Households' liquidity preference, banks' capitalization and the macroeconomy: a theoretical investigation

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Abstract: In this paper we build a simple model on the role of households' 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(s) at a level of its own willing. We show that even in such a framework liquidity preference, while obviously not constituting anymore a theory for the determination of the interest rate, continues to be a key element for the determination of both the level and evolution over time of aggregate income and capital accumulation. In our model, this happens because of the working of a mechanism so far unexplored in the literature, i.e., the endogenous variations of banks' policy of profits' distribution in response to changes in the liquidity preference of the public.

Key words: Liquidity preference, endogenous money, finance dominance

JEL code: B26, B50, E12, E44

1. Introduction

Economic theory seems to show a renewed interest in the theory of liquidity preference. This is quite understandable given those economy-wide consequences of the last financial crisis (read turbulent capital flights to quality, the collapse of entire segments of financial markets, and sudden increases in interest rates) that economic theory has traditionally associated to changes in liquidity preference.

Since then, a wide range of contributions has revived the debate around the macroeconomic role of liquidity preference in a world of endogenous money (see Dafermos, 2012; Lavoie, 2014; Bertocco and Kalajzic, 2014 and 2018; Palley, 2017; Asensio, 2017; Lavoie and Reissl, 2019; Oreiro *et al.*, 2020 and Mehrling, 2020, among others). All these works, and some older ones as well (see Taylor and O'Connell, 1985; Taylor, 2004; Taylor and Rada, 2008), have focused on the link between liquidity preference and the determination of interest rates and/or capital gains. In a similar vein, the debate about the macroeconomic relevance of liquidity preference mostly centred around the ability of monetary authorities to control and manage interest rates against possible drops in people's trust in financial markets (Lavoie, 1996; Rochon, 1997). The wide battery of conventional and unconventional measures

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adopted by monetary institutions since 2008 to restore trust in financial markets and set interest rates under control certainly justifies such approach.

In this paper, we take a different and, at the best of our knowledge, so far unexplored route. More specifically, we build a simple post-Keynesian model to investigate how *households'* liquidity preference may influence the real economy by affecting banks' policy of profit distribution. We carry out our analysis in the context of a "fully accommodationist" banking system, where monetary authorities are postulated to be able to fully control interest rates and set them exogenously. This assumption of a "purely horizontalist" banking system may somehow capture some features of the post-2008 environment, where monetary institutions took extraordinary measures, quantitative easing included, to set interest rates at a level of their own willing[1]. Also, it is consistent with both some late theoretical contributions by Keynes (1937) and more recent developments in the post-Keynesian literature (see Rochon, 1997). Finally, it is functional to the development of our argument and the very purpose of this work: to show that households' liquidity preference influences economic activity and capital accumulation even if it *does not* play any role in the determination of interest rates, interest rate spreads or capital gains.

Our focus on the interaction between households' liquidity preference and banks' dividend policy provides a more realistic description of banks' behaviour. Banks are corporations that *need* to retain part of their profits in order to be able (and allowed) to conduct and expand their business. The details of Basel III agreement (BIS, 2010) make this argument even stronger and clearly show how banks must constantly revise their dividends' policy not only as a consequence of self-chosen management strategies, but also of an imposition (and increasingly so…) set by regulatory restrictions. Differently from previous works (see Le Heron and Mouakil, 2008; Dafermos, 2012), in this paper we capture this aspect by modelling the distribution of banks' profits as a key *endogenous* variable, at least in the transition from the short to the medium run (see section 5 below).

We obtain two main results. First, differently from the above-mentioned contributions, we show that households' liquidity preference does affect macroeconomic performances even when it does not bear any effect on bonds' yields, interest rate spreads or capital gains. Liquidity preference matters simply because it affects the relative importance of the different ways through which capital incomes accrue to households, either direct returns on bonds' holding or banks' dividends. Second, we show that changes in the liquidity preference of the public affect economic activity and capital accumulation both in the short and in the medium

[1] In this paper, we obviously refer to the *Keynesian* view of unconventional monetary policies (see Kregel, 2014; Lavoie, 2016; Lavoie and Fiebiger, 2018), according to which central banks' asset purchases aim at controlling interest rates, long-term ones in particular, and possibly lowering them to minimum levels. This view is perfectly consistent with the theory of endogenous money that, by rejecting the mainstream money multiplier, clearly explains the irrelevance of quantitative easing itself in stimulating banks' credit via its effects on banks' reserves (Rochon, 2016; Lavoie and Fiebiger, 2018).

run[2]. In doing so, we somehow provide a formal proof of the numerical simulations contained in Dafermos (2012), albeit through different economic mechanisms.

The paper is organized as follows. Section 2 provides a brief review of how, according to different streams of thoughts, households' liquidity preference has been considered relevant or not for the determination of macroeconomic outcomes. Section 3 describes the accounting structure of our model through the analysis of the balance sheets (stocks) and the Social Accounting Matrix of our economy. It also illustrates how, within such a structure, what we are going to label as the "Kaldorian view" (section 3.1) makes liquidity preference irrelevant for the determination of macroeconomic outcomes. Sections 4 and 5, instead, describe how the liquidity preference of the public determines the short- and medium-run equilibria of the economy, even in the context of a "purely horizontalist" banking system, via its effects upon banks' own funds-to-assets ratio and dividends policies. Section 6 discusses some possible implications of our findings in terms of the understanding of the relation between financial and real outcomes in modern financialized economies. Section 7 concludes.

2. Households' liquidity preference and the real economy: brief literature review of a controversial relation

In the General Theory, Keynes presented the theory of liquidity preference as a "satisfactory" theory of interest (Tily, 2006). It was based on the innovative concepts of money as store of value and of the interest rate as depending "on the strengths of the desire to hold it [wealth] in liquid and illiquid forms respectively, coupled with the amount of the supply of wealth in the one form relatively to the supply of it in the other" (Keynes, 1973, p.213). The Hicksian IS-LM model developed by the so-called "bastard" Keynesians (Robinson, 1962) subsequently synthetized and popularized, not without criticisms[3], Keynes' view of liquidity preference as a theory for the joint determination of the interest rate and the level of economic activity.

In those contributions, the theory of liquidity preference was developed in a framework of exogenous money. Money, however, is endogenous. The monetary authority does not decide the quantity of money, but the interest rate(s). 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.

[2] In this paper, we don't 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) are taken as fixed. The time horizon we take into consideration is not "long" enough to allow these magnitudes to vary.

[3] Tily (2006), for instance, makes reference to Victoria Chick's studies and notes that "[bastard] Keynesian liquidity preference function is wrongly derived as a portfolio choice in the face of *risk* rather than a precautionary and speculative behavior in the face of *uncertainty* [….and that it] has detracted from the fact that Keynes' schedule is a demand schedule that shifts according to the 'mass psychology' of the public" (Tily, 2006, p.661).

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) 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 useful representation of the New Consensus 3-equation model, Lavoie (2009) shows things are 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, 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[4].

Post-Keynesian authors do not have a unique position in this respect. The well-known divide between horizontalists and structuralists matters here. On the one hand, "*early horizontalists*"[5] such as Kaldor (1985) and Moore (1988) do believe in the ability of the central bank to fix the interest rate at a level of its own willing and deny 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*" (Kaldor, 1985, 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"[6].

On the other hand, the so-called "structuralists" (Palley, 1994, 2013a, 2017; Dow, 1997) believe that banks' behaviour is characterized by a traditional upward sloping loans' supply

[4] Of course, the real effects of liquidity preference variations would be permanent in a model with growth hysteresis. However, this would be true for any possible shock.

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

[6] This "early" horizontalist perspective is also incorporated in a post-Keynesian 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.

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:

> "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).

Obviously, things are not so clear cut. Palley (2017) himself admits that there are "*later horizontalists*" (Lavoie, 2006, among others) who 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". Lavoie (1996), for instance, offers a more elaborated and nuanced analysis of the "horizontalist" approach and, in a way, tries to put the old *querelle* between horizontalists and structuralists aside. 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[7]. This fact notwithstanding, Lavoie (1996) also recognizes that a source of tension may still remain between horizontalists and 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 taken by monetary authorities when they are determined enough to change markets' conventions underpinning an excessive (from their point of view) spread between the base rate and 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). This line of thought is further developed in Godley and Lavoie (2007; chapter 5), where it is shown that "sufficiently insistent" monetary authorities may always decide to fix both the short- and the long-term interest rate and that in such a case the liquidity preference of the public does not affect the real equilibrium of the economy. It does so only if monetary authorities (the Central Bank plus the Treasury) are not sufficiently insistent.

Similar to Lavoie (1996), Fontana (2003, 2004) reconciles horizontalist and structuralist views under the umbrella of a broader theory of endogenous money. The two approaches may in fact be consistent with each other once it is recognized that they consider different time horizons and treat expectations differently. On the one hand, horizontalists adopt a "*single period*" approach in which expectations of both banks and the public can be taken as constant. According to Fontana (2003, 2004), it is the constancy of expectations that permits *credit* money supply by banks to fully accommodate creditworthy demand for loans at a given lending interest rate. On the other hand, structuralists adopt a "*continuation period*" framework that focuses on the "dynamics of a sequence of single periods, […] deals explicitly with the linkages between successive periods [and] explicitly allows for the fact that the

[7] Before Lavoie (1996), see also Townsend (1937) and Chang *et al.*, (1983) as contributions discussing liquidity preference as relevant factor for the determination of interest rates' spreads over assets with different maturity.

general state of expectations may change" (Fontana, 2004, p.380). It is precisely the change in expectations that distinguishes the end of one period from the beginning of the next. In this framework, changes in banks' expectations about their leverage and exposure to borrowers' risk may lead them to revise their preference between creating new credit money via lending to firms and households on the one hand and, on the other, purchasing existing securities (Fontana, 2003). In a similar way, changes in central banks' expectations about demand for reserves may induce them to modify the policy rate. Finally, changes in the liquidity preference of the public can modify interest rates on traded securities, "and these changes are eventually bound to affect future negotiations between banks and firms in the credit market" (Fontana, 2004, p.377). In the expansionary phases of the business cycle or in presence of bearish financial markets, all these changes can likely come along with changing (rising) costs of credit in a sequence of different periods.

The above-mentioned works by Lavoie and Fontana contribute to portray an economic environment where monetary authorities may fully control the interest rate(s) by influencing economic actors' expectations. This picture is in turn consistent with Keynes' perspective about liquidity preference and the effectiveness of monetary policy. As suggested by Kregel (2014), Keynes attributed a rise in the liquidity preference of the public to the uncertainty about the future level of interest rates and the ensuing capital gains/losses. Monetary policy can be effective only if implemented by monetary institutions that are "sufficiently insistent" to guide public's expectations and make them consistent with their own goals. Indeed, given the "highly conventional" nature of the interest rate, "any level of interest which is accepted with sufficient conviction as likely to be durable will be durable" (Keynes, 1973, p.203).

In this paper, we provide a simple analytical description of this system where the central bank is resolute enough to maintain full control of the interest rate(s) and the overall banking system (monetary institutions included) is "purely horizontalist". We will show how, even in such a framework, a change in the liquidity preference of the public does play a relevant role in the determination of the dynamics of the economic system.

3. The model: 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 use a definition of liquidity preference consistent with Wray (1992, p. 301 and 303): "The liquidity preference of the *nonbank* public can be satisfied by the stock of bank liabilities … rising liquidity preference represents a desire to exchange illiquid assets for assets with greater liquidity" (italics is ours). We will illustrate, on the basis of the ideas expressed by Keynes in 1937 (Keynes, 1937) and through a simple Keynesian model, the reasons why the liquidity preference of the general public continues to

be, even in a world of endogenous money, an important determinant of the short-run and steady state medium-run level of real output.

We assume a 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:

Table 1 – The balance sheets of the economy

	Households	**Firms**	**Banks**	**Total**
Deposits	M		$-M$	0
Bank loans		$-L$	L	0
Bonds	B_H/i_B	$-B/i_B$	B_B/i_B	0
Capital		K		K
Banks' own funds	OF		$-OF$	0
Balance	$-V_h$	$-V_F = 0$	$-V_B = 0$	$V_h = K$

The reader might think of column "Banks" in Table 1 as the consolidation of commercial banks and a central bank. Commercial banks have loans and reserves among their assets, and deposits and own funds on the liability side. The central bank has bonds on the asset side and reserves on the liability side. Commercial banks make loans on demand, whereas the central bank holds those bonds that households do not want to hold anymore in order to keep the interest rate at the desired level[8]. This is the perfectly horizontalist environment we alluded at.

For the sake of the argument, we assume that firms do not retain profits (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). Hence, their wealth, V_F in Table 1, is zero, and they must make recourse to external finance to fund 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).

Households ("the rest of the public") provide funds to firms by subscribing bonds "B_H" ("releasing more cash"), i.e., by changing the composition of their wealth (less money, more bonds). Firms are assumed to be indifferent between getting bank loans or issuing bonds (more on this in section 5) and the market for bonds is demand-driven. Firms issue bonds in

[8] In our model, the central bank behaves passively by adjusting its holding of corporate bonds (which is what some central banks did during the pandemic crisis). In a more complete model with a Treasury (see for instance Godley and Lavoie (2007), chapter 5), the central bank would also adjust its holding of government securities. In both cases, this is done to maintain full control of the interest rate(s).

the amount demanded by households. In case households want to sell some bonds, banks purchase them in order to ensure full control of the interest rate(s)[9]. We assume 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".

The banking system creates money (M) by extending loans (L) – "loans make deposits", according to the endogenous money *adagio*. As we already saw, the banking system hold those bonds that households do not want to hold anymore, "B_B".

What are banks' own funds (OF)? And what are they for? Clearly, they are an asset from the perspective of banks' owners (some households) and a liability from the perspective of banks. According to banking regulations, banks' own funds are the *paid-in* capital and retained profits that allow banks to start and develop their business. They are "perpetual" (i.e., shareholders cannot redeem their funds on demand or at a given maturity)[10] and "must be available to institutions for unrestricted and immediate use to cover risks and losses"[11]. Given their purpose, banks' own funds are kept in the most liquid possible form and cannot be used to purchase interest-bearing assets. From the point of view of households, banks' own funds may either take the form of untraded shares or common equities traded (but not redeemable or without maturity) in the stock exchange. For the sake of the argument (we want to abstract from capital gains), we follow Godley and Lavoie (2007) and assume that "banks are privately held companies, which do not issue stocks. As a result, the net worth of these banks belongs to the private owners of the banks and must appear as part of the net wealth of households" (Godley and Lavoie, chapter 11, p.380)[12]. Obviously, nothing prevents the reader from thinking banks' own funds to be shares ordinarily traded in a secondary market. In this case, however, capital gains/losses would become part of the picture, giving rise to mechanisms different from those we want to focus on. Indeed, our argument holds regardless of whether banks are corporate or unincorporated firms. Observe, also, that banks wealth is zero.

[9] In a recent debate, Lavoie and Zezza (2020) on the one hand, and Sardoni (2020) on the other, while partially disagreeing on the relation between savings, investment and interest rate(s), agree on explaining the macroeconomic role of liquidity preference with its effects on the interest rate on corporate bonds.

[10] According to Basel III agreement, this applies to the TIER 1 component of banks' own funds, which is set to be equal to 4.5% of banks' risk-weighted portfolios.

[11] See Bundesbank's definition of banks' own funds at https://www.bundesbank.de/en/tasks/banking-supervision/individual-aspects/own-funds-requirements/own-funds/own-funds-622952.

[12] The scheme proposed in Table 1 is essentially the same as the balance sheet in Godley and Lavoie (2007), chapter 11. In our case, however, commercial banks and the central bank are consolidated, and therefore we do not see commercial banks' reserves held at the central bank. To avoid any misunderstanding, it is worth stressing that commercial banks' own funds and reserves are two completely different things. The former are commercial banks' "perpetual" *debts* towards their owners that constitute banks' passive liquid buffer against losses and risks. The latter are commercial banks *credits* towards the central bank and are constantly mobilised in banks' daily operations.

Table 2 – The Social Accounting Matrix of the economy

	Hous.	Firms		Banks		TOT
		c/a	k/a	c/a	k/a	
Cons	$-C$	C				0
Invest		I	$-I$			0
Bank int.		$-i_L L$		$i_L L$		0
Bonds int.	B_H	$-B$		B_B		0
Wages	W	$-W$				0
F. profits	Π_F	$-\Pi_F$				0
B. profits	$\lambda\Pi_B$			$-\Pi_B$	$(1-\lambda)\Pi_B$	0
Money	$-\dot{M}$				$\dot{M}$	0
Bonds	$-\dot{B}_H/i_B$		$\dot{B}/i_B$		$-\dot{B}_B/i_B$	0
Loans			$\dot{L}$		$-\dot{L}$	0
TOT	0	0	0	0	0	
memo	$-\dot{O}F$				$-\dot{O}F$	

According to Table 2 (where, following standard conventions, a dot over a variable indicates its time derivative), 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).

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. 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 certainly make the descriptive structure richer and allow to incorporate interest rates' multiplicity. In such a more realistic setting, the lending rate "i_L" would be typically determined as a mark-up on the policy rate decided by the central bank. Whilst it could be argued that the size of the mark-up varies with the level of banks' own funds (or capital cushion) and other factors[13] (people liquidity preference among them), we take it as given. Indeed, the inclusion of multiple interest rates and interest rate spreads would just make the analysis more complicated without altering the validity of our argument. Moreover, as Rochon (1997) claims, the idea that the interest rate can be treated as an exogenous variable is fully coherent with (the evolution of) Keynes' own views on monetary theory:

[13] Carlin and Soskice (2014) argue that the mark-up lowers with higher own funds because 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. Let us assume people (money managers) and/or the central bank want to increase the share of bonds in their portfolios. Ceteris paribus, this will lower the return on 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 the *General Theory*, Keynes introduced his liquidity preference theory of the rate of interest. As I will argue below, however, Keynes began moving increasingly away from this analysis toward the view that the rate of interest is an exogenous variable. … Keynes's liquidity preference theory of the rate of interest should therefore be seen as a two-stage process, as Keynes himself recognized. First, Keynes argues that an increase in the finance required will impose pressure on the rate of interest. However, the actual movement in the rate depends not on the demand curve, but on the supply curve. … Finally, in March 1945, Keynes … makes the following decisive statement on the issue: 'The monetary authorities can have any rate of interest they like… They can make both the short and long-term [rate] whatever they like…'… It now appears that Keynes has come around to accepting the exogeneity of the interest rate" (Rochon, 1997, pp. 287-289)[14].

3.1. The Kaldorian view

In the "early" horizontalist approach à la Kaldor and Moore (what we could label with some simplification as the "Kaldorian view"[15]), the endogenous nature of credit money was considered enough to make liquidity preference irrelevant for the determination of macroeconomic outcomes. Two assumptions are crucial to justify this view:

a) Capital gains/losses on traded securities are assumed away;
b) Banks' profits are fully distributed to households, which essentially means that banks operate without own funds.

To see the reason why (a) and (b) play such an important role, take the simple structure portrayed by tables 1 and 2 and assume both assumptions 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:

$$u = c + g \tag{1}$$

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 (b), 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:

[14] This is clearly a radical Keynes' departure from the Keynes of the General Theory, where – as Le Heron (2020, p.144) reminds us – the view of an exogenous short-term rate of interest was already there, but the long-term rate of interest was said to be a "highly psychological phenomenon", a magnitude "more recalcitrant" to be controlled by monetary authorities.

[15] Of course, Kaldor does not "coincide" exclusively with the view expressed in the 1985-quoted-text above. Yet, that view is, say, a "strong" one and may justify the use of such simplifying label.

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

where, consistent with common sense and empirical evidence, $\alpha > \beta$, i.e., the marginal propensity to consume out of income is higher than that out of wealth.
Normalizing again by the capital stock and using $V_h = K$, this becomes:

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

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

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

Assuming that bank loans and bonds are perfect substitutes, implying that $i_b = i_L = i$, 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, we want to keep it as simple as possible and concentrate on the response of capital accumulation to aggregate demand. Therefore, we collect all the "exogenous" determinants of investment decisions (i.e., firms' animal spirits and, in this model, finance and distribution) into the constant term γ. Calling δ the positive parameter measuring the response of investments to aggregate demand, we end up with.

$$g = \gamma + \delta u \quad (3)$$

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

Figure 1 – Short- and long-run equilibrium in the Kaldorian view

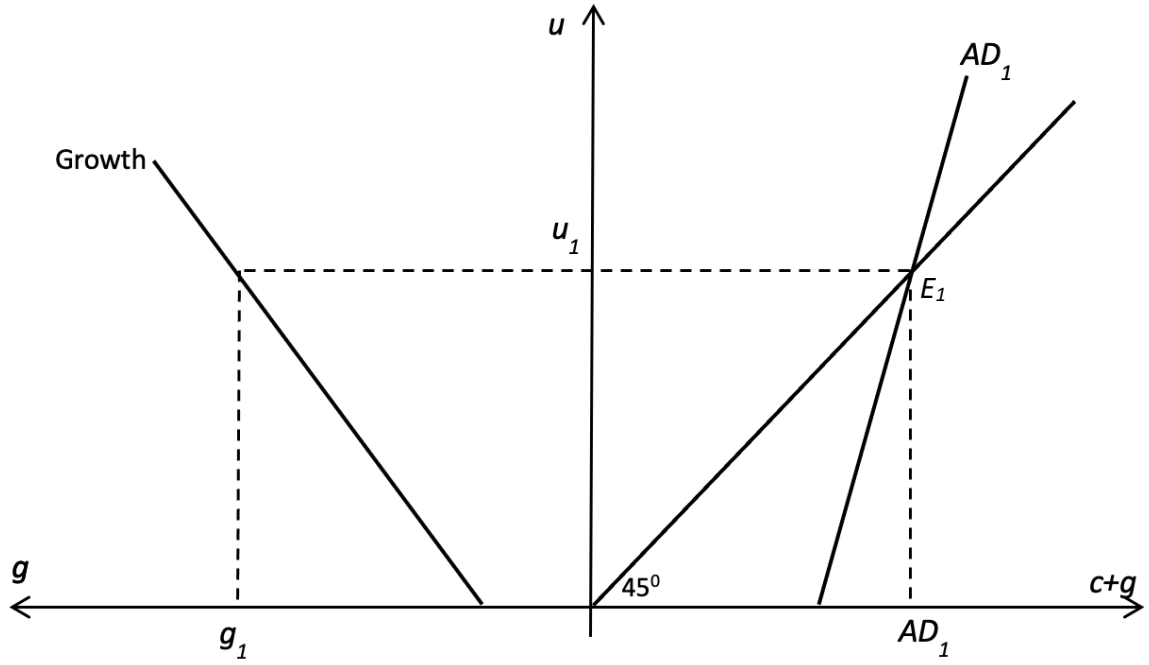


Figure 1 shows the solution. The AD curve expresses aggregate demand ($c + g$) as a function of capacity utilization, whereas the "Growth" curve represents equation (3). In the right-side quadrant of Figure 1, the 45-degree sloping curve is the equilibrium locus between aggregate demand (i.e, $c + g$) and aggregate supply (u), both normalized to the capital stock K. Provided that the standard Keynesian stability condition holds, i.e. $(1 - \alpha) > \delta$, the slope of the AD curve is greater than 1 and the AD itself intersects the 45-degree sloping curve at the equilibrium point E_1. 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 position: 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 – expand their supply of funds. Banks provide firms with the amount of funds households do not want to lend anymore and give households the extra-money they want to hold (money supply adjusts to money demand, bank loans create deposits). The share of firms' investment funded by banks and the share of money in households' portfolios increase, but the real equilibrium is totally unaffected. To go back to Keynes' 1937 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 earned 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 two assumptions mentioned above. Removing assumption (a) would clearly be enough to put liquidity preference back at the centre of the stage. Indeed, taking interest rate's changes or 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). Our purpose, however, is to take the other route and remove assumption (b): as we are going to show in sections 4 and 5, the interaction between banks' profits distribution and banks' capitalization is an important channel through which households' liquidity preference affects the macroeconomic outcomes.

4. Banks' profits and capital

According to Fontana (2003, 2004), banks take the (pro-cyclical) evolution of their asset-to-equity ratio (or capital adequacy ratio in the context of banks' regulation) as one relevant factor to define their credit policy. Indeed, according to the structuralist approach, banks may increase (decrease) interest rates in the expansionary (contractionary) phases of the cycle, when their leverage is going up (down), as a response to higher (lower) perceived exposure to borrowers' default risk. Other responses are equally likely to materialize. Strange enough, most of the existing literature on this topic has neglected to describe how banks *directly* manage their capital adequacy ratio by modifying their policy of profits' distribution.

Banks retain a portion of their profits because they have to (banking regulation) and also because they want to. Banks ensure they will remain trustworthiness by pledging part of their profits as immediate guarantee against losses and risks. Cohen (2013), for instance, shows that the brunt of changes in banks' own funds come from retained earnings. In the years following the outbreak of the last financial crisis, banks increased the amount of retained profits up to or above 60 percent of their net income (profits), in some cases close to 80 percent[16]. Gambacorta *et al.*, (2020) provide empirical evidence showing how banks increase

[16] Following Palley (2013b), if we look at the US economy, the shares of total financial profits over GDP and non-financial profits have significantly increased since the 1970s. In the years just before the outbreak of the last financial crisis, they accounted for almost 4 percent of US GDP and 44 percent of non-financial profits. If we look at commercial banks only, commercial banks' profits suddenly returned to represent about 15 percent of non-financial profits from 2010 to 2014 after the considerable decline experienced in 2008 and 2009 (see Lapavitsas and Mendieta-Munoz, 2017). According to data from the Federal Reserve Bank of St. Louis, commercial banks' net income accounted for 0.61 percent of US GDP, on average, from 1984 to 2019. This implies that commercial banks' retained profits could stand up to half percentage point of US GDP, a non-negligible amount indeed. See https://fred.stlouisfed.org/series/USNINC#0.

retained profits as a strategic action in order to open more space for the expansion of their balance sheet, i.e., to implement more aggressive policies in the concession of new loans.

International banking regulation also imposes banks to hold a minimum level of own capital 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 $\overline{\Omega}$. Basel II originally set it at 8 percent of banks' assets. Basel III has made it even more stringent by raising minimum capital requirement to 10.5 percent and by adopting a more restrictive definition of TIER 1 capital. More importantly, Basel III has directly institutionalized restrictions to banks' possibility to distribute dividends and pay bonuses based on possible misalignments with respect to capital requirements themselves, as well as on micro- and macro-prudential considerations ("too-big-to-fail" banks and excessive expansion of banks' assets at the macroeconomic level)[17].

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 thought of as a multiple of the minimum capital, i.e., $\Omega^* = (1+\eta)\overline{\Omega}$, around which the *actual* capital adequacy ratio Ω fluctuates. 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[18]. Banks use retained profits and *endogenously* modify their dividend policy to keep their actual capital adequacy ratio close to the target and adjust their own funds to the amount of their assets[19].

The existing literature on this topic, even complex SFC models, largely misses to capture how banks effectively determine retained profits and dividends' distribution. Le Heron and Mouakil (2008), for instance, assume that banks retain all their profits. By doing this, however, they neglect the legitimate bank owners' claims on banks' profits themselves. Dafermos (2012), on the contrary, in line with the "Kaldorian view", assumes that banks' profits are fully distributed. This way, he misses to recognize that banks use retained profits as a strategic tool to expand their balance sheet and possibly gain market shares (Gambacorta *et al.*, (2020)), and to comply with capital adequacy requirements. Godley and Lavoie (2007, ch.11) presents a SFC model where, as the authors themselves admit, banks' dividends are "crudely" modelled as a fixed proportion of (previous period) GDP, an assumption that is not consistent with the above-mentioned empirical evidence.

[17] Next-to-come Basel IV will tighten such rules even further by introducing the so-called "output floor". This is a minimum level of banks' own funds that banks will have to hold in proportion of their assets once these are weighted according to external standardized risk assessment criteria rather than "discretional", internal ones. Available estimates suggest that most banks will have to raise their own funds (Schneider *et al.*, 2017).

[18] 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 $\eta = 0$.

[19] Our analysis mainly refers to commercial banks. Nonetheless, it can be equally extended to other types of credit institutions such as cooperative banks and credit unions. Following McKillop *et al.*, (2020), for instance, in most European countries also cooperative banks are subjected to Basel III regulation as they are "systematically relevant" financial institutions. And when cooperative banks are small players that offer a narrow range of products and benefit of simplified rules, such simplifications are often compensated by higher capital requirements.

In this paper we assume that banks distribute a fraction $0 < \lambda < 1$ of their profits, whilst the rest is devoted to the accumulation of own funds. In the short-run version of the model, we can safely take λ as given. However, following the empirical literature we just mentioned, we endogenize λ and describe how banks change it in the transition from the short to the medium run (see Section 5 below).

Given these assumptions and the ensuing changes with respect to the "Kaldorian view", equations (1) and (3) remain the same as before, but consumption function (2) now needs to be properly amended. As it 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:

$$c = \alpha[u - i(1 - \lambda)(l + b_b)] + \beta \quad (4),$$

where $b_b = B_b/(i_b K)$ is a normalized measure of the importance of bonds in banks' assets.

This is not the end of the story, however. Defining $\mu = (B_H/iV_H) = (B_H/iK)$ the fraction of households' wealth held in the form of corporate bonds, and observing that accounting identities (the balance sheet matrix) implies that $1 - \mu = l + b_b$, we finally get to

$$c = \alpha[u - i(1 - \lambda)(1 - \mu)] + \beta \quad (5)$$

Needless to say, μ is the parameter through which we can capture changes in households' liquidity preference (Taylor (2004) and Lavoie (2014) also represent liquidity preference simply through a fixed parameter). The stronger their liquidity preference, the lower μ. Solving the model formed by (1), (3) and (5) is extremely easy. The short-run solution is:

$$u = \frac{\gamma + \beta - \alpha(1-\lambda)(1-\mu)i}{1-\alpha-\delta} \quad (6)$$

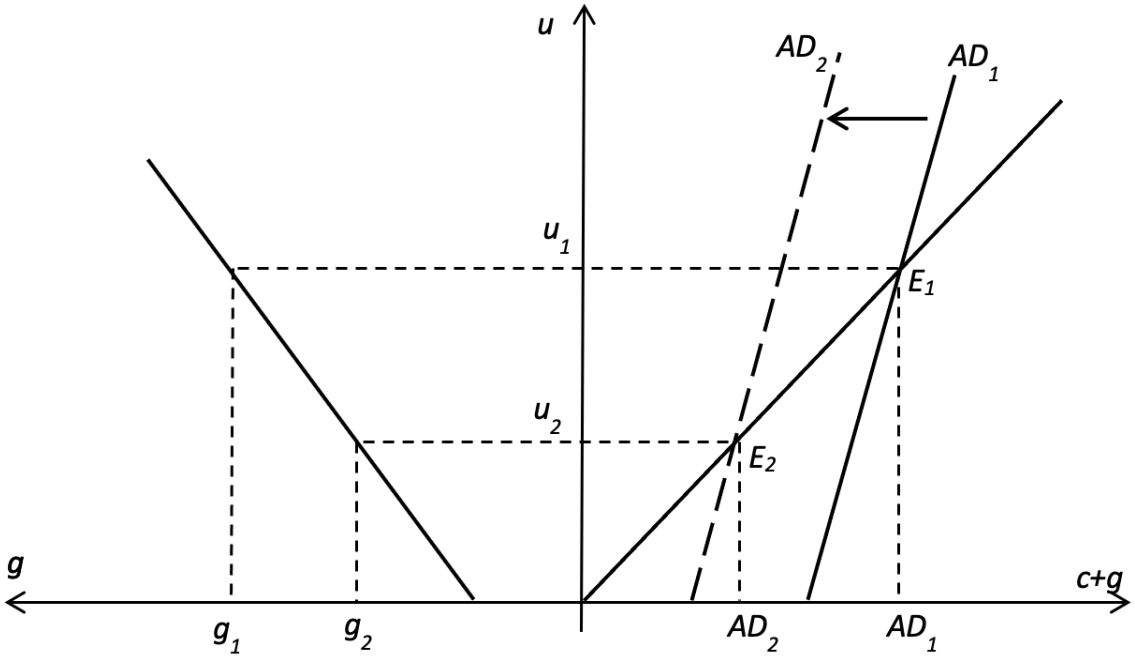
$$g = \frac{\gamma(1-\alpha) + \delta[\beta - \alpha(1-\lambda)(1-\mu)i]}{1-\alpha-\delta} \quad (7)$$

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

Clearly, households' liquidity preference (μ) and banks' dividend policy (λ) now contribute to the determination of the short-run equilibrium. Activity and growth increase with λ, since a higher fraction of banks' distributed profits raises households' income and consumption expenditures. As to μ, the higher households' liquidity preference (the lower μ), the lower their income and consumption expenditures, which in turn depresses 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[20]. 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, consumption expenditures decline 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) 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



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, policy-determined interest rate established by "sufficiently insistent" monetary authorities. In other words, differently from previous contributions, we show that liquidity preference Is relevant 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 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

[20] Adrian and Shin (2009), for instance, noted that in the immediate aftermath of the 2007-2008 financial shock, commercial banks' lending partially compensated for the dry-up of credit via market-based intermediaries.

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

Banks' ability to operate and extend loans is influenced by the solidity of their balance sheets. In our simple aggregate model, this can be captured by banks' own funds-to-assets ratio $\Omega = OF/(L + B_b/i_b)$, i.e., the equivalent to the capital adequacy ratio in the jargon of the Basel agreements. Using again the accounting identity $1 - \mu = l + b_b$, this ratio may be re-expressed as:

$$\Omega = \frac{OF}{(l+b_b)K} = \frac{OF}{(1-\mu)K} \tag{8}$$

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

$$\dot{\Omega} = \Omega\left\{\frac{\dot{OF}}{OF} - g\right\} = \Omega\left\{\frac{(1-\lambda)i}{\Omega} - g(\lambda)\right\} = \theta(\Omega, \lambda) \tag{9}$$

According to 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 (10), which simply states that banks adjust the share of distributed profits to the gap between Ω and Ω^*:

$$\dot{\lambda} = \varphi(\Omega - \Omega^*) = f(\Omega, \lambda) \qquad \varphi > 0 \tag{10}$$

Banks distribute more profits each time the actual own funds-to-assets ratio exceeds the target Ω^*, and vice versa. The parameter φ represents the speed of adjustment, which may be influenced by shareholders' quest for dividends.

Equations (9) and (10) describe the dynamics of the system over the medium-run. The non-linearity of the system implies that stability can be assessed only in the neighbourhood of the equilibrium. We do this in Appendix 1. In what follows, we concentrate on the two isoclines for Ω and λ.

Put (7) into (9), 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}:

$$\lambda_{SS} = 1 - \frac{\Omega_{SS}[\gamma(1-\alpha)+\delta\beta]}{[\Omega_{SS}\delta\alpha(1-\mu)+(1-\alpha-\delta)]i} \tag{11}$$

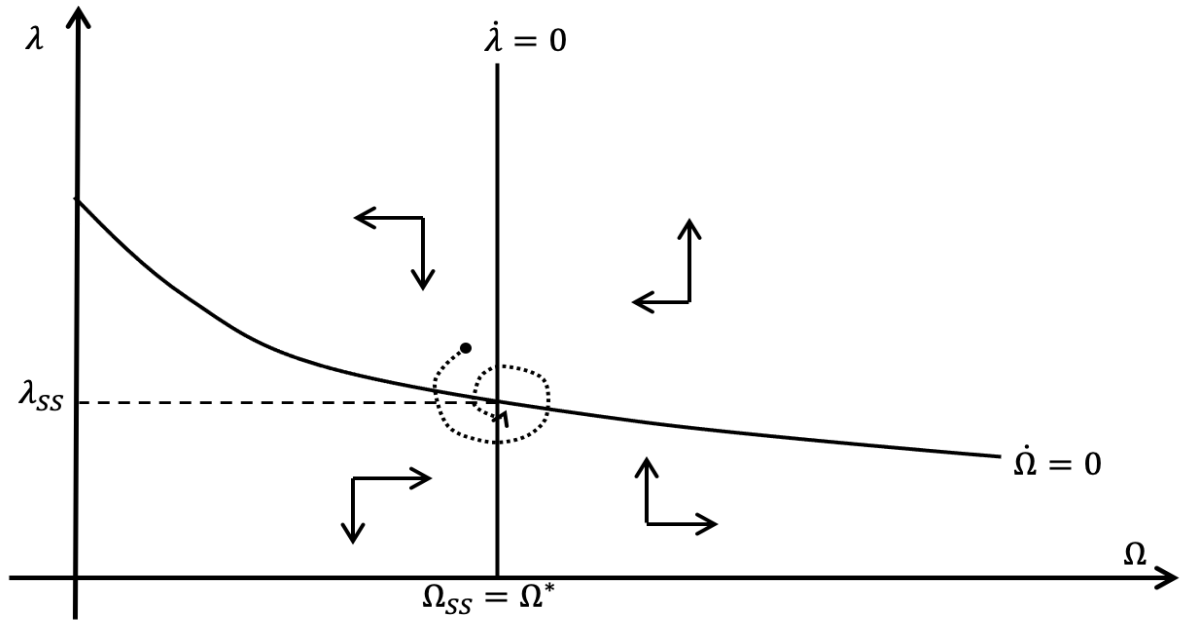
Using (11), one can easily verify that the isocline $\dot{\Omega} = 0$ is a downward-sloping function of Ω[21], with vertical intercept equal to 1 and a horizontal asymptote at $\lambda_{AS} = 1 - \frac{[\gamma(1-\alpha)+\delta\beta]}{\delta\alpha(1-\mu)i} < \lambda_{SS}$.

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

$$\Omega_{SS} = \Omega^* \tag{12}$$

The economic rationale is fairly intuitive. Outside the equilibrium, whenever the actual own funds-to-assets 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-assets ratio closer to target[22]. 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 Appendix 1 for a fully-fledged local stability analysis).

Figure 3 – The medium-run equilibrium



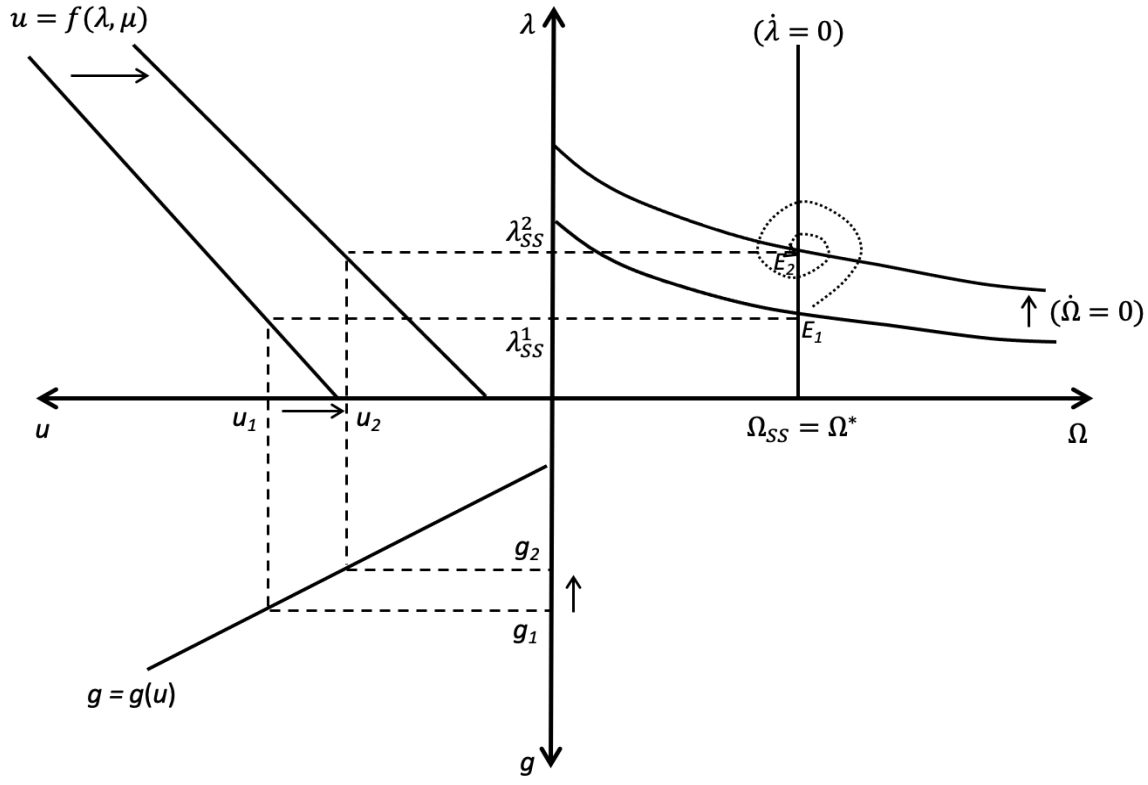
We are now in a good position to study the medium-run effects of variations in the liquidity preference of the public. Formal details may be found in Appendix 2. Here, we focus on the economic rationale and the graphical representation of our story (see Figure 4 below).

[21] One can 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.

[22] Once again, this is not just a matter of complying with bank regulations. Banks are very peculiar corporations; they are also *rentiers*: they adjust own funds to go on making money out of thin air, exactly in the same way as a landlord that from time to time must spend some money to keep her plot of land in decent conditions to be able to go on renting it out. The privilege of making money out of thin air has a price.

Let us consider an increase in liquidity preference (lower μ). From (11) and (12), 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 reduce the share of their wealth held in the form of bonds. In our simple model, this forces banks to step in and satisfy firms' financial needs with loans and, eventually, purchase those bonds that households might want to sell. Banks' own funds-to-asset ratio, however, increases. This is due to the short-run contractionary effects of higher liquidity preference, which 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-assets ratio. To keep it on target, banks will then distribute more dividends and retain a lower share of profits, i.e., λ will increase.

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. The increase in liquidity preference tends to reduce "*u*" (see the 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, "*u*" and "*g*". We determine the final net effect of an increase in liquidity preference in Appendix 2. The direct, contractionary effect of a reduction in μ over "*u*" and "*g*" prevails over the expansionary indirect effect (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 implications stemming from our analysis. First, even in a world of endogenous money where the central bank adopts a fully accommodationist stance and the banking system behaves horizontally, liquidity preference of the general public affects the performance of the economy *both* in the short *and in the medium run*.

Second, we do not need to take into account capital gains/losses and/or changes in the interest rate(s) to give liquidity preference such an important role. 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 banks' policy of profit distribution and then the different channels through which households' (capital) income is generated (i.e., direct remuneration of bonds' holding or banks' dividends). This, in turn, affects households' (consumption) expenditures, aggregate demand, capacity utilization and capital accumulation.

Third, our model 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. The liquidity preference of the public in the age of financial capitalism: further signs of finance dominance?

The outcomes of our study may bear some interesting implications as to the functioning of modern capitalist economies characterized by increasingly large and important financial sectors. Two points are worth stressing.

First, 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 financialized capitalism (Wray, 2009)? Are households' active participation to financial markets, as intermediated by buoyant institutional investors, 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. Indeed, 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 (and our model allows to argue) is that in a 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 the increased participation of the public to financial markets via the intermediation of money managers may have increased exposure to financial shocks. Indeed, this is a major tenet of Minskyan analysis, which emphasizes how "money manager capitalism" may be affected by heightened financial instability (see Wray, 2009).

Second, and connected to the previous observation, recent developments in finance may have increased the impact of the liquidity preference of the general public on banks' management. Think about the securitization of banks' loans and the production of complex financial products that have progressively blown up in the last decades. To some extent, banks securitize *existing* loans to carry out "regulatory arbitrage" (Botta *et al.*, 2020): (i) open more space for the creation of *new* loans while keeping their capital adequacy ratio under control; (ii) avoid negative implications of expanded banks' activities over (increased) retained profits and (decreased) shareholders' dividends. Loans' securitization, however, is possible only if the financial products created with securitized loans satisfy investors' liquidity standards on top of their appetite for returns. Banks frequently retained riskier assets (i.e., mezzanine and junior CDOs' tranches) in their balance sheets and/or committed themselves to repurchase those financial products in case of financial turmoil in order to reassure investors about their safety level. After the outbreak of the 2007-2008 financial crisis, investors' confidence in structured financial products suddenly evaporated and public's liquidity preference skyrocketed. This triggered off a massive reversal in (securitized) assets' flows from shrinking investors' balance sheets to increasingly burdened banks' ones (Bhaduri, 2011). Whilst some banks went bankruptcies, others had to take bold actions such as dividends' cuts and emergency recapitalization plans, with negative consequences for the real economy in line with the story described in this paper. The liquidity preference of the public had never been so important for the management of banks.

A final consideration is about the policy implications of these facts and the story told in this paper. Indeed, our paper echoes 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. Central banks and the overall banking system may well have full control of the interest rate(s), as we assume in this paper. However, this might not be enough to secure solid real economy dynamics in presence of gloomy people expectations on financial markets. Following Kregel (2014), "market "guidance" [perhaps via unconventional policy measures] was precisely the kind of policy that Keynes would have supported in these conditions" (Kregel, 2014, p.3). All in all, we could well interpret this result as an additional sign of financial markets' "take-over" of the real economy (Storm, 2018).

7. 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 affect capacity utilization and capital accumulation both in the short and in the medium run. In a world where banks behave in a "perfectly horizontalist" manner, and the central bank adopts a fully accommodationist stance, we show that the endogenous adjustment of banks' profit distribution (and the simple fact that some are to be retained) is more than enough to give back households' liquidity preference the role it had in the original Keynesian framework.

Our model does not take on board several aspects of modern economies. In this paper, for instance, we do not endogenize the heightened instability and vulnerability of modern economies to financial crises, with the ensuing consequences in terms of (non-financial) firms' animal spirits and willingness to invest. Moreover, 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 most economies in the last four decades, as well as the increasing debt burden on the shoulders of low- and middle-income households. All these aspects represent potentially interesting extensions of our model and could make it richer. More than that, they might contribute to alleviate or even revert the expansionary effects of lower liquidity preference and booming financial markets. None of them, however, would alter the central theoretical message of our work. The original insight of Maynard Keynes is to be rescued. Liquidity preference and financial markets matter, and money endogeneity, not even in a purely "accommodationist" and "horizontalist" world, does not allow us to think of the banking system as the unconstrained *deus ex-machina* of the economy we live in.

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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) below.

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

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

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. Moreover, 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:

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

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:

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

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

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

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 $(1-\alpha-\delta) > 0$. 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.