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Alfonso Palacio-Vera

FACULTAD DE CIENCIAS ECONOMICAS Y EMPRESARIALES
UNIVERSIDAD COMPLUTENSE DE MADRID
VICEDECANATO
Campus de Somosaguas, 28223 MADRID. ESPAÑA

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Abstract: We provide a formal definition of the "liquidity trap" (LT) according to which, a LT arises if a combination of high precautionary saving, low investment and stringent conditions for access to bank credit stemming from a high degree of liquidity preference make the sum of the "neutral" interest rate and the expected inflation rate fall short of the term/risk premium on long-term interest rates. We then compare the "New Consensus" (NC) in macroeconomics as expounded in Woodford (2003) and the Post-Keynesian (PK) approach regarding the causes of a LT. We argue that in the NC approach a LT is a phenomenon caused by unusually large transitory shocks that depress the "neutral" interest rate temporarily. By contrast, we argue that in the PK approach an economy may also exhibit a "structural" or long-lasting LT even in the absence of large adverse shocks. Finally, we discuss a number of theoretical issues recently raised in the rapidly growing literature on the LT.

JEL Classification: B50, E12, E24, E50

Key words: Neutral interest rate, liquidity trap, liquidity preference and credit rationing

SOME REFLECTIONS ON THE THEORY OF THE "LIQUIDITY TRAP"

1.- Introduction

The most salient feature of the institutional framework that characterizes most, if not all, present-day OECD economies is that central banks (CBs hereafter) fine-tune the economy through conventional monetary policy actions with a view to achieving an inflation target in the medium-term. We define the former as the regular actions that characterize the day-to-day setting of short-term nominal interest rates by CBs. However, the latter are subject to a zero lower bound (ZB hereafter). This constraint arises because, in a money-using economy, individuals will not be willing to hold any financial asset other than money when the nominal yield of the former is equal or less than zero. Its existence may cause a "liquidity trap" (hereafter LT), i.e., a situation where the CB is unable to push real interest rates down far enough so as to keep inflation constant in the absence of supply shocks.[1] This feature was termed by Kaldor (1939) the "great constitutional weakness" of monetary policy because it prevents the short-term nominal interest rate from operating equally freely in both directions. The existence of the ZB has been well-known at least since the publication of Keynes´ *General Theory* (Keynes, 1936). Notwithstanding, it has only been in the recent past that mainstream economists have turned their attention to it. In particular, proponents of the "New Consensus" in macroeconomics (hereafter NC) have led this line of research.[2] Two events explain, according to us, this phenomenon. First, it has become much clearer, especially since the early 1990s, that CBs fine-tune the economy through changes in nominal short-term interest rates rather than through changes in the monetary base. Second, there is the protracted period of sluggish growth and deflation experienced by the Japanese economy

since the 1990s and its attribution by some prominent scholars to the occurrence of a LT (Krugman, 1998; Svensson, 2005).

In order to show the causes of the emergence of a LT we develop a simple Post-Keynesian (hereafter PK) model. Central to the workings of the model is the notion of the "neutral" interest rate which we define as the long-term real interest rate which is *neutral* with respect to the inflation rate and tends neither to increase it nor to decrease it in the absence of supply shocks.[3] The model is then used to discuss a number of issues raised by recent contributions to the theory of the LT.

The structure of the study is as follows. Section 2 presents a formal definition of a LT. Section 3 presents the NC approach to the analysis of the LT whereas section 4 presents the PK approach. According to us, the crucial difference between the two approaches is that, in the former, a LT is viewed as a *fairly* rare and transitory situation which may only emerge in the wake of unusually large adverse shocks that depress the "neutral" or "natural" interest rate whereas, in the PK approach, an economy may also exhibit a "structural" or long-lasting LT. More specifically, an economy will exhibit a "structural" LT if a combination of high precautionary saving, low investment, and stringent bank credit conditions stemming from a high degree of liquidity preference (hereafter LP) makes the sum of the steady-growth "neutral" interest rate and the expected inflation rate fall short of the term/risk premium on long-term interest rates and loan rates. Section 5 discusses a number of theoretical issues that have featured prominently in the recent literature on the LT like the possibility of generating inflation to escape a LT, the "monetarist" definition of the LT and the role of the banking system in bringing about a LT. Section 6 concludes.

2.- The Liquidity Trap

A LT is usually defined as a situation in which the real interest rate (in a closed economy without a government sector) at which saving at the employment rate consistent with constant inflation and investment would be equal is negative (Krugman, 1998, p. 150). In a LT conventional monetary policy becomes 'impotent because nominal interest rates are at or near zero: injecting monetary base into the economy has no effect, because base and bonds are viewed by the private sector as perfect substitutes' (Krugman, 1998, p. 141). If we denote by ω the *minimum* (ex-ante) actual real interest rate that a CB can set for a given expected inflation rate and by r^n the "neutral" interest rate, we may define a LT as a situation where:

$$r^n \prec \omega \tag{1}$$

where r^n is the long-term real interest rate which is *neutral* with respect to the inflation rate and tends neither to increase it nor to decrease it in the absence of supply shocks. If we think of r as a long-term interest rate, then ω will be positive because lenders will require a time-varying term premium $\mu \succ 0$ to grant credit or to purchase long-dated securities. Post-Keynesians insist that the time-varying nature of μ stems mainly from changes in the degree of "liquidity preference" (hereafter LP) of investors and financial intermediaries.[4] Next, if we denote by π^e the expected inflation rate we have that:

$$\omega = \mu - \pi^e \tag{2}$$

By inserting (2) into (1), we have that an economy exhibits a LT if:

$$r^n + \pi^e \prec \mu \tag{3}$$

Expression (3) tells us that the lower are r^n and π^e, and the higher is μ the more likely it is that an economy will exhibit a LT. Finally, if we replace r^n in (3) by the steady-growth "neutral" interest rate and condition (3) holds, then we will say that the economy exhibits a "structural" LT (Palacio-Vera, 2009).

A number of authors have recently analyzed the likelihood of economies getting stuck in a LT as well as the policy options that will: (i) minimize the probability that the ZB becomes a binding constraint on monetary policy and (ii) remove this constraint in case the economy is in a LT. Two recent Journal Symposiums have been devoted to this issue; the 2000 Symposium on 'Monetary Policy at the Zero Lower Bound' published in the *Journal of Money, Credit, and Banking* and the 2004 Symposium on 'Policies to deal with deflation' in the *American Economic Review*. A summary of the former is in Blinder (2000) and an evaluation of the different proposals is in Bernanke and Reinhart (2004). It is not our purpose to review this large literature here. However, we may highlight two points on which there seems to be an emerging consensus. First, the mere existence of a ZB on nominal interest rates can engender a moderate deterioration in macroeconomic stability as the inflation target approaches zero and, hence, it is an important constraint on how conventional monetary policy can operate in a low inflation environment (Fuhrer and Madigan, 1997; Reifschneider and Williams, 2000; Mussa, 2000). In particular, studies usually find that there is a trade-off between the average rate of inflation and the variability of the output-gap so that the latter increases as the rate of inflation approaches zero and becomes negative (Orphanides and Wieland, 2000). Second, CBs should set a low but positive inflation target (preferably 2 percent). This is because the risk of hitting the ZB appears to be small down to inflation rates close to those currently pursued by

most CBs but gets much larger below that. Another aspect these studies address is the possibility that the economy enters a "deflationary spiral" once the ZB binds. The usual verdict is that this type of episode is very rare and thus it should not be a matter of concern.

Conversely, there is no emerging consensus on whether unconventional monetary policy options can take the economy out of a LT should it be necessary. Several authors have proposed a number of policy options for CBs to deal with the ZB should it arise (Goodfriend, 2000; Clouse *at al*., 2000; McCallum, 2000; Svensson, 2001; Buiter, 2003; Ito and Mishkin, 2004; Orphanides, 2004). These options include setting a carry tax on currency and vault cash as well as on electronic reserves, open market operations on long-term government bonds, foreign exchange intervention and price-level targeting. Yet, as noted in Reifschneider and Williams (2000, p. 943) 'the likely effectiveness of such actions is unclear from a theoretical perspective, and they have never been put to a definitive test'. This view is shared by a number of authors who remain skeptical about the effectiveness of unconventional monetary policy to spur activity when nominal interest rates are at zero (Freedman, 2000; Blinder, 2000; Bryant, 2000; Mussa, 2000). The words of Kazuo Ueda at the 1999 JMCB Conference in Woodstock (Vermont) serve to summarize the difficulties faced by a CB once the ZB on nominal rates binds: 'Don't put yourself in the position of zero interest rates. You'll have to face a lot of difficulties. I can tell you it will be a lot more painful than you can possibly imagine' (Ueda, 2000, p.1109).

3.- The New Consensus and the theory of the "liquidity trap"

As emerges from the previous section, for a given expected rate of inflation, the likelihood that the economy exhibits a LT depends on the value of the "neutral" interest rate and the term/risk premium on long-dated securities and loan rates. Thus, any attempt to address the causes of the emergence of a LT needs to explain the determinants of these two variables. In mainstream economics the "neutral" interest rate is usually referred to as the "natural" interest rate, after Wicksell (1936). The modern notion of the "natural" interest rate is associated to the NC approach. For the sake of exposition, we take the study by Woodford (2003) as the canonical version of the NC. He defines the "natural" interest rate as 'the equilibrium real rate of return in the case of fully flexible prices' (Woodford, 2003, p. 248) and names his approach "neo-wicksellian" because output-gaps and, hence, changes in the inflation rate are explained by deviations of the actual real interest rate from the "natural" interest rate. In the "extended" version of his framework, demand shocks include fiscal policy, investment and "impatience" shocks. The latter modify the rate of time preference of the representative household. Supply shocks consist of productivity shocks to the production function of the representative firm, shocks to the disutility-of-labour function and changes in the amount of physical capital. He concludes that real 'interest rates must increase in response to temporary increases in government purchases or in the impatience of households to consume and decrease in response to temporary increases in labor productivity or in the willingness of households to supply labor' (Woodford, 2003, p. 250). Importantly, he admits that a range of shocks may render the "natural" interest rate negative, albeit he implies that this will be a transitory situation:

'The present theory allows for variation over time in the natural rate for a variety of reasons, and there is no reason why it should not sometimes be negative. (The model does imply a positive *average* level of the natural rate, determined by the rate of time preference of the representative household)' (Woodford, 2003, p. 251, emphasis added).

To this date, there is no presentation of the NC model couched in a growth setting so we need to make use of "optimal" growth theory to extrapolate Woodford´s results to a growing economy. According to it, the optimality condition for saving yields the following "balanced growth" condition:

$$r^* = \frac{a}{\sigma} + n + \vartheta \tag{4}$$

where r^* denotes the steady-growth "natural" interest rate, *a* denotes the rate of labor-augmenting technological change, *n* denotes the rate of population growth, σ denotes the inter-temporal elasticity of substitution in consumption, and ϑ denotes the rate of time preference of the representative household.[5] Since *a* and *n* will be positive in a growing economy, r^* is positive and its lower bound is ϑ.

Several comments are in order. First, the literature conflates different meanings of the notion of a "natural" interest rate.[6] This problem was recognized long time ago by Myrdal (1939) who noted that monetary equilibrium in Wicksell´s theory entails that the "natural" rate of interest must (i) equal the marginal productivity of real capital, (ii) equate the supply and the demand for savings at full employment and, (iii) guarantee a stable price level. Only the third meaning is compatible with our previous definition of the "neutral" interest rate albeit it needs to be adapted to a modern setting where it is the inflation rate and not the price level that is stable in the long run.[7] This is because (i) we

will assume that the economy operates in the long run at an employment rate that is equal (or lower) than the rate of employment compatible with a constant inflation rate and this, in turn, corresponds to an employment rate that falls short of full employment and (ii) the notion of the marginal productivity of capital is flawed (Harcourt, 1969). Second, there is nothing *natural* about the "natural" interest rate since it depends, inter alia, on the government budget balance and so we think that the term "neutral" is preferable. Be that as it may, the role of the "natural" interest rate in the NC approach is equivalent to the role of the "neutral" interest rate as defined above since, as Woodford (2003, p. 248) himself notes 'the natural rate of interest is just the real rate of interest required to keep aggregate demand equal at all times to the natural rate of output'.[8]

Third, Woodford´s assumption that the average value of the "natural" interest rate is positive implies that the former *returns* in the long-run to a positive gravitation centre provided prices are fully flexible. In the standard NC model this occurs because it is assumed that (i) there is "perfect foresight" so that households´ expected future income stream equals future potential output per capita (ii) all households are perfectly creditworthy so they can smooth consumption as predicted by the standard life-cycle/permanent income consumption model. Admittedly, there are some attempts to render the standard NC model more realistic by introducing household heterogeneity, financial intermediaries, and interest rate spreads into the standard model (Cúrdia and Woodford, 2008; Canzoneri et al., 2008).[9] However, as noted in Goodhart (2007), some fundamental problems like the absence of default risk and, hence, credit rationing remain to be tackled. By contrast, we have argued elsewhere that the presence of uncertainty about future income and credit-rationing by financial intermediaries will result in the

existence of strong deviation-amplifying mechanisms in the form of "income" effects that affect consumption and investment demand and which may prevent the "neutral" interest rate from converging to the (positive) average rate of time preference in the long run (Palacio-Vera, 2009). The former means that the steady-growth "neutral" interest rate may become negative and the economy may thus remain stuck indefinitely in a LT. The argument is two-fold. First, and in stark contrast to the NC approach, the usual PK argument is that banks accommodate all creditworthy demands for credit, and ration all those demands not deemed creditworthy. In particular, Post-Keynesians insist that there is always some degree of credit-rationing and that it tends to increase near business cycle peaks and decrease near business cycle troughs due (mainly) to changes in the degree of LP of banks: [10]

'A world of ultimate liquidity preference is a world where firms would refuse to produce for fear of indebtedness, where banks would refuse to lend for fear of loan defaults, and where consumers would refuse to spend for fear of unemployment' (Lavoie, 1996, p. 292).

In turn, changes in the degree of credit-rationing by banks will tend to exacerbate output contractions thus reinforcing the power of deviation-amplifying mechanisms. Second, the joint existence of credit-rationing and uncertainty about future income implies that households will carry out some precautionary saving and that the latter will be proportional to the former. According to Carroll (2001, p. 25), if consumers are "impatient", in the sense that if there were no uncertainty or liquidity constraints they

would spend more than current disposable income and "prudent" in the sense that they have a precautionary saving motive, then the existence of uncertainty about future income entails that the level of consumption of a representative household will, for every possible level of wealth, fall short of the level of consumption implied by the "perfect foresight" consumption model. As shown in Carroll (1992), there will be some target level of wealth such that, if actual wealth is greater than the target, impatience will outweigh prudence, precautionary saving will decrease and wealth will consequently fall, whereas if wealth is below the target, precautionary saving and wealth will increase. Precautionary saving is thus defined as the amount by which consumption falls as a consequence of uncertainty. Furthermore, Samwick (1995) shows that unconstrained consumers who exhibit a precautionary saving motive behave in ways qualitatively and quantitatively similar to the behavior of liquidity-constrained consumers facing no uncertainty. This is because households who are liquidity-constrained exhibit less flexibility in responding to shocks since the effects of the shocks cannot be spread out over time. In addition, precautionary motives and liquidity constraints interact because the inability to borrow when times are bad provides an additional motive for accumulating assets when times are good, even for impatient consumers (Deaton, 1991).

Fourth, as recognized by proponents of the NC, an economy that exhibits a low inflation rate and a negative output-gap may enter into a "deflationary spiral" in which a decrease in inflation endogenously raises the level of the real rate causing aggregate demand (hereafter AD) to weaken and push inflation down more, thereby raising the real interest rate even further (Reifschneider and Williams, 2000, p. 942). Hence, if a "deflationary spiral" is to be avoided, proponents of the NC approach need to assume that

the adjustment process described above will not be short-circuited by the adverse effect upon AD of a rising real interest rate. Arguably, the sluggish adjustment of goods prices may well prevent a "deflationary spiral" from setting off.[11] However, if this were the case, then the "natural" interest rate could no longer be defined as 'the equilibrium real rate of return in the case of fully flexible prices', as Woodford does. In practice, the possibility that a "deflationary spiral" sets off is readily recognized by proponents of the NC although they tend to believe that this scenario may only come about in the wake of unusually large adverse shocks.[12]

Finally, from the discussion above we may be tempted to conclude, as Woodford apparently does, that a LT may only come about whenever the "neutral" interest rate is very low or negative. However, as expression (3) above reflects, a LT may also come about even when the "neutral" interest rate and the expected inflation rate are positive. This will be the case if, due to a high degree of LP, the term/risk premium becomes large enough so as to satisfy condition (3). The importance of the term premium is (implicitly) recognized in Blinder (2006, pp. 47-48) when he notes that 'long rates are terrible (and biased) predictors of future short rates… Just why this is so remains a major intellectual puzzle'. However, he fails to connect the empirical problems of the "expectations hypothesis" of the term structure of interest rates to the changes in the term/risk premium brought about by changes in the degree of LP.

4.- The Post-Keynesian approach and the "neutral" interest rate

We now expound a simple PK model for a closed economy without a government sector. We intend to utilize it as a benchmark to be contrasted to the NC and to discuss a

number of additional issues raised in recent contributions to the literature on the theory of the LT. We display the model in the first subsection and present the analysis of its steady growth properties and short-run behaviour in subsequent subsections.

4.1.- The supply side

Let us consider a one-sector economy with two inputs, labour and capital, and assume that (i) there is a large number of identical firms and (ii) they all utilize the same technology. If we aggregate across all firms in the economy, we may define potential output $\overline{Y}$ as:

$$\overline{Y} = \lambda \cdot \overline{N} \leq v \cdot K \tag{5}$$

where $\overline{N}$ is the level of employment that keeps inflation constant in the absence of transitory supply shocks, K is the aggregate capital stock, and λ and v are respectively the productivity of labour and capital when the factors are fully utilized. The current rate of capacity utilization is:

$$u = \frac{Y}{v \cdot K} \leq 1 \tag{6}$$

where Y is the actual level of output. Post-Keynesians like Rowthorn (1977) and Sawyer (1982) postulate the existence of a employment rate compatible with constant inflation in the short run (hereafter CIER) which results from the conflicting income claims of workers and firms so inflation will increase if the actual employment rate is higher than the CIER and vice-versa.[13] Thus, the CIER can be interpreted as a short-run "inflation barrier" albeit one that may be affected by the level and time path of aggregate demand if, for instance, hysteresis effects are present. We define the rate of capacity utilization when $Y = \overline{Y}$ as the "constant inflation capacity utilization" (hereafter CICU) or:

$$\bar{u} = \frac{\bar{Y}}{\nu K} = \frac{\lambda}{\nu} \cdot \frac{\bar{N}}{K} = \left(\frac{\lambda}{\nu}\right) \cdot \left(\frac{\bar{e} \cdot L}{K}\right) \leq 1 \tag{7}$$

where we denote the by $\bar{e}$ the CIER, by L the labour force and $\bar{N} = \bar{e} \cdot L$. For simplicity, we assume there is no overhead labour and firms are fully integrated, producing all the materials required for their final output so that prime costs are made up only of labour costs. We also assume that firms set a constant mark up over prime costs. The "natural" rate of growth is:

$$g_n = n + a \tag{8}$$

where a is the growth rate of labour productivity λ.

4.2.- The demand side

The equilibrium condition in the goods market for a closed economy without a government sector when current output is equal to potential output is:

$$s(r^n, z) \cdot \bar{Y} = I \tag{9}$$

where *s* is the saving rate, *I* is (gross) investment, and *z* is a vector of variables to be filled below. r^n is the "neutral" interest rate which we define here as the real interest rate that makes planned saving at potential output equal to planned gross investment. It is better thought of as a long-term rate. If we divide (5) through by *K* and denote the rate of capital accumulation by *g* and the rate of depreciation of physical capital by ψ we get:

$$s \cdot \nu \cdot \bar{u} = g + \psi \tag{10}$$

We now turn our attention to functions *s* and *g*. We assume that the saving rate *s* is a function of the rate of inflation π, the rate of growth of output $\hat{y}$, the real interest rate *r* and a measure of shocks ε_s that includes changes in the degree of LP or:

$$s = s(\pi, \hat{y}, r, \varepsilon_s) \tag{11}$$

where $s_{\hat{y}} \succ 0$, $s_{\pi} \prec 0$, $s_r \succ 0$, ε_s is a stochastic variable and the subscripts in function *s* denote partial derivatives. The positive sign of $s_{\hat{y}}$ is here justified by resort to Marglin´s (1984) "disequilibrium hypothesis" according to which household saving relative to disposable income increases when income rises faster than households can adapt their spending habits whereas the opposite occurs when income falls faster than households can rein in their spending. However, we must note that a positive sign of $s_{\hat{y}}$ is also an implication of the "buffer-stock" theory of saving (Carroll, 1992, 2001) and the "life-cycle theory of saving" (Modigliani and Cao, 2004).[14] The positive sign of s_r is attributed to the presence of significant *distribution* effects rather than to households´ behaviour. To be sure, if we assume (realistically) that the average propensity to consume of net debtors is higher than that of net creditors, then a rise in the real interest rate will redistribute income away from net debtors and towards net creditors thereby raising the *aggregate* saving rate.[15] The sign of s_{π} is attributed to the presence of inside-debt effects that depress private spending when, for a given real interest rate, inflation decreases and vice-versa.

Next, let us assume that firms have a desired rate of capacity utilization $u^* \prec 1$ so they expand productive capacity whenever $u \succ u^*$ and stop expanding it whenever $u \prec u^*$. A possible justification for this assumption is that firms prefer to keep some capacity idle in order to respond rapidly to unanticipated favourable demand shocks and to deter the entry of potential rivals into the industry (Spence, 1977).[16] This can be conveniently captured by defining the rate of accumulation, *g* as:

$$g = v \cdot u \cdot f(u - u^*, \varepsilon_g) \tag{12}$$

where $f_u \succ 0$ is inversely proportional to the size of the construction and capital goods delivery lags, $f(0) = \bar{f} \succ 0$, $E(\varepsilon_g) = 0$ and ε_g represents shocks affecting *g*. Parameter $\bar{f}$ represents the ratio of current net investment to output when $u = u^*$. It captures firms´ expected future demand growth and, hence, it is closely linked to expected profitability. In turn, we assume that the investment function *f* adopts a linear form or:

$$f(u - u^*, \varepsilon_g) = \bar{f} + f_u \cdot (u - u^*) \tag{13}$$

Inserting (12) into (10) we obtain the equilibrium condition in the goods market when $Y = \bar{Y}$ or:

$$s(\pi, \hat{y}, r^n, \varepsilon_s) = f(\bar{u} - u^*, \varepsilon_g) + \frac{\psi}{v\bar{u}} \tag{14}$$

Next, we assume that the saving function *s* adopts a linear form or:

$$s = \bar{s} + s_{\hat{y}} \cdot \hat{y} + s_\pi \cdot \pi + s_r \cdot r \tag{15}$$

where $\bar{s}$ is a shift term determined by households´ preferences, institutional factors, and the degree of LP. If we insert (15) and (13) into (14) and re-arrange, we obtain the (short-run) rate of growth of output:

$$\hat{y} = \frac{\bar{f} - \bar{s} + f_u \cdot (u - u^*) - s_\pi \cdot \pi - s_r \cdot r}{s_{\hat{y}}} + \frac{\psi}{s_{\hat{y}} \cdot v \cdot u} \tag{16}$$

Finally, a solution for the "neutral" interest rate r^n can be obtained by setting $u = \bar{u}$ in (16) and rearranging:

$$r^n = \frac{\bar{f} - \bar{s} + f_u \cdot (\bar{u} - u^*) + \frac{\psi}{v \cdot \bar{u}} - s_{\hat{y}} \cdot \hat{y} - s_\pi \cdot \pi}{s_r} \tag{17}$$

Therefore, an increase in the degree of uncertainty about future income will tend to increase "precautionary saving" by households $\bar{s}$ and lower $\bar{f}$ thereby pushing r^n downward and vice-versa.[17]

4.3.- Steady growth analysis

Steady growth equilibrium corresponds to a period of sufficient length to enable all variables in the economy to settle at constant rates in the absence of new disturbances. If we denote by π^* the inflation target of the CB we have that, in a hypothetical steady growth scenario, $\hat{y} = g_n = g$, $u = \bar{u} = u^*$, $\pi = \pi^*$ and $\varepsilon_s = \varepsilon_g = 0$ so that the two following conditions must be satisfied:

$$v \cdot u^* \cdot \bar{f} = g_n = \hat{y} \tag{18}$$

and

$$s(\pi^*, g_n, r^*) \cdot v \cdot u^* = g_n + \psi \tag{19}$$

Equation (18) tells us that, in steady growth, the rate of accumulation must equal the "natural" rate of growth. Equation (19) is the counterpart to equation (14) for the steady growth case. In order to get an explicit solution for the steady growth "neutral" interest rate r^* we insert (15) into (19) and re-arrange:

$$r^* = \left[\frac{g_n + \psi}{v \cdot u^*} - \bar{s} - s_\pi \pi^* - s_{\hat{y}} g_n \right] \frac{1}{s_r} \tag{20}$$

Thus, r^* is a function of the "natural" rate of growth, the target inflation rate, the depreciation rate and the aggregate saving rate. It can be interpreted as the real interest rate where 'all markets are in equilibrium and there is therefore no pressure for any resources to be redistributed or growth rates for any variables to change' (Archibald and

Hunter, 2001, p. 20) and it is equivalent to the 'equilibrium' real interest rate embedded in Taylor´s rule (Taylor, 1993). It follows that:

$$\frac{\partial r^*}{\partial \bar{s}} = \frac{-1}{s_r} \prec 0 \tag{21}$$

The negative sign of (21) reflects that an increase in the saving rate due, for instance, to an increase in the degree of LP of households, pushes r^* down and vice-versa. Likewise, a decrease in the "natural" growth rate will also push r^* downward:

$$\frac{\partial r^*}{\partial g_n} = \left(\frac{1}{v \cdot u^*} - s_{\hat{y}} \right) \cdot \frac{1}{s_r} \succ 0 \tag{22}$$

Therefore, r^* may become negative if, for instance, g_n is very low and $\bar{s}$ is relatively large due to a high degree of uncertainty about future income. As such, it has been argued that the main cause of the stagnation experienced by the Japanese economy in the last decade or so is its high saving rate and low "natural" rate of growth (Krugman, 1998, pp. 173-4; Nakatani and Skott, 2007).[18]

5.- Some issues regarding the theory of the liquidity trap

We now address three issues that affect the relevance of the definition of the LT provided above. The purpose of this section is to show that the definition of the LT encapsulated in expression (3) above together with the PK view of the determination of the "neutral" interest rate is general enough as to encompass any situation characterized by the fact that conventional monetary policy becomes ineffective.

5.1.- The "liquidity trap" versus the "credit crunch" view

The competing explanation to the LT hypothesis in Japan is the so-called "credit crunch" view. This explanation focuses on the contraction of the supply of credit (credit crunch) by Japanese banks in the 1990´s caused by massive nonperforming loans accumulating in the financial system (Cargill *et al*., 1997; Palley, 2000). The argument has two parts. The first part focuses on the substantial decline in bank capital due to the accumulation of bad loans held by Japanese banks. According to Hutchison (2000), the capital asset ratio of the 20 largest Japanese financial institutions fell significantly between 1994 and the end of 1998. The second part of the "credit crunch" view focuses on the cautious lending attitude of Japanese banks owing to their recent experience with bankruptcies and nonperforming loans. Krugman (1998, pp. 174-77) admits that Japan faced a huge problem of bad loans in the late nineties and that these loans were in part a legacy of the burst of the asset bubble of the 1980s. He also notes that a look at the data does seem to support this view because both base and narrow money increased robustly since 1995 but broad monetary aggregates grew more slowly and bank credit stagnated. Notwithstanding, he rejects the view that the troubles of the Japanese banks were central to Japan´s macroeconomic difficulties in that period. Instead, he argues that 'given an economy in a liquidity trap, this sort of disconnect between monetary base, aggregates, and bank credit is to be expected even if the banks are financially healthy' (Krugman, 1998, p. 175). He adds that, according to the textbook model of bank behaviour, in the absence of a bank run, a bank of questionable solvency that manages to hold on to its deposits thanks to the existence of a government guarantee has an incentive to *overlend* to risky projects. He argues that, in the case of Japan, there were few allegations of

credit-rationing before the second half of 1997 and that only by early 1998 did the "credit crunch" become widely accepted. Hence, according to him, the former did not cause but deepened Japan´s slump:

'A review of press reports also makes the reasons for the emergence of credit constraints in late 1997 quite clear. The immediate forcing event was the announcement, in October 1997, of new capital adequacy standards, to be effective from April 1998. To meet this standard, banks began cutting bank on loans that would have required larger capital backing. In other words, the financial problems of the banks only became a drag on aggregate demand when the government began half-hearted efforts to come to grips with those problems' (Krugman, 1998, p. 177).

Krugman´s argument aside, we believe that both the "macroeconomic" and the "credit crunch" view are encompassed in the definition of the LT proposed above. Specifically, a negative "neutral" interest rate and a low expected inflation rate are indicators of a low level of aggregate demand relative to potential output. Whether the ultimate cause of a negative "neutral" interest rate is a "credit crunch" or any other macroeconomic factor is, for some purposes, not important, as long as this is the case. This is because there is likely to be a two-way causality between macroeconomic prospects and the degree of credit-rationing by banks so it may be rather difficult to identify in practice the ultimate source of the economic malaise. For instance, a LT may be brought about by a substantial worsening in macroeconomic prospects initially unrelated to problems in the banking sector but, eventually, the decrease in the level of

economic activity may reduce the liquidity and capital ratios of banks thereby forcing them to restrain the amount of credit they grant to the non-bank private sector. Likewise, if an unfavourable event in the "financial" side of the economy brings about a "credit crunch" this may eventually depress the level of economic activity so as to cause a LT.[19] As noted above, Post-Keynesians believe that the banking system tends to amplify rather than to cushion financial crisis. Specifically, if an economy enters a recession for reasons other than a drastic reduction in bank lending, then the LP of banks will rise and this, in turn, will exacerbate the output contraction owing to a combination of an increase in the degree of credit-rationing and a rise in the risk premium embedded in loan rates. Therefore, we think that the definition of the LT proposed above is an encompassing one; it does not attribute the emergence of a LT to a specific factor and it is compatible with a range of different potential factors making condition (3) be fulfilled.

5.2.- The role of inflation expectations

Expression (3) suggests that a possible escape route from a LT is the creation of inflationary expectations as proposed in Krugman (1998) and elaborated in Eggertsson and Woodford (2003). The argument is that by inducing inflation expectations the real interest rate will (when the ZB binds) decrease and this will stimulate the economy out of the LT. According to Krugman (1998), if a CB can credibly commit to pursue inflation and ratify it when it comes, it should be able to increase inflationary expectations despite the absence of any traction on the economy by means of conventional monetary policy. In the specific case of Japan, he proposes an annual inflation target of 4 percent for 15 years. Eggertsson and Woodford (2003) present a more fully dynamic analysis of the

problem. To them, a commitment to create subsequent inflation is presented as a commitment to keep interest rates low for some time in the future. As noted in Blinder (2000, p. 1098), Krugman´s proposal to escape a LT seems to be the right thing to do, at least, in *theory*. However, he notes that it is hard to see how it can possibly work in a country where the average inflation rate is very low and may even be negative. That is, the problem is that if expected inflation closely tracks current inflation, there is no obvious manner through which a CB can overcome the "inverted credibility" problem, i.e. to convince the private sector that it will create inflation and will not attempt to undo this policy once the economy has escaped the LT. This means that, the so-called "expectations" channel to the monetary policy transmission mechanism may not be operative when an economy exhibits a LT and that, consequently, a CB can only raise inflation expectations by actually generating inflation but, unfortunately, it cannot generate inflation as long as the economy exhibits a LT.[20] Thus, the right question to ask when the ZB binds is whether there is anything a CB can do to stimulate aggregate demand when conventional monetary policy becomes ineffective. We address this question below.

5.3.- The "monetarist" theory of the liquidity trap

According to the standard NC model, once the ZB binds, the CB has exhausted its ability to stimulate the economy. Monetarists, among others, reject this conclusion and argue instead that, once the policy rate becomes zero, the CB should embark on a strategy of monetization, or quantitative easing, and judge the stimulus of its policies in terms of the rate of growth of the money supply rather than by the level of its (real) interest rate.

Monetarists make two claims. First, they argue that money may *directly* affect aggregate demand. Second, they argue that, even if money does not "directly" affect aggregate demand, the transmission mechanism is much more complicated than the simple *IS* curve specification suggests since money could still play a role as a proxy for channels that may be difficult to quantify. In particular, when monetarists such as Friedman and Meiselman (1963) and Brunner and Meltzer (1963, 1968) have discussed the transmission mechanism, they have described monetary policy as operating through the prices and yields of a broad range of marketable (financial and real) assets. As a result of it, they argue that the *IS* curve in the standard NC model is misspecified because it allows only for an interest-rate channel and ignores either a "direct" effect of money or an "indirect" effect on aggregate spending through the prices and yields of assets other than short-term securities. A theoretical justification for the existence of a "direct" effect of money on aggregate demand is discussed in Woodford (2003, ch. 2) and McCallum (2000).[21] Svensson (2001) summarizes the conditions as follows:

'[A] direct money effect would arise, if real balances entered the representative agent´s utility function and this utility function was not additively separable in consumption and real balances but had a positive cross derivative.' (Svensson, 2001, p. 291).

However, Woodford (2003, ch. 2), McCallum (2000) and Svensson (2001) argue that reasonable parameterizations of the utility function lead to very small coefficients on money in the *IS* equation. Likewise, using M2 as the measure of money supply, Ireland

(2001) finds little empirical support for the importance of nonseparable utility. Despite the lack of empirical support for the hypothesis of nonseparable utility, monetarists back their claims with empirical evidence that shows that real money base growth matters for real economic activity, for a given short-term real interest rate. For instance, in an empirical study with U.S. data for the period 1951 through 1986 Koenig (1990) found that real money balances entered consumption regressions significantly. Meltzer (2001) uses historical data from periods of deflation in the U.S. economy to show that changes in real money balances appear at times to dominate changes in real interest rates as indicators of the direction of change induced by monetary actions. Furthermore, he replicates the study by Koenig (1990) and finds even more supportive results for the monetarist cause when the sample period is extended by 30%. His interpretation of these results is that the change in real balances is a mixture of a pure (Haberler-Pigou-Patinkin) wealth effect and the changes in wealth induced by changes in the relative yields of a wide range of assets. Finally, Nelson (2002) presents evidence for the US and the UK that reaffirms Meltzer´s evidence that real money base growth matters for real economic activity for a given short-term real interest rate.[22] He concludes that money is a superior index of monetary policy effects. Notwithstanding these results, the conventional wisdom is that changes in real base money have, if anything, a negligible effect on private real wealth and, hence on aggregate demand. The quantitative irrelevance of the "direct" effect of changes in money on aggregate demand and the empirical results obtained in Koenig (1990), Meltzer (2001) and Nelson (2002) suggest that the monetarist story is circumscribed to the thesis that changes in real monetary base exert "indirect" effects on real aggregate demand through many real interest rates, implicit or explicit, that are

relevant for economic activity, and that the expected real interest rate on short-term securities is thus an inadequate indicator for these yields. As we discuss below, this has some implications for the definition of the LT presented in Section 2.

In a recent contribution, Meltzer (2001, p.3) defines a LT as 'a condition in which the demand for nominal balances equals the stock of nominal balances at unchanged prices and interest rates, for all values of the nominal stock. Additions to the nominal stock cannot be transmitted to the real sector or the price level because the interest rate has reached a floor at or near zero'. He argues that the traditional (Keynesian) LT makes short-term Treasury Bills (hereafter TB) or similar securities a perfect substitute for base money or bank reserves so that exchanging one for the other makes nothing of interest. By contrast, he claims that exchanging either money or TB for some other assets such as foreign currencies, domestic or foreign long-term bonds, equities, or commodities changes relative prices and real private wealth. In this hypothetical case, base money plus TB represents a composite good. Crucially, the former is a *gross* substitute for other assets; increasing either component, or both, is expansionary. According to him, for a LT to become effective, the composite asset — money plus TB — must be a perfect substitute for *all* other assets, that is, when the marginal rate of substitution of money for bonds goes to zero all marginal rates of substitution also must go to zero. If so, then all assets become part of a single composite good (Brunner and Meltzer, 1968). A corollary of this is that, as long as some assets other than money and TB remain gross substitutes, a LT means only that one row and one column in the matrix of marginal rates of substitution has been removed but, importantly, all other marginal rates of substitution remain and, hence, monetary policy remains effective. In short, the "monetarist" position

implies that a LT is not possible *except* in the limit when all marginal rates of substitution are zero. A number of authors have recently expressed views that coincide with Brunner and Meltzer´s. Referring to the recent Japanese stagnation Orphanides (2004) argues that:

'The quantitative easing pursued over the last 2 years has been associated with an overall reduction of longer-than-overnight interest rates, even after the overnight rate reached a level of almost zero. These developments indicate that despite the near-zero short-term interest rate in Japan, it would be misleading to say that the Japanese economy has been stuck in a liquidity trap… Additional monetary expansion continues to have some bite because the prices and yields of *all* assets, not merely "the" short-term nominal rate of interest, jointly determine aggregate demand' (Orphanides, 2004, pp. 117-18).

Orphanides (2004, p. 119) distinguishes between "expectation" effects and "direct" effects of a monetary expansion. "Expectation" effects can alter current long-term real interest rates in two ways. First, convincing the private sector that monetary policy will remain expansionary longer will help lower expected future nominal short-term interest rates and, therefore, longer-term nominal interest rates. Second, convincing the private sector that expansionary monetary policy will result in a higher inflation rate in the future could lower current *real* long-term interest rates. As for "direct" effects, the argument is that the imperfect substitutability among assets implies that the power to alter their relative supplies through open market operations has a *direct* effect on prices. Orphanides (2004) suggests that the effect may be rather small but insists that, in this case, the size of the effect is immaterial given the *infinite* potential supply of money:

'The only difference between "near-perfect" and more "imperfect" substitutes is the size of the money printing run and open-market operations that would be required to achieve any given desired effect on a price' (Orphanides, 2004, p. 119).

He concludes that either the "direct" or the "expectation" effect of monetary actions could, in principle, provide sufficient traction to monetary policy when the overnight nominal interest rate is stuck at zero. Likewise, Meyer (2001, p.5) argues that as long as short-term government bonds are *not* perfect substitutes for longer-term government bonds and private bonds, then large open-market purchases of long-term government bonds could *lower* the long-term government bond rate relative to the policy rate, with potential spillover effects on longer-term private rates. Notwithstanding this possibility, he argues that if aggregate demand is to be stimulated through monetization 'such unconventional policy operations more likely would need to be implemented on a bold scale' (Meyer, 2001, p. 6). Blinder (2000) discuses this possibility and argues that:

'If the pure expectations theory of the term structure holds and short rates are expected to remain (approximately) zero for a while, then intermediate-term rates will be approximately zero, too. And, to bring down truly long rates, the bank would have to convince the market that the zero-interest-rate period would last many years!' (Blinder, 2000, p. 1097).

However, he argues that the pure expectations theory does not hold because long rates include a (positive) time-varying term/risk premium μ which is potentially affected

by changing the relative supplies of short and long-term bonds. Be that as it may, even if massive purchases of long-term bonds could push long-term interest rates to zero by squeezing μ, there is no guarantee that they will provide enough stimulus since 'the real bond rate could still be too high' (Meyer, 2001, p. 5).

We now comment briefly on three additional channels through which a process of monetization could, in theory, provide some stimulus to the economy. First, McCallum (2000) has recommended foreign-exchange interventions to depreciate the currency and, in this way, stimulate the economy when the nominal interest rate is zero. However, his argument either ignores uncovered interest rate parity or relies on a "portfolio-balance" effect whereby the relative supply of domestic- and foreign-currency denominated assets affects the foreign exchange premium and thereby the exchange rate. According to Svensson (2001, p. 279), one problem with McCallum´s argument is that, although huge foreign–exchange interventions are likely to affect the exchange rate because of the expectations of future depreciation they may induce, 'most empirical work on the effect of sterilized foreign-exchange interventions indicates that the portfolio effect is small or negligible'. Besides, as noted in Blinder (2000), if uncovered interest rate parity holds, then with the short-term nominal interest rate stuck at zero, the expected rate of depreciation is locked in by the foreign short-term interest rate. In addition, if purchasing power parity theory (hereafter PPP) holds, then the expected rate of depreciation of the domestic currency will mirror the expected inflation differential but, if agents´ inflation expectations are correct, the *real* exchange rate will remain constant and, hence, there will be no stimulus to the economy. Be that as it may, Blinder (2000, p. 1096) argues that PPP theory does *not* hold in practice so this breaks the link between expected future

exchange rate and the expected future price level and, hence, it opens up the possibility of reducing both the spot and the expected future exchange rates through large purchases (sales) of the foreign (domestic) currency thereby achieving currency depreciation while maintaining covered interest rate parity. The extent to which such purchases will help depreciate the currency depends on the degree of substitutability on the margin between foreign and domestic bills/bonds and on the magnitude of the intervention. The larger the degree of substitutability is, the larger the magnitude of the interventions will have to be for the CB to depreciate its currency. According to Blinder (2000, p. 1096), 'very large interventions may be needed to move the exchange rate'. Lastly, Svensson (2001, p. 280) recommends a temporary exchange-rate peg backed by a commitment by the CB to buy and sell unlimited amounts of foreign exchange at the given pegged exchange rate. In turn, the temporary exchange-rate peg should be accompanied by (i) the announcement of a price-level target path corresponding to a positive long-run inflation target above the current price level and (ii) the abandonment of the peg in favour of price-level or inflation targeting once the price-level target path has been reached.

Another possibility is the purchase of private assets like equities and real estate. Doing so seems quite feasible and it would have an expansionary effect on the economy. However, as noted in Blinder (2000), one problem is that there may be legal impediments in some countries and, even if such impediments do not exist, there are still some serious "political" problems to overcome since the CB will have to decide which companies´ equities or which real estate to buy and in what amounts. Finally, there is the possibility of carrying out large purchases of domestically-produced goods and services financed by printing high-powered money. Again, there is no question that such purchases would

stimulate the economy.[23] However, this type of operation of the CB is really a *fiscal* policy and not a monetary policy operation

To finish off, our overall assessment of the discussion above is that there is no question that there are a number of unconventional monetary policy operations that a CB can use to provide stimulus to the economy when the short-term nominal interest rate is stuck at zero. However, as some authors have emphasized, the scale of the open-market purchases of assets other than short-term securities would have to be massive for them to have a significant effect on aggregate demand. In addition, when open-market operations consist of the (money-financed) purchase of assets, goods and services, they represent *fiscal* rather than monetary policy operations. In view of this, our main objection to Brunner and Meltzer´s definition of the LT is that it refers to a scenario that, for all practical purposes, appears to be irrelevant; there are always some assets other than short-term securities that a CB can purchase in exchange for high-powered money and that, if implemented in a sufficiently large scale, will eventually let the economy escape a LT. By contrast, our (and Krugman´s) definition of the LT refers to a scenario that may occur in practice, as the protracted Japanese stagnation that started in the mid-nineties shows. That is, it denotes a scenario in which conventional monetary policy operations are ineffective. We believe it is such definition of the LT that is of interest for policy-makers since it identifies situations where they may be forced to resort to unconventional (and problematic) monetary policy actions to spur the economy.

6.- Conclusion

In this study we provided a formal definition of the "liquidity trap" (LT) according to which, a LT arises if a combination of high precautionary saving, low investment and stringent conditions for access to bank credit stemming from a high degree of liquidity preference makes the sum of the "neutral" interest rate and the expected inflation rate fall short of the term/risk premium on long-term interest rates. We then compared the "New Consensus" (NC) in macroeconomics as expounded in Woodford (2003) and the Post-Keynesian (PK) approach regarding the causes of a LT (Palacio-Vera, 2009). We argued that in the NC approach a LT is a phenomenon caused by unusually large transitory shocks that depress the "neutral" interest rate temporarily. We argued that this is an implication of the neoclassical premise that there is a *gravitation centre* towards which the "natural" interest rate converges in the long run provided prices are fully flexible. By contrast, we argued that in the PK approach an economy may also exhibit a "structural" or long-lasting LT even in the absence of large adverse shocks. Finally, we discussed a number of theoretical issues recently raised in the rapidly growing literature on the LT including the relation between the theory of the LT and the so-called "credit crunch" view, the role of inflation expectations as a possible escape from a LT, and the "monetarist" critique of the conventional (Keynesian) definition of the LT.

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[1] The term "liquidity trap" was originally coined by Sir Dennis Robertson (1940). However, the subsequent literature tended to attribute it to Keynes (1936) and present it as a phenomenon associated to certain characteristics of households´ demand function for money whereby the aggregate demand for money becomes infinite at a (low) long-term *nominal* interest rate owing to the behavior of speculators in the bond market (see Kregel, 2004). By contrast, the more recent use of the term following Krugman (1998) ignores the original explanation and focuses on the existence of a ZB for the short-term nominal interest rate as the ultimate cause of the problem.

[2] Expositions of the NC approach can be found in Clarida *et al*. (1999) and Meyer (2001) and a recent critical review is in Arestis and Sawyer (2008).

[3] This definition of the *neutral* interest rate differs from Keynes´ (1936, p. 243) definition in that he views the former as the long-term interest rate that yields full-employment whereas we define it as the long-term interest rate that yields an employment rate that keeps inflation constant.

[4] For instance, Wells (1983, p. 533) argues that 'liquidity preference determines not the long rate of interest but the spread between the short and the long rates'.

[5] For this example, we assume "constant relative risk aversion" preferences of the representative household and that the utility of each future generation is weighted equally irrespective of size.

[6] The classical presentation of the notion of the "natural" interest rate is in Wicksell (1936[1898]).

[7] This third meaning is emphasized in Cassel (1928).

[8] In addition, Woodford (2003, p. 244) notes that 'it is a *long-term* real rate of interest rather than a short rate, that determines aggregate demand in this model' and he refers to agents´ expectations about future short-term real interest rates as key determinants of aggregate demand.

[9] Canzoneri et al. (2008) compare a standard NC model with no banks and monetary aggregates with an "enlarged" NC model endowed with banks that create deposits and make loans. Along other features, the "enlarged" model brings a role for government bonds in household and bank liquidity, and provides an endogenous spread between the money market rate and the rate of return in the representative agent utility function in that it depends mainly upon the fiscal target for the ratio of government bonds to GDP. However, other key features of the standard NC model like the absence of default risk remain.

[10] Some prominent contributions on this topic are the studies in Dymski (1992), Wray (1991), Lavoie (1996), Neal (1996) and Wolfson (1996).

[11] To be sure a "deflationary spiral" may not set off whenever the economy exhibits a LT. For instance, Japan´s recent experience shows that, despite the presence of a large negative output-gap for most of the period 1991-2002, inflation turned negative in the second half of the 1990s but, after 1998, core inflation remained stable at moderately negative levels reaching its trough at -0.79 percent in 2002.

[12] However as remarked in Yates (2002, p.5), a key unknown of the risk is the shape of the distribution of shocks that hit the economy. So far most studies have assessed this risk by assuming that the distribution of shocks is (and will presumably be) similar to the shocks that hit in the past.

[13] This feature of PK theory is emphasized in Stockhammer (2008). He notes that 'as a theory of inflation the NAIRU model resembles the conflict inflation theory of Post Keynesian origin. This theory… reflects Post Keynesians long-standing conviction that inflation is the outcome of distributional conflict (and not excessive growth in the money supply) and thus has to be combated through incomes policies' (Stockhammer, 2008, p. 495).

[14] The strongest claims on behalf of the precautionary motive come from the work of Carroll [1992]. According to him, unemployment expectations are important determinants of consumption because 'when consumers become more pessimistic about unemployment, their uncertainty about future income increases, so their target buffer-stock increases, and they increase their saving to build up wealth toward the new target' [Carroll 1992, p. 62]. His simulations show that, contrary to standard life-cycle and permanent income models: (i) even with unchanging expectations about the *average* future level of labor income, increases in the expected probability of unemployment or a tightening in the borrowing constraints facing households will make them increase their target wealth and saving rate; (ii) the elasticity of the saving rate with respect to the growth rate of personal labor income is positive; (iii) the interest elasticity of saving (for a given household) is approximately zero. The precautionary demand for saving can thus be described as the extra saving caused by future income being random rather than determinate.

[15] By contrast, the usual neoclassical justification of a significant and positive interest-elasticity of saving is based on the existence of a *wealth* effect that operates in the same direction as the substitution effect and swamps the offsetting impact stemming from the income effect (Summers, 1981).

[16] Empirical studies for the U.S. economy show that actual capacity utilization in the manufacturing sector fluctuates around 82 percent in the long run (Garner, 1994; Corrado and Mattey, 1997) which lends support to the notion that firms exhibit a stable "desired" rate of capacity utilization.

[17] It must be noted that the uniqueness of the "neutral" interest rate is an implication of the existence of a unique (short-run) "inflation barrier" as enshrined in the CIER. Of course, the presence of hysteresis effects would lead to changes in the CIER over time and, hence, to changes in the "neutral" interest rate.

[18] According to Nakatani and Skott (2007), the low Japanese "natural" rate of growth was the result of the negative rate of growth of the labor force due to adverse demographic trends and to a low rate of growth of productivity owing to the exhaustion of the technological catch-up phase. They argue that the low "natural" growth rate generates a low profit rate and denote this situation as a "structural" LT. Likewise, low "potential" growth and a (secularly) high aggregate saving rate are, according to Krugman (1998, p. 173), crucial factors behind the Japanese stagnation.

[19] For instance, in the case of Japan, Hoshi and Kashyap (2004) argue that the financial system problems are due to many factors besides the long macroeconomic stagnation so that a macroeconomic recovery will not go towards ending its financial problems.

[20] As pointed out by Blinder (2000, p. 1089), 'the problem, in a word, is that such a policy pronouncement will not be credible once a country is already in the soup'.

[21] The neoclassical mechanism whereby changes in real money balances are thought to affect aggregate spending is the Haberler-Pigou-Patinkin "wealth" effect. It is sometimes referred to as the "real balance" effect. According to it, changes in the real value of the monetary base brought about, for instance, by changes in the price level, affect aggregate demand through changes in aggregate consumption. However, the quantitative relevance of this effect has been repeatedly called into question. A pertinent rebuttal to the "real balance" effect is in Greenwald and Stiglitz (1993) who, referring to it, point out that 'quantitatively, it is surely an *n*th order effect; one calculation put it that, even at the fastest rate at which prices fell in the Great Depression, it would take more than two centuries to restore the economy to full employment. And in the short run even its sign is ambiguous, as inter-temporal substitution effects may (depending on expectations) more than offset the wealth effects' (Greenwald and Stiglitz, 1993, p.36).

[22] Nelson (2002, tables 1 and 2) uses US and UK data to regress the current output-gap on several lagged values of the output-gap, the current and several lags of an estimate of the real Federal Funds rate and four lags of real quarterly monetary base growth for the period 1961Q1-1999Q2. He finds that real monetary base growth terms have a sizeable coefficient which is statistically significant. Importantly, the real funds rate continues to enter with a significantly negative coefficient when the regression includes the monetary base growth terms so the latter contain explanatory power largely separate from that in the funds rate. He argues that standard optimizing models provide little rationale for this finding, but he shows that they can provide a rationale if the money demand function is generalized to include extra yields like, for instance, the long-term nominal interest rate. In particular, he argues that 'when yields beside the short-term rate enter both the *IS* and *LM* relations, it is possible that real money growth might be a valuable summary statistic for these yields, and might therefore contain information about *GDP* not present in short-term interest rates' (Nelson, 2002, p. 696).

[23] Recent examples of studies that analyze the potential benefits of this type of policy proposal on the Japanese economy are the studies in Auerbach and Obstfeld (2005) and Ball (2008).