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The Supermultiplier-Cum-Finance. Economic Limits of a Credit Driven System

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Abstract

Credit explosion, debt overhang and asset bubbles, of the size observed in the period 1995-2008, have been a recurrent problem of advanced capitalism. In this paper we analyse the causes and consequences of over-indebtedness from a supermultiplier model that takes into account the debt-service. We contend that the accelerator of investment is a stable and stabilizing mechanism when investment depends on the expected increases in "permanent" demand. The problems of instability are rooted in the consumption-multiplier when it does not depend on fixed parameters (like the tax rate) but on coefficients that evolve endogenously; namely the debt-burden and the debt service. To control the financial sources of this instability, monetary authorities should prevent that credit rises systematically above the growth of nominal GDP.

Keywords: Financial Instability; Supermultiplier; Post-Keynesian Economics, Sraffian Economics

JEL codes: E11; E12; E32

1. Introduction

As students we learnt that the financial system is a "satellite" that oscillates around the real economy ("the planet"). What happens if the satellite becomes bigger than the planet and takes the lead? Are there macroeconomic limits to credit expansion? And what are the consequences of exceeding them?

After 1995, the economies of rich countries (the US in particular) were driven by the construction industry fueled by cheap mortgage loans. The prevailing economic circumstances at the time provided a rationale for such an outcome. In an epoch of low wages, a massive building of houses was only possible if many workers received cheap mortgage loans. Credit expansion was also desirable for banks. In an epoch of low interest rates, banks were bound to multiply the number of loans in order to keep profitability taking advantage of the strong economies of scale they enjoy. In fact, credit expansion stimulated economic growth during the nineties. But credit has a debt counterpart and debt has deflationary effects on aggregate demand. They start from the first moment by are particularly harmful during the recessions.

The dangers of credit overexpansion and the debt overhang resulting from it, have been highlighted by some authors at different times. Their warnings have had, however, a minor impact on the scientific community since they were either non-academic professionals or professors outside the mainstream. The most compact account of the credit cycle can be credited to the Austrian School of Economics[1]. Minsky, a student of Schumpeter (an Austrian born economist), focused on the financial part of the Keynesian system and the endogenous deterioration of debt structures (Minsky, 1982, 1986). Under Minsky's inspiration, some post-Keynesian economists have emphasized the financial fragility of capitalism[2]. Among the "independent" authors that warned about the dangers of credit overexpansion, we should mention Reinhart & Rogoff (2009), Werner (2005, 2014), Hudson (2015), Turner (2015) and King (2016).

In our opinion, a weakness of such criticisms is that they do not provide a model able to demarcate the limits to credit expansion. Adair Turner, the Chairman of Britain's Financial Services Authority when the global financial crisis struck in 2008, makes clear that the crisis was caused by "too much debt of the wrong sort". Unfortunately, he concludes, economics lacks the tools to know where the limit is:

> The fundamental problem is that modern financial systems left to themselves *inevitably create debt in excessive quantities*, and in particular debt that does not fund new capital investment but rather the purchase of already existing assets, above all real estate. It is that debt creation which drives booms and financial busts: and it is the debt overhang left over by the boom that explains why recovery from the 2007-08 financial crisis has been so anaemic". "We have neither the science to tell us what the perfect level [of debt] is, nor the policy tools to achieve it". "What we lack is any precise science to tell us how much debt is too much and what mix of debt is optimal (Turner, 2015, pp. 3-4; see also pp. 47, and 195).

Our paper tries to fill this gap focusing on the interaction between production, distribution and finance and taking seriously Keynes's warning:

> Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes a bubble on a whirlpool of speculation. When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill done (Keynes, 1936, ch. 12).

The paper is structured in three sections plus the Introduction and the Conclusions. In section 2 we summarize the economic model behind our analysis. It is a synthesis of

[1] Mises (1912, 1953), Hayek (1933), Huerta de Soto (2009).

[2] Important books in the postKeynesian tradition that address our current concerns are: Keen (2001), Epstein (2005), Wolfson & Epstein (2013), Lavoie (2014), Palley (2015), Hein, Detzer, & Dodig (2016). See also: Skott (1991), Badhuri, Laski, & Riese (2006), Blankenburg & Palma (2009), Hein & Treeck, (2010), Badhuri (2011), Arestis, Sobreira, & Oreiro (2011), Lang (2015).

the theory of value and distribution of classical political economy revived by Sraffa, (1960) and the Keynesian-Kaleckian theory of output based on the principle of effective demand (Keynes, 1936; Kalecki, 1971)[3]. This principle becomes more compelling when we connect the consumption-multiplier with the acceleration of investment in a "super-multiplier model" [4]. It highlights the key role of the expected growth of *permanent* autonomous demand. The multiplier and supermultiplier are stable and stabilizing mechanisms … until we introduce the service of debt into the propensity to consume.

Section 3 shows the possibility of a credit-led economy and the destabilizing forces it conveys. Our model considers a pure credit economy where the banking industry appears as a vertically integrated sector. In the provision of credit for output-transactions, banks follow the "endogenous" behaviour claimed by the post-Keynesian school[5]. Yet, banks also grant loans for non-output transactions (Werner, 2104). The limits for such credits are less precise, not to say inexistent. Through the multiplier, credit overexpansion engenders an endogenous and cumulative process of overindebtedness. A credit-led growth becomes a debt-burdened growth.

Section 4 (and the Appendix) illustrates the dynamics of a supermultiplier-cum-finance model in a variety of scenarios that try to reproduce the basic trends after 1995 in the US and other advanced economies. Section 5 details our theoretical conclusions and policy recommendations aimed at preventing another episode of a credit boom, overindebtedness, a financial crash and an economic recession.

2. The rate of growth of permanent autonomous demand "rules the roost" in a supermultiplier model

In order to focus on the specific goals of this paper, it suffices to consider a closed economy without government services. It contains three vertically integrated sectors (VIS) whose final output consists of goods and services for household consumption (Y_c), capital goods for business investment (Y_k) and houses for dwelling (Y_z). Intermediate consumption and capital consumption appear as indirect labor and indirect fixed

[3] For a summary of the Sraffian "surplus approach" and its "long period methodology" combining the theories of value, distribution and output see Eatwell & Milgate (1983). The Introduction and Conclusions are particularly relevant.

[4] The revival of Harrod's multiplier-accelerator model and Hicks' supermultiplier appeared in Serrano (1995), Bortis (1997), Cesaratto, Serrano, & Stirati (2003), Dejuán (2005), The proof of its stability (contrary to Harrod's "knife edge" simile) is more recent: White (2009), Allain (2015), Serrano & Freitas (2015), Lavoie (2016) and Dejuán (2016). The introduction of financial variables in the supermultiplier appears in Dejuán (2013), Pariboni (2016), Dejuán & Dejuán (2018).

[5] "Money is credit driven and demand determined", concludes Moore (1988), p. 28. See also Graziani (2003) and Rochon & Rossi (2017) for the meaning and consequences of the endogenous credit-money hypothesis. Post-Keynesian stock-flow consistent models are the best way to trace the path of money from its creation (the granting of a loan) till its destruction (the amortization of the loan) Nikiforos & Zezza, (2017).

capital. As it is the case for the aggregate economy, the value added of each VIS coincides (wages and profits) coincides with the value of its final output (Pasinetti, 1973).

Produced goods and services differ in their functions but, sharing the same technology, their prices are similar (we normalize them at 1). Our "classical" technology is represented by two fixed coefficients (constant during the period of our analysis): the labor coefficient, l (an inverse measure of labor productivity, π) and the "optimal" capital-output ratio, k.

Given the technology and the real wage (w), we obtain the rate of profit on fixed capital (r) and the normal prices of production (Sraffa, 1960). From these data we can derive the share in income of wages ($\omega = w \cdot l$) and profits ($\rho = r \cdot k$). To make clearer the link between distribution and effective demand, we assume that all disposable wages are consumed, while firms finance investment with retained profits[6].

According to the Keynesian-Kaleckian principle of effective demand, current output is not determined by the available stocks of labor and capital, but by the expected demand at normal prices (Keynes, 1936; Kalecki, 1971)[7]. Aggregated demand includes final induced consumption of households (C), expansionary investment of productive firms (I), and (proper) autonomous demand (Z), here identified with the residential investment of households[8].

Induced consumption (C) can be computed as the propensity to consume (c) times disposable income (Y_d) or the effective propensity to consume (c') times income. Because of our classical expenditure assumptions, the propensity to consume coincides with the share of wages in income ($c=\omega$). To obtain the effective propensity to consume (c') we shall subtract the tax rate (nil in our private economy) and the compulsory transfers from borrowers (workers) to lenders (banks). The debt service can be presented as a proportion (τ) of wages. This is the first link of our economic model with financial variables. In section 3 we shall see that it may be the source of instability problems. They are somehow contained because of the existence of a maximum and a minimum rate of compulsory transfers. The maximum rate ($\hat{\tau}$) derives from subsistence consumption (historically given) ($\underline{c}'$)[9]. The minimum transfer rate ($\underline{\tau}$), from $\underline{z}$: workers have to spare a part of their wages in order to pay for the subsistence dwelling services provided by someone else.

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[6] The importance of distribution on economic growth is one of the distinctive features both of post-Keynesian and Sraffian economics. Some examples: Badhuri (2008), Skott & Ryoo (2008), Onaran, Stockhammer, & Grafl (2011), Lang (2015), Stirati (2016).

[7] Demand expectations are referred to "normal prices" that according to Sraffa (1960) are the "prices of production"

[8] In our equations, all the variables (in capital letters) should bear the subscript t. When there is not a risk of confusion, we have deleted it. The value of a variable in the previous period is indicated by the subscript "(-1)".

[9] Subsistence consumption should be related to the people employed, not to the rents obtained by them. Yet, both concepts are related through the labour coefficient, the real wage and the expenditure patterns. In our case, w=1 so $C/W=C/L$.

Expansionary investment (I) depends on the expected growth of permanent demand (γ). According to Eatwell (1983) "the long-term state of expectations" (chapter 3 of the *General Theory*) is the key variable of the Keynesian system. The "accelerator of investment" that adjusts capacity to meet efficiently the expected increases in permanent demand (γ). The result is: $h=I/Y=k\cdot\gamma$ [10]. As we have seen, k is the "optimal" capital/output ratio. It is associated with the "normal" rate of capacity utilization that we normalize at unity ($u^*=1$). The actual rate may differ from 1, although in their search for efficiency, firms will try to recover "normality" via investment[11]. Full employment, on the contrary, is not an equilibrium condition either in the short or in the long-run. The labour force ceases to be a serious restraint if migration keeps the unemployment rate around a sustainable level.

Autonomous demand (Z) encompasses all the elements of aggregate demand that are different from induced consumption and expansionary investment; namely, autonomous consumption, residential investment, public expenditure and exports. In our private and closed model that explores the dynamics of a construction-driven economy, we will focus on residential investment and assume that it is completely funded by mortgage loans ($Z=CR_z$). Our model takes as given the level of autonomous demand at the base year (Z_o) and its expected growth in the following years (g_z). Such expectations refer to permanent autonomous demand. If they last long enough, aggregate demand will eventually adjust to it; the level of production and the stock of capital will follow suit. When all these rates are aligned we can use a single symbol for the rate of growth: γ.

Equations [1] to [4] summarize the preceding statements.

[1] $$Y = C + I + Z$$

[2] $$C = c \cdot (1-\tau) \cdot Y = c' \cdot Y$$

[3] $$I = k \cdot \gamma \cdot Y = h \cdot Y$$

[4] $$Z = Z_{(-1)}(1+\gamma)$$

After introducing [4], [3] and [2] into [1] we obtain the equilibrium level of output at a given moment. It can be computed as μ (the multiplier) times broad autonomous demand (I+Z) or as *sm* (the supermultiplier) times proper autonomous demand (Z). The result is the same provided in [5a], investment is computed as the required capital in the previous year times the expected growth of permanent demand: $I=KR_{(-1)}\cdot\gamma$.

[5a] $$Y = \frac{I+Z}{1-c(1-\tau)} = \frac{I+Z}{1-c\prime} = \mu \cdot (I+Z)$$

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[10] Transient demand is met by increasing temporarily the rate of capacity utilization. It includes the once-and-fall-all adjustment of capacity after an acceleration of permanent demand.

[11] An important fraction of post-Keynesian and Sraffian economists show that the average degree of capacity utilization may differ from the normal one (Ciccone, 2000, Palumbo & Trezzini, 2003, Lavoie, 2010, Smith, 2012). We follow Kurz (1986) and Lavoie (2016) that emphasize the tendency towards normal rate of capacity utilization that it is quickly recovered through investment.

[5b] $$Y = \frac{Z}{1-c(1-\tau)-k\cdot\gamma} = \frac{Z}{1-c'-h} = (sm)\cdot Z$$

In the previous equations, *Y* refers to the long period equilibrium output in *t* corresponding to the expected permanent demand. The actual growth takes into account transitory increases in autonomous demand (*A'*). They will have an impact on induced consumption captured by the traditional multiplier. Not an acceleration of investment since firms do not consider them as permanent demand.

[6] $$Y'_t = (sm)\cdot Z_t + \mu \cdot A'_t$$

The theoreticians of the supermultiplier have proved that, if properly formulated, it is a stable and stabilizing mechanism. According to Dejuán (2016) the key condition of stability is that expectations refer to "permanent" demand. After an increase in the autonomous trend, firms are supposed to overuse capacity to meet demand expectations. Continuous over-utilization will lead to an adjustment of capacity. In principle, the required extra capacity will be taken out of inventories the last day of period (*t-1*): $Ix_{(-1)} = KR_{(-1)}-KI_{(-1)}$). If the inventories of capital goods are already at the minimum level, it will be necessary to reproduce them in *t*. This is a one-and-for-all adjustment included in A'_t. If overutilization persists despite the addition of capital goods, businessmen will realize that the rate of growth of permanent demand has risen. They will adjust the γ that appears in the *h* of the supermultiplier. In this way, the warranted rate of growth (g_w) adjusts to the autonomous trend, thus making possible a new path of growth with full capacity utilization.

[7] $$g_w = \frac{1-c'-z}{k} = \frac{\sigma}{k} = \frac{h}{k} = \gamma$$

The supermultiplier model emphasizes the importance of the principle of effective demand both in the short-term and in the long-term; both in the determination of the equilibrium level of output in *t* and in the equilibrium path of growth through time. "The super-multiplier is the most Keynesian of the Keynesian growth models", states Palley (2018). Its key message is that the expected of growth of permanent autonomous demand is supposed to shape the structure of demand and production until the rates of growth of demand, output and capital coincide: $gz = gd = gk = gw = \gamma$. The autonomous trend (so to speak) "rules the roost". Banks may accelerate the autonomous trend by relaxing the creditworthiness requirements. There is, however, a maximum rate of growth in construction (as in any other industry) that is determined by the potential expansion of the market for dwelling. A second limit is set by the minimum of consumption-type expenditure (historically given). Macroeconomic equilibrium requires that $h=k\cdot\gamma=1-c'-z$. The maximum rate of growth becomes $\gamma^*=1-\underline{c}'-\underline{z} = 1-\underline{c}''$

Table 1 summarizes the relationship between supply, demand, distribution and finance under the simplified assumptions we have introduced. It serves as a conclusion of section 2 and an introduction of section 3. Consumption goods are paid by disposable wages. Capital goods (productive investment of firms) are purchased with the retained profits of firms, which eventually will become equity. Houses are bought by workers' households. They are financed by mortgage loans. *TF* represents the "debt service", that suggests "forced savings" of workers or "compulsory transfer" from borrowers (households) to lenders (banks). As a first approximation we can represent this transfer as a constant portion τ of wages. The multiplier would adopt the traditional expression $\mu = 1/(1-c(1-\tau))$, where the tax rate has been replaced by τ. The problem is that the debt service ratio represented by the last variable is not constant. It evolves endogenously and may cause a cumulative process that reduces or increases the multiplier. In the next section we shall analyse the dynamics of the debt-service ratio (f) and the debt-burden ratio, $\beta = [DB]/W$ (share in wages of the stock of debt)[12]. The preceding variables are related by the following expression where ia is the gross interest rate, the sum of the amortization rate (a) and the interest rate (i).

[8] $$f = (ia) \cdot \beta = (a+i) \cdot \frac{[DB]}{W}$$

Table 1. Economic flows in an equilibrium path of growth

Production (Y) and Demand	Distribution and Redistribution of income (VA)	Sources of the expenditure
Y = C+I+Z = sm·Z	VA=Y=R+W = R+W_d+TF	
I = k·γ·Y = Y_k	R = Y-W	Retained profits → Equity
C = c'·Y = Y_c	W_d = W(1-τ)	Disposable wages
Z = $Z_{(-1)}$·(1+γ)	TF = τ·W	Credit (mortgage loans)

Note: In a long-period equilibrium (given our expenditure assumptions), the cells of each row are supposed to be equal: I=R; C=W_d; Z=TF=Mortgage loans.

3. Financial dynamics: a credit-led growth becomes a burdened growth.

Banks play an essential role in the economic process even if they are not fully visible in usual presentations, as in table 1. In our model of vertically integrated sectors (VIS), the bank industry can be considered a subsystem (vis(b)) that provides financial services (F) to the producers and consumers. For the buyers, the actual value of the new houses is: *Z=Z'+F*. *F* refers to the value added by the banking subsystem. It coincides with the interest payments that are split into the wages and profits paid to the factors directly or indirectly employed in vis(b): $F = INT = W_b + R_b$. In a long-period equilibrium, and ac-

[12] [*DB*] is the stock of mortgage debt that, by definition, equals the stock of outstanding mortgage loans ([*CR*]). To obtain a ratio, this stock is usually divided by the flow of current income. In our model, where credits are mortgage loans to workers' households it makes more sense to divide by current wages (*W*).

cording to our expenditure assumptions, W_b will be consumed and R_b will buy the equities issued by expanding firms. These flows are already accounted by the C and I that appear in table 1 above.

We are going to analyse a pure credit economy where money is created in the very act of granting loans and it is destroyed when the loans are cancelled. Following the official definition, we can compute the stock of money by the stock of the most liquid assets: bank deposits.

Among the multiple varieties of credit, we are especially interested in the distinction between credit for output-transaction (*CRy*) and credit for non-output transactions (*CRx*). The first group includes, at least, three flows. (a) Short-term loans to advance the working capital required at the beginning of a new process of production (*CRo*). This is "initial finance" in the parlance of Graziani (2003). The loans to the firms advancing wages become short-term deposits. They will be used during the process of production to purchase consumption goods. The money (means of payment) created at the beginning of the process of production is "destroyed" at the end, when firms return the loans. (b) Long-term loans to cooperate in the finance of productive investment (*CRk*). Although we have assumed that productive investment is financed with retained profits that eventually become equity, in the more general case we should give room for the credit to small and medium firms without access to the capital markets[13]. (c) Very long-term loans for residential investment (*CRz*) –the focus of this paper. They allow the building companies to advance wages and pay for profits. Note that mortgage loans are not directly reflected in long-term deposits. The counterpart of outstanding loans is the outstanding debt of borrowers.

Non-output transaction includes land, old houses and equity. *CRx* encompasses the loans for buying all of them. These loans become medium term deposits that wait for a favourable speculative opportunity. At his moment, the deposits change to the current account of another speculator. It only disappears with the amortization of the loan.

The endogeneity of credit-money (one of the trademarks of the post-Keynesian theory) refers, mostly to the loans for output transactions borrowed by firms. No matter the financial facilities offered by banks, firms will not borrow to augment production and/or capacity if demand expectations are gloomy. Banks have more chances to expand the supply of loans to speculators and to households willing to buy a dwelling. This implies that the rate of growth of credit (φ) may surpass the rate of growth of nominal GDP (γ). This may have a positive impact on demand and production: $\Delta\varphi \rightarrow \Delta\gamma$. We have seen that γ has clear limits related to the potential growth of the market and the minimum consumption rate. On the contrary, the limits of credit expansion are quite flexible, not

[13] In this "more general case", we should allow capitalists to hold in liquid assets (say, medium term deposits) a part of their profits, waiting for favourable investment opportunities. In equilibrium, this leakage of effective demand would be offset by the loans to small and medium firms willing to expand capacity.

to say inexistent, at least in boom periods where all banks expand in parallel. We are going to see, that this is the main source of financial instability.

The dynamics of the financial system can be replicated by the following set of equations:

[9] $$CR = CR_y + CR_x$$

[10] $$CR = CR_{(-1)}(1 + \varphi)$$

[11] $$CR_n = CR - AM$$

[12] $$[CR] = [CR]_{(-1)} + CR_n = [DB]$$

[13] $$[DP] = a[CR] = [M^s] = [M^d]$$

Equations [9] and [10] have been sufficiently described. Equation [11] focuses on net credit (CR_n). It results from subtracting the amortization allowances (AM) from the total flow of credit (CR). Net credit feeds the stock of outstanding loans and debt ($[CR]$=$[DB]$) (this is equation [12]). Equation [13] shows that the total stock of deposits (that corresponds to the official definition of money supply, $[M^s]$) is a fraction, just a fraction, of the outstanding loans ($0<a<1$). Such deposits are justified by the demand for liquid assets that, according to Keynes, depends on the transaction motive, the precautionary motive and the speculative motive.

From the borrowers' point of view, what matters is the purchasing power that they have to transfer regularly to the banking system (TF) (equation [14]). The first part of these compulsory transfers corresponds to the amortization allowances ([15]): TFo=AM=$a[DB]$ where a is an inverse measure of the length of the amortization period. The second, to the interest payments: TF_1=INT=$i\cdot[CR]$. They will allow banks to pay normal wages, normal profits and extraordinary profits (R_{bx} in [16]). The interest rate (i) is a function of three variables (see [17]). (a) The official interest rate set by the Central Bank at which banks obtain the required funds (i_o). (b) The normal mark-up that allows banks to cover the costs of production (included the normal rate of profit), ψ^*. And (c), a second mark-up to cover special risks that usually emerge at the end of a boom and at the beginning of a recession, ψ'.

[14] $$TF = TF_o + TF_1 = AM + INT$$

[15] $$AM = a \cdot [DB]$$

[16] $$INT = i \cdot [DB] = W_b + R_b + (R_{bx})$$

[17] $$i = f(i_o, \psi^*, \psi')$$

The necessary balances between the different credit and debt categories depend on the type of scenarios we are considering. Panel A of figure 2 considers a stagnant economy that, so far, has accumulated a stock of credit and debt equal to [*DB*][14]. The yearly flow of credit of each coincides with the (proper) value of the new houses: *CR=CRy=CRz=Z'*. Each year, the amortization allowances will match it: *AM=CR=Z'*. In panel B we consider an economy where the flow of credit is growing at the same rate of construction, income and wages: $\varphi=\gamma$. If a=0.05, the sum of amortization allowances in the next 20 years (1/0.05=20) will be $\overrightarrow{AM}=CR$. Amortization allowances in t are below this figure: ($AM=a\cdot[DB]$) < CR. The difference corresponds to the outstanding payments, that is, to the debt that would be paid in the next years. In panel C, credit is growing faster than output ($\varphi>\gamma$). Amortization allowances, too. Yet, they continue below the current flow of credit. (AM+) < (CR+).

In the three scenarios, interest payments are a fraction (i) of the outstanding debt. In A and B, *INT* is just enough to pay normal wages and profits to the factors directly and indirectly employed in vis(b). The third panel presents important novelties. When $\varphi>\gamma$ the stock of debt grows faster than income. This implies the extraction of an additional part of wages bringing about extra profits in the banking sector (R_{bx}). In principle, they will be hoarded as deposits waiting for speculative opportunities. In this sense, the banking sector becomes a "sinkhole" that has a deflationary impact on aggregate demand. An increase in the monopoly power of banks could also result in additional interest payments and profits, draining resources from the real economy.

Table 2. Financial flows in an equilibrium path of growth

Panel A: Stationary economy (γ=φ=0, after having accumulated [CR]=[DB]).			
Z'	TF_0 = a[DB]= AM	CR_0 = AM	CR = CRz
+F	TF_1 = i[DB] = INT = W_b+R_b		

Panel B: Balanced expansion: (γ=φ)			
Z'	TF_0 = AM (*outstanding payments*)	CR_0 = AM *CRn* → *[CR]*	CR = CRz
+F	TF_1 = INT = W_b+R_b		

Panel C: Asymmetric expansion: (φ>γ)			
Z'(1+***ΔPx***)	TF_0= AM+ (*outstanding payments*+)	CRo+ CRn+	CR=CRz+***CRx***
F	TF_1 = INT+ = $W_b + R_b$ + ***R_bx***		
Notes: (1) In a long-period equilibrium, the cells of each row are supposed to be equal. In panel B, CRz=Amortization in t + outstanding debt to be paid in t+1, t+2… (2) *(2) Z=Z'+F is the true cost of a house for the borrower that purchases it.* *(3) The symbol "+" in panel C shows an increase with respect to the same variable in panel B.* *(4) The acceleration of credit may cause asset inflation (ΔPx)*			

[14] The model also applies to an economy where debt is cancelled in one year (a=1).

We are now prepared to formalize the requirements for a stable finance that paves the way for a sustainable path of growth. They should be interpreted in a broad sense. Short-term mismatches may be corrected in the long-term. The major concern emerges from big and persistent disequilibria that feed themselves.

First requirement for macro-financial sustainability. The rate of growth of credit should be lower than or equal to the rate of growth of nominal GDP.

[18] $$\varphi \leq \gamma$$

When, systematically, $\varphi > \gamma$ we can expect asset inflation and overindebtedness. Werner (2014) explains asset inflation through the "quantitative theory of credit". Since the supply of non-produced assets is fixed or moves slowly, an acceleration of credit is bound to pump their prices, generating bubbles in the residential and the stock exchange markets[15],[16]. This push is encapsulated in the following equation where ε is a positive parameter.

[19] $$P_x = P_{x(-1)}(1 + \varepsilon(\varphi - \gamma))$$

If asset inflation is persistently above output inflation ($P_x > P_y$) the indebtedness ratio is bound to rise. To purchase the same number of houses, workers need to borrow more to buy the same number of houses. The indebtedness ratio also increases with the portion of the value of the house financed with credit. And when workers borrow to speculate in the asset markets or just for gambling. Speculations and gambling are zero sum games for the players. Not for the economy, since the income available for consumption shrinks.

The debt-burden ratio evolves according to the following expression derived from equations [10] to [12].

[20] $$\beta = \beta_{(-1)} \cdot \left(1 + \frac{\varphi - \gamma}{[CR]}\right)$$

The debt-service ratio (f) rises with β. Any increase in f causes a fall in the effective propensity to consume, the multiplier and the level of income and wages associated to a given level of autonomous demand. This is the deflationary effect of debt on demand. It may lead to a downward spiral in the economy since lower wages convey a higher debt-burden ratio. The multiplier is the key piece of such cumulative process.

$$(\varphi > \gamma) \rightarrow \Delta\beta \rightarrow \Delta f \rightarrow \nabla c' \rightarrow \nabla(\mu, sm) \rightarrow \nabla(Y, W)$$

[15] Post-Keynesian model used to explain output inflation by the Phillips curve. The globalization of the economy (international migration, in particular) explains why nominal wages do not rise with employment and output. In our paper, we suppose that the consumption price index (Py) amount to 1 and is constant.

[16] Asset inflation has dangerous pro-cyclical effects on the economy. In the boom, it stimulates aggregate demand for both produced goods and non-produced assets. In the bust, the wealth effects become negative. The burst of the bubble may cause a deep financial crash.

From the previous expression, we can derive a first definition of over-indebtedness. An economy is over-indebted when the debt burden-ratio accelerates in an endogenous and cumulative way: ($\beta_{(t+1)} > \beta_{(t)}$).

Second requirement for macro-financial sustainability. The compulsory rate of transfers from wages to banks should be lower than or equal to the maximum transfer rate that workers can afford.

[21] $$f \leq \hat{\tau}$$

As the legal debt service ($f = ia \cdot \beta$) approaches ($\hat{\tau}$), the most fragile portion of debtors will default. After a point, we can expect a massive default that may jeopardize the viability of the banking system and the entire economy. When signing the mortgage contract, borrowers know the portion of wages they have to set initially aside for repayments (τ) and are confident they will honour their commitments in the future. As time evolves, this portion may increase and surpass the threshold that the majority of borrowers can afford. The main concern here is that the debt-service ratio increases by forces outside the borrower's control. Namely: (i) a rise in the official interest rate; (ii) an economic recession that cuts down employment and wages and (iii) an acceleration of credit that raises the stock of debt faster than output and wages.

A second definition of overindebtedness derives from the existence of a maximum affordable rate of financial transfers ($\hat{\tau}$) related to the minimum consumption propensity ($\underline{c}'$). If the monetary authorities desire to maintain a given gross interest rate (ia^*), the following expression would indicate overindebtedness: $\beta > \frac{\hat{\tau}}{ia^*}$

Third requirement for macro-financial sustainability. The income generated in the process of production should be fully spent. A fully adjusted path of growth requires that the flow of mortgage loans (CR that pushes residential investment up) is matched by compulsory transfer to banks (TF that cuts private consumption). Subtracting amortization allowances from both sides, we formulate the equilibrium condition as the equality between interest payments in a given period (INT) and the net flow of credit (CRn).

[22] $$TF \approx CR \quad \text{or} \quad INT \approx CRn$$

This long-term equilibrium condition rarely occurs. The multiplier magnifies any possible disequilibrium until the economy tops the maximum or minimum propensity to consume. Simultaneously, some mechanisms operate to ensure that production is fully absorbed by demand and the surplus or shortage of money are neutralized. Suppose that, starting from equilibrium, the interest rate falls. The subsequent reduction of final consumption will be lower than the increase in residential investment. An adjustment can come through these channels:

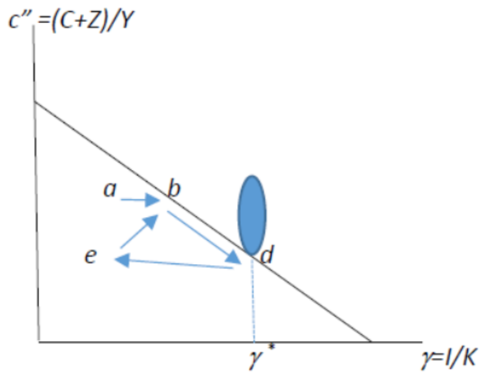
(a) An increase in the amortization rate that compensates for the fall in the interest rate. The same amount of credit would be repaid sooner.

(b) A contraction in the rate of credit expansion since (richer) households decide to finance with mortgage loans a lower proportion of the value of the house.
(c) An increase in the level of medium term deposits. A part of the disposable income of (richer) workers is now hold in deposits for precautionary or speculative motives.

4. An illustration of the working of a credit-driven economy through a supermultiplier model

Figure 1 summarizes the story of a credit boom leading to a financial crash and an economic recession, as we have recently seen. It represents the technological frontier of growth which coincides with the frontier of distribution when wages (and only wages) are consumed. In ordinates, $c''=c'+z$ stands for the share in income of consumption-type expenditures, those which do not expand capacity. Residential investment belongs to this group. In a fully adjusted path of growth, all the real variables (autonomous demand, aggregate demand, output, labour and capital) grow at the same rate, γ (in abscises). γ can be defined as "full capacity rate of growth". Its maximum rate (γ^*) is set by the potential market for dwelling (g_z^*) and/or by the warranted rate associated with the subsistence consumption ($\underline{c}''$).

Figure 1: Movements around the technological frontier of growth in a financialized economy



Note: The oval represents an increase in the indebtedness ratio and a bubble in the asset market

At point *a,* the economy was out of equilibrium with involuntary unemployment and excess capacity. Banks were able to foster the construction industry by granting cheap mortgage loans to households. Residential investment, fueled by mortgage loans, became the driver of the economy that reached full capacity (not full employment) at point *b*. A second acceleration of credit increased the autonomous trend up to γ^*. This is represented in point *d* that corresponds to the scenario 1 of Table A1 (see appendix). The task of this section is to analyse the evolution of the real and financial variables when an economy located in *d* suffers different shocks.

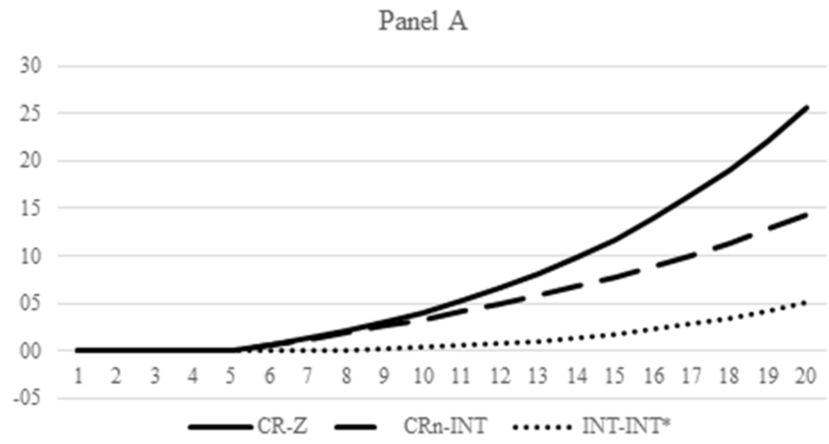
Scenario 1: Balanced expansion (1-5)

The first scenario describes a fully adjusted path of growth where both real and financial variables grow at the same rate: $\gamma=\varphi=0.05$. The shares of demand in income stay at their equilibrium ratios, i.e. the rates that warrant a stable growth at full capacity: $g_w=(1-c-z)/k=$ (1-0.8-0.1)/2 = 0.05*;* or $g_w=h/k=0.1/2$. Since credit grows *pari passu* with output, we can expect the constancy of the debt-burden ratio ($\beta=1$) and the debt-service ratio ($f=0.11$). The result of all these stable ratios is a constant multiplier ($\mu=5$) and super-multiplier ($sm=10$)[17].

Scenario 2: Credit acceleration

After period 6 banks expand credit at a rate $\varphi=0.1$, while autonomous demand and income continue rising at $\gamma=0.05$. For a better visualization of the results, figure 2 extends the scenario until year 15. In panel A we observe that the gap between mortgage loans and the construction of new houses is positive and accelerates through time, ($CR-Z$) > 0. This implies that an increasing part of credit is devoted to non-output transactions[18]. The increasing gap between net credit and interest payments means that the credit-push on aggregate demand is above the drain of demand through interest payments. There is also a positive and increasing gap between the total amount of interest payments and the amount that would allow the normal remuneration for the factors directly and indirectly employed in the vertically integrated sector corresponding to banks[19]. This implies a further drain on aggregate demand because extra profits are supposed to be hoarded in deposits waiting for speculative opportunities.

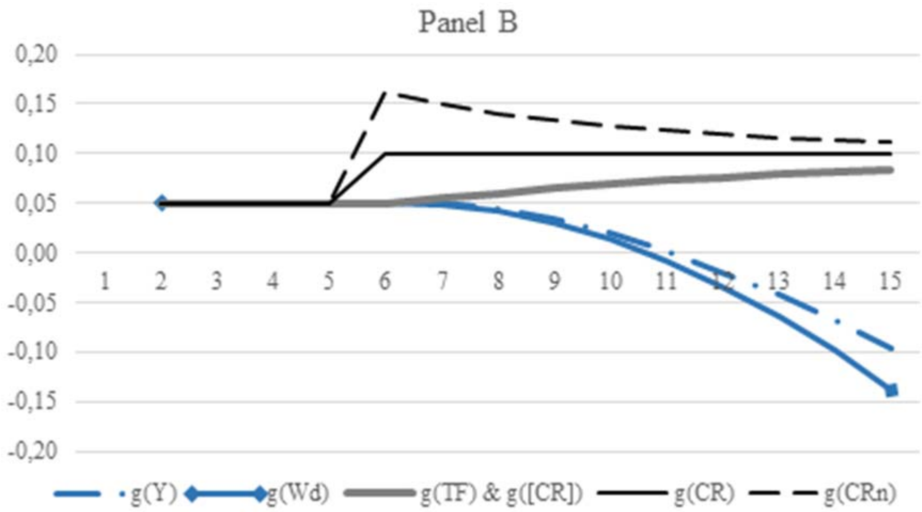
Figure 2: Effects of a prolonged acceleration of credit: (φ=0.1) > (γ=0.05)



[17] Of course, different combinations of numbers may produce the same result. For instance: $f=(a+i)\cdot\beta=0.11$ may be obtained with different value for each single variable.

[18] The gap is supposed to generate asset-inflation. It is not represented neither in table A1 nor in figures 2 and 3. Yet, we can infer that an important part of the new loans is absorbed by the higher prices of the houses.

[19] The normal interest payments is derived from the ratio *INT/Z* in the base year that we considered fully adjusted.



In panel B we see the rate of growth of the flow of total credit and net credit that converges towards φ=0.1. Also the growth of the stock of credit (debt) that runs in parallel to financial transfers, provided the gross interest rate is constant. The acceleration of credit implies an increase in the debt service, a reduction of the effective propensity to consume and in the multiplier. This causes a longstanding fall in the rate of growth of output. Disposable wages fall even further because the transfers to banks are increasing.

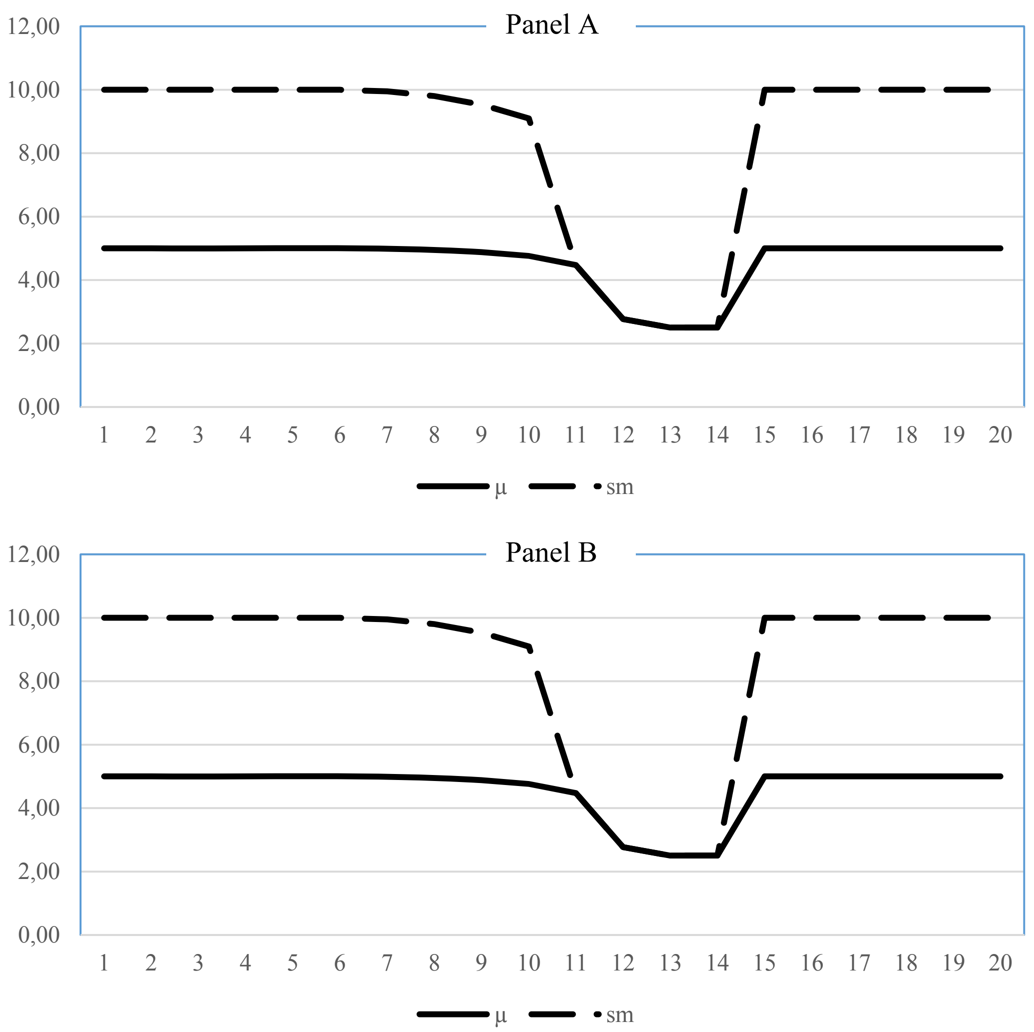
Scenario 3: Recession.

We shift to figure 3. Scenario 3 introduces a recession from year 10 to year 15. Both output and credit stagnate: $\gamma = \varphi = 0$. The bust makes visible, and even accelerates, the ongoing financial disequilibria hidden in the boom. Despite that annual credit is constant after 6, a positive net credit feeds the stock of debt. Income and wages, on the contrary, remain constant. The increase in the debt-burden ratio depresses the multiplier. For the same amount of autonomous demand, income will be lower which implies a second rise in the burden of debt. The process feeds back.

The minimum consumption rate that we have fixed in c'=0.6 and the maximum affordable transfer rate corresponding to it ($\hat{\tau}$ =0,33) stop the downward process[20]. The multiplier stabilizes at μ=2.50. The supermultiplier coincides with it since in a stagnant economy the share of investment in income is zero. A stable supermultiplier helps to the stabilization of the real economy.

[20] In figure 2 this top would be met in year 17. Then the supermultiplier becomes constant contributes to stabilize the real economy. Credit for non-output transactions would continue increasing and pumping bubbles.

Figure 3: Sustainable and unsustainable finance; four scenarios



1-Balanced expansion	*2-Acceleration of credit*	*3-Recession*	*4-Recovery*
(φ=γ=0.05)	*(φ=0.1)>(γ=0.05*	*(φ=γ=0)*	*(φ=γ=0.05)*

Scenario 4: Recovery.

From scenario 4 (after period 15) we can infer the forces that have contributed to overcome the recession and start a new sustainable path of growth. The first one has been already mentioned: fixation of a maximum transfer rate. This is a natural process. In the verge of default, borrowers negotiate with lenders an extension of the amortization period in order to keep transfers below $\hat{\tau}$. The government should pave the way to this natural process.

Monetary policy may help to stabilize the economy cutting the official interest rate in recessions. At the end of the boom, when inflation edges up, the Central Bank should avoid the temptation to raise sharply the official rate in order to check inflation. In a highly indebted economy this could be too dangerous. Lethal, if past mortgages are linked to the official rate. Such linkages make the system more vulnerable and should be avoided.

An expansionary fiscal policy may be a useful piece in the recovery. In Table A1 (year 16) government expenditure in goods and services becomes G=10 and grows at γ=0.05. It is financed with taxes (t=0.055 is the tax rate). Even if taxes match public expenditure, a positive and constant growth of G would contribute to stimulate and stabilize the economy.

Of course, the locomotive could also be a private source of demand: autonomous consumption, exports, modernization investment or, even, residential investment. To recover residential investment as a co-driver of the new path of growth, certain financial arrangements are in order. In Table A1 we simulate that, in period 16, residential investment amounts to 10 units and resumes its original rate of growth (γ=0.05). It continues to be financed by mortgage loans but now they represent 5% of income (instead of 10%). The stock of debt is made equal to the current mass of wages to keep the burden of debt at the desired rate: β =1. This could imply a cancellation of a portion of debt, a normal procedure in the midst of financial crises. In our example, the required adjustment is minimal. To ensure that the debt service absorbs the flow of credit, the gross interest rate should be ia=0.055 (instead of 0.11) [21]. If the interest rate continues at i=0.05, the amortization rate has to fall to a=0.0055. This implies an important extension of the repayment period.

5. Conclusions and policy implications

This paper has explored the possibilities and limits of a credit-driven growth. The basic idea is that a credit-led growth usually becomes a debt-burdened growth.

Our model of analysis has been based on the supermultiplier-cum-finance that integrates the impact of the autonomous demand (construction, in our case) on consumption and on investment. After Harrod's knife edge, the accelerator of investment is surrounded by a curse of instability. We contend that it is a stable and stabilizing mechanism when investment adapts to the expected increase in "permanent" demand. It shapes the structure of demand and production so that all the variables tend to grow at the autonomous trend. It "rules the roost", so to say. Traditionally, the multiplier has been considered a stable mechanism, as stable as the propensity to consume on which it relies. What we have seen in the paper is that, once we account for finance, the effective propensity

[21] Now, compulsory transfers include the debt service and the tax rate. They should add to 0.11 in order to recover the value of the original multipliers (μ=5; $sm=10$). In Table A1 we suppose that in year 15 businessmen foresee properly the consumption and investment rates so the multiplier and supermultiplier return at once to these levels.

to consume and the multiplier evolves through time and becomes a potential destabilizing mechanism. The disposable income of workers, from which consumption derives, depends not only on fixed parameters (like the tax rate) but on the debt-service ratio, that inflates when credit expands faster than the nominal GDP. Increases in the debt-burden and debt-service ratios, shrink the effective propensity to consume and the multiplier. Also the income corresponding to a given level of autonomous demand. The fall in income brings about an additional increase in the debt-burden ratio. Only the existence of a minimum and a maximum consumption propensity, may stop the downwards and upwards spiral in income.

The basic condition for dynamic equilibrium is that the growth of credit is lower than or equal to the rate of growth of nominal GDP. The potential market of the goods included in the vector of autonomous demand sets a clear limit to output expansion. Subsistence consumption adds a further check. On the contrary, there are no strict limits for credit expansion. In a booming economy, when banks expand loans in parallel, they do not appreciate the risks they are creating for the entire economy. Such risks will appear later in the form of asset bubbles and over-indebtedness. Over-indebtedness introduces a deflationary pressure on aggregate demand that leads the economy into a recession and makes the recovery even more difficult. We support Basel's recommendation of higher capital ratios for the banks engaged in a risky credit expansion.

To avoid a massive default, it may be convenient to delay the repayment obligations in critical times. Our first proposal is to include in the mortgage contracts the following clause. "The yearly service of mortgages divided by the wage of the borrower, should not surpass the percentage $\hat{\tau}$ agreed in the contract. If the difference is positive (and the borrower agrees), the mortgage period will be extended".

Our last policy proposal can be labeled as "credit discrimination". Financial authorities should regulate credit in different ways according to its destination. (1) Loans to buy assets should be forbidden. It is not possible to ban speculation on land and financial shares. Notwithstanding, we can check it by forcing these speculators to obtain the money from their own savings or issue bonds to attract other people's savings. (2) Mortgage loans should be restricted when they expand faster than the building of new houses. Asset inflation in the residential market is an indicator of the ongoing mismatch.

All these proposals try to put finance (a satellite) to the service of the real economy (the planet). Otherwise, Keynes verdict may become true. Advanced capitalism will become a "casino economy". (Keynes, 1936, ch. 12).

APPENDIX

Table A1: Numerical example of credit explosion and over-indebtedness

(A) Definition of parameters and variables

Name	Formulation	Explanation
PARAMETERS		
Technology		
l=0.9	Data	Labor coefficient (constant in the 4 scenarios)
k=2	Data	Capital coefficient (normal or desired; constant)
u	KR/KI	Capacity utilization. Normal utilization: u^*=1.
Distribution		
w=1	Data	Real wage per worker (constant)
ω=0.9	w·l	Share of wages in income (constant because constant w & l)
r	R/KI	Actual rate of profit. In long-period equilibrium: r*=R/KR=(1-w·l)/k=0.05
τ	TF/W	Compulsory transfer ratio from workers to banks. Usually it is equivalent to the debt service (f)
$\hat{\tau}$=0.33	Data	Maximum ratio of affordable transfer of wages to banks. It derives from the minimum consumption rate $\underline{c}$'=0.6
t	TG/W	Tax rate (TG: taxes paid by workers to government; it is introduced in year 16)
Demand		
c_w=1	Data	Propensity to consume out of wages
c_r=0	Data	Propensity to consume out of profits
c	c_w·ω+c_r·(R/Y)=ω	Aggregate propensity to consume.
c'	C/Y = c(1-τ)	Effective propensity to consume. After period 16 c'=c(1-τ-t).
$\underline{c}$'=0.6	Data	Minimum rate of consumption
h	I/Y	Share of productive investment in income
z	Z/Y	Share of autonomous demand (residential investment)
μ	1/(1-c')	Multiplier

(sm)	1/(1-c'-h)	Supermultiplier
γ=0.05	Data	Expected rate of growth of permanent autonomous demand. The rates of growth of permanent aggregate demand, output and capital adjust to it.
g_w	(1-c'-z)/k = h/k	Warranted or potential rate of growth. It adapts to γ.
Finance		
φ	Data	Rate of growth of the flow of credit (mortgage loans)
β	CR/W	Indebtedness or debt-burden ratio
f	$\beta\cdot$(i+a)	Debt-service ratio
i=0.05	Data	Interest rate
a=0.0611	Data	Amortization rate
ia	i+a	Gross interest rate
ECONOMIC VARIABLES		
KI (200)	$KI_{(-1)}+I_{(-1)}+Ix_{(-1)}$	Installed capacity. A datum in the base period that we select to equalize to required capacity (KR)
Z (10)	$Z_{(-1)}(1+\gamma)$	Autonomous demand
G	$G_{(-1)}(1+\gamma)$	It appears in period 16 as a second component of autonomous demand
Y	Z·(sm)	Income. The μ and the (sm) change with the debt service ratio. We take the (sm) of the previous year
KR	Y·k	Required capacity
L	$Y\cdot l$	Employment. If necessary, it adjust through migration.
W	L·w	Wages
TF	[DB](ia)	Compulsory transfers from workers to banks. In principle, it coincides with the debt service. We impose the condition that the ratio TF/W cannot surpass $\hat{\tau}$=0.33.
Wd	W-TF	Disposable wages. After period 16, Wd=W-TF-TG, where TG are transfers to government (taxes)
R	Y-W	Mass of profits
C	Y·c'=Wd	Induced consumption = disposable wages
I	$Y\cdot k\cdot\gamma$	Expansionary investment to attend permanent increases in demand
Ix	KR-KI	Extra investment to adjust capacity. If necessary, the required machines will be taken from inventories.

FINANCIAL VARIABLES		
CR=DB	CR(1+φ)	Flow of credit (mortgage loans) = debt.
AM	a[DB]	Amortization allowances
CRn	CR-AM	Net flow of credit
CRx	CR-Z=CR(φ-γ)	Loans for non-output transactions
[CR]	$[CR]_{(-1)}+CRn_{(-1)}$	Stock of credit (outstanding mortgages)
INT	i[DB]	
INT*	$(INT_1/Z_1)*Z$	Interest payments that allow to pay normal wages and profits to factors employed in vis(b)

Notes: (1) Figures refer to the initial values taken as data and assumed constant.
(2) Angular brackets refer to stocks.
(3) g refers to the rate of growth of the implied variables

(B) Scenarios:

Sc-1: Years 1-5. Long-period equilibrium path, balanced growth. φ=γ=0.05
Sc-2: years 6-10. Credit acceleration to finance non-output transactions. γ=0.05; φ=0.1.
Sc-3: years 11-15. Recession. γ=0; φ=0.
Sc-4: years 16-20. Recovery. Autonomous demand consists of Z=10 (only half of them are financed with mortgage loans) and G=10 (financed with taxes, t=0.055). Both drivers grow at γ=0.05. Credit grows at φ=0.05 but applies just to half the autonomous demand.

(C) Data of table A1

	Scn 1: balanced growth, γ=φ=0.05					Scn 2. Credit acceleration, φ(0.1)>γ(0.					Scn 3: Reccessión, γ=φ=0.					Scn 4: Recovery, γ=φ=0.05				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
KI	***200.0***	210.0	220.5	231.5	243.1	255.3	268.0	281.4	294.0	304.2	310.4	282.1	138.8	86.0	77.6	77.6	420.0	441.0	463.1	486.2
Z	***10.0***	10.5	11.0	11.6	12.2	12.8	13.4	14.1	14.8	15.5	15.5	15.5	15.5	15.5	15.5	***10.0***	10.5	11.0	11.6	12.2
G																***10.0***	10.5	11.0	11.6	12.2
Y	100.0	105.0	110.3	115.8	121.6	127.6	134.0	140.0	144.9	147.8	141.1	69.4	43.0	38.8	38.8	200.0	210.0	220.5	231.5	243.1
KR	200.0	210.0	220.5	231.5	243.1	255.3	268.0	280.0	289.7	295.6	282.1	138.8	86.0	77.6	77.6	400.0	420.0	441.0	463.1	486.2
L	90.0	94.5	99.2	104.2	109.4	114.9	120.6	126.0	130.4	133.0	127.0	62.4	38.7	34.9	34.9	180.0	189.0	198.5	208.4	218.8
W	90.0	94.5	99.2	104.2	109.4	114.9	120.6	126.0	130.4	133.0	127.0	62.4	38.7	34.9	34.9	180.0	189.0	198.5	208.4	218.8
R	10.0	10.5	11.0	11.6	12.2	12.8	13.4	14.0	14.5	14.8	14.1	6.9	4.3	3.9	3.9	20.0	21.0	22.1	23.2	24.3
TF	10.0	10.5	11.0	11.6	12.2	12.8	13.5	14.3	15.2	16.3	17.4	18.1	12.9	11.6	11.6	10.0	10.5	11.0	11.6	12.2
TGw																***10.0***	10.5	11.0	11.6	12.2
Wd	80.0	84.0	88.2	92.6	97.2	102.1	107.1	111.7	115.2	116.8	109.5	44.4	25.8	23.3	23.3	160.0	168.0	176.4	185.2	194.5
C	80.0	84.0	88.2	92.6	97.2	102.1	107.1	111.7	115.2	116.8	109.5	44.4	25.8	23.3	23.3	160.0	168.0	176.4	185.2	194.5
I	10.0	10.5	11.0	11.6	12.2	12.8	13.4	14.0	14.5	14.8	0.0	0.0	0.0	0.0	0.0	20.0	21.0	22.1	23.2	24.3
Ix	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-4.3	-8.6	-28.2	-143.4	-52.8	-8.4	0.0	322.4	0.0	0.0	0.0	0.0
u	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.97	0.91	0.49	0.62	0.90	1.00	5.16	1.00	1.00	1.00	1.00
r	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.02	0.03	0.05	0.05	0.26	0.05	0.05	0.05	0.05
c'	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.78	0.64	0.60	0.60	0.60	0.80	0.80	0.80	0.80	0.80
h	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10
z	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.22	0.36	0.40	0.40	0.05	0.05	0.05	0.05	0.05
CR	10.0	10.5	11.0	11.6	12.2	13.4	14.7	16.2	17.8	19.6	15.5	15.5	15.5	15.5	15.5	***10.0***	10.5	11.0	11.6	12.2
AM	5.5	5.8	6.1	6.4	6.7	7.0	7.4	7.9	8.4	8.9	9.6	10.0	10.3	10.6	10.9	1.0	1.0	1.1	1.2	1.2
INT	4.5	4.7	5.0	5.2	5.5	5.7	6.1	6.4	6.8	7.3	7.8	8.1	8.4	8.7	8.9	9.0	9.5	9.9	10.4	10.9
CRn	4.5	4.7	5.0	5.2	5.5	6.4	7.3	8.3	9.4	10.6	5.9	5.6	5.2	4.9	4.6	9.0	9.5	9.9	10.4	10.9
[CR]	***90.0***	94.5	99.2	104.2	109.4	114.9	121.2	128.5	136.8	146.3	156.9	162.8	168.4	173.6	178.5	***180.0***	189.0	198.5	208.4	218.8
CR-Z	0.0	0.0	0.0	0.0	0.0	0.6	1.3	2.1	3.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRn-INT	0.0	0.0	0.0	0.0	0.0	0.6	1.2	1.9	2.6	3.3	-1.9	-2.6	-3.2	-3.8	-4.3	0.0	0.0	0.0	0.0	0.0
INT*-INT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-1.2	-1.4	-1.7	-1.9	0.0	0.0	0.0	0.0	0.0
CR/W	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.13	0.14	0.15	0.12	0.25	0.40	0.44	0.44	0.06	0.06	0.06	0.06	0.06
β= Debt-b	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.02	1.05	1.10	1.24	2.61	4.35	4.97	5.11	1.00	1.00	1.00	1.00	1.00
f= Debt-s	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.14	0.29	0.48	0.55	0.57	0.06	0.06	0.06	0.06	0.06
τ= TF/W	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.14	0.29	0.33	0.33	0.33	0.06	0.06	0.06	0.06	0.06
$\hat{\tau}$ Mx (T	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
g(Y)		0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.02	-0.05	-0.51	-0.38	-0.10	0.00	4.16	0.05	0.05	0.05	0.05
g(Wd)		0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.01	-0.06	-0.60	-0.42	-0.10	0.00	5.88	0.05	0.05	0.05	0.05
g(TF)		0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.04	-0.29	-0.10	0.00	***0.10***	0.05	0.05	0.05	0.05
g(CR)		0.05	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.10	-0.21	0.00	0.00	0.00	0.00	-0.36	0.05	0.05	0.05	0.05
g(CRn)		0.05	0.05	0.05	0.05	0.16	0.15	0.14	0.13	0.13	-0.44	-0.06	-0.06	-0.06	-0.06	0.96	0.05	0.05	0.05	0.05
g([CR])		0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.04	0.03	0.03	0.03	0.01	0.05	0.05	0.05	0.05
μ	5.00	5.00	5.00	5.00	5.00	5.00	4.99	4.95	4.88	4.76	4.47	2.77	2.50	2.50	***5.00***	5.00	5.00	5.00	5.00	5.00
sm	10.00	10.00	10.00	10.00	10.00	10.00	9.95	9.80	9.53	9.09	4.47	2.77	2.50	2.50	***10.00***	10.00	10.00	10.00	10.00	10.00

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