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A CRITICAL ANALYSIS OF THE SECULAR STAGNATION THEORY

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A critical analysis of the Secular Stagnation theory

Stefano Di Bucchianico*

February 2019

Abstract: In this paper a novel critique of the neoclassical Secular Stagnation theory is presented. Focusing in particular on the ‘demand side’ explanation, it is in the first place argued for the impossibility of a long-run equilibrium position to host a negative natural interest rate, which is its main feature. The problem is theoretical and not methodological, and can be highlighted even neglecting the ‘Cambridge capital controversies’. Secondly, it is argued that, despite the label, there is not a true role for aggregate demand in determining a stagnation. It is also maintained that while the ‘supply side’ viewpoint does not suffer from these shortcomings, it cannot provide a clarification since there is no place in it for involuntary unemployment. Therefore, a demand-led alternative is advocated to be better equipped for the sake of accounting for high and persistent unemployment caused by a shortfall of aggregate demand.

Keywords: Secular Stagnation, natural interest rate, fiscal policy

JEL Codes: E620, E430, E130, E120

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1. Introduction

Since the speech given at the 2013 IMF Conference by Larry Summers, the issue of Secular Stagnation (SS), originally coined by Hansen (1939), has been brought back to the stage. In fact, we have seen in recent years a spur of articles treating the subject from various angles. Despite the partial recover testified by the US economy after the Great Recession and the stagnation post-2010, the matter is still protagonist of harsh confronts, the last being the bitter debate between Summers and Stiglitz about the meaning of SS.¹ Arguably, one of the most important features of the SS theory resides in its alleged capability to interpret why many advanced capitalistic economies are experiencing low rates of growth together with a high and persistent unemployment and plunging real interest rates. The answer provided by the SS scholars rests in the emergence of an equilibrium position in which there is a negative natural interest rate (NNIR); given the ‘zero lower bound’ (ZLB) on the nominal interest rate plus weak prospects for inflation, monetary policy becomes ineffective. Moreover, this theoretical proposal allows to look anew at fiscal policy as a valid instrument to fight a stagnation, contrary to the received mainstream wisdom according to which monetary policy has to be relied upon to ensure that the deviations of output growth from its given trend determined by supply side factors are minimized. A close strand of research then investigates the long-term consequences of a persistent shortfall of demand such as hysteresis feedbacks; thus, the potential output itself can suffer from insufficient aggregate demand.

We will not engage in a reconstruction of the path leading to the restatement of the SS theory;² rather, we will focus on the major recent attempts to formalize it within the most frequently used neoclassical models. Our discussion will touch upon two main issues: the study of the theoretical long run position featuring a NNIR, which is the main novelty within those models, and an enquiry about the role of aggregate demand in explaining the stagnation, since the problem is said to reside in a realized output persistently below its potential level. Accordingly, section 2 describes the SS theory, differentiating also between its demand and supply side strands, section 3 discusses the impossibility for the models analysed to encompass a NNIR and the altogether secondary role attributed to aggregate demand, section 4 concludes.

¹ The debate (Stiglitz and Summers 2018), appeared on *Project Syndicate*, has seen Stiglitz attacking the SS theory inasmuch as it served, in the aftermath of the Great Recession, as an excuse for the US government authorities for their ill-designed policy crackdowns. Summers has replied by pointing out the basic misunderstanding of Stiglitz; according to him, that theory serves exactly to buttress the case for more active public fiscal intervention. We are going to see below that these issues are not of secondary importance for assessing the validity of the SS framework.

² For a comprehensive treatment of these aspects, see Backhouse and Boianovsky (2016).

2. The Secular Stagnation theory

In this section we will illustrate the analytical framework characterising the SS theory. We will hereby focus on the so-called ‘demand side’ Secular Stagnation (dsSS), which is by far the mostly discussed and accepted version. After that, we will briefly present the ‘supply side’ Secular Stagnation (ssSS).

2.1 - The ‘demand side’ Secular Stagnation

At the core of the dsSS coined by Summers (2014a, 2014b, 2015), whose reasoning is embedded in a classic IS-LM framing, there is the Wicksellian natural interest rate determined at the intersection of the curves of the demand for investment and the supply of savings.^{3,4} Following Summers, in the last decades such a natural interest rate has been continuously decreasing because of the downward pressure imparted to both curves by several factors interplaying together. The most important are enlisted by Summers together with each respective effect upon either schedule (Summers, 2014b, pp. 69 – 71). On the one hand, The changing nature of major firms, which do not anymore rely on massive amounts of physical capital to operate,⁵ together with the falling relative price of investment goods with respect to consumption goods, weaken the demand for investment. On the whole, a significantly lower amount of savings are needed to finance the aggregate desired amount of investment. On the other hand, the worsening of income distribution, that tends since decades to disfavour workers’ incomes,⁶ boosts the supply of savings as the recipients of capital incomes have a higher marginal propensity to save. This element thus increases the availability of savings in the economy.^{7, 8} The overall effect is a remarkable pressure on the natural interest rate that eventually results in its fall below zero, as shown in the graph:

³ For a comprehensive work in which several viewpoints about Secular Stagnation are reviewed, cfr. Teulings and Baldwin (2014).

⁴ “The rate of interest at which *the demand for loan capital and the supply of savings* exactly agree, and which more or less corresponds to the expected yield on the newly created capital, will then be the normal or natural real rate.” (Wicksell K., 1935, p. 193, emphasis in the original)

⁵ Summers cites companies such as Facebook, Whatsapp, etc.

⁶ The recent work of Piketty (2014) has provided an encyclopedic evidence about the increasing trend of inequality in the major advanced economies.

⁷ Before SS regained attention, Bernanke (2005) was already singling out the role of the ‘global savings glut’ originated from the major Eastern economies. That flow of savings was already seen back then as a source capable of boosting the supply of savings.

⁸ The slackening of population growth is said to be another element contributing to lower the natural interest rate, but with a less clear cut role. In Eichengreen (2015, pp. 68 - 69) this element is said to have ambiguous effects on the natural interest rate.

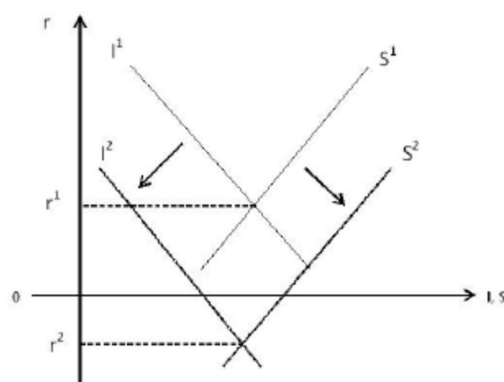


Figure 1 - The negative natural interest rate resulting from a low demand for investment and a high savings' supply, own graph.

According to Summers, in presence of a NNIR the Central Bank's monetary policy loses much of its power since the policy controlled nominal rate is constrained by the ZLB. The normal strategy would be, for given inflation expectations, to lower the nominal interest rate for the sake of equalizing the market real interest rate to its natural level; the nominal rigidity impairs the effectiveness of such a policy.⁹ As long as the disequilibrium situation persists, the effective level of output will systematically fall short of its potential; this can ultimately lead to 'hysteresis' effects (Fatás and Summers, 2018). In the words of Summers (2015, p. 61):

if one assumes that investment is a decreasing function of the interest rate and that saving is an increasing function of the interest rate and that the level at which equilibrium with full employment takes place requires a negative nominal interest rate, then adjustment will take place in the form of a lower level of output, and that lower level of output may continue indefinitely.

As in the original Wicksellian framework therefore, the equalization between a natural interest rate determined by real factors and the market interest rate can be hindered by a financial friction; in the old conception the responsibility was borne by private banks' behaviour,¹⁰ while in the modern theory the ZLB prevents the adjustment from taking place. In such a situation the market process of convergence towards an equilibrium would involve a recession that makes the 'excess of savings' vanish, thereby bringing the natural interest rate back to a non-negative level. This is why Summers contends for fiscal policy to regain a primary role within the policymakers' tools: when monetary policy is ineffective the best way to address stagnation is to resort to a deficit-spending policy fostering public investment. This would permit to bring the natural interest rate back to the positive region by moving upwards the demand for investment curve.¹¹

⁹ The 'Taylor Rule' is usually considered the rule of thumb followed by Central Banks when conducting monetary policy; cfr. Taylor (1993).

¹⁰ On this point, cfr. Wicksell (1907).

¹¹ The renewed attention towards the role of fiscal policy in a ZLB situation was already present in DeLong *et al.* (2012).

The dsSS framework in which the NNIR and the ZLB together cause a persistent shortfall of aggregate demand can be found in other major contributions. Krugman *et al.* (1998) already explained the long-lasting Japanese stagnation utilizing that schema: following the author, for a given plunging population growth rate of Japan, the prospects of decreasing potential output would have caused the emergence of a NNIR while the Bank of Japan had already brought the nominal interest rate close to the ZLB. More recently we find the attempt of Eggertsson and Mehrotra (2014) and Eggertsson *et al.* (2017) to translate the intuitions of Summers into a fully-fledged OLG model in which the NNIR is present in a long run steady-state position. The intuitions of Summers find in there a formal treatment, but the final message is the same: in a SS equilibrium fiscal policy is the best available tool to prevent a persistent shortfall of demand. These claims are finally tested against a calibrated model simulation.

After the bird's eye view on the major dsSS models, we can present a general reconstruction of the logic beneath this theory:

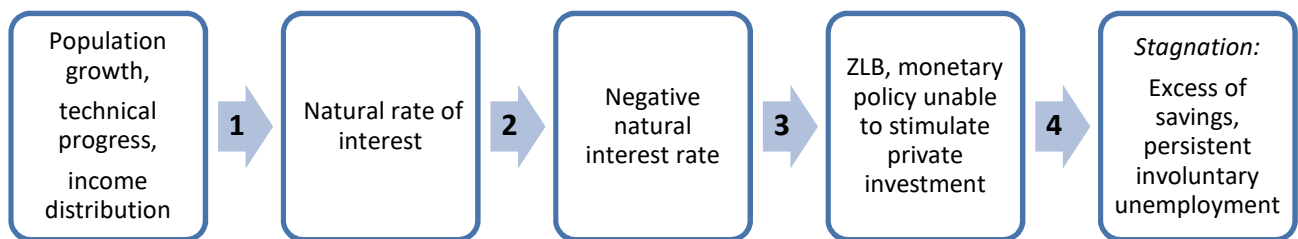


Figure 2 - The logical chain of the 'demand side' Secular Stagnation, own graph.

Step 1 shows the channel through which the various factors enlisted by the dsSS scholars enter the picture, namely their effect upon the natural interest rate. Step 2 displays the crucial novelty of the dsSS: the appearance of a NNIR. Step 3 singles out the impediment to the realization of an equilibrium: the ZLB prevents monetary policy from exploiting the systematic inverse relationship between private non-residential investment and the interest rate when there is a NNIR. Step 4 closes the reasoning: a SS equilibrium materialises, involving an excess of savings at any positive interest rate and persistent involuntary unemployment.

2.2 - The 'supply side' Secular Stagnation

We now conclude sec. 2 by briefly presenting the 'supply side' SS. This version points the attention towards the supply side factors affecting the dynamics of the potential output. There is, according to this view, no need to resort to the NNIR and the ZLB to explain a stagnation; it suffices to refer to demography, technological progress and human capital accumulation. The most important author setting forward the ssSS theory is Gordon (2015). The main concerns expressed by Gordon regard the following factors:

- demography trends, reflected chiefly in ageing population and plummeting labour force participation rates;
- the TFP growth slowdown, caused by both a weakening effect of technical improvements on productivity growth and the diminishing returns from education in terms of human capital accumulation, once the large scale transition to a universally educated society had been completed already by the '70s.

In this version therefore there is no mechanism hindering the realization of the full employment output, it is the dynamics of potential itself that is much slower than what we have witnessed in previous decades. Its logical chain is:

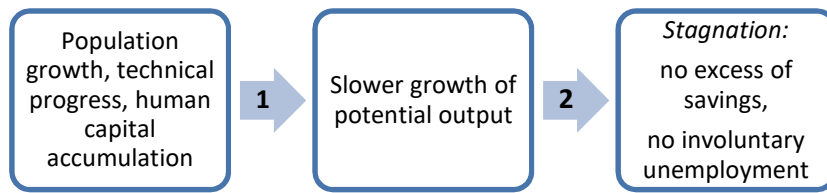


Figure 3 - The logical chain of the 'supply side' Secular Stagnation, own graph.

In it the path to stagnation is way more direct than that of fig. 2, but at the end we do not find neither a shortfall of demand nor involuntary unemployment, given the absence of elements hindering the realization of full employment. After the presentation of the two main strands of thought we are concerned with, let us now move to section 3, where we will develop our critique on the SS theory.

3. Theoretical shortcomings of the Secular Stagnation theory

Between the two different proposals, the dsSS has received a much greater deal of attention both within the mainstream field and the heterodox camp. In addition to this, it is within such a field that the main theoretical novelty, namely the NNIR, is employed to explain the SS equilibrium. It is therefore on the dsSS that we are going to mainly linger on; later, we will include into our discourse also the ssSS. In this section we will analyse two major issues: the theoretical acceptability of an equilibrium position in which the natural interest rate is negative, and what role has aggregate demand within the dsSS.

We start by discussing the possibility for a NNIR to be present within the most common neoclassical models. We will investigate such an issue, in this order, into a model with intertemporal optimization but without capital, a model with capital but not intertemporal optimization, a model with capital and intertemporal optimization over an infinite horizon, a model

with capital and intertemporal optimization over a finite horizon. We will emphasise the logical difficulties encountered to obtain a NNIR along with the plausibility of the hypothesis needed to get it.

3.1 – Intertemporal optimization without capital over a finite horizon

In the model of Krugman *et al.* (1998, pp. 142 – 148) the natural interest rate is pinned down through the Euler equation for intertemporal utility maximization over a two-periods horizon:¹²

$$1 + r = \frac{1}{\beta} \left(\frac{y^*}{y} \right)^\rho \rightarrow r < 0: \left(\frac{y^*}{y} \right)^\rho < \beta \quad (1)$$

$$r = i - \pi^e, \quad i = 0 \rightarrow r = -\frac{P^* - P}{P} \quad (2)$$

In this case, the NNIR is obtained in an economy in which agents optimize their utility within a two-periods time span, with given endowments and preferences. Within the Euler equations therefore the interest adjusts to deliver optimality. This produces a result in which the agents would prefer to consume tomorrow since the marginal utility of doing so is higher than today; therefore, the interest rate becomes as a price to be paid to move consumption from today to tomorrow. Indeed, in equation (1) the NNIR comes about when the future potential output falls sufficiently below the current potential output. Krugman argues that by coupling the NNIR from (1) and the equality at the ZLB between the real interest rate and the expected inflation rate with the sign changed in (2) one may not be able to reach the equilibrium when the price level today is sticky and the belief that the Central Bank will stick to a conservative inflation policy even tomorrow is deeply ingrained in agents' minds.^{13, 14}

The *restrictiveness* of the assumption needed to get the NNIR rests in the supposition that the endowments tomorrow are not only strictly lower, but sufficiently lower than today. In the case

¹² In (1) r is the (real) natural interest rate, β, ρ are the representative agent's discount factor and relative risk aversion, y^*, y are the endowments of a single consumption good for tomorrow and today. The representative agent preferences and the amounts of consumption today and tomorrow are exogenously given. In (2) i is the nominal interest rate, π^e is the expected inflation rate, P^*, P are the price levels for tomorrow and today; this condition is the usual Fisher's formulation for the real interest rate. The price level tomorrow is given, while the price level today is fixed by the Quantity Theory of Money.

¹³ In that instance the best policy would have been, according to the author, the reliance on a 'irresponsible' monetary policy ran through deliberate attempts to make agents believe that the Central Bank will pursue a higher inflation target.

¹⁴ Later, Eggertsson and Krugman (2012) singled out another instance in which the natural interest rate in an economy without capital could have become negative: the case for a sharp decline in the borrowing abilities of households. In that case, the two economists argued, a temporary small scaled public fiscal policy intervention would be needed.

of Krugman, such an hypothesis served as a metaphor for a decline in the economy's potential output, making the hypothesis hardly acceptable. From a *logical* perspective, on the contrary, equation (1) appears to deliver an acceptable result: given those restrictive assumptions, the result follows straight. The issue here rests rather in the absence of a treatment of profit maximization when capital and production are introduced.^{15, 16} What happens when we consider capital?

3.2 – Profit maximization without intertemporal optimization

The proposal of Summers (2015) is set forth in a static IS-LM theoretical environment; thus, we can consider within it the presence of capital and profit maximization but we do not have an explicit intertemporal optimizing behaviour. Summers is hence supposing that, absent the ZLB, the economy would find its equilibrium in a position in which entrepreneurs utilize a quantity of capital such that the last unit employed yields a negative net product. Such a result may be attributed to a capital/labour ratio so high that the ensuing marginal product of capital (MPK) becomes not only very low, but even negative. Hein (2016a, 2016b) has attacked the dsSS on this ground: according to him, the 'Cambridge capital controversies' have already shown the untenable nature of the natural interest rate concept outside a one-good economy. This means that, following the critiques of Sraffa (1960), Pasinetti (1966) and Garegnani (1970), there is no possibility to claim that the natural interest rate can be meaningfully determined at the intersection of a downward sloping demand curve for investment and an upward sloping supply curve of savings.¹⁷ However, despite the *full acceptance* of those critiques, our aim is to ascertain whether the neoclassical models under review can host a NNIR even conceding the existence of a positive natural interest rate once capital is introduced in the model.¹⁸ In terms of our enquiry, we want to establish the validity of the 'step 2' even acknowledging the flaws in the 'step 1'.

The widespread constant elasticity of substitution (CES) family of production functions¹⁹ allow to represent the production process as a direct technical relationship between the final net product and the amount of available inputs. Among them the most commonly utilized version is the

¹⁵ A more detailed treatment of the issues arising within the 1998 Krugman's model, which is beyond the scope of the present work, can be found in Di Bucchianico (2018).

¹⁶ Besides, within such a framework, even granting the validity of result, the meaning of the natural interest rate loses much of its force: it is nothing more than a 'own-rate of interest', i.e. a relative price between periods. To better frame the different meaning of the profit rate among the classical, neoclassical and neo-Walrasian approaches, cfr. the discussion of Fratini in Bellino *et al.* (2017).

¹⁷ For a thorough reconstruction of the entire debate, cfr. Petri (2004) and Lazzarini (2011).

¹⁸ Bertocco and Kalajzić (2018) attack the use of the natural interest rate in the dsSS from a different angle. They maintain that in a monetary economy in which investment and savings decisions radically differ to those undertaken in a corn economy (as described by the works of Keynes and Schumpeter that they analyse) a natural interest rate does not exist, and it is hence a useless theoretical tool.

¹⁹ Introduced by Arrow *et al.* (1961).

Cobb – Douglas aggregate production function with constant returns to scale. We employ it in per capita terms to get a better grip on the argument:²⁰

$$Y = AF(K, L) = AK^\alpha L^{1-\alpha}, \quad 0 < \alpha < 1, \quad \alpha + (1 - \alpha) = 1$$

$$y = Af(k, 1) = A \left(\frac{K}{L}\right)^\alpha \left(\frac{L}{L}\right)^{1-\alpha} = Ak^\alpha \quad (3)$$

$$f'(k) = A\alpha k^{\alpha-1}$$

The first derivative with respect to the capital per capita gives the marginal contribution to production of an additional unit of capital to be employed, which in the neoclassical theory also determines the remuneration of capital. In this case, as k increases, the MPK decreases; in the limit, as k approaches infinity, MPK tends to zero. This implies that a proper decrease of the interest rate allows for a demand for capital per capita to be employed in production that can potentially absorb any amount of savings at disposal in the economy. In other words, there is no finite capital/labour ratio at which the natural interest rate becomes negative;²¹ graphically:

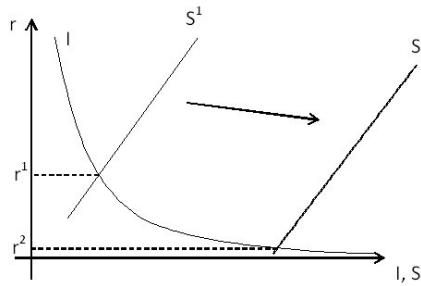


Figure 4 - The intersection between the savings – investment schedules supposing an aggregate production function without a maximum finite capital/labour ratio , own graph.

Hence, in order to sustain the intuition of Summers a particular kind of production function involving a finite value for the capital/labour ratio at which the MPK becomes zero is necessary;

²⁰ In which Y is the net product of the economy, A is the total factor productivity, K and L are the capital and labour inputs, α and $1 - \alpha$ are the output elasticities of capital and labour.

²¹ The same holds for the case of infinite substitutability between factors of production:

$$Y = F(K, L) = aK + bL$$

$$y = f(k, 1) = ak + b \quad (4)$$

$$f'(k) = a$$

In (4) the MPK is a finite positive constant and does not depend on the value of the capital/labour ratio. For a Generalized Leontief Production Function²¹ we get:

$$Y = F(K, L) = K + L + 2\sqrt{KL}$$

$$y = f(k, 1) = k + 1 + 2k^{0.5} \quad (5)$$

$$f'(k) = 1 + k^{-0.5}$$

In (5) when that ratio tends to infinity the MPK tends to 1.

when the required full employment capital/labour ratio surpasses that value, then one would have a NNIR.²²

Let us then suppose the technical feasibility of the latter situation. Indeed, at the abstract level a MPK schedule falling below zero can be conceived. The concept of an ‘excess’ quantity of capital that would push its marginal product below zero is not problematic. What is instead questionable is the statement that the demand curve for capital could follow below zero the MPK schedule. In fact, entrepreneurs always have the possibility not to employ the amount of capital that would render its marginal product negative; in this respect, the lowest reasonable value for the demand for capital schedule is the one in which the MPK would become zero. Graphically:

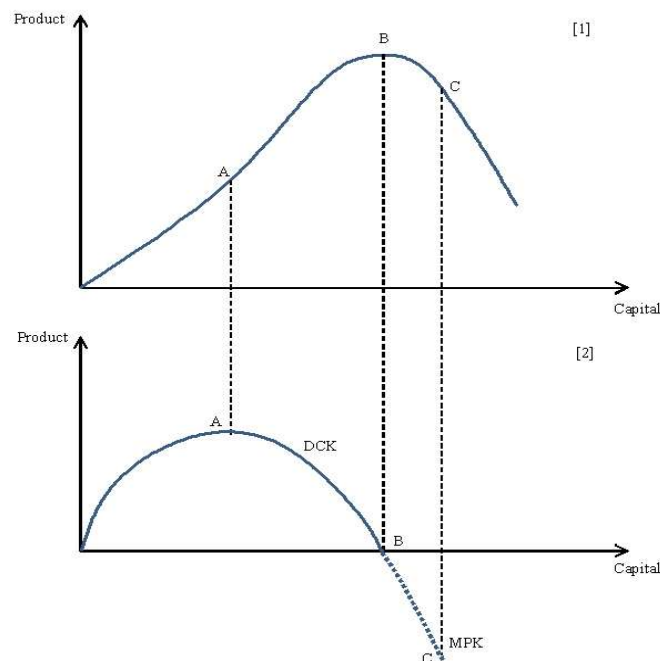


Figure 5 – The profit maximization problem in terms of [1] the product obtained by employing increasing doses of capital and [2] the construction of the demand curve for capital (DCK); own graph.

In [1] we have the amount of product as a function of the capital employed, for a given amount of available labour. At point A entrepreneurs face the flex point beyond which there are diminishing returns from an additional unit of capital utilized. In B the function hits its stationary point delivering the maximum amount of product obtainable. In C it encounters negative returns, as each unit of capital besides B yields a negative net product. In [2] we thus get that the diminishing MPK is displayed from A to C (and beyond), but the demand curve for capital is defined only in the A – B subset. Therefore, even if the technical conditions of production would allow for a negative MPK, a rational entrepreneurs’ decision rules out that possibility. Thus, the demand curve for capital in

²² In Von Weizsäcker (2014) we have an analogous intuition, but the author then claims that the problem can be solved by building an Austrian-type production function replacing the CES functions. Yet, the former incurs in the usual problems of aggregation even when the choice of techniques is well-behaved in a neoclassical sense, as shown in Fratini (2010).

the negative territory is not defined, and without it there can be no intersection with the savings' supply curve below zero.²³

A different but complementary perspective on the issue emerges when reflecting on the implications of the NNIR in terms of income distribution. The 'Product Exhaustion' theorem states that under a regime of constant returns to scale paying the factors of production according to their marginal products ensures that the entire net product is distributed. Formally we have that²⁴

$$Y = F(K, L) = F'_K K + F'_L L = rK + wL \quad (6)$$

In (6) a NNIR entails

$$Y = rK + wL \rightarrow r = \frac{Y - wL}{K} < 0 \rightarrow wL > Y \quad (7)$$

namely, that the share of the net product going to the factor labour exceeds the net product of the economy. Such a situation is difficult to accept. Since in this neoclassical world the pure remuneration of capital (the rate of interest) and the rate of profit are equal in an equilibrium situation, capitalists are supposed to be investing in real capital in order to get a negative rate of profit. What is more, in this instance the very same neoclassical interpretation of factors' remunerations being determined by their relative scarcity crumbles. The theory we are enquiring upon aims at explaining a persistently high unemployment: hence, labour is abundant. Yet, if there also is a NNIR, capital ought to be abundant as well. In light of the theorem, on the contrary, labour ought to be so scarce to earn a disproportionately high remuneration. Therefore, these considerations do not add up in a coherent interpretation. By connecting this issue with the profit maximization principle shown before, we can nevertheless say that in the most extreme situation the amount of capital employed in production can be so high that its remuneration falls to zero, and thus the whole net product would be absorbed by the wage bill.²⁵

A last observation is made by referring to Petri (2015): in there it is shown that in the neoclassical schema the interest rate only determines the optimal capital/labour ratio. Without an initial assumption of labour full employment, the amount of investment remains undetermined. Thus, the very same decreasing demand curves for production factors' employment are drawn having full employment as a premise, rather than a conclusion. It is evident the relevance of such a critique from our perspective: the dsSS wishes to explain a high and persistent unemployment by

²³ We are not discussing here the existence of a savings' supply schedule in the negative territory.

²⁴ In the formula we have a generic aggregate production function, with K and L the capital and labour inputs, F'_K the first derivative of the production with respect to capital and F'_L with respect to labour, r is the interest rate earned on capital employed and w the wage rate earned on labour employed.

²⁵ When the amount of capital employable in production is so high that its remuneration falls to zero it ceases to be scarce, and therefore it is not necessary to pay a price to use it.

drawing its conclusions from an analytical apparatus in which the demand for investment curve is derived by supposing labour full employment.²⁶

But - the dsSS theorist may argue at this point, possibly taking into account the critiques hitherto singled out - the equilibrium position characterized by a NNIR ought not to be taken at face value. In fact, supposing that case is tantamount to saying that a natural interest rate in some very particular instances does not exist; in other words, it simply means that the investment and savings schedules do not intersect at any positive or zero interest rate. If this is the case, the economy remains stuck in a suboptimal equilibrium. Hence, the dsSS would be only describing an underemployment situation, and the efforts spent studying the NNIR equilibrium position would be misplaced. How to reply to this possible contention? According to our reconstruction, the dsSS is *firmly grounded* on the NNIR. In particular, the great emphasis put on the ZLB clearly hints in this direction. Without it, the Central bank might move the nominal interest below zero, thereby attaining (for given inflation expectations) the equality between the market interest rate and the NNIR. For instance, Fischer (2016, p. 41) and Rogoff (2017, Part II) discuss the possible strategic decision to make a transition towards a cashless economy, thereby easing the constraint to monetary policy associated with the ZLB.²⁷ We want to point out that, from a history of thought viewpoint, there is a clear cut counterfactual to our line of discussion. Lawrence R. Klein, in his seminal book '*The Keynesian Revolution*' (1966, pp. 84 – 86), discussed whether the Keynesian system can always be supposed to deliver an equilibrium real interest rate in the market for savings and investment. In his words:

When the saving process is analyzed, the slope of the savings function with respect to the interest rate might be negative or positive and will probably be small in absolute value. More recently, we have come to believe that the investment function is also interest inelastic. It is more likely than not that there will be no positive value of r which satisfies this equation. *Perfect equilibrium of perfect competition is not in general compatible with the system of Keynesian economics.* (Klein, 1966, p. 85, emphasis in the original)

The textual discussion was integrated with a graphical example:

²⁶ Besides, that contribution also inspired the present enquiry since in there one finds the attempt to criticize the neoclassical use of Say's Law without recurring to the results of the 'Cambridge capital controversies'.

²⁷ Given that at the ZLB cash and bonds become perfect substitutes, a negative nominal interest rate on bonds will just make agents willing to hold cash; thereby the impossibility to move the policy controlled nominal interest rate below zero.

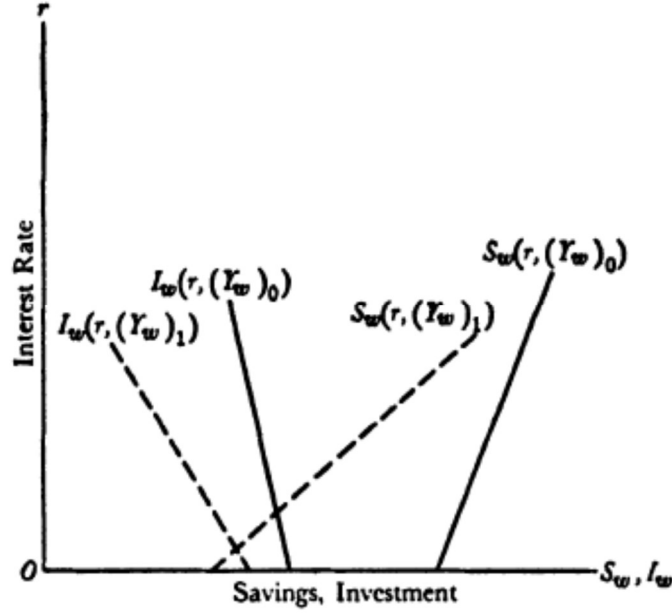


Figure 6 – Klein’s investment-savings schedules in the initial situation without a NNIR intersection (continuous lines), and with the equilibrium at a positive equilibrium interest rate (dashed lines), from Klein (1966), p. 85.

The way in which Klein framed the problem comes in peculiarly useful for our discussion: it permits to better appreciate the stark difference between the two possible positions. In Klein’s framework, given the inelasticity of the two curves, if no positive (or zero) equilibrium real interest can be found, the adjustment process can only run through quantities, hence, a recession removing the excess of savings. In the ‘demand side’ SS, instead, there is a defined NNIR equilibrium position, and *without* the ZLB there would be *no need* for a recession.

A final comment on the ‘static’ model. In the case of Summers it would seem that no stringent hypotheses are necessary to get the NNIR. After all, the factors that should allegedly push the natural interest down are undeniable features of the US capitalism. The problem appears to surface on purely *logical* grounds, as such a long run position violates several basic neoclassical claims. Yet, his statements are set forth in a model without intertemporal optimization, so a deeper investigation is needed.

3.3 – Intertemporal optimization with capital over an infinite horizon

The ‘Ramsey-Cass-Koopmans’ class of models allow to couple intertemporal profit and utility maximization over an infinite horizon, since there is an infinitely-lived representative agent. In this framework the long run balanced-growth natural interest rate is equal to:²⁸

$$r = \rho + \theta x \quad (8)$$

and can thus be negative when

²⁸ Where r is the natural interest rate, ρ the representative agent’s discount factor, θ the intertemporal elasticity of substitution, x the exogenous TFP growth rate.

$$r < 0: \quad x < -\frac{\rho}{\theta} \quad (9)$$

Thus, given the warranted positivity of the preferences parameters, a NNIR requires not only a simply negative, but a sufficiently negative TFP growth rate, which is an extremely strong statement about technical regress; even within the ssSS, where the slackening TFP growth rate is a fundamental element, there is no such claim. What is more, Skott (2016, pp. 176 – 177) and Backhouse and Boianovsky (2016, p. 18) point out that the infinite horizon optimization feature of the model prevents the economy from getting in a ‘dynamically inefficient’ steady-state with a suboptimal capital intensity, with the ensuing ‘too low’ level of the interest rate.^{29, 30} We want to make a stronger case, as dynamic inefficiency is about a *lower-than-optimal* interest rate, but dsSS is about a *negative* natural interest rate. In fact, in the Ramsey model logic a situation of persistent over-accumulation of capital leading to a NNIR cannot be conceived. But, even accepting the above mentioned restrictive assumption about technical regress, the logical conclusion would remain flawed: as shown in sec. 3.1.2, even when $x < -\frac{\rho}{\theta}$, profit maximization does not involve a NNIR.

Nonetheless, Skott, Backhouse and Boianovsky agree in suggesting that an OLG structure would allow the dsSS scholars to make a more favourable case for their conclusions. Let us then turn the attention to this alternative.

3.4 – Intertemporal optimization with capital over a finite horizon

The OLG model of Eggertsson and Mehrotra (2014) studies the intertemporal dynamic behaviour of three different generations (young, middle-aged, old). In the basic case there is no production; in the aggregate there are no savings. There are only endowments of income, which are distributed only to the middle-aged and the old. The young can consume only by borrowing, which is carried out by means of bonds. In this framework the market for loans and savings in which the natural interest rate is arrived at is based on the demand for loans from the young generation and the supply of savings from the middle generation. The old simply consume what they receive as endowment, plus the reward for their lending when they were middle-aged. In the basic version (2014, pp. 5 - 7), from the three periods intertemporal utility maximization problem the authors arrive at the following formulation for the natural interest rate:³¹

²⁹ To this consideration Backhouse and Boianovsky (2016) add that in the model the natural interest rate cannot fall below the positive discount rate, whereas the latter has to be positive to ensure a non-explosive case.

³⁰ In the OLG models there is the possibility to have ‘dynamic inefficiency’ (Diamond, 1965), i.e. a situation in which there is higher-than-optimal capital intensity and thus a lower-than-optimal interest rate. Such a state for the economy can emerge when agents are finitely lived and there is no intergenerational altruism.

³¹ Where r_t is the natural interest rate, β the discount rate, g_t the population growth rate, D_{t+i} are the exogenous debt limits, Y_t^m and Y_{t+1}^o the given endowments to the old and middle aged.

$$1 + r_t = \frac{1 + \beta (1 + g_t) D_t}{\beta Y_t^m - D_{t-1}} + \frac{1}{\beta} \frac{Y_{t+1}^o}{Y_t^m - D_{t-1}} \quad (10)$$

Despite its more refined structure, the authors construct a loans-savings schedule analogous to that of fig. 1. Therein, the demand for loans from the youngsters replaces the traditional investment schedule exhibiting the inverse relationship between the interest rate and the demand for capital as a flow. For an appropriate combination of the parameters in equation (10), the NNIR can emerge in the economy. This happens when, for a given agents' discount rate, the rate of growth of population decreases, the distribution of income favours more the middle-aged and the private debt limit falls.³² The overall picture is consistent with Summer's proposal.

Capital then enters the model through a Cobb – Douglas aggregate production function, and the MPK is arrived at by taking its first derivative r'_t

$$r'_t = (1 - \alpha) \frac{Y_t}{K_t} \quad (11)$$

In addition to (11), the authors formulate the rental rate of capital r_t^K by means of the following equation^{33, 34}

$$r_t^K = p_t^K - p_{t+1}^K \frac{1 - \delta}{1 + r_t} \quad (12)$$

When (12) is evaluated at the steady-state, the exogenously given relative price of capital does not change over time; therefore, the MPK and the rental rate coincide. The minimum value for the steady-state real interest rate r_{ss} compatible with a non-negative MPK and rental rate is shown to be:³⁵

³² The latter two elements require a qualification: the worsening income distribution in the initial version refers to intergenerational distribution, and the exogenously set private debt limit is supposed to fall in order to mimic the collapse of the US financial market happened in 2008.

³³ The rental rate of capital is a variable that contains both the MPK and the capital's price variation between the moment in which it is bought and the one in which it is sold.

³⁴ For the complete derivation, cfr. Eggertsson and Mehrotra (2014, sec. 9). We now have Y the net product of the economy, K and L the capital and labour inputs, α and $1 - \alpha$ the output elasticities of capital and labour, p_{t+i}^K the exogenously given relative price of the capital good in terms of the consumption good, δ the rate of capital depreciation, r_t is the real interest rate.

³⁵ The passages to get to that result, which are not presented by the authors, are

$$r'_{ss} = r_{ss}^K = \bar{p} - \bar{p} \frac{1 - \delta}{1 + r_{ss}} \geq 0 \rightarrow \bar{p} \left(1 - \frac{1 - \delta}{1 + r_{ss}} \right) \geq 0 \rightarrow \frac{1 + r_{ss} - 1 + \delta}{1 + r_{ss}} \geq 0 \rightarrow \begin{cases} r_{ss} \geq -\delta \\ r_{ss} \geq -1 \end{cases}$$

where in the last step only the first inequality is binding.

$$r'_{ss} = r^K_{ss} \geq 0, \quad r_{ss} \geq -\delta \quad (13)$$

In (13) the real interest rate can fall within a range that includes negative values, thereby demonstrating, according to the authors, the possibility of a NNIR in the steady-state even when capital is introduced and MPK is non-negative. The steady-state real interest rate is bound from below by the depreciation rate of capital.

As in the case of Summers (sec. 3.2 above), and contrary to the Krugman and Ramsey-Cass-Koopmans examples, the formalization herein reported involves a list of factors (ageing population, debt-deleveraging processes, rising income inequality) that are empirically verified.³⁶ Thus, the hypotheses made about the patterns for those variables are not problematic; what has to be questioned is the neoclassical interpretation of how do they conduct to a NNIR. Indeed, at the logical level the NNIR appearance is not warranted even in this case. Once capital is introduced agents have two investment options: bonds or real capital. The authors analyse a steady-state solution, in which relative prices do not change; the MPK, which has a zero floor, coincides with the rental rate of capital. Since we are discussing a long run equilibrium with different investment opportunities, the requirement of uniformity for the rates of return must be satisfied. If there is a lower bound on the rate of return yielded by physical capital, in the steady-state the bonds' interest rate cannot fall below it. In equation (13) we thus have two shortfalls: first of all, the interest rate in that model is not only a factor needed to discount future income streams, but also the remuneration of a specific kind of investment. Secondly, a situation in which the MPK is positive (or zero) while the interest rate is negative is clearly not a steady-state position, and violates the uniformity of the rates of return. In our opinion the correct formalization is:

$$r'_t = r^K_t = r_t \geq 0 \quad \rightarrow \quad r_{ss} \geq 0 \quad (14)$$

Let us describe what would happen if the economy finds itself in the equation (13) scenario. With capital mobility, the subjects investing in the bond will not be content with a remuneration lower than the one obtainable on real capital investment. Hence, they will progressively move capitals towards the alternative kind of asset. Under the supposition of a technical description of production via Cobb-Douglas, such a flow of investment will push the MPK down at most to the zero floor, and with it, its rental rate.³⁷ On the other side, the capitals flowing away from the investment in

³⁶ Indeed, in this model the conditions needed are less extreme than in Pagano and Sbracia (2014, pp. 9 – 12, 40 – 42) where a simulation exercise shows the utterly implausible decline of labour productivity needed to get a NNIR in their OLG model, leaving them sceptical about that possibility.

³⁷ Recalling the analysis carried out in sec. 3.1.2, the reasoning holds even with the other CES functions or when there is a finite capital/labour ratio at which the MPK becomes zero.

bond will cause the fall of its price, because of a lower demand for that asset; consequently, the real interest rate rises. Such a process will continue until the two rates of return converge to a uniform value, and thus investors will cease to move capitals from one kind of asset to the other. In the limit case in which a large amount of capitals flow towards the real capital investment, uniformity will in any case be realized at a non-negative value for the two rates of remuneration. Even in this case, therefore, the NNIR cannot be hosted within the model.

Closing the paragraph, we point out that the dsSS equilibrium position featuring a NNIR is not acceptable. Such a conclusion has been reached despite the neglect of the (fully correct) ‘Cambridge capital controversy’ results, showing the deep flaws beneath the natural interest rate theoretical category. What is more, by recalling Garegnani (1976)³⁸ we want to single out another aspect involved in our line of criticism: the equilibrium position under enquiry is not flawed from a *methodological* standpoint, but rather from a *theoretical* standpoint. *The NNIR cannot be welcomed in the widespread neoclassical models*, at least not without costs in terms of general solidity of the entire dsSS explanation. In fact, what we have tried to show are the various serious difficulties in which that theory incurs in, regardless of the specific formalization, being it the simple Euler equation, Ramsey, IS-LM, OLG. The only case that we have deemed *logically* consistent is the Krugman’s Euler version, which unfortunately dodged the introduction of capital. The *restrictiveness* of the assumptions needed to get the NNIR generally mars the plausibility of the results. The version of Summers, and its direct emanation (the OLG model), appear to relax such a restrictiveness but cannot nevertheless host a NNIR. The critique of Skott, Backhouse and Boianovsky holds for what concerns the Ramsey-Cass-Koopmans models but the suggestion to shift to an OLG strategy does not permit to the dsSS to solve its basic inconsistency.

4. What role do aggregate demand and fiscal policy have in the ‘demand side’ SS?

In section 2 we have reviewed the difference between the demand and supply side SS. While in the latter the usual supply side factors constrain the growth of potential output, in the former an insufficient aggregate demand makes actual output systematically lower than potential. We want now to concentrate on the role of aggregate demand and afterwards of fiscal policy within this theory.

³⁸ Garegnani was discussing the shift occurred between the old neoclassical long-run normal position method to the more temporary/intertemporal method; such a methodological change was argued not to matter for the underneath theory.

4.1 – The role of aggregate demand

It is difficult, *prima facie*, not to recognize the particular emphasis that the dsSS puts on the chronic deficiency of aggregate demand, in particular in its component represented by private non-residential investment. Yet, at a closer scrutiny, things gets blurred. Paraphrasing Barba and Pivetti (2008, p. 121), one can state that genuine effective-demand preoccupations ultimately permeate through the discussion of the dsSS, in spite of the whole question being generally approached and wrapped up in neoclassical conceptual garments.³⁹ In the ‘step 1’ and ‘3’ above we have pinpointed two aspects that delimit the role of demand. The first one concerns the way in which the elements causing a stagnation enter the picture. All the various factors do play a role only inasmuch as they have some influence on either the demand for investment or the savings’ supply schedules. Besides the supply side factors such as population growth and technical progress, let us take as paradigmatic the alleged role for worsening income distribution: one expects the redistribution towards subjects having a lower propensity to consume to be read in light of the adverse direct effect on demand. Although saying that such a redistribution towards subjects having a higher propensity to save boosts the supply of savings is tantamount for national accounting, the message becomes altogether different. In the dsSS income distribution *only matters* because it contributes to push the natural interest rate below the ZLB, and so does *any* other factor entering the picture. But, if our claim about the untenable NNIR concept is correct, the dsSS would lose its explicative power. If there is no space to claim that the enlisted elements cause a stagnation by shovelling the natural interest rate into the negative territory, they must be studied from a different perspective. In addition to this, taking a bird’s eye view about the presented literature casts doubts even upon the degree of relevance assigned to the various elements. In the Krugman’s model population growth was of paramount importance, and while the contributions of Summers, Eggertsson, Mehrotra and Robbins widen the group of aspects to be looked at, the simulation of the calibrated SS model of Eggertsson *et al.* (2017, sec. 8, pp. 30 – 42) appears to close a circle. Within it in fact population regains the primary role in the collapse of the natural interest rate below zero.⁴⁰ Overall, we also hence have that in the dsSS supply side factors regularly get the centre of the stage.

In the ‘step 3’ we have pinned down another basic tenet of the theory: were it not for the ZLB, it would be possible to move the nominal interest rate below zero. Such a manoeuvre would permit to further lower the real interest rate, thereby stimulating investment to the level that would remove the excess of savings. It is therefore clear the presence of the usual neoclassical systematic

³⁹ The two authors were discussing the neoclassical reading of the process of private debt accumulation before the unravelling of the Great Recession.

⁴⁰ The final authors’ claim is that the collapse of the natural interest rate started from the seventies, mainly due to the progressive retirement of the ‘baby boom’ generation.

inverse relationship between the interest rate and the amount of private non-residential investment. On this respect, two aspects have to be underlined. Firstly, investment growth is deemed to be weak not because of accelerator-type adverse effects due to low expected demand growth. Rather, investment is held down by the presence of a nominal rigidity. Secondly, even neglecting the theoretical critique laid down to the *logical* structure of the theory, on the *empirical* side there is no neat confirm about the responsiveness of private investment to price variables (as shown, among others, by Shapiro *et al.* 1986, Chirinko 1993, Chirinko *et al.* 1999, Deleidi 2018). Accordingly, there would be *no* definite stimulus to investment from a lowering of the real interest rate below the ZLB.

4.2 – *The role of fiscal policy*

The main novelty about policy prescriptions within the dsSS is the apparent strong role attributed to fiscal policy. At the ZLB estimated fiscal multipliers are larger than average (Woodford, 2011) and public expenditure channelled towards investment can solve the drought of private initiative. Anyway, these claims lose much of their force as they are, again, all related to the NNIR. As it is well known, in the neoclassical models fiscal policy effectiveness is generally marred by the ‘crowding-out’ effect.⁴¹ The NNIR leaves the reasoning unscathed, but changes the role of fiscal policy: in this peculiar instance the pressure on the natural interest rate due to the public sector’s demand for savings is welcomed, as it helps that variable to get back to the positive territory, in so restoring monetary policy effectiveness. It is hence evident how, being the NNIR absent as we maintain, ‘crowding-out’ would become again a curse for fiscal policy actions. What is more, in the already cited model simulation of Eggertsson *et al.* (2017) it is said that a doubling of public debt would augment the natural interest rate by just a 1%. Hence, the authors argue, the strategic return over such a huge public debt increase would be negligible, causing sustainability concerns. As for the role of population, the simulation is enlightening. Within this framework, in fact, it is always possible to retreat from backing up active government actions in the name of public debt sustainability.

It is in our opinion now possible to close the assessment of what role aggregate demand retains within the dsSS by adding fiscal policy to the list of secondary role elements in which consumption, income distribution and investment already belong. Given the untenable nature of the NNIR, it is possible to state that in this framework, contrary to its labelling, *there almost is no role for aggregate demand*.

⁴¹ Together with the ‘Ricardian equivalence’.

4.3 – A demand-led logical chain

The logical chain of the dsSS (fig. 2) allows to analyse a persistent underemployment equilibrium at the cost of walking along a cumbersome and flawed path (step 2 and 3 are indeed defective). The logical chain of the ssSS (fig. 3) is clear-cut but leads to a description of a slower growth rate along a full employment path.⁴² What is missing between these options is an explanation that *is* straightforward *and* allows for persistent unemployment caused by a shortfall of aggregate demand:

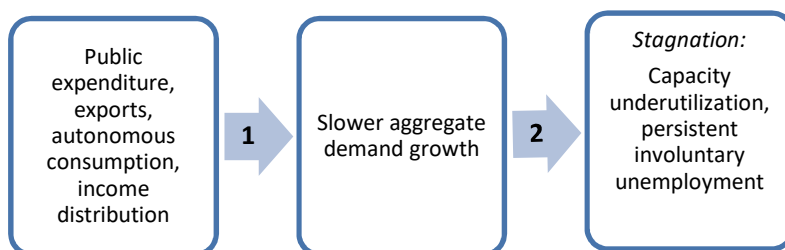


Figure 7 - The logical chain of the demand-led models, own graph.

This kind of alternative can be found in demand-led models in which income distribution and the autonomous components of aggregate demand directly affect both the short and long-run performances of the economy, such as, among others, Allain (2014), Stockhammer (2015), Freitas and Serrano (2015), Pariboni (2016), Lavoie (2016).

5. Conclusions

Secular Stagnation is a widely discussed topic. Its ‘demand side’ description is an interesting theory putting several real world factors (population growth slowdown, novel technical progress trends, worsening income distribution) into a comprehensive explanation for weak economic performances and persistent unemployment, buttressing the case for active fiscal policy. Unfortunately, the reasoning hinges on a long-run equilibrium position in which the natural interest rate is negative. We have tried to show that there is no room within the major neoclassical models to say that there can be a negative natural interest rate, even neglecting the results of the ‘Cambridge capital controversies’. Without it, the rationalization running through the impossibility for monetary policy to reach it because of the ‘zero lower bound’ crumbles. In addition to this, according to our reconstruction, within this framework the ‘genuine aggregate demand preoccupations’ are actually suffocated by the neoclassical garment. It is so because all the elements entering the theory have a role only inasmuch as contribute to the natural interest rate collapse. From a demand side

⁴² Recall that in both cases we have not questioned the existence of a natural interest rate (step 1).

viewpoint, worsening income distribution is of concern for boosting savings' supply, not for its direct adverse effect on consumption. Investment is not held back by weak expected demand growth, but because of the interest rate rigidity. Government spending helps through its pressure upon the natural interest rate, not as a sustain to demand.

More generally, the 'demand side' SS has been framed within the New – Keynesian field. Within that framework, indeed, aggregate demand stimulus usually play a role only when price rigidities, in this case on the nominal interest rate, prevent the attainment of a full employment equilibrium. Here resides the core of our critique: by showing the indefensibility of the negative natural interest rate equilibrium position, also the impossibility for those models to forcefully maintain that demand side issues can explain a Secular Stagnation is exposed. The 'supply side' Secular Stagnation alternative provides a more direct rationale for the slackening economic performances, but cannot account for the enduring presence of involuntary unemployment. Further research upon the neoclassical models is necessary, as for instance Farmer and Nicolò (2018) claim the superiority of their model with respect to the New – Keynesian attempts hitherto investigated. Nevertheless, we claim that what is needed is an explanation which is simple and capable of taking into account a lasting unemployment due to a shortfall of demand. The demand-led heterodox approaches appear to be better equipped than those two mainstream strands of thought.

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