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Are keynesian ideas applicable to the long run? Some theoretical reflections and an illustrative model

¿Se pueden aplicar las ideas Keynesianas al largo plazo? Unas reflexiones teóricas y un modelo ilustrativo

Est-il possible d'appliquer les idées keynésiennes dans le long terme? Quelques considérations théoriques et un modèle illustratif

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RESUMEN

El modelo que se construye en este artículo quiere mostrar que la más importante idea Keynesiana, el principio de la demanda efectiva, no se aplica solamente a un corto plazo en el que unos precios son fijos o rígidos. También se aplica a un largo plazo en el que los precios son perfectamente flexibles y vacían el mercado, las firmas maximizan sus ganancias y la distribución funcional del ingreso depende de las productividades marginales. También se muestra que la naturaleza Keynesiana de un modelo no depende de sus resultados – en unos casos bajar los salarios es una buena idea y en otros no lo es; en unos casos la paradoja del ahorro vale en el largo plazo y en otros no vale – sino del hecho de incorporar (o no incorporar) la noción de demanda autónoma. Para terminar, se le da un sustento a la idea de que la forma en la que se trata el asunto de los salarios monetarios (y su flexibilidad) en la Teoría General no se puede aplicar al mundo "financiarizado" en el que estamos.

Palabras clave: Economía keynesiana, enseñanza de la economía, flexibilidad salarial.

RÉSUMÉ

Cet article présente un modèle destiné à montrer que l'idée la plus importante de Keynes, le principe de la demande effective, n'est pas seulement applicable à court terme, dans lequel il y a des prix fixes et rigides ; mais aussi à long terme dont les prix sont parfaitement flexibles et vident le marché, les firmes maximisent leurs profits, et dont la distribution fonctionnelle des revenus dépend de la productivité marginale. De plus, nous montrerons que la nature keynésienne d'un modèle ne dépend pas de ses résultats ; dans certains cas les abaissements de salaires sont des politiques efficaces, mais dans quelques autres ils ne sont pas. Dans certains cas, le paradoxe de l'épargne a une valeur à long terme, mais dans quelques autres il n'en a aucune ; au contraire, cette nature dépend du fait d'incorporer ou non la notion de la demande autonome. Pour mettre au point la conception finale de cette étude, nous soutiendrons l'idée indiquant que la façon dont les salaires sont traités à partir de la théorie générale ne peut pas être appliquée au monde financiarisé où nous habitons.

Mots clé: Economie Keynésienne, Enseignement de l'Economie, Flexibilité des salaires

ABSTRACT

This paper presents a model intended to show that the most important Keynesian idea, the principle of effective demand, cannot be only applied to short terms, in which some prices are fixed or sticky; but also to long terms where prices are perfectly flexible and empty the market, firms increase their profits, and where the functional income distribution depends on marginal productivities. Moreover, we will show that the Keynesian nature of a model does not depend on its results, in some cases lowering wages is a good policy and in others it is not. In some cases, the paradox of thrift stands out in the long run and in some others it does not; instead, this nature depends on incorporating (or not) the notion of autonomous demand. To conclude, we will support the idea stating that the way in which monetary wages (and flexibility) are addressed in the General Theory is not applicable to the financialized world, where we live.

Key words: Keynesian economics, Teaching of Economics, Wage flexibility

JEL classification: A20, B00, B20, B30, E12

INTRODUCTION

The so-called *New Consensus* in macroeconomics is not really that new. The crucial idea is at least as old as the IS-LM model: Keynesian ideas and policies might have some relevance in the short run, i.e. as long as some prices and wages are rigid; but in the longer run, when by definition all prices are flexible (unless you are living in a centrally planned economy), Say's law necessarily holds. In the long run, the economy in the aggregate is deemed to spend what it produces (*all* what it produces: the income elasticity of expenditure is one). Due to real interest rate flexibility and/or the Pigouvian real balance effect, aggregate demand deficiencies are to be ruled out and the economy behaves as efficiently as its supply side does. Aggregate demand affects the level of economic activity (GDP) in the short run, but in the longer run it does not have any traction on the economy.

From the perspective of mainstream scholars and, above all, generations of students all around the world, some of the classical Keynesian results seem too difficult to digest. For example, in chapter 19 of the General Theory (GT) Keynes argues that the level of monetary wages does not have any role to play in the determination of the real equilibrium of the economy (at least of a closed economy), and the same applies to the general price level. In particular, money wages' variations do not change the equilibrium level of employment and their "flexibility" is a bad or useless medicine against unemployment. Another Keynesian result so difficult to digest is the extension to the long run of the so-called "paradox of thrift" (Robinson, 1962). This paradox can be eventually accepted as a short run result, but how can one seriously deny we are richer and better off than our forefathers thanks to their sacrifices and saving efforts? Even the idea of "income multiplier" – at least as it has been popularized in almost every textbook – is hard to swallow: why is it that a demand shock only produces a quantity adjustment without prompting any effect on prices? It would be much more intuitive to think that (unless you live in a centrally planned economy) both prices and quantities adjust, in proportions that are likely to depend on the concrete economy at hand and its peculiar institutions.

The main purpose of this paper is to show that the above arguments are essentially wrong. Keynesian ideas do not need a fix-price framework to be defended, neither in the short nor in the long run. What is essential to support those ideas is the notion of "autonomous demand". I will show how to build a theoretical structure in which prices are flexible and market-clearing (both in the short and in the long run), firms maximize profits, functional income distribution is governed by marginal productivities, some degree of money wage "moderation" may help reduce unemployment, the paradox of thrift does not hold in the long run, *but output is determined by the principle of effective demand*, both in the short and in the long run. To put it differently, the Keynesian nature of a model does not depend on its specific results; it only depends on incorporating (or not) the idea of autonomous demand and then the principle of effective demand. My hope is to be able to build a model such that students stop thinking that Keynesian ideas may only be applied to a short run in which prices are fixed or sticky and do not clear the market[1]. I would also be glad should students learn that a Keynes-

1 To avoid any misunderstanding, I want to clarify from the onset that I do *not* believe that in our concrete economies prices are market-clearing, but this is not the point. The point is to show that even when they are, the principle of effective demand applies.

ian model is not to be associated with a set of pre-specified policy prescriptions or analytical results. Increasing (the rate of growth of) monetary wages could be good in some economy and bad in others, but in all of them the short and long run equilibrium are determined by the principle of effective demand. Or, again as an example, the fact that the paradox of thrift may not hold in the long run does not have anything to do with the long run validity of the principle of effective demand.

I will start with the illustration of the so-called Marshallian/Keynesian model (see Lavoie, 2014), which is essentially short-run and represents a very synthetic and effective representation of what Keynes himself wrote in the General Theory (GT). Then – and this is the original contribution of the paper – I will propose an extension of that model in which financial relations among social actors are explicitly considered. This will allow reaching the results I briefly outlined in this introduction.

THE MARSHALLIAN/KEYNESIAN MODEL OF THE GENERAL THEORY AND JOAN ROBINSON EXTENSION TO THE LONG RUN

The economy is closed and there is no government. There is only one good (GDP), with monetary price p, which can be used for consumption and investment purposes. Workers do not save (equation 1), whilst capitalists' savings are defined as the excess of profits over capitalists' consumption (equation 2). Profits, in turn, are the differences between sales and labor cost (equation 3). In equilibrium and in national accounts too, savings are equal to investments (equation 4). Total consumption is the sum of capitalists' and workers' consumption (equation 5), whereas total savings coincide with capitalists' savings (equation 6):

$$wL = pC_w \tag{1}$$

$$S_p = p\pi - pC_p \tag{2}$$

$$p\pi = pC + pI - wL \qquad (3)^{2}$$

$$S = pI \tag{4}$$

$$C_w + C_p = C \tag{5}$$

$$S_p = S \tag{6}$$

To get a standard Keynesian model *à la* Marshall, consider the following assumptions:

a) Real investment I are given (I = I*), an "autonomous" component of aggregate demand. It might be worth recalling that an expenditure is "autonomous" when it is not financed by incomes generated in the current period, but by previously accumulated wealth;
b) The wage rate w is also given (contracts, whatever);
c) Capitalists save a fixed fraction of their income, i.e. $S_p = s_p p\pi$;
d) The technology is represented by a standard neoclassical production function with usual properties (marginal products are diminishing, this is the crucial feature);
e) Firms maximize profits and therefore the real wage coincides with the marginal product of labor;

It is straightforward to see that these assumptions together with (1) to (6) imply

$$F(L,K) - F_L(L,K)L = \frac{I^*}{s_p} \qquad (7),$$

$$F(L,K) - F_L(L,K)\left\{\frac{wL + iB(1-s_p)}{w}\right\} = I \qquad \text{(7 Bis)}$$

2 This relation can be interpreted as an AS-AD equilibrium, i.e. wL + pπ = pC + pI. The sum of distributed incomes is equal to the sum of their possible uses.

where F(L,K) is a standard and well-behaved neoclassical production function and F_L is the marginal product of labor.
In each period the capital stock is given and then (7) can be solved in its unique endogenous variable, the level of employment L. Economically, equation (7) says that aggregate profits (LHS) are determined by exogenous investments and capitalists propensity to save (RHS). Capitalists as a class earn what they spend (Marx, Kalecki, Kaldor), whereas workers spend what they earn. It might also be noted that the flow of savings generated by the autonomous investment level I* is equal to $s_p(I^*/s_p) = I^*$.

It is important to understand that this is a model with *perfectly flexible and market-clearing prices*. To get this point, assume we are initially in equilibrium (aggregate supply, AS, equal to aggregate demand, AD) and there is an exogenous increase in I*. Equation (7) tells us that L will increase (just use the implicit function theorem), but how does the underlying process work exactly? The rise in I* creates a disequilibrium with AD > AS. Prices p go up to clear the market and thus, for a given money wage (assumption b), the real wage decreases. Profit-maximizing firms will then be induced to hire more people, L goes up and equilibrium is restored in (7)[3]. The same mechanism is at work when the propensity to save of capitalists, s_p, changes. Imagine it increases. This creates an excess supply, AS > AD. Market-clearing prices will fall, the real wage increases and firms will optimally reduce employment and output. This is the mechanics of the well-known Keynesian "paradox of thrift". Prices are flexible, but monetary wages are not. Let me describe the essential mechanics of wage flexibility within the framework of this static model. Assume we are in an unemployment equilibrium, with AS = AD and $L^* < L_s$ (the latter being labor supply). What would be the effect of lowering money wages in response to unemployment (the neoclassical medicine)? Lower wages would increase AS, since they imply a reduced real wage for a given price level (the equilibrium price level at which AS = AD) and then would push firms to increase their labor demand. AD would be affected too. Indeed, aggregate demand is C + I. By assumption, I does not change. What happens to $C = C_w + C_p$? Now, $C_w = (w/p)L$ and $C_p = (F(L,K)-(w/p)L)(1-s_p)$. Starting from an equilibrium (AS = AD), a reduction in w ($dw < 0$) decreases C_w by $dC_w = (L/p)dw$ and increases C_p by $dC_p = -(L/p)(1-s_p)dw$, and then $dC = dC_w + dC_p = s_p(L/p)dw < 0$. Other things being equal, a reduction in money wages reduces aggregate demand. So, starting from an equilibrium point in which AS = AD and $L^* < L_s$, the reduction in money wages stimulates aggregate supply and depresses aggregate demand. An aggregate excess supply materializes, AS > AD, market-clearing prices go down and the ultimate effect is to leave real wages unaffected (this is the essence of Keynes' argument in Chapter 19 of the General Theory). That is the reason why employment (and then output) in (7) does not depend on nominal wages. Nominal wages are basically a unit of account, the *numéraire* of the model. What really matters, at least under an orthodox perspective, is real wages' flexibility. And in this model real wages are perfectly flexible – as a matter of fact output responds positively to an aggregate demand stimulus *because of their flexibility*.

3 Note also that an increase of aggregate demand pushes employment up at the expense of lower real wages. This is due to the assumption of diminishing marginal product of labor. Another important observation is that in this model both prices and quantities adjust during the unfolding of the multiplier process (I never understood why the textbook presentation of the multiplier is one in which only quantities adjust).

Extending the above, short-run model to a longer period has been the task of several among the first Cambridge post-Keynesians (Kaldor, Pasinetti, Joan Robinson, Kalecki, etc.). Their idea was to show that the fundamental Keynesian insights – macro causality runs from investments to savings – could be extended from the short to the long run. Joan Robinson (1962) put it very clearly:

> "The Keynesian models (including our own) are designed to project into the long period the central thesis of the General Theory, that firms are free, within wide limits, to accumulate as they please, and that the rate of saving of the economy as a whole accommodates itself to the rate of investment that they decree" (Robinson 1962, pp. 82-83).

Equation says that s_p x (Total Profits) = Total Investment, total investment being the engine of the system: the autonomous expenditure whose level generates, via income multiplier, an equal amount of savings. Just divide both sides by the capital stock and you will get the well-known "Cambridge equation", i.e.

$$r = \frac{g}{s_p} \quad (8),$$

saying that in the aggregate the rate of accumulation (g = I/K) determines the rate of profit (r = π/K)[4]. Joan Robinson added to (8) an equation explaining the accumulation rate with the expected rate of profit, r^e. With static expectations, we would have (r^T is a threshold level for the expected profit rate – the minimum required to start investing)

$$g = f(r) \qquad f' > 0 \quad f'' < 0 \quad f(0) < 0 \quad and \quad f(r^T > 0) = 0 \quad (9).$$

(8) and (9), sometimes referred to as the "neo-Keynesian" growth model, give rise to the very famous "banana diagram" of Joan Robinson and constitute a generalization (or, better still, one amongst a number of generalizations) to the long run of the Keynesian paradox of thrift (an increase in s_p lowers both g and r).

We already saw that in the short run, Marshallian/Keynesian model of the GT there is no role to be played for monetary wage flexibility. The same holds in Robinson's long run extension. Monetary wages (and prices) continue to be nothing more than a mere unit of account. The model, both in the short and in the long run, is a purely real one, and does not give nominal magnitudes any role to play. This is clearly rather unsatisfactory – all the more so in our contemporary, "financialised" world, where credit/debit relations are almost invariably defined in nominal terms and seem to be so important in the making of our economic destinies. I am then going to modify the model so far developed and consider explicitly some simple *financial* relations among social actors. After all, as Jan Kregel (1986) remarked, a Keynesian model without finance is like *Hamlet* without his Prince.

Finance (Hamlet with his Prince)

As I already stressed, expenditure is autonomous when it is funded out of previously accumulated wealth rather than current income (or – this is the essence of endogenous money theory – out of purchasing power that banks may create *ex-nihilo*). It is then necessary to specify whom holds that wealth and in which

4 The intuition behind this result is simple and powerful. The profitability of my own investment plan (and then the average, macro profitability) depends on how much my colleagues entrepreneurs decide to invest. This is a sort of "permanent" big push argument. If economic activity is buoyant, it will be easier to sell my stuff.

form. Table1 (borrowed from Hein, 2014, p.356) is the simplest balance-sheet matrix one can reasonably imagine.

Table 1: The Balance-Sheet Matrix

	Workers	Capitalists	Firms	Total
Loans		B	-B	0
Capital			pK	pK
Total		B	ARE	pK = B + ARE

Workers by assumption do not save, and then they do not have any wealth to allocate. B is the value of outstanding loans (maybe bonds) of capitalists to firms. Getting loans form capitalists is not the only way for firms to finance their investments. They can also make recourse to retained earnings (ARE stands for Accumulated Retained Earnings). It follows that in each moment in time, the value of the capital stock (pK) is equal to the sum of outstanding loans and accumulated retained earnings. Of course, in a more realistic setting one should also explicitly include banks (deposits and loans) and shares, but the minimalist framework of Table 1 is more than sufficient to develop the theoretical points I want to investigate. The transaction-flow matrix associated to this balance-sheet matrix is

Table 2: The Transaction-Flow Matrix

		Workers	Capitalists	Firms		Total
				Current	Capital	
NIPA	Consumption	$-pC_w$	$-pC_p$	pC		0
	Investment			pI	-pI	0
	Wages	wL		-wL		0
	Retained Profits			$-p\pi_f$	$p\pi_f = \Delta ARE$	0
	Distributed Profits		iB	-iB		0
FOFA	ΔLoans		-ΔB		ΔB	0
Total		0	0	0	0	

Table 2 (again borrowed from Hein) is just a useful accounting framework. Above the bolded horizontal line, it shows the components of the National Income and Product Accounts (NIPA), i.e. transactions (flows) taking place during a given accounting period (maybe a year) among institutional sectors (here only households, in turn split between workers and capitalists, and firms). Below this line are the changes (occurring between the beginning and the end of that given period) in the stocks of financial assets and liabilities of the different sectors, which correspond to the Flow-of-Funds Account (FOFA). Here, the only financial assets taken into consideration are loans. Notice that in such a framework profits are distributed in form of interests on outstanding loans (iB), and dividends are not into the picture since there are no shares in the first place. Distributed profits are either consumed (pC_p) or saved, and the only reason for capitalists to save is to make loans to firms (ΔB).

However rudimentary, the financial structure just illustrated implies that (7) is to be slightly but significantly modified. Let us see how. The first column of Table 2, together with the neoclassical assumption that the real wage equals the marginal product of labor, implies

$$C_w = F_L(L,K)L \tag{10}$$

The second column, together with the assumption that capitalists save a fraction s_p of their income, implies

$$C_p = i\frac{B}{p}(1-s_p) \tag{10'}$$

In a framework in which the neoclassical theory of distribution is accepted, the price level may be expressed as the ratio between the exogenously given monetary wage and the marginal product of labor. Hence,

$$C_p = i\frac{B}{w}(1-s_p)F_L(L,K) \tag{11}$$

The reason why, other things being equal, capitalists' real consumption is negatively affected by the level of monetary wages is simple. The higher the money wage, the higher the price level, the lower the real value of outstanding capitalists' credit towards firms, the lower their real income for any given interest rate.

Total consumption may then be expressed as

$$C = F_L(L,K)L + i\frac{B}{w}(1-s_p)F_L(L,K) = F_L(L,K)\left\{\frac{wL+iB(1-s_p)}{w}\right\} \tag{12}$$

and the reader may note that, other things being equal, the nominal interest rate affects total consumption positively. This is due to an income effect (capitalists' income is going up) and one could easily mitigate this result by introducing a substitution effect and making s_p an increasing function of the interest rate. I will not pursue this route here – a useless complication of mathematics without any relevant consequence on the main results. It should also be noted that higher nominal wages depress total real consumption as long as $B > 0$.

Total profits (see Table 2) are $p\pi = pC + pI - wL$. In real terms they can be expressed as $\pi = C + I - (w/p)L$ and then, using (10) and (12),

$$\pi = F_L(L,K)\frac{iB(1-s_p)}{w} + I \tag{13}$$

However, having adopted the neoclassical assumption that technology is represented by a standard neoclassical production function and that firms maximize profits, the theorem of product exhaustion makes it possible to write (13) as

$$F(L,K) - F_L(L,K)L = F_L(L,K)\frac{iB(1-s_p)}{w} + I$$

or

$$F(L,K) - F_L(L,K)\left\{\frac{wL+iB(1-s_p)}{w}\right\} = I \tag{7 bis}$$

Once again, if we accept the now (rightly) widespread view according to which the interest rate is a policy variable[5] and take the investment level as exogenous, (7 bis) is a theory of effective demand for the determination of real income in the short run. It is one equation with only one unknown, the level of employment L. Indeed, in each single period the capital stock is what it is, the nominal wage rate is given and B (capitalists' nominal wealth) is a product of history. The *big* difference with (7) is that monetary wages, far from being a mere unit of account, are now crucial in the determination of employment and real output in the short run. To

5 In the framework of my model, where banks are not explicitly considered and capitalists only have one option to allocate their savings, the interest rate is essentially a reflection of firms' policy concerning investment financing as well as capitalists' attitude toward consumption. A "decent bourgeoisie" (Max Weber) would accept a lower interest rate, whilst a "burguesía compradora" (dependency theory) would strive for higher interest rates. In this framework, it is certainly possible to make the interest rate endogenous, the result of a negotiation process (a simple game) between capitalists and firms, each side with its own objectives and negotiation power.

go deeper into the point, note that (7 bis) is a saving-investment balance expressed in real terms. To get things expressed in growth rates, both sides may be divided by the capital stock (S/K = I/K). Using the fact that F is a standard neoclassical aggregate production function exhibiting constant returns to scale, we will have

$$f(l) - f_l(l)\left\{l + \frac{iB(1-s_p)}{wK}\right\} = \frac{I}{K} \qquad (14)$$

where f(l) = F(L/K, 1) and l = L/K is the labor-capital ratio. What is (B/wK)? Should we look at the ratio (B/pK), its meaning would be immediately clear. It is (just look back at the balance sheet matrix) the firms' leverage ratio, i.e. a measure of the importance of external finance (vs. retained earnings) in the funding of their capital stock. Now, in this model any increase in w is associated to a corresponding increase in p (see below), so we may safely take B/wK as a proxy for the leverage ratio and call it "LEV". Labeling I/K as g (the accumulation rate), (14) may be written as

$$f(l) - f_l(l)\{l + iLEV(1 - s_p)\} = g \qquad (15)$$

Obviously, the crucial step needed to turn this scheme into a growth model is to make the accumulation rate endogenous. What does g depend on? In several post-Keynesian models, the accumulation rate is supposed to be negatively affected by the interest rate and the leverage ratio – the standard argument is the Kaleckian "principle of increasing risk" (1937). I do not believe that invoking such a principle in the framework of *this* model would make much sense. For a given expected gross profitability of some investment plans, it would be foolish on the part of firms to invest less just because the interest rate and/or the leverage are high. Their only result in the aggregate would be to get less profits for them, since what they owe to capitalists is in any case fixed, determined by the interest rate (given) and the outstanding debt B, which is also given (by history). Investing less does not reduce the size of the slice which is owed to capitalists, but does reduce the size of the cake[6]. I will then follow Joan Robinson and safely assume that g only depends on the expected rate of profit (needless to say, these expectations incorporate "animal spirits"). We could then write

$$f(l) - f_l(l)\left\{l + \frac{iB(1-s_p)}{wK}\right\} = g(r^e) \qquad (16),$$

where the relevant partial derivative is $g_r > 0$ (the higher the expected profit rate, the more rapid the accumulation path)[7]. To complete the illustration of the model, note that (16) determines l, the labor-capital ratio, and then, once l is known, the macro profit rate and the price level may also be determined. Indeed, using (13) and the equality between the real wage and the marginal product of labor, we have

$$r = f_l(l)\,\frac{iB(1-s_p)}{wK} + g(r^e) \qquad (17)$$

$$p = \frac{w}{f_l(l)} \qquad (18).$$

The model (16)-(17)-(18) is now complete. It is a system of 3 equations with 3 un-

6 It is certainly possible to have the interest rate and the leverage among the arguments of the accumulation function, but this requires a convincing microeconomic story (some kind of market or coordination failure) to justify the collectively absurd outcome that would result (a smaller cake for a fixed-size slice to be handed out to external financers).

7 Joan Robinson also assumed that grr < 0 and g(rmin > 0) = 0, where rmin is the mínimum expected rate of profit required by firms to start accumulation.

knowns – l, r and p. In any short period, for given r^e, i, s_p and leverage (B, w and K), (16) determines l; then, you plug this solution for l into (17) and (18) to get the solutions for r and p. Before turning to the long-run analysis, some short-run comparative statics may be useful (use the implicit function theorem):

a) An increase in s_p (capitalists save more) reduces l, output and employment (the paradox of thrift). From (18), it is also clear that the price level goes down (f_{ll} is negative). The macro profit rate can also be shown to go down;
b) An increase in the interest rate has a positive effect on output and employment (via increase in capitalists' real income and consumption). Prices go up as well and so does the macro profit rate;
c) An increase in the leverage ratio is also expansionary in the short-run: output, employment, prices and the macro profit rate all respond positively to a higher leverage ratio (again, via increase in capitalists' real spending);
d) One of the reasons why the leverage may go up is a reduction in monetary wages. We should then conclude that such a reduction is expansionary in the short-run. Why? Using (16) and (18) one can easily show that the elasticity of prices with respect to monetary wages is less than one (in the purely Marshallian model of the GT it was exactly equal to one), i.e. that a reduction in monetary wages prompts a reduction in real wages. Hence, the expansionary effect.

The mechanics of the long run analysis is simple. We already saw that, in any short period (given r^e, i, s_p and leverage LEV), the model determines an effective, realized profit rate. A second "round" may now start. On the one hand, the effective profit rate realized in the first round will somewhat affect the new level of r^e (depending on how expectations are formed) and, on the other, LEV = B/wK will change too. B will change because capitalists' savings are lent out to firms; K will change because capital is being accumulated; and w will change according to the concrete labor market institutions prevailing in the economy at hand. With these new levels of r^e and LEV, a new, second-round equilibrium may be calculated and new levels for employment (labor-capital ratio) and the effective profit rate will emerge from (16) and (17). And so on and so forth: a long run steady state for this simple model is a state in which firms' expectations on the profit rate are correct ($r = r^e$), the leverage ratio is constant and so are g and r. The growth rate of total employment, as implied by (16), is also constant and equal to g. Does such a steady state exist? Is it stable? What are its relevant features?

The long run equilibrium, money wage flexibility and the paradox of thrift

The verbal description of the mechanics spurred by (16) and (17) should have made it clear that the relevant relations for leverage and (expected) profit rate dynamics are (as usual, a hat over a variable indicates its growth rate):

$$\hat{LEV} = is_p - \hat{w} - g(r^e) \quad (19)$$

$$\hat{r}^e = \varphi\big(r(r^e, i, LEV, s_p) - r^e\big) \qquad \varphi' > 0$$

$$\varphi(0) = 0 \quad (20)$$

Equation (19) comes from the definition of LEV and the fact that capitalists use the whole of their savings to finance firms' investments. Equation (20) is a very simple rule of expectations' formation. It says that when the effective profit rate is higher (lower) than the expected profit rate, firms revise their expectations upward (downward).

In this paper, I do not want to concentrate on the determinants of the rate of growth of monetary wages, which will then be taken as exogenously given. After all, the growth of monetary wages over time follows different dynamics and rules depending on the concrete economy we want to consider and especially on its labor market institutions. Instead, I will rather concentrate on the consequences of different (and given) growth rates of monetary wages on the steady state levels of the profit rate, the accumulation rate and firms' leverage ratio.

The Jacobian of the system is

$$J = \begin{bmatrix} 0 & -g_r \\ \varphi' \dfrac{\partial r}{\partial LEV} & \varphi' \left(\dfrac{\partial r}{\partial r^e} - 1 \right) \end{bmatrix}$$

Making use of (A2) and (A3) in the Appendix, this can be written as

$$J = \begin{bmatrix} 0 & -g_r \\ \varphi' \dfrac{f_l l i(1-s_p)}{l + i(1-s_p)LEV} & \varphi' \left(g_r \dfrac{l}{l + i(1-s_p)LEV} - 1 \right) \end{bmatrix}$$

The determinant of the Jacobian is certainly positive, but the sign of its trace is ambiguous. It clearly depends on the absolute value of g_r, the derivative of the accumulation rate with respect to expected profitability. This is not surprising at all. Imagine the economy is outside its steady-state with, say, $r > r^e$. According to (20), the expected profit rate will increase. If investments are highly responsive to the expected profit rate (g_r is very high), then – within this Keynesian framework – the actual profit rate will increase more rapidly than the expected profit rate: the gap between r and r^e will further increase and the economy will never converge to its steady-state. I will assume this unstable case away and the long-run stability condition

$$g_r < \frac{l + i(1-s_p)LEV}{l} \qquad (21)$$

is then taken to hold.

The (stable) dynamics of the system is better illustrated graphically. In Figure 1 the curves labelled "Leverage" and "Profit rate" are stationary locus for, respectively, the leverage ratio and the expected macro profit rate. Their intersection is the steady state of the economy.

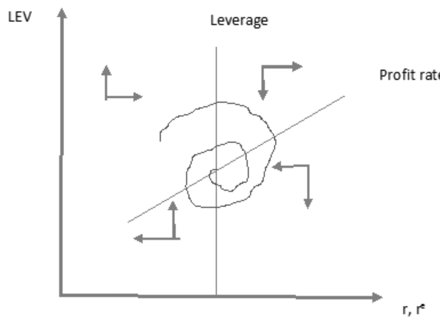

Figure 1: The Steady-State of the Model

The "Leverage" curve, as (19) makes clear, is vertical: there is only one profit rate such that the leverage ratio does not change over time (remember that we are taking monetary wages' growth as exogenous)[8]. To the left (right) of the stationary locus, the leverage ratio would increase (decrease). Note that the higher the interest rate or the capitalists' propensity to save, the higher the profit rate needed to maintain stationary the leverage ratio (the "Leverage" curve moves to the right). Note, also, that the higher the rate of growth of

8 Should the interest rate be endogenous (see footnote 5), the Leverage curve would not be vertical. In this case, indeed, the interest rate would be likely to depend on the leverage itself and the north-west element of the Jacobian would not be zero.

monetary wages, the lower the profit rate that maintains stationary the leverage ratio: the Leverage curve moves to the left.

What about the "Profit rate" curve? The analytical details are tedious and worked out in the Appendix. There, it is shown that the slope of the stationary locus for the expected profit rate is

$$\left.\frac{\partial LEV}{\partial r^e}\right|_{\dot{r}^e=0} = \frac{l(1-g_r)+iLEV(1-s_p)}{f_l\, li(1-s_p)} \qquad (22),$$

which is positive because (21) is assumed to hold. Above (below) the stationary locus, the expected profit rate will increase (decrease). The system (19)-(20) gives then rise to a stable focus and both variables flow cyclically toward their steady state levels (Figure 1).

There are two interesting questions that may be addressed using this simple model. First, what are the long-run effects of changing the growth rate of monetary wages? Second, is the paradox of thrift valid also in the long-run?

To understand the effects of having different rates of growth of monetary wages, it is important to realize that in this model the real wage is constant in the steady-state (this is a model without technical change). Just look at (16): when the profit rate and the leverage ratio are stationary, the labor-capital ratio does not change and then the marginal product of labor is constant too. So, in the steady-state of our model the rate of growth of monetary wages coincide with the (price) inflation rate. Now, imagine that the economy is in a steady-state (point A in Figure 2) where the labor force is growing more rapidly than the economy, or

$$n > g^{ss} = g(r^{ss})$$

This is clearly a case in which the pool of unemployed people grows over time. What would be the effect of lowering the rate of growth of monetary wages (and then, from a long-run perspective, the inflation rate)? A slower growth of monetary wages would shift the Leverage curve to the right and the steady-state of the economy would move from A to B

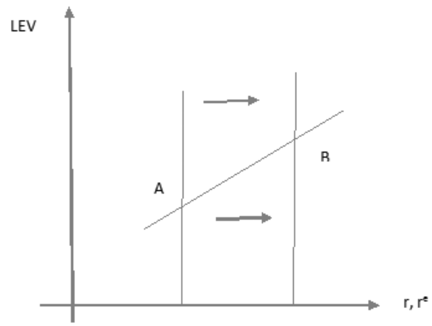

Figure 2: the effect of slower growth of monetary wages

The economy would end up in a long run equilibrium with higher profit and growth rates, as well as a higher leverage ratio. Wage "flexibility", in the specific form of a reduction in the rate of growth of monetary wages, may help the economy grow faster and then absorb some unemployment in the long run. This is a rather "classical" result. However, this is due to an aggregate demand effect and does not have anything to do with mainstream stories. Specifically, other things being equal, slower growth of monetary wages, and then a lower inflation rate, increases firms' leverage ratio and then redistributes real income (real profits) from firms to capitalists and this, for any given level of investments, increases aggregate demand.

Let us move to the paradox of thrift. Is it still valid in the long run? No, in this model it is not. Imagine we are in a steady-state (point A in Figure 3). What would happen should capitalists decide to save more (increase s_p)? The stationary locus for the leverage ratio will move to the right and that for the expected profit rate will shift upward (in the short-run, the actual profit rate responds negatively to higher savings), moving the economy to a new steady-state with higher profit and growth rates and a higher leverage ratio as well (point B in Figure 3).

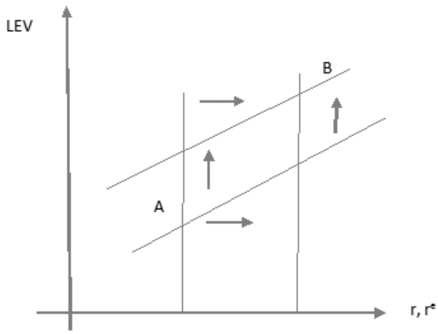

Figure 3: the paradox of thrift does not hold in the long-run

What is concretely going on in the economy? In the short run, for *given* levels of LEV and r^e, both the labor-capital ratio and the actual profit rate will decrease (the paradox of thrift holds); in the long run, however, things are different: the very fact that s_p is higher than before means that LEV starts to increase, real profits are redistributed from firms to capitalists and aggregate demand is then stimulated. However cyclically, the economy will finally converge to a steady-state with higher leverage and higher growth.

CONCLUSIONS

The simple model presented in the paper is essentially an extension of the Marshallian/Keynesian model of the GT. It serves different purposes, three of which are perhaps worth mentioning.

First, it shows that the Keynesian principle of effective demand governs the macro performance of an economy both in the short and in the long run, in a framework in which prices are fully flexible and market-clearing (and firms maximize profits and income distribution depends on marginal productivities). Keynesian ideas are not a special case, applicable just in a short run with rigid prices. Long run growth depends on the evolution of effective demand because it is the ultimate determinant of the level of *real* wages and, in general, of the evolution of the supply conditions.

Second, the model presented in the paper shows that the discussion on monetary wages and their variations must go beyond the too narrow boundaries of the Marshallian/Keynesian model of the GT. Money wages are not a pure unit of account. They are the fundamental nominal magnitude governing the evolution of the general price level and then, in a world where credit-debit relations are more and more important, the distribution of real income among social actors. In particular, in our model they are a key variable determining the distribution of real profits between firms and capitalists. However it may seem paradoxical, in chapter 19 of the GT Keynes was too "classic", claiming that money wages and prices do not affect the real equilibrium of the economy.

Third, there are some "Keynesian" results that may be valid in the short but not in the long run. The example given in the model concerns the well-known paradox of thrift. The reason why in this model the paradox does not hold in the long run is simple. A higher propensity to save of capitalists increases the leverage ratio (which is taken to be fixed in the short run) and then, again, modifies the distribution of real profits in favor of capitalists and then, for any given level of investments, increases aggregate demand. It follows that the fact that the paradox of thrift does not hold in the long run is a purely Keynesian result (depending on the principle of effective demand).

Keynesian ideas, if correctly understood, are absolutely general. They do not coincide with their vulgarization – just spend more under any circumstance. Rather, their deep essence is the principle of effective demand. The paper shows this principle is valid in a framework with price flexibility, profit-maximizing firms and wages free to vary at whatever rate over time. It cannot be confined to a short period in some rich economy where unions are strong enough to defend wage rigidity. It is a general principle of the functioning of any macroeconomy.

The model can be extended in several directions. In my opinion, two of them should be pursued. First, money and banks may be included in the model, to give savers more options as to the usage of their savings and understand more profoundly the issues of liquidity preference and interest rates determination. Second, an open-economy extension would be crucial to discuss more at length the issue of money wages and their flexibility in a globalized environment.

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Appendix:

The Slope of the Profit rate curve

From (20), it is clear that the equation of the stationary locus for the expected profit rate is

$$r(r^e, i, LEV, s_p) - r^e = 0,$$

which can be written as

$$G(r^e, i, LEV, s_p) = 0.$$

From the implicit function theorem, the slope of the stationary locus for the expected profit rate is

$$\frac{\partial LEV}{\partial r^e} = -\frac{G_{r^e}}{G_{LEV}} = -\frac{\frac{\partial r}{\partial r^e} - 1}{\frac{\partial r}{\partial LEV}} \tag{A1}$$

Using (16) and (17), we can write

$$r = f_l(l(LEV, r^e))i(1 - s_p)LEV + g(r^e)$$

,
and then:

$$\frac{\partial r}{\partial LEV} = i(1 - s_p)\left\{f_{ll}\frac{\partial l}{\partial LEV}LEV + f_l\right\}$$

$$\frac{\partial r}{\partial r^e} = i(1 - s_p)LEV f_{ll}\frac{\partial l}{\partial r^e} + \frac{\partial g}{\partial r^e}$$

The derivatives of the labor-capital ratio with respect to the leverage ratio and the expected profit rate are to be computed applying the implicit function theorem to (16):

$$\frac{\partial l}{\partial LEV} = -\frac{f_l i(1 - s_p)}{f_{ll}\{l + i(1 - s_p)LEV\}}$$

$$\frac{\partial l}{\partial r^e} = -\frac{\frac{\partial g}{\partial r^e}}{f_{ll}\{l + i(1 - s_p)LEV\}}$$

By substitution, we will get

$$\frac{\partial r}{\partial LEV} = \frac{f_l l i(1 - s_p)}{l + i(1 - s_p)LEV} \tag{A2}$$

$$\frac{\partial r}{\partial r^e} = \frac{\partial g}{\partial r^e}\frac{l}{l + i(1 - s_p)LEV} \tag{A3}$$

Plugging these results into (A1), we get at last what we are interested in, i.e. the slope of the stationary locus for the expected profit rate:

$$\frac{\partial LEV}{\partial r^e} = \frac{l + i(1 - s_p)LEV - l g_r}{f_l l i(1 - s_p)}$$