links the nominal interest rate set by the central bank with the real return on capital obtained at equilibrium on the financial market. Since the central bank sets the nominal policy rate according to observed inflation, it follows that the level of current inflation depends on expectations about the future state of the economy in terms of inflation and accumulated capital.

This theoretical framework makes it possible to characterize the long-term convergence with the transient dynamics and thus not to be limited to the study of stationary states alone. It also helps in examining how fiscal policy can promote inflationary pressures that are beneficial to the economy but also lead to an unfavourable crowding out of private investment.

Chart 8a illustrates the dynamics of the fall into secular stagnation following a tightening of credit at date $t = 0$. Starting from a situation of full employment characterized by an initial capital level, denoted k_{FE}, and a rate of inflation at its target level (denoted π^*), shown that if the credit crunch is sufficiently large then the equilibrium interest rate becomes sufficiently negative that it is no longer possible to actively pursue a conventional monetary policy.

In this case, the only equilibrium the economy has is a secular stagnation type, and it plunges into recession with underemployment of the labour factor (unemployment induced by nominal rigidity) associated with production that is below its initial potential (decline in the

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5.   In each period, a portion of the output is saved and invested in capital. The latter will be used in producing during the next period.

Chart 8. Dynamics of entering and exiting secular stagnation: profile of capital and inflation trajectories

a) Dynamics of entering (credit crunch)   **b) Dynamics of exiting (credit loosening)**
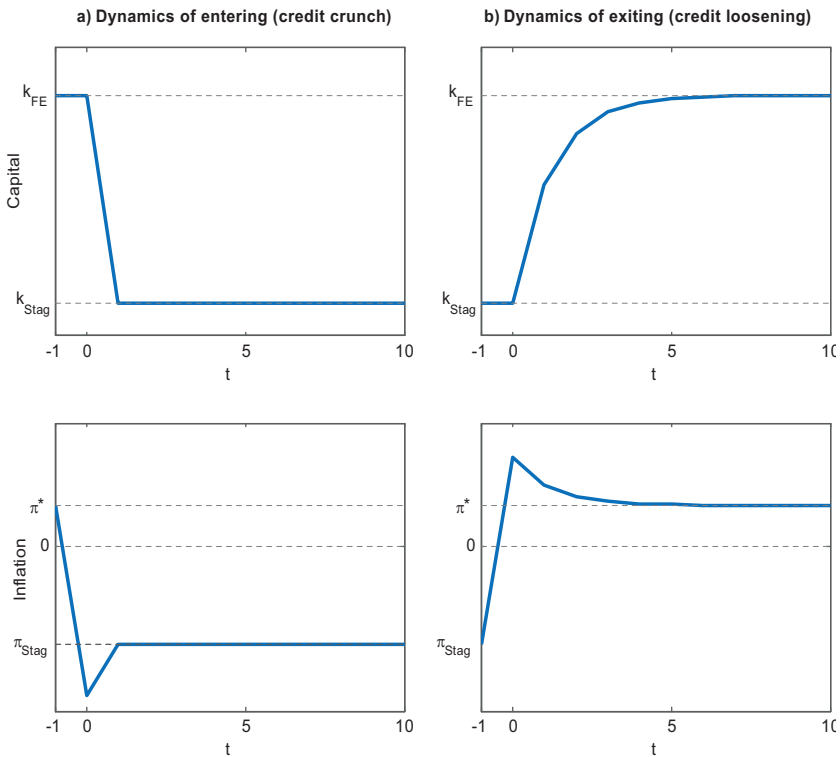
Source: Le Garrec and Touzé (2016b).

stock of productive capital) and a negative inflation rate (deflation) denoted $\pi_{Stag} < 0$. If we assume that initially the economy is at its stationary level of full employment, following the first period when the capital cannot be adjusted since it is already installed, the latter will then decrease to directly reach its new equilibrium level of secular stagnation denoted k_{Stag}.[6] It is worth noting that the level of deflation over-adjusts at the moment of the shock. Indeed, since the installed capital does not adjust instantaneously, there is a higher supply, which results in stronger deflation. Deflation then adjusts to a lower level.

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6.   Technically speaking, this adjustment is due to the presence of an eigenvalue equal to zero (the other being greater than unity which guarantees a determinate equilibrium).

The determination of the dynamics of secular stagnation (Charts 8a and 8b) shows an asymmetry. Thus, in Chart 8b, which characterizes the credit constraint loosening to return to its initial level, we observe that capital takes time to return to its initial level while the entry into secular stagnation is immediate (Chart 8a). In other words, the fall into secular stagnation seems to take place significantly faster than the process of exiting the crisis. This observation suggests that economic policy interventions to combat secular stagnation must be made as quickly as possible.

3. Efficiency of Economic Policy in the Age of Secular Stagnation

The secular stagnation equilibrium thus highlighted, as in Eggertsson and Mehrotra (2014) and Le Garrec and Touzé (2015, 2016b), and contrary to Krugman and Eggertsson (2012), is an equilibrium that will persist as long as the tight credit lasts. From this point of view, active policies to counter the scarcity of credit, all other things being equal, are crucial for combatting secular stagnation. But the conditions for a secular stagnation equilibrium are not due solely to the effects of a financial crisis. Excess savings that lead to negative real interest rates can also result from other factors, such as the aging of the population. The latter is characterized by a decrease in the growth of the workforce as well as an increase in life expectancy:

— The reduction in the growth of the labour force hinders investment needs, which reduces the demand for capital.

— A longer life expectancy increases the need for life cycle consumption, which requires greater savings.

These two effects cumulate to favour an excess of savings.

In addition to the stabilization of the financial markets, any other economic policy that could prove effective in fighting unemployment must therefore be considered: first and foremost, monetary and fiscal policies, but also more structural policies aimed at making the labour market more flexible and promoting productivity.

3.1. Structural policy: Keynesian paradoxes in a supply model

First of all, to reduce unemployment one naturally thinks of policies that promote productivity: training, innovation and investment. However, in secular stagnation, this leads to a paradox that was first

formulated by Eggertsson (2010): "if everyone tries to work more, this will in fact reduce aggregate employment in equilibrium". More generally, in a configuration of the secular stagnation type, any increase in productivity leads to recessionary effects in the economy because it generates deflationary pressure. As a result, since monetary policy is constrained by a zero bound on nominal interest rates, deflation is accompanied by an increase in the real interest rate, which tends to reduce demand at equilibrium. On the other hand, rising productivity has a positive impact on full employment output, even if the actual impact is reversed in a state of secular stagnation.

Second, making the labour market more flexible is often considered in fighting against unemployment. However, in secular stagnation, a decrease in nominal wage rigidity also tends to reduce the level of output and push up unemployment. Indeed, this wage deflation policy also weighs on households' purchasing power, which reduces their demand and tends to lower inflation expectations, which in turn favours greater deflation and therefore a downturn in economic activity.

3.2. Monetary policy: inflation target and instability of anticipations

To get out of secular stagnation, the monetary authorities could go for a policy aimed at raising the inflation target π^* as advocated by Blanchard *et al.* (2010). However, Eggertsson and Mehrotra (2014) as well as Le Garrec and Touzé (2015, 2016b) show that raising the target too little does not make it possible to exit the secular stagnation equilibrium, which remains unique and stable. However, a sufficient increase would make it possible to bring back the full employment equilibrium, but without removing the secular stagnation equilibrium. The economy would be facing a situation of multiple equilibria. So nothing indicates that inflation expectations will automatically align with the target, which poses problems of an instability in expectations, as the secular stagnation equilibrium is locally determinate. In such a configuration, anchoring the expectations of private agents to align with the target is a difficult task for the monetary authorities. For inflation targeting to be effective, it is crucial in particular that the central bank have sufficient credibility (Woodford, 2004).

The low efficiency of conventional monetary policy poses the need to develop models capable of accounting for the impact of other, less conventional forms of monetary policy, such as quantitative easing or the helicopter currency devised by Friedman (1970).

3.3. Fiscal policy, the impact of crowding out and the size of the multipliers

Fiscal policy is a natural candidate for breaking out of secular stagnation. In fact, by supporting demand, any fiscal impulse generates inflationary pressures which, if they are sufficient, will be able to bring the economy out of the deflationary zone and subsequently into secular stagnation. However, it is necessary to be vigilant about the effectiveness of such a policy. First, if it is financed by debt, it can further increase an already high level of debt, which can pose significant solvency problems. Second, if it is financed by taxes, it can have a negative impact on capital accumulation and thus depress potential GDP. So there may be a trade-off between "exiting from secular stagnation" and "the accumulation of capital". We highlight this by studying the fiscal multiplier:

$$\frac{\Delta\ Production}{\Delta\ Public\ Spending} = 1 + \frac{1}{s}\ \frac{\Delta\ Private\ Investment}{\Delta\ Public\ Spending}$$

where s is the savings rate.

The size of the multiplier depends crucially on the variation in private investment (and thus on capital accumulation) in response to the fiscal stimulus. If investment increases, then the multiplier is greater than one, meaning that fiscal policy is effective.

The fiscal stimulus has two effects on investment. On the one hand, if the rise in aggregate demand helps to avoid deflation, the gain in efficiency (nominal rigidities become inactive) leads to an increase in household income and demand for capital. On the other hand, the rise in tax-financed public spending reduces the disposable income to be saved, which pushes up interest rates and crowds out private investment.

When the crowding out effect is weak, after-tax household income rises and the economy accumulates capital. The fiscal multiplier is then greater than one, marking an effective policy (Chart 9a). In contrast, when the fiscal stimulus is too large, after-tax household income declines and the crowding out effect depresses investment. The fiscal multiplier is then less than one even though the economy has moved out of a state of secular stagnation (Chart 9b). The capital accumulated in the state of full employment is then lower than that accumulated under the secular stagnation regime: $k_{FE} < k_{Stag}$.

Chart 9. Fiscal impulse and exiting secular stagnation
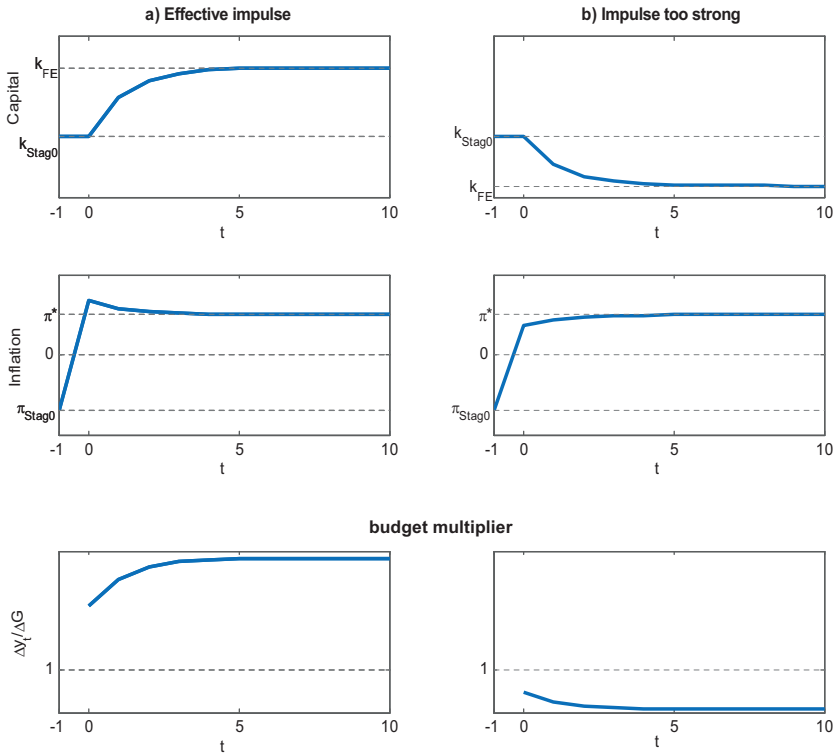
Note: The fiscal impulse is permanent and begins at $t = 0$. y_t denotes the level of production at the date t and G the volume of public expenditure.
Source: Le Garrec and Touzé (2016b).

4. Conclusion

Even if over time certain features of the crisis seem to fade, its impact is lasting (reduction of potential), and the resort to fiscal policy in a context of high public debt as well as to unconventional monetary policies raises questions about the nature of the crisis and its impact on the functioning of the economy. Modelling the secular stagnation equilibrium is therefore a promising avenue for research.

The secular stagnation hypothesis and the formal study of its dynamics thus invite us to rethink the analysis of classic macroeconomics, and therefore the conception of economic policy. In our approach, following Eggertsson and Mehrotra (2014), based on two

types of market imperfections that hit, respectively, the credit market (rationing) and the labour market (nominal rigidity), the emergence of a nominal rate that is close to zero (zero lower bound) raises concerns that "conventional" monetary policy, which is based mainly on setting a key rate, will lose its effectiveness. In a context where the effective inflation rate and the full-employment equilibrium interest rate are negative, macroeconomic dynamics can lead to trajectories of permanent underemployment that are synonymous with secular stagnation.

The lessons of this approach are multiple. First, to avoid the ZLB, there is an urgent need to create inflation while avoiding speculative asset "bubbles" (Tirole, 1985), which may require special regulations. The existence of a deflationary equilibrium poses questions about the validity of monetary policy rules that focus too much on inflation (Benhabib *et al.*, 2001). Second, one must be wary of the deflationary effects of policies aimed at increasing potential output. The right policy-mix could be to support structural policies with a sufficiently accommodating monetary policy. Reducing savings to raise the real interest rate (for example, by facilitating access to credit) is an interesting avenue, but the negative impact on potential GDP must not be overlooked. There is an undeniable trade-off between getting out of secular stagnation and not depressing capital accumulation (crowding out effect), and therefore the economy's long-term productive potential. One interesting solution might be to finance infrastructure, education and R&D policies (higher productivity) through public borrowing (raising the equilibrium real interest rate). Indeed, a strong investment policy (public or private) could make it possible to satisfy a twofold objective: to support aggregate demand and develop the productive potential.

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