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Central bank's power versus the tyranny of financial markets: Liquidity preference and macroeconomic dynamics in a world of endogenous money

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Abstract

In this paper we build a simple Keynesian model on the role of liquidity preference in the determination of economic performance. We postulate, for the sake of the argument, a purely "horizontalist" environment, i.e., a world of endogenous money where the central bank is able to fix the interest rate at a level of its own willing. In the paper, we show that even in a purely "horizontalist" framework the Keynesian theory of liquidity preference, while obviously not constituting anymore a theory for the determination of the interest rate, continues to be a fundamental piece of theory for the determination of both the level and evolution over time of aggregate income and capital accumulation. We show how households' liquidity preference (financial markets' behaviour) and banks' policy of profits' distribution interact with each other to determine real macroeconomic outcomes. However powerful, the banking system and monetary authorities are not the *deus ex-machina* of our economies and financial markets are likely to exert a permanent influence on our economic destiny. We finally draw some policy implications in line with Minsky's emphasis about the changing role of monetary authorities in ensuring financial markets' stability in "money-managers" capitalism.

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Central Bank's power versus the tyranny of financial markets: Liquidity preference and macroeconomic dynamics in a world of endogenous money

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1. Introduction

The theory of liquidity preference as incorporated in the traditional IS-LM scheme all of us grew up with was a theory for the determination of the interest rate and (then) the level of activity. This theory was developed in a framework of exogenous money. Money supply was taken as fixed, decided by monetary authorities, and fluctuations of money demand were in charge of determining the equilibrium interest rate and *then* the level of output. Money, however, is endogenous. The monetary authority does not decide the quantity of money, but the interest rate. This is now recognized even by the many (the large majority of the profession) who still adhere to the Wicksellian loanable funds theory and believe in the existence of a natural interest rate determined by the fundamentals of thrift and productivity. The central bank decides the policy rate and allows the supply of money to adjust to whatever is the level of demand.

Does money endogeneity imply that private sector' demand for money (liquidity preference) becomes a useless tool? Some strands of Keynesianism seem to share the same, positive answer. Take the so-called New Consensus, for instance. Carlin and Soskice (2015), who made a great effort to spread and clarify the new-Keynesian perspective by means of very elegant and accessible models, are rather explicit:

> "… structural changes in the economy that shift the private sector's demand for money, do not alter the central bank's ability to achieve its desired output gap… any shift in the money demand function affects the money supply [endogenous money] but does not feedback to influence real economic activity" (pp. 158-159).

In a very useful representation of the New Consensus 3-equation model, Lavoie (2009) shows things are a bit more complicated. A rise in liquidity preference, there represented as a "Minsky moment" (a rush towards liquidity and riskless assets that prompts an increase in those market rates relevant to the private sector's spending decisions), does have a temporary recessionary impact. However, if the central bank is able to revise downward its estimate of the natural interest rate and reduces the policy rate accordingly,

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the economy will return at its NAIRU equilibrium and inflation on target. A variation in liquidity preference, despite its real short-term effects, does not modify the steady-state position of the economy[1].

Post-Keynesian authors do not have a unique position in this respect. On the one hand, the so-called "structuralist" (Palley, 1994, 2013, 2017; Dow, 1997), believe that banks' behaviour is characterized by a traditional upward sloping loans' supply curve - the interest rate goes up with credit expansion and constitutes an endogenous variable of the system. In this case, money is endogenous but the liquidity preference of the public may matter again[2]:

> "An increase in liquidity preference puts upward pressure on interest rates, which in turn puts downward pressure on output and employment, as long as the money supply is constrained to some degree" (Dow, 1997, p.64).

On the other hand, the so-called "early horizontalists"[3] (Moore, 1988), believe in the ability of the central bank to fix the interest rate at a level of its own willing and follow Kaldor (1985) in denying any significant role to liquidity preference:

> "… 'liquidity preference' was regarded as the essential factor that distinguished Keynesian from pre-Keynesian theories…. All this, however, depended on the assumption of the quantity of money being determined irrespective of all other factors that determined the demand for goods and services. If we regard money as an endogenous factor, *liquidity preference and the assumption of interest-elasticity of the demand for money cease to be of any importance*" (p.9; italics is ours).

Quite an astonishing parabola: from being the cornerstone of the Keynesian edifice ("the essential factor that distinguished Keynesian from pre-Keynesian theories"), liquidity preference "ceases to be of any importance"[4].

Lavoie (1996) offers a more elaborated and nuanced analysis of the "horizontalist" approach. He shows that "horizontalism" might be potentially compatible with the idea of liquidity preference as a relevant factor in the determination of interest rates' *spreads* among different financial assets. Lavoie (1996) himself, however, recognizes that a source of tension may still remain between horizontalists on the one hand and, on the other, those post-Keynesian authors believing in the importance of liquidity preference in the determination of the real equilibrium of the economy. This emerges from the actions possibly taken by monetary authorities when they are strongly determined in changing markets' conventions underpinning an excessive and undesirable (from their point of view) spread between the base rate and

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[1] Of course, the real effects of liquidity preference variations would be permanent in a model with growth hysteresis (due, for instance, to some kind of Kaldorian technical progress function). However, this would be true for any possible shock and not just for liquidity preference shifts.

[2] According to Palley (2017), there are also "later horizontalists" (for instance Lavoie, 2006). These authors fully acknowledge the role of liquidity preference in the determination of interest rates, but do not recognize that the overall financial system may be "financially constrained".

[3] This terminology is due to Palley (2017).

[4] This horizontalist perspective is also incorporated in a post-Keynesian pedagogical model proposed by Fontana and Setterfield (2009), in an attempt at building a teachable post-Keynesian model to be contrasted with the 3-equation model of the new-Keynesians and the more traditional IS-LM scheme.

the interest rates on longer term assets. In his own words, "if monetary authorities are sufficiently insistent and consistent, a shift in interest rate differentials can only be temporary" (Lavoie, 1996, p. 295).

On top of being important from a theoretical point of view, this debate has relevant political implications. At the end of the day, it is a debate around the relative roles of and distribution of power between central banks and financial markets. Horizontalists (and their modern followers of the Modern Monetary Theory) give prominence to the power of monetary authorities. Structuralists recognize a crucial macroeconomic role for financial markets, "money managers" and the alike. In a sense, the Keynesian theory of liquidity preference was a recognition of the power of the City, of how its changing mood and orientations could seriously affect the real economy and the concrete prospects of firms and households. This is for instance the interpretation offered by Bibow (2009), who considers liquidity preference as the fundamental piece of economic theory needed to understand the big mess in global finance that led to and accompanied the 2007-8 world crisis. Given these premises, it is not surprising that some recent papers – Oreiro et al. (2020), Mehrling (2020), Bertocco and Kalajzic (2014 and 2018), Dafermos (2012), Lavoie and Reissl (2018), Palley (2017) and Asensio (2017) among others – have revived the debate around the macroeconomic role of Keynesian liquidity preference in a world of endogenous money.

As argued below, the alleged irrelevance of liquidity preference - or what we label here as the "Kaldorian view" - rests on three key and very unrealistic assumptions:

(a) Capital gains/losses are assumed away;

(b) Bonds and bank loans are treated as perfect substitutes from the perspective of non-financial firms;

(c) Banks' profits are fully distributed to households, which essentially means that banks operate without own funds.

Taylor and O'Connell (1985), Taylor (2004), Lavoie (2014) and, though somehow differently, Dafermos (2012) and Asensio (2017) remove assumption (a) to give liquidity preference some traction in the determination of macro outcomes. The same result may be achieved by removing assumption (b). Some post-Keynesian literature related to the idea of "finance frontier" and based on Kalecki (1937) and Davidson (1972) takes the different modalities of financing capital accumulation as perfect complements[5], and then the willingness of people to hold bonds (shares) rather than bank deposits becomes crucial again.

In this paper, we contribute to the debate by analysing what happens if we remove assumption (c) instead. So far, the implications of assumption (c) have been neglected by the literature. In this paper, we demonstrate that assuming banks retain even a small share of their profits in order to accumulate own funds is more than enough to make liquidity preference of the public relevant for the determination of economic activity both in the short and in the medium run. More specifically, we obtain three main results.

First, we show that liquidity preference matters just because it affects the relative importance of the different ways (either direct returns on bonds' holding or banks' dividends) through which capital incomes accrue to households. In a world of "financialized" capitalism, where households' (mediated) participation to financial markets has increased considerably and an increasing part of their income (or pensions) may come from these types of financial relations, this is more than enough to make liquidity preference relevant for the real economy.

[5] As Davidson (1972, p.348) put it, "In an uncertain world, therefore, internal and external finance are complements rather than substitutes…".

Second, differently from Dafermos (2012) and Asensio (2017), we show that liquidity preference influences the level of economic activity even when it does not play any role in the determination of interest rates or interest rate spreads. In this paper, we assume an economy where money is created endogenously in a purely "horizontalits environment" and with a fully accommodationist stance taken by the central bank. For the sake of our argument, we assume "the" interest rate (below we will briefly elaborate on interest rates' multiplicity) to be fully exogenous. Yet, changes in liquidity preference remain fundamental for the determination of the real equilibrium of the economy. In a similar vein, differently from Taylor and O'Connell (1985), Taylor (2004), Taylor and Rada (2008), and Lavoie (2014), we also demonstrate that liquidity preference matters for the real economy even in the absence of capital gains and/or losses.

Third, we extend the study of the role of liquidity preference beyond the short run and show that changes in liquidity preferences may have long-lasting consequences on capital accumulation and, hence, on the *medium-run* development of the economy[6]. In doing so, we provide a formal demonstration of some numerical simulations contained in Dafermos (2012), albeit through different economic mechanisms.

The paper is organized as follows. Section 2 describes the structure of our model through the analysis of the balance sheets (stocks) and the Social Accounting Matrix of our economy. Section 3 illustrates the "Kaldorian view". Sections 4 and 5 describe the short- and medium-run equilibria of the economy, and the way liquidity preference affect them. Section 6 concludes.

2. Structure and accounting

The recent debate on the macroeconomic role of liquidity preference does not consider exclusively the liquidity preference of the public (households' liquidity preference), but also the liquidity preference of banks and other financial firms (Le Heron and Mouakil, 2008). This certainly helps and constitutes an element of realism in any applied macro model. The route we are going to follow here, however, is different. We will show, on the basis of the ideas expressed by Keynes in 1937 (Keynes, 1937), that the very simple structure of the traditional Keynesian cross is more than enough to understand the reasons why the liquidity preference of the general public continues to represent, even in a world of endogenous money, a key determinant of the steady state medium-run level of real output.

We assume a very simple closed economy without government composed by households, non-financial firms (or simply firms) and banks. The balance sheets of these social actors are summarized in Table 1. Table 2 reports the corresponding flows:

[6] In this paper we will not employ the expression "long run" in association with the steady state equilibrium of the system. The reason is that labor productivity (technology) and population (labor force) will be taken as fixed: the time horizon we are taking into consideration is not "long" enough to allow these magnitudes to vary.

Table 1 – The balance sheets of the economy

	HOUSEHOLDS	FIRMS	BANKS	TOT
Deposits (Money)	M		$-M$	0
Loans		$-L$	L	0
Bonds	B/i_b	$-B/i_b$		0
Capital		K		K
Banks' own funds	OF		$-OF$	0
Balance	$-V_h$	$-V_F = 0$	$-V_b = 0$	$V_h = K$

For the sake of the argument, we assume that firms do not retain profits. Hence, their wealth, V_F in Table 1, is zero, and they must make recourse to external finance to fund capital accumulation (including retained profits would not change the logic of our argument, except in the completely unrealistic case where this is the only way of financing capital accumulation). Banks and households may provide this finance:

> "The transition from a lower to a higher scale of activity involves an increased demand for liquid resources which cannot be met without a rise in the rate of interest, unless the banks are ready to lend more cash or the rest of the public to release more cash at the existing rate of interest" (Keynes, 1937, p.222).

The banking system creates money (M) by extending loans (L) – "loans make deposits", according to the endogenous money *adagio*. Households ("the rest of the public") cannot create money ex-nihilo and make loans to firms by subscribing bonds ("releasing more cash"), "B", i.e. by changing the composition of their wealth (less money, more bonds). We will assume that bonds are "consols" or perpetuities. These are pieces of paper which are never redeemed and pay the owners, say, 1 dollar after one period has elapsed. The market price of these bonds is "p_b" and by construction the interest rate on them is $i_b = 1/p_b$, with $p_b = 1 + 1/(1+i_b) + 1/(1+i_b)^2 +\ldots = 1/i_b$. The total interest bill paid on them coincides with the number of outstanding bonds, i.e., "B".

Banks' own funds (OF) or own capital are an asset from the perspective of banks' owners (some households) and a liability from the perspective of banks. In most cases, these own funds take the form of equities, but here this is not relevant since, for the sake of the argument, we want to abstract from capital gains. In other words, our argument holds regardless of whether banks are corporates or unincorporated firms. Observe, also, that banks wealth is zero.

According to Table 2, the economy produces one commodity, GDP, used for both consumption and investment purposes and its price is fixed at 1 (putting inflation into the picture would not change our point).

Table 2 – The Social Accounting Matrix of the economy

	HOUSEHOLDS	FIRMS		BANKS		TOT
		c/a	*k/a*	*c/a*	*k/a*	
NIPA (Net Income and Product Account)						
Consumption	$-C$	C				0
Investment		I	$-I$			0
[memo: GDP]	$GDP = Y = C + I = i_L L + B + W + \Pi$					
Bank Inter.		$-i_L L$		$i_L L$		0
Bonds Inter.	B	$-B$				0
Wages	W	$-W$				0
Firms Profits	Π	$-\Pi$				0
Banks Profits	$\lambda i_L L$			$-i_L L$	$(1-\lambda) i_L L$	0
Flows-of-funds						
Money	$-\dot{M}$				$\dot{M}$	0
Bonds	$-\dot{B}/i_B$		$\dot{B}/i_B$			0
Loans			$\dot{L}$		$-\dot{L}$	0
TOT	0	0	0	0	0	0
[memo]	$\dot{OF}$	0		0	$-\dot{OF}$	0

We assume that banks do not pay interests on households' deposits and a fraction λ ($0 \leq \lambda \leq 1$) of their profits is distributed to households. We do not explicitly model central bank. Rather, we consolidate the banking system (commercial banks plus central bank) and assume the central bank to take a fully accommodationist stance. Consistently, in Table 2 "i_L" is the lending rate, i.e., the interest rate charged by banks on their loans to firms. Taking the central bank explicitly into consideration would have certainly made the structure richer and allow to incorporate interest rates' multiplicity. In fact, in a more realistic setting, we should model the central bank in charge of fixing the policy rate to achieve its policy goals, whatever they might be. In such a case, the lending rate "i_L" would be typically determined as a mark-up on this policy rate. Whilst it could be certainly argued that the size of the mark-up varies with the level of banks' own funds (or capital cushion) and other factors[7] (among which people liquidity preference), we will take it as given. This simplifying assumption is made for the sake of the argument. Our purpose, let us insist on this point, is indeed to show that even if the interest rate is taken as fully exogenous, liquidity preference remains a key element for the determination of the short- and medium-run equilibria of the economy. To keep our model as simple as possible, we do even more and take the policy rate and the lending rate as being one and the same ("the" interest rate), since with a constant mark-up this does not entail any loss of generality and does not change in any way the results of our analysis.

[7] Carlin and Soskice (2014, chapter 5) argue that the mark-up lowers with higher own funds: in this case, commercial banks are better equipped to deal with riskier loans, expand their credit supply and the lending rate falls. Mark-ups and lending rates might also be affected by people liquidity preference and/or central bank's open market operations. As an example, assume people (money managers) and/or the central bank want to increase the share of government bonds in their portfolios. Ceteris paribus, this will lower the return on government bonds and induce commercial banks to hold less of them and expand their credit supply to the private economy. Once again, the lending rate (mark-up on the policy rate) would fall too.

In Table 2, following standard conventions, a dot over a variable indicates its time derivative (absolute variation per unit of time), whereas a "hat" stands for its growth rate.

3. The Kaldorian view

The idea that liquidity preference "ceases to be of any importance" can be easily illustrated within the simple structure illustrated by Tables 1 and 2 if we assume that conditions (a) – (c) identified above hold true.

In this model economy, output (Y) is determined by aggregate demand, consumption plus investments: $Y = C + I$. Normalizing by the capital stock and defining $u = Y/K$ (rate of capacity utilization), $c = C/K$ (normalized consumption) and $g = I/K$ (rate of capital accumulation), we get:

$$u = c + g \qquad (1)$$

As it is the case in several Keynesian models, aggregate consumption is postulated to be a positive function of households' current income and accumulated wealth (this can be easily derived from a Modigliani (1986) aggregate consumption function). Given assumption (c), households' income is here the same as GDP (there are no banks' retained profits, i.e., $\lambda = 1$) and, using a linear form, we may write:

$$C = \alpha Y + \beta V_h$$

Normalizing again by the capital stock and using assumptions (a) and (b), which together imply $V_h = K$, this becomes:

$$c = \alpha u + \beta \qquad (2)$$

The good way to write an investment function is a controversial issue within the Keynesian tradition. In fairly general terms, aggregate investment spending is likely to respond positively to the (expected) profit rate. In the simple economy we are dealing with, the net macro profit rate accruing to non-financial firms is to be calculated as:

$$r = \frac{Y - W - i_L L - B}{K}$$

where W is the wage bill paid by firms to households and interest payments have been accounted for in the calculation of net profits. Be $W/K = \omega N/K = \omega(N/Y)(Y/K) = \omega a(Y/K)$, with "$N$" indicating total employment, "ω" the wage rate (real and nominal, there is no difference here) and "a" the labour coefficient (the inverse of labour productivity). Assuming $a = 1$ (we are not interested in studying the dynamics of labour productivity), we have $W/K = \omega(Y/K)$, with ω representing at the same time the wage rate and the wage share in total GDP. Then, defining $l = L/K$ (the share of capital accumulation financed through bank loans) and observing that accounting consistency implies $L/K + (B/(i_b K)) = 1$, we may express the profit rate as

$$r = (1 - \omega)u - [i_L l + i_b(1 - l)]$$

Using assumption (b), which implies $i_b = i_L = i$, the profit rate becomes:

$$r = (1 - \omega)u - i$$

There are different ways of mixing the components of the net macro profit rate – distribution (ω), demand (u) and finance (i) – to cook some kind of Keynesian investment function. Here, for the sake of the argument, we want to keep the investment function as simple as possible and only concentrate on the accelerator term (including the interest rate as a specific argument of the investment function would make the model more complicated without affecting the role of liquidity preference in this economy):

$$g = \gamma + \delta u \tag{3}$$

Equations (1), (2) and (3) constitute a complete model for the determination of the flow-equilibrium of the economy. This model (just a bit more than the Keynesian cross) fully determines the three endogenous variables u, c and g.

Figure 1 – Short-run equilibrium in the Kaldorian view

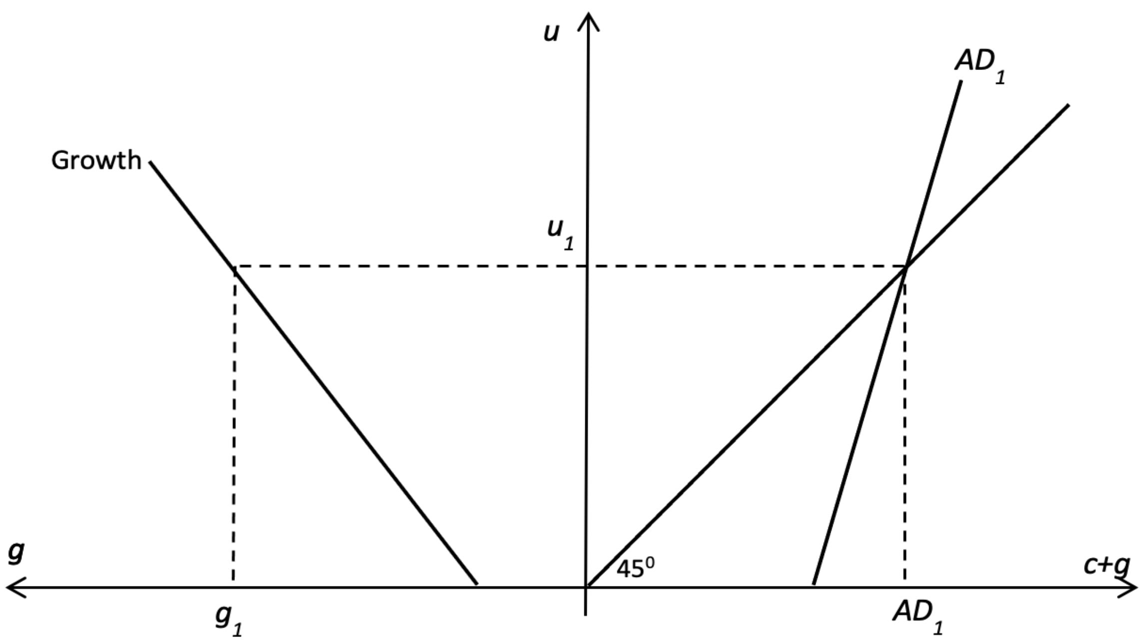


Figure 1 shows the solution. The AD curve expresses aggregate demand ($c + g$) as a function of capacity utilization, whereas the "Growth" curve represents equation (3). Provided that the standard Keynesian stability condition holds, i.e. ($1 - \alpha$) > δ, the slope of the AD curve is greater than 1 and the equilibrium values u_1, g_1 and c_1 are all positive (unless autonomous investment, γ, is strongly negative). It might be noticed that the position of the AD curve depends on all the parameters included in the consumption and investment functions but does not vary with the willingness of the public to "release more (or less) cash", i.e., households' liquidity preference. To understand the economic rationale of this point, assume the economy is in a steady state: period after period, each flow and each stock grows at the rate g_1 we just solved for. This clearly implies that in such a steady state the shares of money and bonds in households' portfolios as well as the shares of firms' investments funded by bonds and bank loans are constant. At a point, for whatever reason (a sunspot), liquidity preference goes up. People stop subscribing bonds at the same rhythm as before and banks – in order to prevent the interest rate from increasing[8] – expand their supply of loans (and then money supply: loans make deposits). Banks are giving households the extra-money they want to hold (money supply adjusts to money demand) and are giving firms the amount of funds households do not want to lend anymore. The share of firms' investment funded by bank loans and the share of money in households' portfolios increase, but the real equilibrium is totally unaffected. To go back to Keynes' quotation, this is nothing but a model where in case "the public decides to release less cash", "banks are ready to lend more". A world where households get in the form of banks' distributed profits what previously got as a remuneration on bonds' holding. No more than that. The equilibrium represented in Figure 1 is both a short- and a medium-run equilibrium.

This result of irrelevance of liquidity preference rests essentially on the three assumptions listed above. Removing either (a) or (b) would certainly be enough to return liquidity preference a key role in the determination of aggregate income in a world of endogenous money. On the one hand, taking capital gains into consideration would force us to recognize that households' wealth and its evolution over time (and then aggregate consumption, aggregate demand and output) do not depend exclusively on households' overall savings, but also on how these savings are allocated between money and bonds, since the latter is the only item on which capital gains (losses) may mature. This is the route already explored by a series of contributions (Taylor and O'Connell, 1985; Taylor, 2004; Taylor and Rada, 2008; Lavoie, 2014). On the other hand, taking bank loans and corporate bonds as imperfect substitutes would lead us to recognize that the profit rate realized by non-financial firms (and then capital accumulation, provided that the investment function is made explicitly dependent on the profit rate) depends on the willingness of the public "to release more or less cash".

Our purpose, however, is to remove assumption (c): the interaction between banks' profits distribution and banks' capitalization is indeed an important channel through which liquidity preference affects macro outcomes.

4. Banks' profits and capital

Banks retain a portion of their profits both because they have to and because they want to. International banking regulation imposes banks to retain a minimum level of own funds with respect to the value of their assets in order to be allowed to operate. This is the so-called *required* (or minimum) capital adequacy ratio, say $\overline{\Omega}$, originally set at 8 percent of banks' assets in Basel II agreement and now raised to 10.5 percent under Basel III. In order to accomplish with these regulatory requirements and have enough margins of flexibility in the event of non-performing loans, banks generally pursue a *target* (or normal) capital adequacy ratio $\Omega^* > \overline{\Omega}$ (see Godley and Lavoie, 2007). This can be stated as a multiple of the minimum capital, i.e., $\Omega^* = (1+\eta)\overline{\Omega}$, around which the *actual* capital adequacy ratio Ω fluctuates.

[8] Do not forget our discussion in the last part of section 2.

According to the Federal Reserve Bank of New York (2018), for instance, actual own funds of US financial institutions fluctuated from 10 percent to about 13 percent of their assets from 1996 to 2018[9].

So, assume banks only distribute a fraction $0 < \lambda < 1$ of their profits, and the rest is devoted to the accumulation of own funds. In section 5, we will discuss the determinants of λ, but in the short-run version of the model it can be safely taken as given. Equations (1) and (3) remain the same as before, but the consumption function (2) is to be properly amended. As is clear from Table 2, in this case households' income does not coincide with GDP (Y), since households are not receiving the totality of banks' profits anymore. If we maintain that aggregate consumption is a function of households' income and wealth, the relevant equation becomes:

$$c = \alpha[u - (1 - \lambda)il] + \beta \tag{4}$$

This is not the end of the story, however. Households' wealth is $V_h = B/i + (M + OF)$ and, dividing both sides by K ($V_h = K$), one gets

$$l = 1 - \frac{B}{iV_h} \tag{5}$$

where (B/iV_h) is the fraction of households' wealth held in the form of corporate bonds. Needless to say, this fraction is an expression of households' liquidity preference. The stronger their liquidity preference, the lower that fraction. Abstracting from the so-called "transaction" demand for money (which here is not relevant at all) and following Taylor (2004) and Lavoie (2014), it is convenient to represent liquidity preference simply through a fixed parameter:

$$\frac{B}{iV_h} = \mu \leq 1 \tag{6}$$

This way, (4) may be written as

$$c = \alpha[u - i(1 - \lambda)(1 - \mu)] + \beta \tag{7}$$

which is the final formulation of our consumption function.

Solving the model formed by (1), (3) and (7) is extremely easy. The short-run solution is:

$$u = \frac{\gamma + \beta - \alpha(1-\lambda)(1-\mu)i}{1 - \alpha - \delta} \tag{8}$$

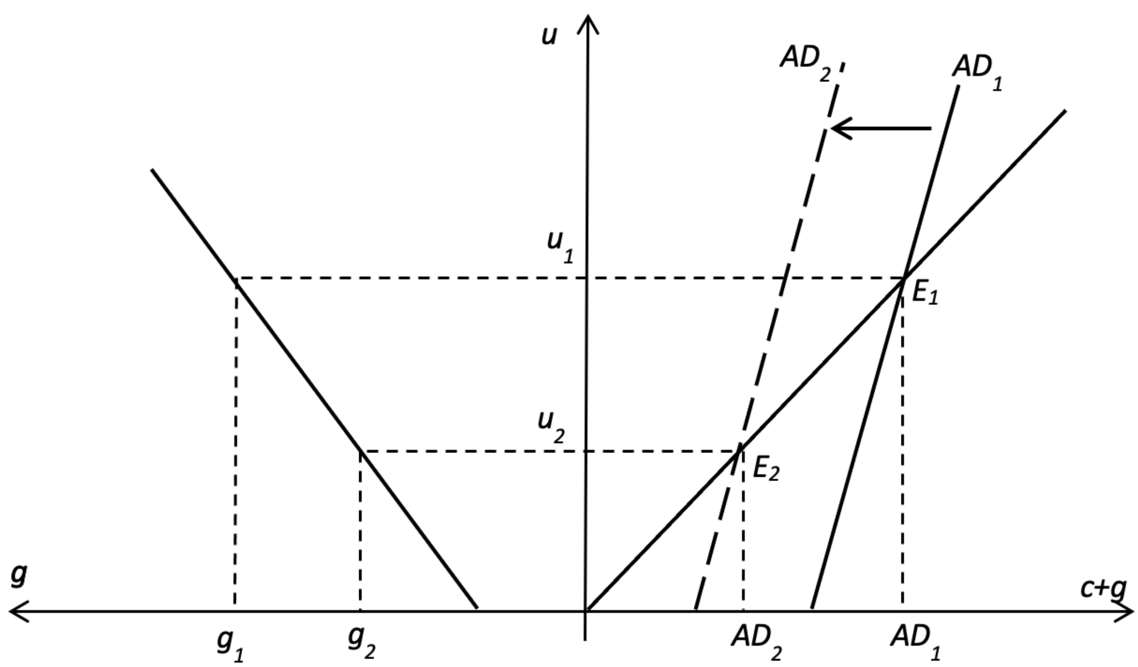
$$g = \frac{\gamma(1-\alpha) + \delta[\beta - \alpha(1-\lambda)(1-\mu)i]}{1 - \alpha - \delta} \tag{9}$$

The standard short-run stability condition for this kind of Keynesian model is $(1 - \alpha - \delta) > 0$, and we will assume it holds.

[9] The argument we are going to develop holds regardless of the specific value taken by η. In particular, the following results are valid even when $\eta = 0$.

In this model, a higher interest rate reduces both economic activity and its growth rate. By construction, this is not due to the impact on investments, but on households' income and consumption. A lower interest rate increases households' income because in such a case a lower proportion of non-financial firms' gross profits ends up into the pockets of banks, which do not distribute the totality of their profits to households. As to λ, the fraction of banks' distributed profits, its increase stimulates activity and growth by raising again households' income and consumption expenditures. Finally, the higher households' liquidity preference, the lower their income, consumption expenditures, aggregate demand and then activity and growth. This is shown in Figure 2 below. This result is in stark contrast with what described in Figure 1 under the "Kaldorian view". The economic rationale of this result is pretty simple. Ceteris paribus, a higher liquidity preference of the public implies that a higher share of investment is financed by banks' loans. As a consequence, households will receive lower "direct" capital incomes from financial markets and higher banks' profits in the form of dividends. However, only a share λ of banks' profits will be distributed as dividends, whilst the remaining will take the form of additional banks' own capital. Given different households' propensity to consume out of income and wealth, and the reduction in overall households' income, consumptions expenditures declines and so does aggregate demand. The AD curve moves leftward from AD_1 to AD_2 in Figure 2. The economy reaches a new short-run equilibrium (point E_2 in Figure 2) featuring lower levels of capacity utilization (u_2) and capital accumulation (g_2) with respect to the original equilibrium E_1.

Figure 2 – Short-run effects of an increase in liquidity preference in a non-Kaldorian world



Interestingly, our analysis shows that liquidity preference returns to be a key parameter in the determination of short-run macro equilibrium (with respect to the Kaldorian view) even in a very simple context with endogenous money and a fixed interest rate. Differently from previous contributions, we demonstrate that this holds true even in the absence of capital gains (see Taylor and O'Connell, 1985; Lavoie, 2014) or changes in the level of the interest rate or in the spread among different interest rates (see Dafermos, 2012; Asensio, 2017). All what we need to get this result is to recognize the very simple fact that banks (must) retain some profits to accumulate own funds in order to be allowed to keep on conceding loans. Will this result hold in the medium run as well? It is time to say more on banks' own funds accumulation.

5. Liquidity preference and economic activity in the medium run

Once reaffirmed the importance of liquidity preference for short-run economic activity, it makes sense to wondering whether it may also influence medium-run dynamics. Indeed, banks' ability to operate and extend loans is somehow influenced by the solidity of their own balance sheets. In this simple aggregate model, this can be captured by banks' own funds-to-loans ratio $\Omega = OF/L$, i.e., the equivalent to the capital adequacy ratio in the jargon of the Basel agreements. This ratio evolves according to both banks' loans creation (and hence, indirectly, liquidity preference of the public) and profits' distribution policy. Formally, it is convenient to use (5) and (6) and rewrite Ω as follows:

$$\Omega = \frac{OF}{L} = \frac{OF}{lK} = \frac{OF}{(1-\mu)K} \tag{10}$$

Given (10), the dynamics of Ω is governed by the percentage variation of banks' own funds and capital accumulation. Taking into account that banks' own funds are accumulated via retained profits, the relevant differential equation for Ω reads:

$$\dot{\Omega} = \Omega\left\{\frac{\dot{OF}}{OF} - g\right\} = \Omega\left\{\frac{(1-\lambda)i}{\Omega} - g(\lambda)\right\} = \theta(\Omega, \lambda) \tag{11}$$

Equation (11) simply states that the evolution of banks' capital adequacy ratio is a function of λ as well as of the *current status* of banks' capital adequacy ratio itself.

Following Godley and Lavoie (2007), banks adjust their policy of profits' distribution in order to satisfy shareholders' demand for financial returns but also to avoid excessive discrepancies between the actual capital adequacy ratio and the normal one. This is the meaning of equation (12) below, which simply states how banks modify through time the share of distributed profits according to the existing gap between Ω and Ω^*:

$$\dot{\lambda} = \varphi(\Omega - \Omega^*) = f(\Omega, \lambda) \qquad \varphi > 0 \tag{12}$$

According to (12), banks will tend to distribute more profits each time the actual own funds-to-loans ratio exceeds the target Ω^* and vice versa. Parameter φ stands for the speed of adjustment, which may be influenced by shareholders' quest for dividends.

Equations (11) and (12) form a system of non-linear differential equations through which we can describe the dynamics of the system over the medium run and, in particular, the long-lasting effects of changes in the liquidity preference of the public. The non-linearity of the system implies that stability can be assessed only in the neighbourhood of the equilibrium. We do this in mathematical appendix 1. In what follows, we concentrate on the two isoclines for Ω and λ.

Put (9) into (11) first, take the steady-state values of Ω and λ and call them Ω_{SS} and λ_{SS}. After rearranging, one can easily find an explicit solution for λ_{SS}:

$$\lambda_{SS} = 1 - \frac{\Omega_{SS}[\gamma(1-\alpha)+\delta\beta]}{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]i} \qquad (13)$$

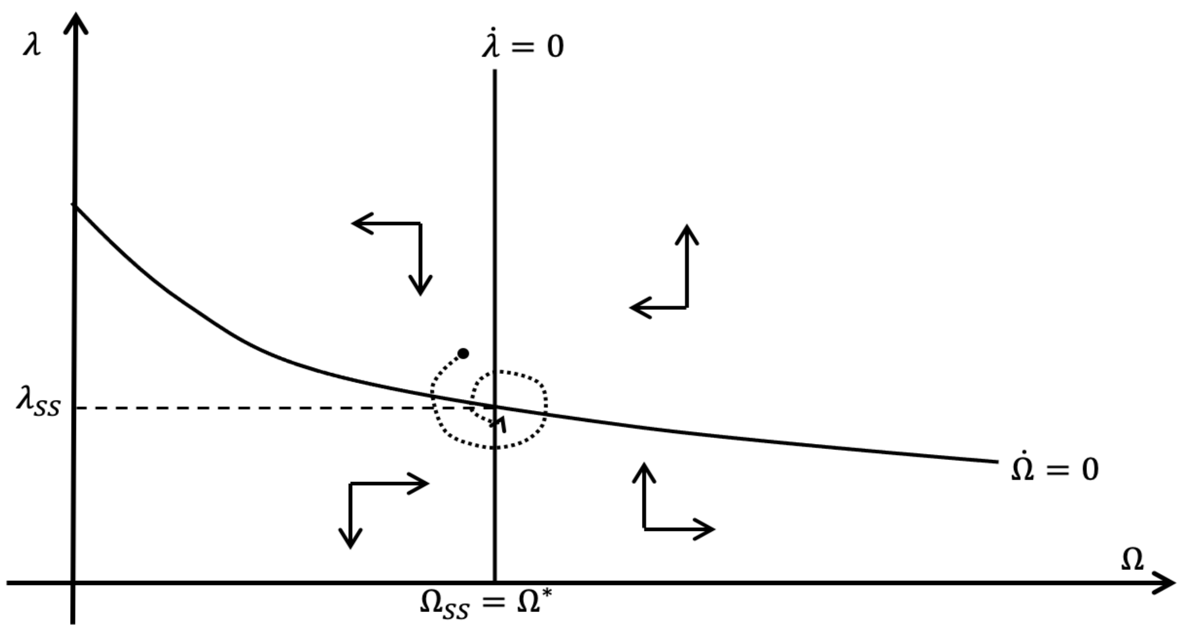
By taking the appropriate first derivative, one can easily verify that the isocline $\dot{\Omega} = 0$ is a downward-sloping function of Ω[10], with vertical intercept equal to 1 and a horizontal asymptote at $\lambda_{AS} = 1 - \frac{[\gamma(1-\alpha)+\delta\beta]}{\delta\alpha(1-\mu)i} < \lambda_{SS}$.

The analysis of the isocline $\dot{\Omega} = 0$ is much simpler. This is nothing but a vertical line at:

$$\Omega_{SS} = \Omega^{*} \qquad (14)$$

The economic rationale of this result is fairly intuitive. Outside the equilibrium, whenever the actual own funds-to-loans ratio falls below target, banks will reduce λ and distribute to shareholders a lower share of realized profits. They do this in order to "reintegrate" own funds and bring the own funds-to-loans ratio closer to target. The opposite happens when $\Omega > \Omega^{*}$. The two isoclines $\dot{\Omega} = 0$ and $\dot{\lambda} = 0$ are represented in Figure 3, where it is also shown that the economy converges cyclically to its medium-run equilibrium (see Mathematical Appendix 1 for a fully-fledged local stability analysis).

Figure 3 – The medium-run equilibrium

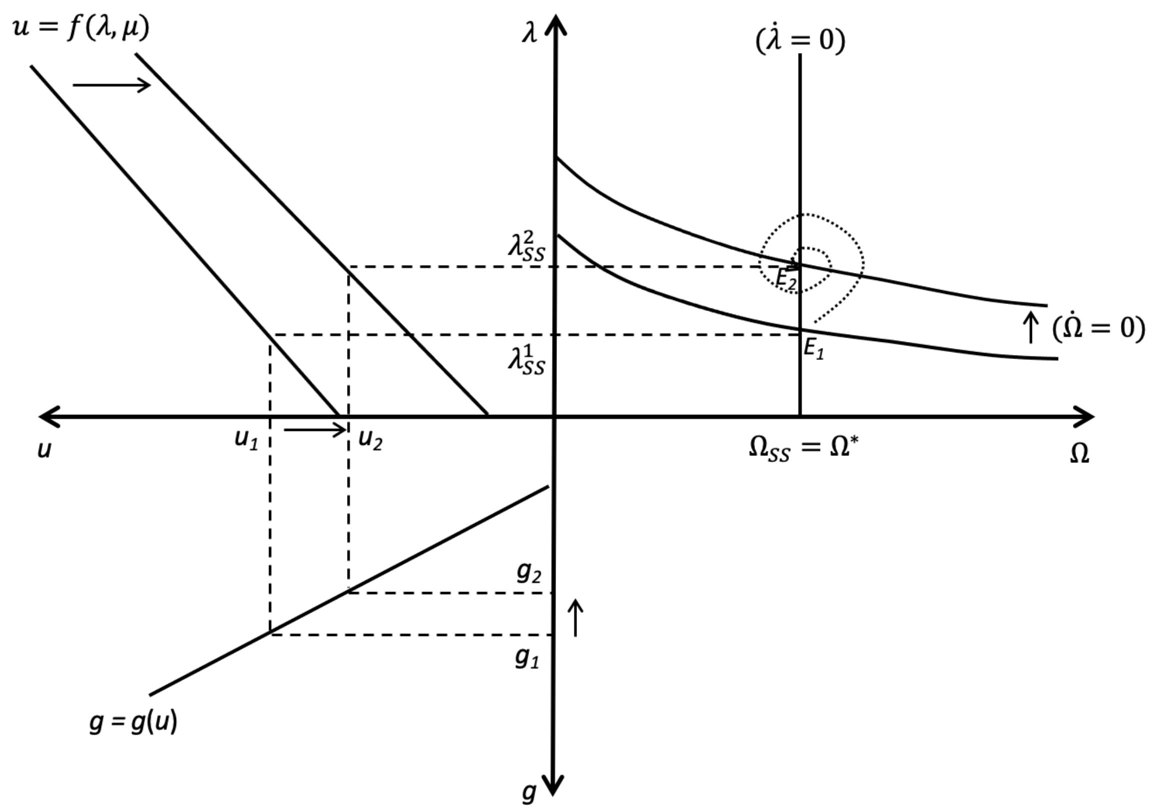


[10] One can easily verify that $\frac{\partial \lambda_{SS}}{\partial \Omega_{SS}} < 0$ if $(1-\alpha-\delta)i > 0$, which we assume to hold true by default as it is the standard Keynesian stability condition for a meaningful short-run equilibrium.

We are now in a good position to study the medium-run effects of variations in the liquidity preference of the public. The formal details of the analysis may be found in Mathematical Appendix 2. In what follows, we focus on the economic rationale and the graphical representation of our story (see Figure 4 below).

Let us consider an increase in liquidity preference (lower μ). From (13) and (14), it is easy to see that the isocline $\dot{\lambda} = 0$ is unaffected by this change, whereas the isocline $\dot{\Omega} = 0$ moves upwards (i.e., $(\partial\lambda_{SS}/\partial\mu) < 0$) when people decide to "release less cash to firms" (see North-East quadrant in Figure 4). The economic mechanism behind this result goes as follows. A higher preference for liquidity induces households to purchase less bonds. In our simple model, this forces banks to step in and satisfy firms' financial needs with loans. The amount of new loans conceded by banks, however, declines. This is due to the short-run contractionary effects of higher liquidity preference. Indeed, a higher preference for liquidity curtails current capacity utilization and induces firms to accumulate less capital. Such a reduction in "*g*" will in turn imply that, *ceteris paribus*, firms will demand (and receive) less loans than before. From the point of view of banks' balance sheet, this would cause an increase in their *actual* own funds-to-loans ratio. To keep it constant and equal to the target, banks will then distribute more dividends and retain a lower share of profits, i.e., λ increases.

Figure 4 – Medium-run effects of a rise in liquidity preference



The reduction in μ and the rise in λ bear opposite consequences in terms of the evolution of capacity utilization and capital accumulation. As said, the increase in liquidity preference tends to reduce "*u*" (see rightward shift of $u = f(\lambda, \mu)$ in the North-West quadrant of Figure 4) and, therefore, "*g*" (South-West quadrant of Figure 4). A higher share of distributed profits (out of banks' total profits), instead, leads to higher households' income, consumptions expenditures, and eventually "*u*" and "*g*". We determine the final overall effect of an increase in the preference for liquidity in mathematic appendix 2. The first direct contractionary effect of a reduction in μ over "*u*" and "*g*" prevails over the expansionary indirect one (via increased λ). In the end, an economic shock that brings about an increase in the liquidity preference of the public will cause the economy to stagnate (capacity utilization decreases from u_1 to u_2 in Figure 4) and capital accumulation to slow down (from g_1 to g_2) not only in the short run, but also in the medium run.

There are three important theoretical results stemming from our analysis. First, even in a world of endogenous money where the banking system behave in a "horizontal" manner and, implicitly, the central bank adopts a fully accommodationist stance, liquidity preference of the general public, far from "ceasing to be of any importance", plays a crucial role in shaping the performance of the economy. This holds true *both* in the short *and in the medium run*.

Second, we show that we do not need to take into account capital gains/losses and/or assume imperfect substitutability between bonds and bank loans (from the borrower's perspective) to give liquidity preference such an important role both in the short and long run. In our model, liquidity preference does not play any role in setting interest rates or interest rates' spreads. Yet, it remains important simply because it influences the different channels through which households' (capital) income is generated (i.e., direct remuneration of bonds' holding or banks' dividends) and, therefore, households' (consumption) expenditures, aggregate demand, capacity utilization and eventually capital accumulation.

Third, our model also shows that financial turbulences and sudden increases in liquidity preference (i.e., sharp reductions in μ) may cause long-lasting negative effects on economic performances. In other words, a financial crash and a sharp flight to liquidity may throw the economy into an enduring depression or stagnation.

6. Concluding remarks

In this paper, we contribute to the debate about the role of liquidity preference in the determination of economic activity in a world of endogenous money. In particular, we show that liquidity preference does not need to influence the determination of the base rate, or the spread among yields from different financial assets, or even the occurrence of capital gains or losses in order to be a key determinant of capacity utilization and capital accumulation both in the short and in the medium run. In a world where banks behave in a "horizontalist" manner, and the central bank adopts a fully accommodationist stance, we show that the simple assumption that some positive portion of banks' profits cannot be distributed is more than enough to give back liquidity preference the key role it had in the original Keynesian framework.

Our medium-run analysis seems to suggest that having households eager to invest in financial markets, perhaps with a higher propensity to risk and a lower liquidity preference, might be beneficial for capital accumulation and economic dynamics. Could we take this result as an indication of the potential virtues of "money managers" or "financial" capitalism (Wray, 2011)? Are households' active participation to financial markets, as intermediated by buoyant institutional investors (Whalen, 2017), and the rising share of capital income over national income (Power *et al.*, 2003; Piketty, 2014) good news for the whole economy? The answer is no, at least for two good reasons.

First, in this paper, we do not make any comparison between different types of capitalism, say *paternalistic* or *industrial capitalism* (Minsky, 1986; Hudson, 2010) of the "golden age" on the one side, and the current *financial capitalism* on the other. What we claim is that in a financialized system where financial markets gain increasing relevance in affecting the behaviour of the economy, it is vital to ensure that financial markets keep on working smoothly, and that they are not hit by major waves of panic and sudden runs to liquidity. This is even the more so if banks' disintermediation and increasing importance of market-based financial systems (i.e., a stronger participation of the public to financial markets via the intermediation of money managers) may have increased exposure to financial shocks[11]. In a way, our paper formalises the original Minsky's idea that "the channels by which Federal Reserve [central banks, more generally] operations affect the economy may no longer be by changing the availability or cost of financing, but rather by affecting uncertainty: by affecting the evaluation by portfolio managers of the viability of enterprises and the stability of markets" (Minsky, 1994, p.1). In the present state of capitalism, saving Wall Street from financial shocks is fundamental to avoid Main Street to collapse. We could well interpret this result as an additional sign of financial markets' "take-over" of the real economy (Storm, 2018).

Second, our model provides a simplified representation of reality that, for the sake of analytical tractability, does not take on board several aspects of modern financialized economies. In this paper, for instance, we do not endogenize the heightened instability and vulnerability of the current type of capitalism to financial crises, with the ensuing consequences in terms of (non-financial) firms' animal spirits and willingness to invest. More than that, in the present paper we do not pay attention to distributional issues. Indeed, here we do not model the increasing level of income inequality and wealth concentration that has accompanied the development of modern financialized economies (Botta *et al.*, 2019), as well as the increasing debt burden on the shoulders of low- and middle-income households. It goes without saying that these aspects could well contribute to provide a far less enthusiastic image of the alleged virtuous of a financialized economy.

All these issues are potentially interesting extensions of our model and could make it richer and more *nuancé*. None of them, however, would alter the central theoretical message we want to reiterate once again. The original insight of Maynard Keynes is to be rescued: liquidity preference and financial markets matter, and money endogeneity, not even in its radical, horizontalist declination, does *not* mean that we are allowed to think of the banking system as the unconstrained *deus ex-machina* of the economy we live in.

[11] Indeed, this is a crucial tenet of Minskyan analysis stressing how money manager capitalism may be affected by heightened financial instability (see Wray, 2009; Whalen, 2012). This view is also consistent with Adrien and Shin (2009), when they note that in the immediate aftermath of the 2007-2008 financial shock, larger commercial banks' lending partially compensated for the dry-up of credit via market-based intermediaries.

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Appendix 1

In order to analyse the local stability of our system of differential equations, let first define the Jacobian matrix (*J*) of partial derivates in the neighbourhood of the steady state. We do this in the mathematical expressions (A.1) and (A.2) reported below.

$$J = \begin{bmatrix} \theta_{11} & \theta_{12} \\ f_{21} & f_{22} \end{bmatrix} = \begin{array}{c} \quad\Omega \qquad\qquad \lambda \\ \begin{bmatrix} \left.\frac{\partial\theta}{\partial\Omega}\right|_{\theta=0} & \left.\frac{\partial\theta}{\partial\lambda}\right|_{\theta=0} \\ \left.\frac{\partial f}{\partial\Omega}\right|_{f=0} & \left.\frac{\partial f}{\partial\lambda}\right|_{f=0} \end{bmatrix} \end{array} \quad \text{(A.1)}$$

$$J = \begin{bmatrix} -\frac{(1-\lambda_{SS})i}{\Omega_{SS}} & -\frac{[(1-\alpha-\delta)+\delta\alpha(1-\mu)\Omega_{SS}]i}{(1-\alpha-\delta)} \\ & \\ 1 & 0 \end{bmatrix} \quad \text{(A.2)}$$

Consistent with Figure 3 in the main text, the definition of the Jacobian matrix (*J*) in expression (A.2) confirms that the locus for $(\dot{\Omega} = 0)$ is a downward-sloping function of Ω, whilst the locus for $(\dot{\lambda} = 0)$ is straight vertical line. More than that, given (A.2), we compute the determinant *det.*(*J*) and the trace *Tr.*(*J*) of the Jacobian matrix (*J*) in equations (A.3) and (A.4) below:

$$det.(J) = i\left[1 + \frac{\delta\alpha(1-\mu)\Omega_{SS}}{(1-\alpha-\delta)}\right] > 0 \quad \text{(A.3)}$$

$$Tr.(J) = -\frac{(1-\lambda_{SS})i}{\Omega_{SS}} < 0 \quad \text{(A.4)}$$

It is easy to see that the determinant is positive, whilst the trace is negative. The medium-run equilibrium of our economy is locally stable. Outside the equilibrium (but close to it), the economy will cyclically converge back to it giving rise to a *focus*.

Appendix 2

In order to define the medium-run effects of a rise in liquidity preferences, we need to take the medium-run equilibrium value of capacity utilization (i.e., the level of capacity utilization in the steady state) and totally differentiate it with respect to μ and λ. We get:

$$du = \frac{\alpha(1-\mu)i}{1-\alpha-\delta}d\lambda_{SS} + \frac{\alpha(1-\lambda_{ss})i}{1-\alpha-\delta}d\mu \quad \text{(A.5)}$$

After dividing both side by $d\mu$ and obtaining from (13) the partial derivative of λ_{SS} with respect to μ, we get:

$$\frac{du}{d\mu} = \frac{\alpha(1-\mu)i}{1-\alpha-\delta}\frac{d\lambda_{SS}}{d\mu} + \frac{\alpha(1-\lambda_{ss})i}{1-\alpha-\delta} = -\frac{\alpha(1-\mu)i}{1-\alpha-\delta}\frac{\Omega_{SS}{}^2[\gamma(1-\alpha)+\delta\beta]\delta\alpha i}{\{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]i\}^2} + \frac{\alpha(1-\lambda_{ss})i}{1-\alpha-\delta} \qquad \text{(A.6)}$$

In order to verify whether a rise in liquidity preference will expand or curtail capacity utilization in the medium run, we need to determine the parametric conditions under which equation (A.6) is positive. More specifically, we have:

$$\frac{du}{d\mu} > 0 \text{ if } \frac{\alpha(1-\mu)i}{1-\alpha-\delta}\frac{\Omega_{SS}{}^2[\gamma(1-\alpha)+\delta\beta]\delta\alpha i}{\{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]i\}^2} < \frac{\alpha(1-\lambda_{ss})i}{1-\alpha-\delta}$$

Once plugged in the above expression the value for $(1-\lambda_{ss})$ from equation (13), we have:

$$(1-\mu)\frac{\Omega_{SS}{}^2[\gamma(1-\alpha)+\delta\beta]\delta\alpha i}{\{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]i\}^2} < \frac{\Omega_{SS}[\gamma(1-\alpha)+\delta\beta]}{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]i} \qquad \text{(A.7)}$$

After some simple algebraic adjustments, one can rewrite condition (A.7) as follows:

$$(1-\mu)\frac{\Omega_{SS}\delta\alpha}{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]} < 1. \qquad \text{(A.8)}$$

Once multiplied both sides of (A.8) by $[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]$, it is easy to verify that it always holds true since that $(1-\alpha-\delta) > 0$. As we know, a rise in liquidity preference (i.e., a lower value of μ) will depress economic activity (*u*) and, therefore, capital accumulation (see equation (3)) in the short run. Such contractionary effects of a higher preference for liquidity will persist in the medium run also.