

# THE “NEW CONSENSUS” AND THE POST-KEYNESIAN APPROACH TO THE ANALYSIS OF LIQUIDITY TRAPS

By

Alfonso Palacio-Vera\*  
Universidad Complutense de Madrid (Spain)

**Abstract:** We compare the “New Consensus” (NC) in macroeconomics as expounded in Woodford (2003) and the Post-Keynesian (PK) approach regarding the causes of a “liquidity trap” (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, in the PK approach, the economy may also exhibit a “structural” or long-lasting LT. This may be the case if a combination of high precautionary saving, low investment spending and stringent conditions for access to bank credit stemming from a high degree of uncertainty and liquidity preference 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.

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Correspondence address: Alfonso Palacio-Vera, Departamento de Economía Aplicada III, Facultad de Ciencias Económicas y Empresariales, Campus de Somosaguas, Universidad Complutense de Madrid, 28223 (Madrid), Spain. E-mail: [apv@ccee.ucm.es](mailto:apv@ccee.ucm.es).

# **THE “NEW CONSENSUS” AND THE POST-KEYNESIAN APPROACH TO THE ANALYSIS OF LIQUIDITY TRAPS**

## **INTRODUCTION**

The most salient feature of the institutional framework that characterizes most, if not all, present-day OECD economies is that the central bank (hereafter CB) fine-tunes 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 rates by the CB. However, the latter are subject to a zero lower bound (hereafter ZB). 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 for a given set of inflation expectations the CB is unable to push real interest rates down far enough so as to keep inflation constant in the absence of supply shocks. The existence of the ZB has been well-known for a long time. Yet, it has only been of recent that mainstream economists have focused their attention on it. Research on the causes and policies to deal with a LT has been led by proponents of the “New Consensus” in macroeconomics (hereafter NC).<sup>1</sup> Two events may 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 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].

The main contribution of this study is to identify a number of key differences in the diagnosis of the occurrence of a LT in the NC and the Post-Keynesian (hereafter PK) approach. According to us, the crucial difference 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. By contrast, in the PK approach, an economy may also exhibit a “structural” or long-lasting LT. This will be the case if a combination of high precautionary saving, low investment spending by firms, and stringent bank credit conditions for firms and households alike 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.

The structure of the paper is as follows. Section 2 presents a formal definition of a LT and identifies the factors that may engender it within a general framework. Section 3 reviews briefly the NC approach taking the influential contribution in Woodford [2003] as a benchmark. Section 4 expounds the PK approach to the explanation of the LT vis-à-vis the NC approach. Section 5 expounds a simple PK macroeconomic model for a closed economy without a government sector that illustrates the PK position with regard to the occurrence of a “structural” LT. Section 6 summarizes and concludes.

## **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].<sup>2</sup> If we denote by  $\omega$  the *minimum* (ex-ante) actual real interest rate that a CB can set for a given set of inflation expectations, we may define a LT as a situation where:

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

where  $r^n$  is 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. Since  $r$  is a long-term interest rate then  $\omega$  will be positive because lenders will require a time-varying term premium  $\mu > 0$  either to grant credit or to purchase long-dated securities. Post-Keynesians insist that the time-varying nature of  $\mu$  stems from changes in the degree of LP of investors and financial intermediaries respectively [Wells 1983, p. 533]. Next, if we express  $\omega$  as the difference between  $\mu$  and the expected rate of inflation  $\pi^e$  we have:

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

Therefore, we say that an economy is in a LT if:

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

Expression (3) tells us that the lower are  $r^n$  and  $\pi^e$ , and the higher is  $\mu$  the more likely it is an economy will exhibit a LT in the wake of a shock that pushes either  $\pi^e$  or  $r^n$  (or both) down. Finally, if we replace  $r^n$  in (3) by the steady-growth “neutral” interest rate, then we say that the economy exhibits a “structural” or long-lasting LT.

## THE LIQUIDITY TRAP IN THE “NEW CONSENSUS” APPROACH

A large number of mainstream economists have recently evaluated the likelihood of economies exhibiting a LT and the policy options that may remove this constraint. Two recent Symposiums are devoted to this topic; 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’ published 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]. One aspect these studies address is the possibility that the economy exhibits a LT, that is, a severe contraction such that conventional open-market operations alone are insufficient to restore macroeconomic equilibrium. The general verdict is ‘that such episodes are *fairly* rare, even in a low-inflation environment — about once every hundred years if the target rate of inflation is around zero, given the sort of shocks that have characterized the U.S. economy over the past thirty years’ [Reifschneider and Williams 2000, p. 962]. Therefore, the general impression is that a LT may *solely* come about in the wake of unusually large shocks. Conversely, there is no consensus as to whether unconventional monetary policy options can sort a LT out should it be necessary. Several policy options to deal with a LT have been proposed but, as argued in Reifschneider and Williams [2000 p. 943], a summary of the debate is that ‘the likely effectiveness of such actions is unclear from a theoretical perspective, and they have never been put to a definitive test’.

If the conventional wisdom is that a LT may solely arise in the wake of unusually large transitory shocks, we may wonder why this is so. A first reason is clearly empirical; there has been only one example of an OECD economy experiencing something like a

deflationary episode over the past seventy years, Japan in the 1990s. A second reason is related to the mainstream notion of the “natural” interest rate. For ease of exposition, we take the influential study by Woodford [2003] as the canonical version of the NC approach. Woodford [2003] expounds a fully-fledged model based on explicit optimizing foundations where the deviation of the “natural” interest rate from its steady-growth value is a stochastic process determined by a range of demand and supply shocks. 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 model 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-labor 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]. For the purpose of this study, the important point to note is that he admits that a range of shocks may render the “natural” interest rate negative, but 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 the former, the optimality condition for saving yields the following “balanced growth” condition:

$$r^* = \frac{a}{\sigma} + n + \rho \quad (4)$$

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,  $\sigma$  denotes the inter-temporal elasticity of substitution in consumption, and  $\rho > 0$  denotes the rate of time preference of the representative household.<sup>3</sup> Since  $a$  and  $n$  will be positive in a growing economy,  $r^*$  is positive and its lower bound is  $\rho$ .

Woodford’s assumption that the *average* “natural” interest rate is positive implies that the former returns in the long-run to a positive gravitation center provided prices are fully flexible. He does not explain verbally the process whereby the “natural” interest rate converges to its gravitation center. The argument presumably is the following. Let us suppose the “natural” growth rate is zero so that the steady-growth “natural” interest rate initially equals the rate of time preference. If an adverse shock subsequently drives the “natural” interest rate down far enough so as to make the economy exhibit a negative output-gap, then inflation will tend to decrease. Next, the “permanent income hypothesis” (hereafter PIH) embedded in the standard NC model predicts that, for a given permanent income, current consumption will increase relative to consumption in the previous period

if the actual (ex-ante) real interest rate is lower than the rate of time preference and vice-versa. Meanwhile, the standard NC model predicts that households' permanent income will remain constant in spite of a reduction in current income since, due to the "perfect foresight" assumption embedded in it, the former depends on future potential output [Clarida et al. 1999, p. 1675]. Consequently, as current consumption increases relative to permanent income, the (negative) output-gap will narrow and the "natural" interest rate will increase. This process will unfold as long as the actual real interest rate falls short of the rate of time preference. Eventually, the actual and the "natural" real interest rate will equal the rate of time preference and the output-gap will be zero.<sup>4</sup>

Several comments are in order. First, the function of the "natural" interest rate in the NC approach is equivalent to the "neutral" interest rate as defined above, namely, the real interest rate compatible with constant inflation in the absence of transitory supply shocks since, as Woodford [2003 p. 248] 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'.<sup>5</sup> Second, as recognized by proponents of the NC, an economy that exhibits low inflation and a negative output-gap may enter a "deflationary spiral" whereby a decrease in inflation endogenously raises the level of the actual (ex-ante) real interest rate causing aggregate demand to weaken and push inflation down more, thereby raising the real interest rate even further [Reifschneider and Williams 2000, p. 942]. Therefore, if the adjustment of consumption described above is to occur smoothly, proponents of the NC approach need to assume, as Woodford implicitly does, that it will not be short-circuited by the adverse effect upon consumption demand of the rising actual real interest rate brought about by the setting off of a "deflationary spiral".<sup>6</sup> Third, the adjustment of



consumption predicted by the standard NC model is heavily dependent on the unrealistic assumptions of “perfect” capital markets and creditworthiness of all borrowers stemming from the “transversality” condition [Goodhart 2008]. These assumptions imply the absence of credit-rationing by banks since agents *never* default. Admittedly, there are some attempts to render the standard NC model more realistic by introducing household heterogeneity and interest rate spreads [Cúrdia and Woodford 2008; Canzoneri et al. 2008]. However, as noted in Goodhart [2007], some fundamental problems like the absence of default risk and credit-rationing remain to be addressed. Finally, from the previous discussion we may be tempted to conclude that a LT may only occur when the “natural” rate becomes negative. Yet, as expression (3) highlights, a LT may also come about even if the “neutral” interest rate is *positive*. This will be the case when, for a given inflation rate, the term premium becomes large enough so as to satisfy (3). In this respect, Cúrdia and Woodford [2008] introduce a number of modifications to the standard NC model to allow for a time-varying spread between interest rates offered to depositors and paid to borrowers. Notwithstanding the improvement in terms of realism, they fail to recognize that the spread may change endogenously and, crucially, in the opposite direction as the “neutral” interest rate due to changes in the degree of LP.

## **THE POST-KEYNESIAN APPROACH TO LIQUIDITY TRAPS**

The thrust of our presentation of the PK diagnosis of a LT focuses on the possibility that the steady-growth “neutral” interest rate becomes negative and, consequently, the LT becomes a “structural” or long-lasting phenomenon rather than a “transitory” one. This has deep economic policy implications. We will argue below that

the adjustment of consumption predicted by the joint rational expectations-PIH [Hall 1978] and described above may be short-circuited for reasons other than the setting off of a “deflationary spiral”. The argument is three-fold. First, there is the typical Keynesian assertion about the impact of current disposable income and profits on current consumption and investment spending respectively. This means that adverse demand shocks may well elicit “effective demand failures” whereby output becomes the adjusting variable. Second, we show that the maximization of households’ lifetime consumption profile subject to a lifetime budget constraint that lies at the heart of the arbitrage process described above may, under uncertainty about future income, lead to an equilibrium where the steady-growth “neutral” interest rate falls *short* of the rate of time preference of the representative household and becomes negative. In particular, we show that, even without credit-rationing, an increase in uncertainty will reduce aggregate demand due to (i) an increase in precautionary saving (ii) and low investment and that this, in turn, may reduce potential output growth. Finally, we also show that the presence of financial intermediaries like banks who face illiquidity and default risk will tend to exacerbate the adverse effects on aggregate demand of uncertainty.

### **Effective demand failures**

To make our point clear we take advantage of Leijonhufvud’s well-known theory of “effective demand failures” [Leijonhufvud 1973]. According to it, the central issue in macroeconomic theory is the extent to which the economy may properly be regarded as a self-regulating system in which there is an adequate coordination of desired sales and purchases at the market level in the sense that there are powerful homeostatic

mechanisms whereby all market excess demand and supplies are eliminated. He distinguishes between two types of feedback mechanisms: deviation-counteracting and deviation-amplifying mechanisms. In the former, the larger the displacement from the equilibrium, the stronger will be the homeostatic tendencies working to bring the system back. In the latter, the opposite is the case.

Primary examples of neoclassical deviation-counteracting feedback mechanisms are the adjustments in the composition of aggregate demand prompted by changes in real interest rates as predicated in neoclassical loanable funds theory or the changes in the *level* of aggregate spending that result from the operation of the “real balance” effect. Examples of multiplier-repercussions are the effects of changes in current income and capacity utilization on current consumption and investment demand respectively. One implication of the presence of deviation-amplifying mechanisms is that the “neutral” interest rate will exhibit autocorrelation even when (exogenous) shocks do not exhibit it. As a result of it, the “neutral” interest rate will exhibit a higher variance as opposed to a scenario where such mechanisms do not exist.<sup>7</sup> However, the variance of the “neutral” interest rate is *not* a determinant of the steady-growth “neutral” interest rate in the NC approach owing to the presence of assumptions like (i) the identification of households’ permanent income with present and future (per capita) potential output and (ii) the perfect creditworthiness of all borrowers. Contrastingly, in the PK approach, higher output volatility causes more precautionary saving and credit-rationing, higher term premiums, lower investment and, hence, a lower steady-growth “neutral” interest rate. Indeed, we may argue that the existence of phenomena like precautionary saving and credit-rationing

is inextricably linked to the presence of powerful deviation-amplifying mechanisms that may drive current output away from potential output for long periods of time.

### **Precautionary saving**

Consumption appears to track household current disposable income much more closely than predicted by Friedman's PIH [Friedman 1957]. This is normally attributed to (i) households' permanent income being sensitive to changes in current income and (ii) the presence of liquidity constraints. According to the joint rational expectations-PIH [Hall 1978], the individual's permanent income and, therefore, his consumption plans will be revised period by period as new information about future income becomes available. The magnitude of the revisions in response to the realization of the current innovation in income in a given period will be proportional to the latter. Notwithstanding this, Flavin's [1981] empirical results indicate that the observed sensitivity of current consumption to current disposable income is much *greater* than is warranted by the PIH, even after controlling for the role of current income in signaling changes in permanent income. Likewise, a number of empirical studies show that some groups of households are subject to significant liquidity constraints [Jappelli and Pagano 1994]. The observed "excess" sensitivity of permanent income to changes in current income and the presence of liquidity constraints represent crucial deviation-amplifying mechanisms that are completely absent from the NC model. As noted above, the absence of the former is a consequence of the "perfect foresight" assumption whereby revisions in permanent income are made (only) in response to changes in potential output. This means that, at the aggregate level, there is the equivalent of Say's Law whereby an increase in expected

future potential output brings about an equivalent increase in current and future aggregate spending [Palacio-Vera 2005]. In turn, the absence of liquidity constraints in the NC model stems from the “transversality” condition whereby there is no default risk and *all* borrowers are deemed creditworthy [Goodhart 2007].

Next, Friedman [1957] acknowledged the importance of precautionary saving motives induced by uncertainty about the future level of income. In contrast, the crucial assumption that allowed subsequent theorists to solve their formal maximizing models was that income uncertainty had no effect on consumption either because uncertainty was assumed not to exist — like in the “perfect foresight” model that characterizes the NC approach — or because the utility function took a special form that effectively ruled out precautionary motives — like in the “certainty equivalent” model in which, consumers are assumed to have quadratic utility functions. According to Carroll [2001, p. 25], the main development in consumption theory in the last two decades is that substantial improvements in computer speed have allowed economists to relax the perfect foresight/certainty equivalence assumption and to analyze optimal behavior under realistic assumptions about uncertainty. In particular, 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. Buffer-stock behavior arises because impatience makes consumers want to spend down their assets, while prudence makes them reluctant to draw down assets too far. 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.<sup>8</sup>

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 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. Under certainty we have the well-known result in consumption theory that consumption will be growing when the real interest rate is greater than the rate of time preference, and declining when the real interest rate is less than the rate of time preference. However, as noted in Deaton [1992, p. 29], ‘if the marginal utility of consumption function is *convex*, a mean-preserving

increase in risk will increase the marginal utility of future consumption, so that current consumption will have to decrease in order to bring the current marginal utility back into equality'. Hence, convexity of the *marginal* utility function provides a rationale for the precautionary demand for saving.<sup>9</sup> In a seminal paper, Leland [1968] considers a two period model of consumption in which income in the first period and a subjective probability distribution for income in the second period are known. He is interested in the level of saving as future income becomes more uncertain about a *given* expected (mean) value and finds that, under reasonable assumptions, the optimal saving rate of households under uncertainty is *higher* than under certainty and the higher the degree of uncertainty, the greater will be the optimal saving rate [see also Sandmo 1970, p. 356]. In particular, he shows that, under uncertainty, the Euler equation becomes:

$$E_t[u'(c_{t+1})] > \left[ \frac{1+\mathcal{G}}{1+r_0^*} \right] u'(c_t) \quad \text{if } r_0^* = \mathcal{G} \quad (5)$$

where  $u'(c_t)$  is the marginal utility of consumption  $c$  in period  $t$ ,  $\mathcal{G}$  is the discount factor, and  $E$  is the expectations operator. The inequality in the Euler equation (5) stems from the fact that, as uncertainty increases, households' expected marginal utility of future consumption *increases* relative to the marginal utility of current consumption. Hence, if the real interest rate does not decrease, optimizing households will want to reduce current consumption. Nevertheless, an alternative way of viewing this is that there is a real interest rate  $r_1^* < r_0^* = \mathcal{G}$  such that, in equilibrium:

$$E_t[u'(c_{t+1})] = \left[ \frac{1+\mathcal{G}}{1+r_1^*} \right] u'(c_t) \quad (6)$$

so that, if  $r = r_1^* < \rho$ , households will have no incentive to modify his level of current consumption despite the real interest rate falling short of his rate of time preference. We may note that a similar result can be obtained if, instead of an increase in uncertainty, there is a *decrease* in permanent income. For instance, a decrease in expected future income relative to current income will increase the expected marginal utility of future consumption relative to the marginal utility of current consumption so that households will also want to reduce current consumption.<sup>10</sup> In practice, increases in uncertainty are likely to be coupled to downward revisions of permanent income so both developments will tend to reduce current consumption. However, the important point is that, eventually, households will stop revising (downward) permanent income and, when this occurs, the PIH predicts that current consumption will increase (relative to consumption in the previous period) as long as  $r < \rho$  thereby guaranteeing the convergence of  $r^n$  and  $\rho$ . By contrast, the theory of precautionary saving predicts that, even if permanent income is constant, the presence of uncertainty may prevent such convergence from taking place if, for instance,  $r = r_1^* < \rho$  in (6) above. Hence, in this case, a gap will open up between  $\rho$  and  $r^*$  the size of which will grow larger as uncertainty increases. Crucially, its size may be such that  $r_1^*$  becomes negative and the economy exhibits a LT. Lastly, we have assumed so far that  $\rho > 0$  for *all* households. Nevertheless, as Fisher [1930] noted long time ago, there may be some occasions when this does not hold:

‘The man’s income situation is such that he might even be willing to lend for nothing, or even less than nothing, simply because he would, in such a case, be so surfeited with this year’s income and so short, prospectively, of next year’s income that



he would be thankful to get rid of some of this year's superfluity, for the sake of adding even a trifle to next year's meager real income... In such situations a man would be willing to save for the future without any incentive in the form of interest.' [Fisher 1930, p. 248]

It is straightforward to associate the case mentioned in Fisher's quote above with increases in uncertainty about future income, that is, there may be households whose future income becomes so uncertain that, for all purposes, it is "as if" their rate of time preference were *negative*. Crucially, if the rate of time preference of some households becomes negative in some circumstances, it is no longer the case that the *average* rate of time preference in the economy will always be positive.

## **Investment**

Post Keynesians insist that firms' investment is mainly a function of current and expected profitability. The impact of expected future profits in investment spending recognizes the possibility, as Keynes [1936] does, that long-period profit expectations may shift independently of strictly economic results like current gross profits.<sup>11</sup> The impact of current profits in firms' investment spending stems from the fact that: (i) as proposed in the Kaleckian tradition changes in current profits affect expected profitability as well as the cost of external finance [Fazzari and Mott 1986–87] and, (ii) there is an extensive literature that claims that firms' investment expenditure is significantly affected by changes in firms' cash flows [Fazzari *et al.* 1988; Fazzari and Petersen 1993]. This literature is generally based on the premise that capital markets are imperfect in the sense

that internal and external capital are not perfect substitutes so that investment may depend on financial factors such as the availability of internal finance, access to new debt or equity finance, or the functioning of particular credit markets. In turn, the main source of imperfections is the presence of asymmetric information that makes it very costly, or even impossible, for providers of external finance to evaluate investment opportunities. As a result of it, the cost of new debt and equity may be substantially higher than the opportunity cost of internal finance generated through cash flow and retained earnings. The impact of cash flows on investment thus constitutes an important deviation-amplifying mechanism that reinforces the mechanism that operates through consumption.

### **Credit-rationing**

In the real world many economic agents are liquidity-constrained in the sense that they do not have sufficient assets to sell or the ability to borrow. Samwick [1995] shows that unconstrained consumers exhibiting 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]. This means that uncertainty will have a bigger effect on expected utility for liquidity-constrained agents than for unconstrained ones. The precautionary saving motive is thus

heightened by the desire (in the face of uncertainty) to make such constraints less likely to bind [Carroll and Kimball 2001].

The usual PK assumption regarding expectations formation is that borrowers and lenders are subject to “fundamental” uncertainty about the future [Keynes 1937, p. 113]. By such, is meant the idea that the future cannot be reduced to an actuarial calculation of probabilities, whether objective or subjective. In this setting, the analysis of past data or current market signals does not provide reliable information regarding future prospects and therefore, the future is simply not calculable [Davidson 1991]. They also argue that, in many choice situations more can be learned about the factors governing eventual outcomes after decisions have been made. This presents no problem where choices can be completely and costlessly reversed. But things are very different where they cannot. Such irreversibility entails that it may sometimes be rational to suspend judgement and delay commitment until more information has been acquired. In this context, the function of liquidity is that of “giving us time to think” [Hicks 1974, p. 57]. In general, however, decisions cannot be postponed until all the evidence is available and, in such cases, the readiness and terms at which commitments to previous choices may be dissolved assumes importance [Runde 1994, p. 136]. Thus, in situations of uncertainty liquid assets carry a premium over illiquid ones. In short, Post Keynesians identify the notion of LP with an environment of “fundamental” uncertainty where the degree of LP is inversely related to the degree of confidence and the reliability of beliefs.

Next, reduced LP typically accompanies conditions which are conducive to increases in the level of economic activity and vice-versa. As we argued above, precautionary saving and changes in expected profitability are two channels through

which higher LP may reduce aggregate demand. In addition, Post-Keynesians insist that decisions by banks as to whether or not to grant credit play a major role in the expansion of the economy, in the sense that a failure of banks to supply credit implies that the expansion of expenditure cannot occur.<sup>12</sup>

“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]

The usual PK argument is that banks accommodate all creditworthy demands for credit, and ration all those demands not deemed creditworthy. In addition, it is postulated that there is always some credit-rationing and that the former increases in recessions due (mainly) to increases in the degree of LP of banks which, in turn, exacerbates output contractions. The earliest reference to credit-rationing in the PK literature is Keynes’ comments in the *Treatise* [Keynes 1930, p. 212] about the “fringe of unsatisfied borrowers”, the size of which can be expanded or contracted so that banks can influence the volume of aggregate spending over the business cycle.<sup>13</sup> For the purpose of this study, two questions naturally arise. First, does credit-rationing actually increase in recessions and, if so, why?. Second, does the occurrence of cyclical changes in credit rationing makes it more likely that a “structural” LT comes about?. According to Wolfson [1996, p. 451], ‘all that is necessary for a theory of credit rationing based on Keynesian uncertainty is that borrower and lender evaluate the future differently — that is, they have

*asymmetric expectations*’ about the riskiness of particular projects whose outcome depends on the future. In particular, for those projects deemed safe by the borrower but deemed too risky by the lender, the borrower will be rationed. In turn, this means that the impact of credit rationing at any point in time can be ascertained by computing the number of projects deemed safe by the borrower *relative* to the number of projects deemed too risky by the lender. It is not controversial to say that banks tend to increase both price and non-price terms in response to perceptions of higher risk and that perceived risk increases in recessions. However, it will also be the case that the demand for bank credit decreases in recessions. Be that as it may, Wolfson [1996, pp. 459-61] shows empirical evidence that suggests that interest rate spreads, non-price standards *and* credit rationing increase altogether near business-cycle peaks and decrease near troughs.

Why is this so?. Banks need to reach a compromise between profit maximization on one hand and illiquidity and default risk on the other hand. An increase in lending by an individual bank (to creditworthy borrowers) relative to lending by the rest of the banks leads, in normal circumstances, to higher expected future profits for that bank but also brings about a decrease in its reserves to capital ratio and its reserves to deposits ratio. The specific balance an individual bank reaches will depend on its degree of LP which, in turn, will depend on its *state of confidence*. By this, we mean ‘how highly we rate the likelihood of our best forecast turning quite wrong’ [Keynes 1936, p. 148]. According to Keynes [1936, p. 152], even though we know we do not know the future, we tend to act as if we do by relying on *conventions*. The former represent the non-technical vision of economic agents. As uncertainty increases, agents will ‘place less trust in the past as a guide to the future and become more wary of irreversible commitments that increase the

threat of illiquidity’ [Dymski 1992, p. 317]. In general, the weaker the *state of confidence* is, the more likely it is that opinion will change. In turbulent times like recessions conventions break down and change. In turn, a turbulent time comes about when there is a significant amount of *dissonance* between agents’ anticipations about cash flows and ex post realizations [Minsky 1975]. As for banking firms, an increase in turbulence will bring about a perceived change in borrowers’ creditworthiness that will change their conventional valuation of the risk of lending and, hence, the size of interest rates spreads and the extent of credit rationing. Arguably, this will tend to reinforce the deviation-amplifying mechanisms alluded to above by exacerbating the response of current consumption and investment spending to decreases in current disposable income and profits respectively thus rendering the occurrence of a “structural” LT more likely.

## **A SIMPLE POST-KEYNESIAN MODEL**

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 model. We display the model in the first two subsections and present the analysis of its steady growth properties and short-run behavior in subsequent subsections.

### **The supply side**

Let us consider a one-sector economy with two inputs, labor 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, we may define potential output  $\bar{Y}$  as:

$$\bar{Y} = \lambda \cdot \bar{N} \leq \nu \cdot K \quad (7)$$

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

$$u = \frac{Y}{\nu \cdot K} \leq 1 \quad (8)$$

where  $Y$  denotes aggregate output. We assume there is an “employment rate compatible with constant inflation” (hereafter CIER) which results from the conflicting income claims of workers and firms so that inflation will increase if the actual employment rate is higher than the CIER and vice-versa. Thus, the CIER represents a short-run “inflation barrier” albeit one which may be affected by the level and time path of aggregate demand if it exhibits hysteresis effects. We define the rate of capacity utilization when  $Y = \bar{Y}$  as the “constant inflation capacity utilization” or CICU which we denote by  $\bar{u}$  or:

$$\bar{u} = \frac{\bar{Y}}{\nu K} = \frac{\lambda}{\nu} \cdot \frac{\bar{N}}{K} = \left( \frac{\lambda}{\nu} \right) \cdot \left( \frac{\bar{e} \cdot L}{K} \right) \leq 1 \quad (9)$$

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

$$g_n = n + a \quad (10)$$

where  $a$  is the growth rate of labor productivity  $\lambda$ .

### **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:

$$s(r^n, z) \cdot \bar{Y} = I \quad (11)$$

where  $s$  is the saving rate,  $I$  is (gross) investment, and  $z$  is a vector of variables to be filled below. If we divide (11) through by  $K$  and denote the rate of capital accumulation by  $g$  and the rate of depreciation of physical capital by  $\psi$  we get:

$$s \cdot v \cdot \bar{u} = g + \psi \quad (12)$$

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  $\pi$ , the rate of growth of output  $\hat{y}$ , the real interest rate  $r$  and a measure of shocks  $\varepsilon_s$  that includes changes in the degree of LP or:

$$s = s(\pi, \hat{y}, r, \varepsilon_s) \quad (13)$$

where  $s_{\hat{y}} > 0$ ,  $s_{\pi} < 0$ ,  $s_r > 0$ , and the subscripts in function  $s$  denote partial derivatives.

As noted above, a positive sign of  $s_{\hat{y}}$  is an implication of the “buffer-stock” theory of saving.<sup>14</sup> In any case, it is here justified by 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. We also noted above that the “buffer-stock” theory of saving predicts (for individual households) a negligible elasticity of saving with respect to the interest rate. By contrast, the positive sign of  $s_r$  is here attributed to the presence of *distribution* effects among two sets of households. If we assume 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.<sup>15</sup>



The sign of  $s_\pi$  is attributed to the presence of inside-debt effects that depress private spending when inflation decreases and vice-versa.

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

$$g = v \cdot u \cdot f(u - u^*, \varepsilon_g) \quad (14)$$

where  $f_u > 0$  is inversely proportional to the size of the construction and capital goods delivery lags,  $f(0) = \bar{f} > 0$ ,  $E(\varepsilon_g) = 0$  and  $\varepsilon_g$  represents shocks affecting  $\bar{f}$ . Parameter  $\bar{f}$  captures firms' expected future demand growth and, hence, expected profitability. In turn, we assume that the investment function  $f$  adopts a linear form or:<sup>17</sup>

$$f(u - u^*, \varepsilon_g) = \bar{f} + f_u \cdot (u - u^*) \quad (15)$$

Inserting (14) into (12) we obtain the equilibrium condition in the goods market when  $Y = \bar{Y}$  or:

$$s(\pi, \hat{y}, r^n, \varepsilon_s) = f(\bar{u} - u^*, \varepsilon_g) + \frac{\psi}{v\bar{u}} \quad (16)$$

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

$$s = \bar{s} + s_{\hat{y}} \cdot \hat{y} + s_\pi \cdot \pi + s_r \cdot r \quad (17)$$

where  $\bar{s}$  is a shift term determined by households' preferences, institutional factors, and the degree of LP. If we insert (15) and (17) into (16) and re-arrange, we obtain the (short-run) rate of growth of output:

$$\hat{y} = \frac{\bar{f} - \bar{s} + f_u \cdot (u - u^*) - s_\pi \cdot \pi - s_r \cdot r}{s_{\hat{y}}} + \frac{\psi}{s_{\hat{y}} \cdot v \cdot u} \quad (18)$$

A solution for  $r^n$  can be obtained by setting  $u = \bar{u}$  in (18) and rearranging:

$$r^n = \frac{\bar{f} - \bar{s} + f_u \cdot (\bar{u} - u^*) + \frac{\psi}{v \cdot \bar{u}} - s_{\hat{y}} \cdot \hat{y} - s_\pi \cdot \pi}{s_r} \quad (19)$$

Therefore, an increase in the degree of uncertainty will tend to raise  $\bar{s}$  and lower  $\bar{f}$  thereby pushing  $r^n$  downward and vice-versa.<sup>18</sup> Finally, and in addition to raising the expected real interest rate once the ZB binds as in the NC approach, a decrease in  $\pi$  will directly reduce  $r^n$  in the PK approach owing to the existence of inside-debt effects which tend to depress aggregate demand.

### 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  $\pi^*$  the inflation target of the CB we have that, in a hypothetical steady growth scenario,  $\hat{y} = g = g_n$ ,  $u = \bar{u} = u^*$ ,  $\pi = \pi^*$  and  $\varepsilon_s = \varepsilon_g = 0$  so that the two following conditions must be satisfied:

$$v \cdot u^* \cdot \bar{f} = g_n = \hat{y} \quad (20)$$

and

$$s(\pi^*, g_n, r^*) \cdot v \cdot u^* = g_n + \psi \quad (21)$$

Equation (20) tells us that, in steady-growth, the rate of accumulation must equal the “natural” growth rate. Equation (21) is the counterpart to equation (12) for the steady-growth case. In order to get an explicit solution for the steady-growth “neutral” interest rate  $r^*$  we insert equation (17) into equation (21) and re-arrange:

$$r^* = \left[ \frac{g_n + \psi}{v \cdot u^*} - \bar{s} - s_\pi \pi^* - s_y g_n \right] \frac{1}{s_r} \quad (22)$$

Thus,  $r^*$  is a function of the “natural” rate of growth, the target inflation rate, the depreciation rate and the 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]. It follows that:

$$\frac{\partial r^*}{\partial \bar{s}} = \frac{-1}{s_r} < 0 \quad (23)$$

so that, for instance, an increase in precautionary saving pushes  $r^*$  down and vice-versa.

Likewise, a decrease in the “natural” growth rate will push  $r^*$  downward since:

$$\frac{\partial r^*}{\partial g_n} = \left( \frac{1}{v \cdot u^*} - s_y \right) \cdot \frac{1}{s_r} > 0 \quad (24)$$

Therefore, unlike in the NC approach,  $r^*$  may become negative if  $g_n$  is very low and  $\bar{s}$  is relatively large. In this respect, it has been argued that the main cause of the recent Japanese stagnation is its relatively high saving rate and its low “natural” rate of growth [Krugman, 1998; Nakatani and Skott 2007].<sup>19</sup> Finally, Post Keynesians insist that the “natural” growth rate is a positive function of the growth of aggregate demand.<sup>20</sup> This means that, if sustained for a sufficiently long period of time, a low investment rate may push the “natural” growth rate down and, through this channel, it may reduce  $r^*$ .

## SUMMARY AND CONCLUSION

The purpose of this study was to identify the distinguishing features of a Post-Keynesian (PK) approach vis-à-vis the New Consensus (NC) in macroeconomics with respect to the explanation of the occurrence of a “liquidity trap” (LT). We characterized the NC approach by Woodford’s [2003] influential study which predicts that a LT is likely to be a transitory phenomenon that may solely occur as the result of relatively large shocks that (temporarily) depress the “natural” interest rate. We showed that this is an implication of the neoclassical premise that there is a positive *gravitation center* towards which the “natural” interest rate converges in the long run. However, we argued that such convergence is based on unrealistic assumptions about economic agents’ behavior and the institutional framework in which they make decisions like the assumptions of perfect foresight and perfect capital markets. By contrast, we showed that, in the PK approach, all agents face the risk of default and make decisions under conditions of “fundamental” uncertainty about the future. As such, the main implication of the PK model vis-à-vis the NC model is that economies may exhibit “structural” or long-lasting liquidity traps. This will be the case, for instance, if a perverse combination of high household saving, low investment and stringent conditions for access to credit stemming from a high degree of liquidity preference makes the sum of the steady-growth “neutral” interest rate and the expected inflation rate fall short of the term premium on long-term interest rates. Finally, the main policy implication stemming from the PK model vis-à-vis the NC model is that, even if a “deflationary spiral” does not set off, the economy may remain stuck in a LT for long periods unless forceful expansionary fiscal policy measures are implemented. This policy conclusion is of utmost importance as most OECD economies currently head into

recession and overnight nominal interest rates are getting dangerously close to the zero lower bound in the United States, the Euro Zone, and Japan.

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<sup>1</sup> Expositions of the NC can be found in Clarida et al. [1999] and Meyer [2001] and a recent critical review is in Arestis and Sawyer [2008].

<sup>2</sup> The traditional Keynesian presentation of the LT refers to a situation where the demand for money becomes infinite at a (low) positive long-term *nominal* interest rate owing to the behavior of speculators in the bond market [Kregel 2004]. By contrast, Krugman [1998] refers to the LT as an episode in which the output-gap is negative despite the short-term nominal interest rate becoming zero.

<sup>3</sup> 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.

<sup>4</sup> The introduction of endogenous capital accumulation in the "basic" model [Woodford 2003, ch. 5] does not affect this story. In practice, investment is introduced in terms of the expansion of the capital stock that is required to underpin a predetermined potential output path so it does not play an "independent" role.

<sup>5</sup> 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.

<sup>6</sup> In his defense, we may note that a "deflationary spiral" may not set off when the economy exhibits a LT. For instance, Japan's 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.

<sup>7</sup> Indeed, the high volatility of the "neutral" interest rate explains, at least partly, the practical difficulties encountered by researchers when attempting to estimate it [Weber et al. 2008].

<sup>8</sup> Carroll and Samwick [1998] regress household's wealth on two different measures of uncertainty and find substantial evidence that households engage in precautionary saving. In particular, they find that setting the uncertainty of every household to the smallest predicted uncertainty for every household would reduce total net worth of households under 50 by about 45%; would reduce their net worth exclusive of housing and business equity by 50%; and would reduce their holdings of liquid assets by 32%.



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<sup>9</sup> In turn, this is a consequence of the consumption function under uncertainty being *strongly concave* [Carroll and Kimball 1996]. The concavity property thus implies that consumers engage in “buffer-stock” saving behavior whereby wealth becomes a “reserve” against uncertainty.

<sup>10</sup> Wicksell [1911 (1958), p. 181] discusses the possibility of a negative “natural” rate of interest when agents expect a lower real income in the future.

<sup>11</sup> Ferderer [1993] provides supportive empirical evidence for the hypothesis that, after controlling for accelerator effects and the cost of capital, increased uncertainty induces firms to postpone irreversible investment expenditures.

<sup>12</sup> PK studies on this topic are in Dymski [1992], Wray [1991], Lavoie [1996], and Wolfson [1996].

<sup>13</sup> We view the New Keynesian literature on credit rationing stemming from the seminal work by Stiglitz and Weiss [1981] as focusing on the factors that determine *which* borrowers are denied credit at a given point in time as opposed to the PK literature that is mainly concerned with the change over time in the amount of credit rationing for *all* borrowers.

<sup>14</sup> We may also note that a fundamental implication of the “life-cycle theory of saving” is that the saving rate depends positively on the long-term rate of income growth [Modigliani and Cao 2004].

<sup>15</sup> 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 thus swamps the potential offsetting impact stemming from the “income” effect [Summers 1981].

<sup>16</sup> Empirical studies for the U.S. economy show that actual capacity utilization in the manufacturing sector fluctuates around 82 percent in the long run. This lends support to the notion that firms exhibit a stable “desired” rate of capacity utilization [Garner 1994; Corrado and Matthey 1997].

<sup>17</sup> The absence of the real interest rate as an argument of the investment function stems from the fact that empirical studies normally find that there is no significant relationship between long-term real interest rates and investment once we control for accelerator and cash-flow effects [Stiglitz, 1988, p. 310].

<sup>18</sup> 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.

<sup>19</sup> According to Nakatani and Skott [2007], the low Japanese “natural” rate of growth is 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 share on capital and, hence, a low desired rate of accumulation, and refer to 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 recent Japanese stagnation. These authors treat the Japanese “natural” growth rate as essentially determined by exogenous forces and do not discuss why the Japanese saving rate is so high compared to other developed economies.

<sup>20</sup> This is typically justified by the presence of “learning by doing” effects, induced technical change, changes in participation rates, and migration [León-Ledesma and Thirlwall 2002].