Why Fiscal and Distributive Policies Should Rule the Game: Personal Income Inequality, Taxation and Financial Instability in the Sraffian *(Hyper)*multiplier Model

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Abstract

This paper develops an amended version of the Sraffian Supermultiplier Model incorporating personal income inequality and income taxes to cover an existing gap in the literature. It is demonstrated that a progressive tax shift would engender temporary higher growth rates (during the traverse) and an overall positive level effect. Furthermore, the size of this impact is associated with the product of the propensity to consume and the income share of each income bracket. Secondly, financial features and real estate prices are incorporated in autonomous consumption. Shifts in the financial parameters, as well as the sustainability of autonomous consumption-led growth are discussed, together with the policy conditions that lead to sustainable growth strategies. In this sense, two issues are highlighted. First, the growth of debt-financed consumption has to move in step rather than detached from income distribution, with debt being stopped from replacing systematically disposable income (leading both to higher levels of output as well as to a more stable multiplier). Second, it is argued that an analysis of growth contributions is of chief importance in terms of policy design and implementation, thus preventing the supremacy of autonomous consumption over other components of autonomous demand.

JEL classification: B51; D31; E11; E12; E62; O41

Keywords: distribution, effective demand, growth, Sraffian, Supermultiplier

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1 Introduction

The last major economic crisis triggered by the break down of the US American subprime market has checkmated some important pillars that hold the structure of supply-sided approaches to economics. From then on, the issue of distribution and growth has emerged both in the media and in academia (inclusively in the mainstream) as the *flavor of the month*. Being historically mainly focused on the division of income between different social classes (capitalists, workers and landowners), the debate on distribution dates back to the very foundation of economics as a social science (Ricardo, 1891). More recently, the analysis of the ultimate determinants of distribution has historically characterized the research program of alternative approaches to economic theory, constituting to the present day one of the commonalities within Post-Keynesian economics (Lavoie, 2014, p.42).

Nevertheless, it was only recently, especially driven by publications coming from mainstream strands (Atkinson and Piketty, 2007, 2010; Atkinson et al., 2011; Piketty, 2014), that the availability of data at the household level and research considering the personal dimension of income and wealth inequality have been made possible. From then on, several amendments were done within Kaleckian models drawing special attention to the vertical dimension of inequality and its wage differential component (Lavoie, 2009; Palley, 2014; Tavani and Vasudevan, 2014; Krishna Dutt, 2016; Carvalho and Rezai, 2015) as well as to relative income effects and expenditure cascades on aggregate consumption (Frank et al., 2014; Prante, 2018) and wealth and debt-based consumption (Cynamon and Fazzari, 2008, 2013; Zezza, 2008).

However, Sraffian models, in particular the Sraffian Supermultiplier Model (SSM henceforth) (Serrano, 1995), have not yet incorporated this dimension of inequality. Therefore, this paper seeks to develop a new version of the SSM incorporating personal income inequality and income taxes to cover an existing gap in the literature. Therefore, the main goal is to investigate how changes in income taxes and personal income distribution affect aggregate demand and, in turn, how they affect short and long-run economic growth. Accordingly, it is assumed that progressive tax shifts would have a positive feedback effect on output *via* the Supermultiplier. In this regard, the result is primarily dependent on the propensities to consume out of each income bracket, which are assumed to be heterogeneous and a decreasing function of the income level (following the Keynesian tradition based on *The General Theory*) for progressive shifts to be positive (and vice versa).

Secondly, in line with several works that include financial dynamics in the SSM (Pariboni, 2016; Dejuán, 2013; Dejuán and McCombie, 2018; Dejuán and Dejuán-Bitriá, 2018; Brochier and Silva, 2018), we argue that the model is compatible with these extensions. Thus we attempt to include financial features and assets price inflation in autonomous consumption based on the works of Pariboni (2016) and Teixeira (2015). In doing so we discuss shifts in the parameters and the sustainability of debt-financed consumption and asset price inflation. Here, we assume that the inclusion of these financial parameters reaffirm the necessity of progressive shifts and

improvements in distribution related to the sustainability of demand-led growth regimes.

Section (2) draws a baseline SSM including personal income distribution and income taxes. Section (3) discusses debt-sustainability wealth dynamics and its impact on the baseline model. Section (4) draws some policy implications based on the distribution and financial parameter discussed previously and connects them to the stability of demand-led growth paths. Section (5) concludes, summarizing our findings.

2 The (Hyper)Multiplier Model: The role of Personal Income Distribution and Income Taxes

In this section we attempt to include personal income distribution as well as personal income taxes and transfers into the baseline model of the Sraffian Supermultiplier. In doing so we seek to provide a simple mathematical model to investigate how changes in income taxes and personal income distribution affect aggregate demand and their consecutive influences on output in the short and long-run economic growth.

Assuming an open economy with government sector, the output is defined by the sum of total consumption (C_t), investment (I_t), public expenditure (G_t) and net exports ($X_t - M_t$), as in equation (1) bellow:

$$Y_t = C_t + I_t + G_t + (X_t - M_t) \tag{1}$$

Total consumption (equation 2) is defined as the sum of induced consumption out of disposable income (C_t^y)and autonomous consumption (C_t^a). The induced component (C_t^y) can be decomposed as in equation 3, where c_i indicates the propensities to consume, t_i the tax rates, t_{ri} the transfer rates and y_i the income share of each of the income strata.

$$C_t = C_t^y + C_t^a \tag{2}$$

$$C_t^y = \sum_{i=1}^{n} \left[c_i(1 - t_i + tr_i)\right] y_i Y_t \tag{3}$$

Total imports (equation 4) is assumed to be a linear function of income at each time, with m representing the propensity to import.

$$M_t = mY_t \tag{4}$$

Investment (equation 5) is fully induced with $0 \leq h < 1$ representing the investment share[1].

$$I_t = h_t Y_t \tag{5}$$

[1]The investment share is also defined as "the marginal propensity to invest of firms" (Freitas and Serrano, 2015, p.261).

Total autonomous demand (equation 6) can thus be defined as the sum of autonomous consumption (C_t^a) , government expenditure (G_t) and exports (X_t).

$$Z_t = C_t^a + G_t + X_t \tag{6}$$

After defining the tax and transfers-adjusted marginal propensity to save as $s_i = 1 - [c_i(1 - t_i + tr_i)y_i]$ and isolating Y_t, we obtain the level of output as the product of autonomous demand and the supermultiplier (SM):

$$Y_t = \frac{Z_t}{1 - \sum_i [c_i(1 - t_i + tr_i)y_i] + m - h} = SMZ_t \tag{7}$$

At this point it is convenient to make an important observation. As stated by Girardi and Pariboni (2016), Y_t does not correspond automatically to the level of output realized when the rate of capacity utilization is equal to the normal one. But a continuous tendency of the former to stabilize at its normal level should be assumed in the long run.[2].

Whenever the economy moves away from the normal rate of capacity utilization, firms will experience a discrepancy with their investment decision, thus facing the choice to adjust their investment shares. At the macroeconomic level, this Harrodian adjustment mechanism in the short run can be modelled as follows:

$$\dot{h} = h_t\gamma(u_t - 1) \tag{8}$$

where $\gamma > 0$ is a reaction coefficient and u_n is assumed to be equal to the unity[3].

From (equations 5 and 7) we get the growth rate of output (equation 9) and the growth rate of capital accumulation (equation 10), where v is the capital to potential output ratio (given technical conditions) and δ represents the depreciation rate.

$$g_t{}^Y = g_t{}^Z + \frac{\dot{h}}{1 - \sum_i [c_i(1 - t_i + tr_i)y_i] + m - h} \tag{9}$$

$$g_t{}^K = h_t\frac{u_t}{v} - \delta \tag{10}$$

The change in the actual degree of capacity utilization can be represented as follows:

$$\dot{u} = u_t(g_t{}^Y - g_t{}^K) \tag{11}$$

In the long run, the equilibrium position of the economy is characterized by $u_n = 1$ (equation

[2] "[T]he supermultiplier model does not assume that productive capacity is continuously utilized at its normal level. Discrepancies between the actual and the normal degree of capacity utilization are allowed in the out-of-equilibrium dynamics and the reaction of investment to these discrepancies [...] drives the convergence of the economy towards a normal utilization of the productive capacity"(Girardi and Pariboni, 2016, p.527).

[3] Remembering that $h_t\gamma(u_t - u_n) = h_t\gamma(u_t - 1)$.

13) and $\dot{h} = \dot{u} = 0$. Accordingly, equation (12) follows easily from equation (11):

$$g_t{}^Y = g_t{}^K = g_t{}^Z \tag{12}$$

$$u_t = 1 \tag{13}$$

Lastly, the required investment share (h^{eq}) is uniquely determined by the rate of growth of autonomous demand ($g_t{}^Z$), the capital/output ratio (v), the normal degree of capacity utilization (the unity) and the rate of depreciation (δ).

$$h^{eq} = v(g_t{}^Z + \delta) \tag{14}$$

As stated by Freitas and Serrano (2015), the Supermultiplier captures the effects on the level of output associated with both induced consumption, investment and imports. Accordingly, the SM depends on the propensities to save out of disposable income ($1 - \sum_i [c_i(1 - t_i + tr_i)y_i]$), the propensity to invest (h) and the propensity to import (m). However, it is important to highlight here that whereas the level effects prevail from a long run perspective, as long as the adjustment is taking place through the mechanism described in (equation 8), changes in the parameters of the SM imply also growth effects until fully adjusted position of the system with utilization at its normal level is reached (Lavoie, 2016).

2.1 Taxes and Distribution Shifts

First, let us suppose that the government adopts a more progressive income tax policy. This can be done in different ways:

- Increasing the tax rates on higher-income earners;
- Decreasing the tax rates on lower-income earners;
- Adding more tranches;
- Introducing a higher threshold for tax breaks at the bottom of the distribution [4]

Let us assume that the propensities to consume are heterogeneous and a decreasing function of the income level and that these propensities do not shift with shifts in distribution. Therefore, there would be a dominance of absolute income effects[5].

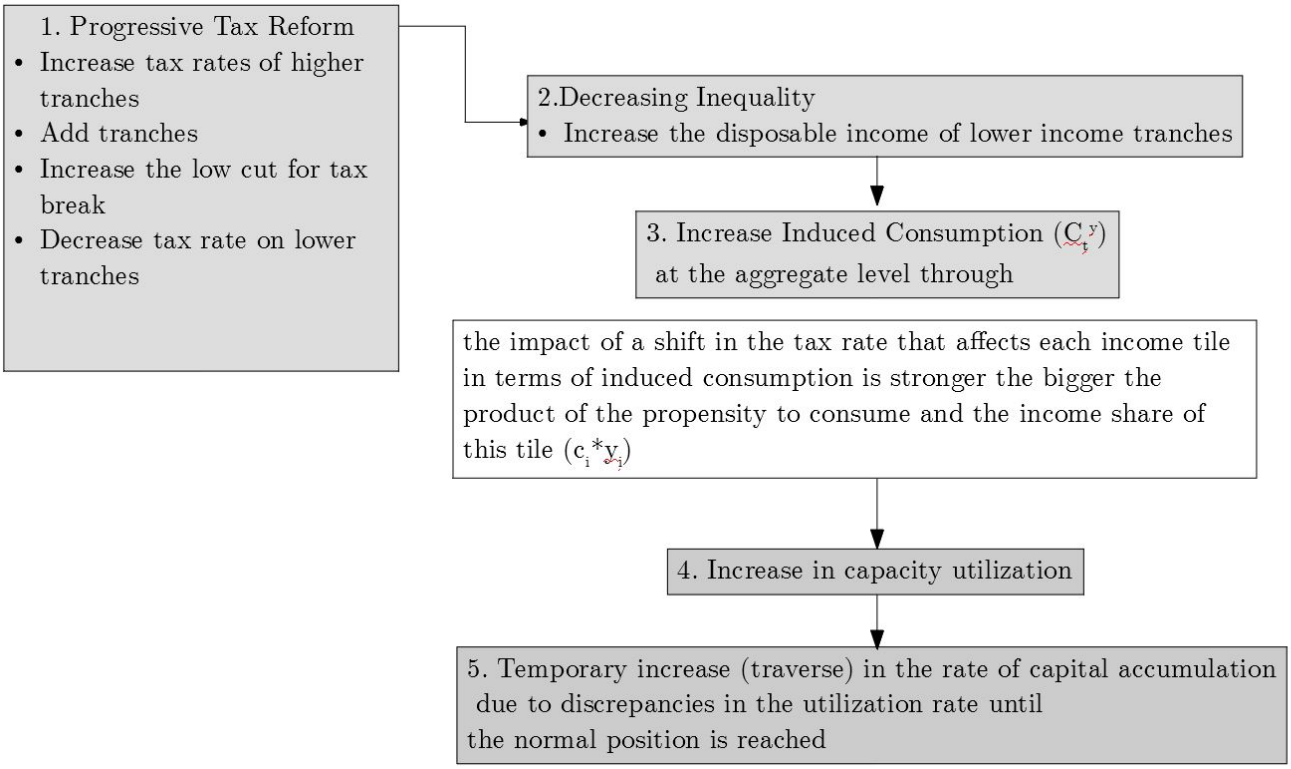
Consequently, a redistribution policy through a tax reform would have an overall positive impact at the aggregate level via the consumption channel, i.e. by raising the net disposable

[4]For an extensive discussion on the exemption on minimum wages and the writings of Piero Sraffa see Levrero (2017).

[5]For an empirical case study confirming both the heterogeneity of the propensities to consume of Italian households, as well as validating the dominance of absolute income effects in the Italian consumer behaviour (which assures the negative trade-off between inequality and aggregate demand) see Barbieri Góes (2018).

income of income tranches with a higher propensity to consume (equation 3). The adjustment process takes place through an increase in capacity utilization in the short run (equation 8) and a subsequent (temporary) increase in the rate of capital accumulation. The mechanism (see figure 1) exert until installed capacity is adjusted to the higher demand level. In other words, a progressive tax shift would engender temporary higher growth rates (during the traverse - from t_0 until t_n as illustrated in figure 2) and an overall positive level effect[6].

Figure 1: The adjustment mechanism of a progressive tax reform



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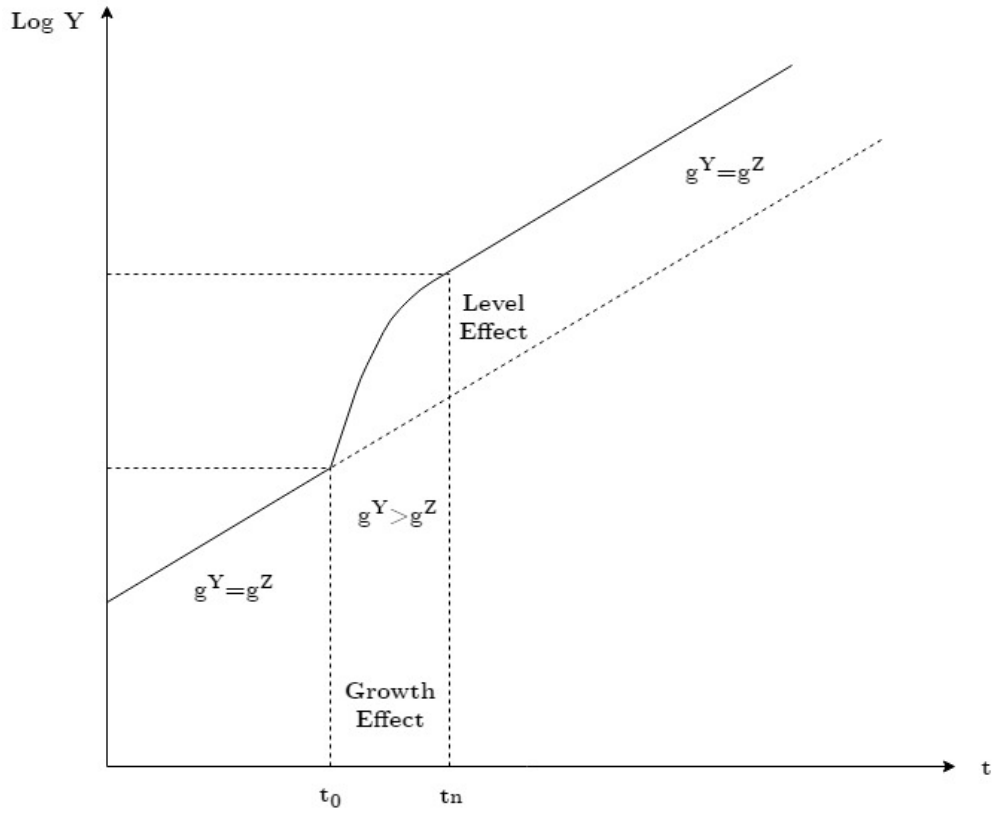
[6] Freitas and Serrano (2015, p.273) also briefly describe the effect of a change in the wage share, which is very similar to the effect of the tax reform: "a permanent change in the marginal propensity to save will have a level effect on output and capacity but no permanent effect on the trend rate of growth. If the marginal propensity to save decreases (say, because of an exogenous increase in the wage share), consumption and aggregate demand will initially grow faster as the multiplier of the economy has now increased. But this will be just a level effect, as the economy will tend to return to a growth rate that matches at the rate of growth of autonomous consumption, with a higher multiplier and the same required trend investment share."

Figure 2: The effect of a progressive tax reform



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The size of the impact of tax shifts in the framework of the the SSM goes out of the scope of this theoretical exercise. However, the mathematical insights deriving from the model presented can be easily discussed. The main argument is that the impact of a shift in the tax rate that affects each income tile in terms of induced consumption is stronger the bigger the product of the propensity to consume and the income share of each tile ($c_i y_i$). Since we assume here that the propensities are a decreasing function of the income level, it is clear that even with a significant higher income share at the top, the negative impact of increasing the tax rate on the top could be overcompensated by a decrease in the tax rates on lower strata. Moreover, due to the increase in the aggregate propensity to consume, the size of the multiplier would not only increase permanently, but this should also affect the sustainability of autonomous components of consumption as it will be discussed in next sections. For this reason we argue that redistribution policies should be kept as a key goal to be pursued by policy makers.

3 Negative Autonomous Consumption, Debt-Sustainability and Asset Inflation

Despite being a prominent framework to deal with long run positions and growth, the SSM (in its original formulation (Serrano, 1995) lacks the tools to incorporate financial factors as it has been recently recognized by (Freitas and Serrano, 2015, p.21): "research efforts should focus on the determinants and dynamics (particularly financial) of the trend of growth of different "unproductive" autonomous components of demand".

From an empirical perspective, Girardi and Pariboni (2015) have shown that there is a correlation between consumer credit and GDP, with the latter preceding the former, consequently challenging the long run independence of this expenditure category from the income level. As argued by Nikiforos (2018), the automatic acceleration of the growth rate that would stabilize debt-income ratios predicted by the SSM nor fit the empirical observations nor the extensive post-Keynesian literature on financial fragility[7] based on Minsky (1986).

However, in line with several works that include financial dynamics in the SSM (Pariboni, 2016; Dejuán, 2013; Dejuán and McCombie, 2018; Dejuán and Dejuán-Bitriá, 2018) we argue that the model is compatible with these extensions. Furthermore, the incorporation of financial elements into the SSM could be the path for not only having a consistent policy and conjuncture tool of analysis, but could also build the bridge that connects the post-Keynesian literature on financial fragility based on Minsky (1986) and the Sraffian approach.

Hence, this section seeks to include financial features and assets price inflation in autonomous consumption based on the works of Pariboni (2016) and Teixeira (2015). In doing so we discuss shifts in the parameters and the sustainability of debt-financed consumption and asset price inflation. Patterns that in several countries emerged to replace deleted fractions of induced consumption in face of a perverse and long trend of increasing inequality.

Accordingly, a brief discussion of the dangerous interaction of increasing income inequality and debt-based consumption on the sustainability of debt financed growth is in order. In this sense, our original contribution would be the suggestion of incorporating the concept of "own-interest rate" based on the works of Sraffa (1932) and on an empirical study based on the US American economy by Teixeira (2015) as well as splitting autonomous consumption in consumer credit and residential investment.

Modifying the autonomous consumption equation used by Pariboni (2016) we get:

$$Ca_t = \sum_i \left[Cc_{it} - c_i(1 - t_i + tr_i)y_i(r + \phi)D^L_{ti}\right] + \sum_i \left[RES_{it} - c_i(1 - t_i + tr_i)y_i(r_m + \psi)D^M_{ti}\right] \tag{15}$$

[7] For an extensive review of the strands of Minsky models see Nikolaidi and Stockhammer (2017).

$$r_s = (\frac{1 + r_{mortgage}}{1 + \pi_{residential}}) - 1 \tag{16}$$

$$RES_{it} = f(\underset{-}{r_s}) = f(\underset{-}{r_{mortgage}}, \underset{+}{\pi_{residential}}) \tag{17}$$

Equation (15) accounts for the total amount of autonomous consumption. We can split autonomous consumption into two main components, the first related to consumer credit and the second to housing dwellings. The first component is the sum of loans (consumer credit) acquired by all income tiles minus the negative fraction of autonomous consumption[8] related to consumer credit. More precisely, this negative fraction refers to the total of debt (here loans for consumer credit by tile) multiplied by the propensity to consume net of taxes and transfers of the respective tiles $(c_i(1 - t_i + tr_i)y_i)$ multiplied by the interest rate (r) and by the percentage of principal repaid every period(ϕ). The second component can be decomposed into the sum of loans (real estate loans) acquired by all income tiles minus the negative fraction. In the second component however, this negative fraction refers to the total debt (mortgages by tile) multiplied by the propensity to consume net of taxes and transfers of the respective tiles $(c_i(1 - t_i + tr_i)y_i)$ multiplied by the "own-interest rate" (r_s) and by the percentage of principal repaid every period(ψ).

Equation (16) expresses the concept of "own-interest rate" (Sraffa, 1932) as used by Teixeira (2015). The own-interest rate of real estate (r_s) is determined by interest rate on mortgages $(r_{mortgages})$ and by profits from real estate $(\pi_{residential})$. The key role of this rate is not only related to determination of the weight of debt-service on the income of real estate owners, but also by the fact that "the owners of an asset, or those who intend to buy it, take price changes into account to speculate and obtain capital gains, or to prevent capital losses, and thus try to avoid reductions in their net worth" (Teixeira, 2015, p.53,*author's translation*). In this sense, we can argue that not only autonomous consumption is impacted negatively by an increase in r_s, but also the amount of residential investment is affected negatively (since housing dwellings -RES- can be represented as a function of own-interest in the real estate sector - as in equation 17).

As regard the sustainability of private debt position in an economy, (Pariboni, 2016, p.227) argues that "if debt-financed consumption grows more rapidly than the other terms of Z, it follows that $g_D > g_Z = g$", in this case, even if we would assume a constant distribution of income, the indebtedness (debt to income ratios) would keep increasing. This can be easily explained by the fact that the rate of growth of Z[9] is simply the sum of the rates of growth

[8] "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. " (Dejuán and McCombie, 2018, p.1)

[9] As argued by (Pariboni, 2016, p.227), equation (18) implies that "the economy's growth rate slowly converges to the growth rate of the fastest growing autonomous component."

of all the components of Z weighted by the respective components' share in Z. In this sense, households' debt to income ratio are affected ultimately by the difference between autonomous consumption and the other components of autonomous demand.

$$g_t{}^{Z} = g_t{}^{Cc_t}\left(\frac{Cc_t}{Z_t}\right) + g_t{}^{RES_t}\left(\frac{RES_t}{Z_t}\right) + g_t{}^{G_t}\left(\frac{G_t}{Z_t}\right) + g_t{}^{X_t}\left(\frac{X_t}{Z_t}\right) \tag{18}$$

However, different from Pariboni (2016), we include autonomous consumption not only as a general component of debt-financed consumption, but we make a distinction between consumer credit and residential investment. In doing so we get two components that add up in equation (18). This implies that actually the sum of these two components gives the growth of debt-based autonomous consumption, which is to be compared with the growth of Z as a whole.

3.1 Housing Prices, Interest Rate and Principal Repayment: Shifts, or Cycles?

Different than Pariboni (2016), we assume that the growth rate of autonomous consumption can turn out to be negative[10]. In the extreme case this turn could trigger a recession through a negative growth rate, since assets are liquidated to pay off mortgage loans. This is mainly due to the inclusion of residential investment (RES), which is a function of the own-interest rate (equation 17). Starting from a fully adjusted position, changes in the real interest rate on real estate explain changes in the rate of growth of autonomous consumption and, consequently, in the rate of growth of output and induced investment (Teixeira, 2015). It is important to clarify here that the positive impact in RES can be triggered both by a (negative) interest rate shock, and also by a change of adjusted real estate prices (reflecting on $\pi_{residential}$ and on r_s), which is the movement that we analyse first.

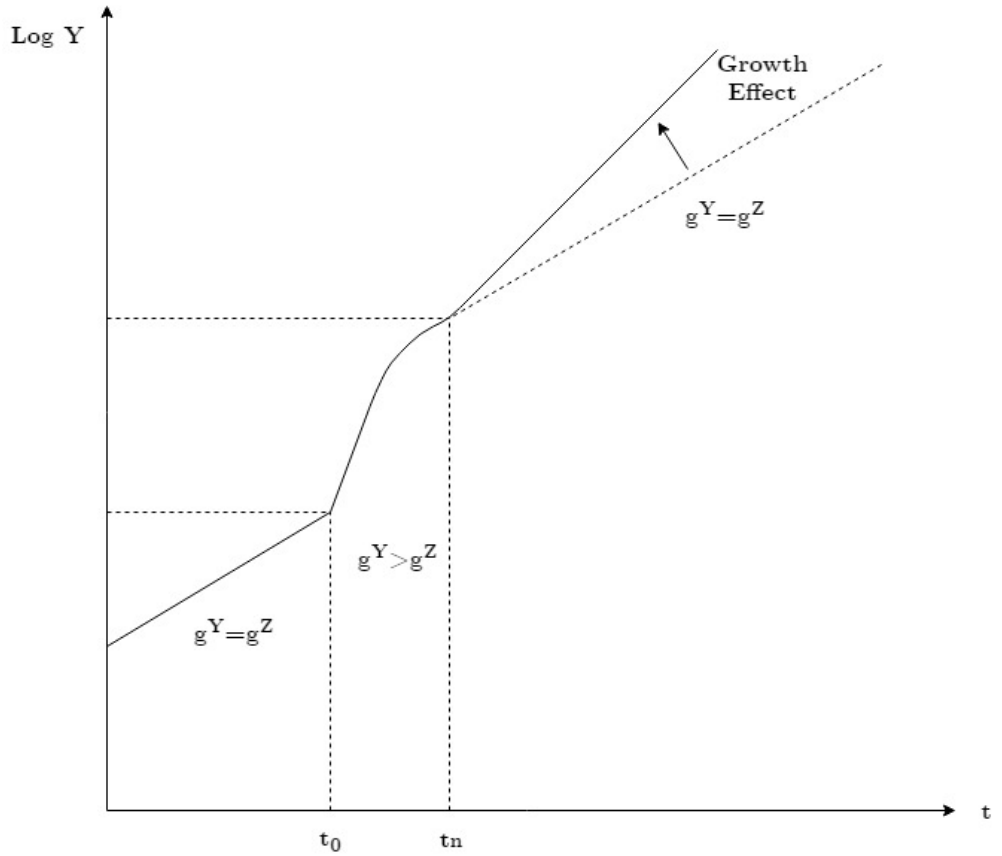
Accordingly, we can affirm that even facing constant income distribution and interest rate, any increase (decrease) in housing prices could lead to an acceleration (deceleration) of the growth rate of residential investment accompanied by a decrease (increase) in the negative component related to debt-service[11] passing by the own rate of interest. After accounting for net liabilities (making the level of debt net of assets valued at current prices) it could be argued that a decrease in net liabilities of households could possibly make banks more willing to lend

[10]Here we highlight the effect of changes in r_s on the debt-burden as well as on the growth of residential investment, however as argued by Teixeira (2015) consumer credit could also be negatively influenced by r_s. This was clearly a pattern followed by US American households in the 2000s, the case analysed by him. We argue nevertheless, that asset prices and consumer credit only can be closely related in specific case such as the one of the US and only a deliberation regarding national peculiarities of the credit system as well as of financial and consumption norms of households could justify the inclusion of a mechanism of asset prices influencing credit for consumption. Accordingly, we choose to neglect the effect of real estate own rate of interest on consumer credit.

[11]Here it is important to highlight that effect on debt-service that passes through r_s is only valid for residential investment, since the interest used for consumer credit is not corrected by price changes in assets. Furthermore, this positive (negative) effect of an increase (decrease) in asset prices is only a level effect, decreasing (increasing) the debt-burden and thus increasing (decreasing) the multiplier.

and households more willing to take credit to buy and/or invest in houses, which would lead to a self-full filling mechanism[12]. The narrowed down growth (and level related to debt-burden) effect of a permanent increase in housing prices, which has a growth effect on housing dwellings and hence on autonomous consumption is illustrated in figure (3) below.

Figure 3: The effect of a permanent increase in the rate of growth of autonomous demand in the equilibrium growth path due to a permanent increase in housing prices



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Despite engendering a positive growth and level effects, the sustainability of this new growth path headed by an increase in asset prices is ultimately related to the growth rate of other components of autonomous demand (i.e. exports and government expenditure) on the macroeconomic level and to the role played by monetary authorities preventing systematic rises in credit boosted by asset bubbles on the policy level. This is because as discussed previously, an acceleration of the growth rate of autonomous consumption above all the other components could lead to a detachment of the growth of Z (g^Z) from that of output (g^Y). In this sense, new loans would be adding more debt (boosted by the trend in the appreciation of assets, in

[12]The cycle component of debt trend and the trend in the growth of asset prices play an important role, but to study these intertwined dynamics a system of differential equations would be required. For an in depth model explaining the cycle of finance-led economies see Dejuán and Dejuán-Bitriá (2018) that highlights the predator role of the financial sector that issues credit for non-output creating activities leading to explosive cycles.

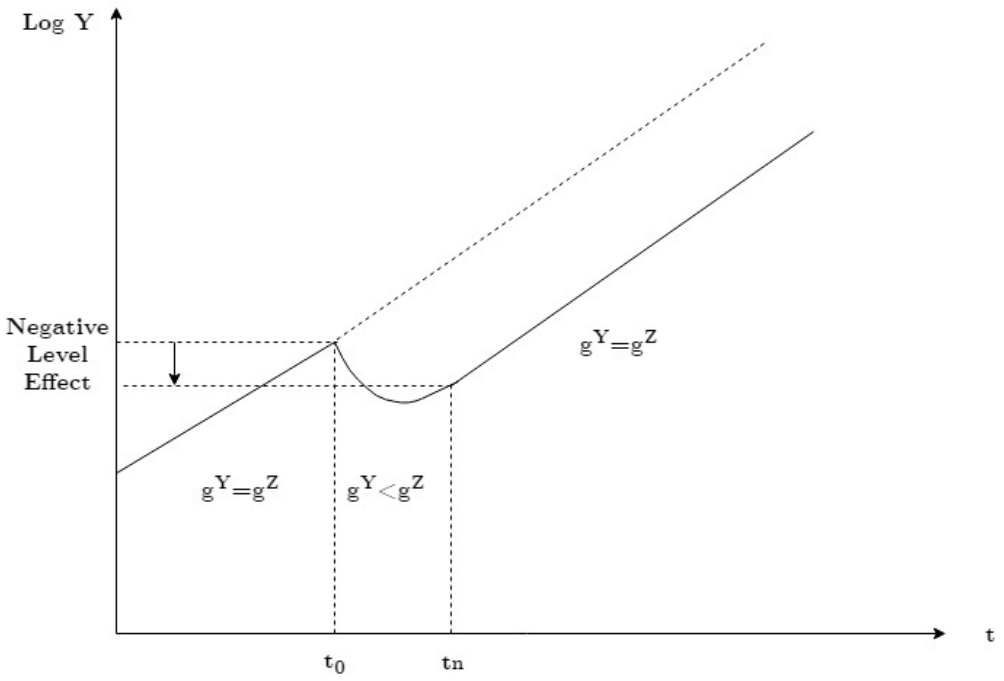
this case real estate) than income. The problem in this regard is exactly that in these moments of credit expansion above the growth of nominal GDP inflation in asset prices would end up "sow[ing] the seeds of financial crashes leading to economic recessions –the kernel of Minsky's financial instability hypothesis"(Dejuán and Dejuán-Bitriá, 2018, p.6). This way, "a credit-led growth becomes a debt-burdened growth" (Dejuán and McCombie, 2018, p.3).

A decrease (increase) in the exogenous rate of interest would have a very similar result and could even reinforce the increase (decrease) in asset prices through the rate on mortgages ($r_{mortgages}$) leading to even more explosive trend (similar to the US and Spanish cases). The effect of r on $rmortgages$ and thus on residential investment is quiet evident. Consumer credit is also shows level effects (passing through the negative part of autonomous consumption related to debt services) and through a growth effect with a general and well recognized from a broad group of mainstream and heterodox approaches credit channel effect, increasing credit in scenarios of low interest rate (and the reverse[13]).

On what concerns the percentage of principal's repayment (ϕ and ψ), we can argue that they have a similar effect of increasing overall taxes. That is, increasing (decreasing) the principal repayment decreases (increases) the multiplier leading to a negative level effect on output without any permanent effect on its growth rate (Pariboni, 2016). Nonetheless, efforts of increasing the principal repayment at the household level might spill-over to the aggregate level leading to a massive selling of assets (especially in the case of ψ which is related to the principal repayment of mortgage loans). As argued by (Dejuán and Dejuán-Bitriá, 2018, p.18)"[t]his deflationary effect is especially harmful in recessions when the repayment flows go on, while credit and income fall". However, our comparative statics exercise shows to be doomed to fail to explain the mechanisms behind the parameters particularly in explosive scenarios where a reversion is ever more probable the longer the expansionary trend period (Minsky, 1972).

[13] A even more interesting dynamics is faced when the reverse occurs, that is in a scenario in which interest rates increase. That is because this reversion could trigger a down-ward spiral with negative contributions of autonomous consumption and falling output which is well developed in the literature based on the seminal article of Fisher (1933).

Figure 4: The effect of a permanent increase in the percentage of principal's repayment



Source: authors' representation

Finally, after having faced all the possible shifts in asset prices, interest rate and percentage of principal repayment we can argue that all the parameters analysed deserve to be treated as dynamic variables that interact with one another. Nonetheless, this does not invalidate the use of the SSM as a tool of analysis. On the contrary we argue that critical values for the parameters and for debt could be better studied with systems of differential equations similar to the one developed by Dejuán and Dejuán-Bitriá (2018) incorporating Minskyan and Fisherian features engendering financial instability to the model. This way we would be "sowing the seeds" for a constructive dialog between the Sraffian approach and the post-Keynesian approach on financial fragility grounded on the works of Hyman Minsky. In the next section we deal with some policy implication, which is one tangent point between the two approaches.

4 The (Hyper)multiplier and Some Policy Implications

The now long lasting crisis triggered by the breakdown of the US subprime market has been deeply investigate in the literature. A broad consensus in this regard is the key role played by the shifts in distribution to create the need of new growth regimes that compensate for its demand pressing effects[14]. In this sense, wealth and debt-based consumption sustained and

[14]Barba and Pivetti (2008) have argued that rising income inequality has been the main source of the rise in debt levels, when declining wages have for long coexisted with increasing consumption demand. Cynamon and Fazzari (2013) have also made an assessment of the US economy associating inequality, worsening relative income and changing consumption and financial norms pushing for the rise in debt levels. Carr and Jayadev

pulled by real estate assets appreciation[15] and a long period of low interest rates have been the key to explain the US American case in the 2000's.

However, as it has been mentioned in the previous sections, these debt-led growth regimes have proven to be unsustainable and doomed to generate instability. This has also been recently recognized by (Freitas and Serrano, 2015, p.272) arguing that the viability of a demand-led regime would be ultimately related to a threshold to the rate of growth of autonomous demand, determined in turn by income distribution (and the implied aggregate propensity to save), technical conditions and the investment's reaction coefficient.

Thus, growth regimes that emerged to replace deleted fractions of induced consumption due to a perverse and long trend of increasing inequality (specially in mature capitalist economies like the US and EU member states) have eroded the core mechanism of stability of the system, the multiplier. As argued by (Dejuán and McCombie, 2018, p.17-18): "[...]once we account for finance, the effective propensity to consume and the multiplier evolves through time and becomes a potential destabilizing mechanism.". The disposable income of lower income earners (with higher propensities to consume, from which consumption in its aggregate mostly derives from), ended up being undermined first by increasing inequality and then by debt-service, once debt tended to increase faster than income. Furthermore, in the same way debt-financed autonomous consumption has led growth, during the reversion its negative impact intensified and was fed by the down-turn reaffirming the pro-cyclical nature of credit.

Accordingly, we argue that improving distribution trough progressive tax policies as discussed in subsection 2.1 should be one major policy recommendation. Arguing in favor of redistribution policies would not only have positive level effects on output, but also a growth effect during the adjustment as well as would lead to a more stable path to demand-led regimes pulled by autonomous demand components (particularly autonomous consumption, which has been extensively discussed in section 3).

Moreover, as we have argued in section 3 based on the analysis of the contributions to growth (equation 18), even if we would assume a constant distribution, the indebtedness (debt to income ratios) would keep increasing if autonomous consumption grows systematically more than the other components of autonomous demand[16]. Accordingly on the macroeconomic level other components of autonomous demand (i.e. exports and government expenditure) should prevent the lead of autonomous debt-financed consumption[17].

(2015) provide evidence from panel data also for the US that the rising indebtedness of households is related to high levels of inequality as well as relative income effects.

[15] For an extensive description of mortgage refinancing in the US see Guttmann (2016) that highlights the process of disposable income creation transforming houses in ATM machines. Cynamon and Fazzari (2008) have also emphasized the mechanism of rising house prices functioning as collateral with significant effects on consumption, once households with mortgages make use of refinancing schemes.

[16] Here we follow the same line of reasoning of (Pariboni, 2016, p.230) that argues the stability of debt/debtors' income ratio is "affected, among other things, by the growth differential between [...]autonomous consumption (and debt) and the other autonomous components of demand."

[17] See Dejuán and McCombie (2018)the role played by monetary authorities preventing systematic rises in credit boosted by asset bubbles.

In this sense we argue that for a sustainable and virtuous growth of autonomous demand two issues are central. The first is that the growth of debt-financed consumption has to move in step rather than detached from income distribution. Debt should not systematically replace income, leading both to higher levels of output as well as to a more sustainable multiplier. The second is that a rigorous analysis of the contributions to growth should be central on policy design preventing a supremacy of autonomous consumption within autonomous demand and reaffirming the leading role of government expenditure[18] also in the downturn, leading recovery and preventing from a down-ward spiral (which can be related to the the allegory of "Big Government" in the Minskyan literature). This line of reasoning would also find support in the literature based on (Kalecki, 1954), arguing in favor of the stabilizing nature of government expenditure, reducing the fluctuations of the business cycle.

5 Conclusion

First, the paper has incorporated personal income inequality and income taxes into the SSM covering an existing gap in the literature. In doing so, it could be concluded that a redistribution policy through a tax reform would have an overall positive impact at the aggregate level via the consumption channel, passing through an increase in capacity utilization in the short run and a subsequent (temporary) increase in the rate of capital accumulation. It has been shown that a progressive tax shift would engender temporary higher growth rates (during the traverse) and an overall permanent positive level effect. Moreover, it has been demonstrated that the impact of a shift in the tax rate is stronger the bigger the product of the propensity to consume and the income share of each income bracket ($c_i y_i$).

Secondly, financial features and assets price inflation have been incorporated into autonomous consumption based on the works of Pariboni (2016) and Teixeira (2015). Accordingly, shifts in the parameters and the sustainability of debt-financed consumption and asset price inflation have been discussed. We have argued that for having a sustainable and virtuous growth of autonomous demand two issues are central. The first is that the growth of debt-financed consumption has to move in step rather than detached from income distribution, with debt being stopped from replacing systematically disposable income leading both to higher levels of output as well as to a more sustainable multiplier. For this reason, redistribution policies should be kept as a key goal to be pursued by policy makers not only because of their obvious role on fighting income inequality, but also their crucial role in the determination of the level of output and the sustainability of demand-led growth regimes (particularly debt-financed). Second, it has been argued that a rigorous analysis of growth contributions has to be regarded as of chief importance in terms of policy design and implementation. This would prevent a supremacy of autonomous consumption within autonomous demand and reaffirm the leading

[18] On government expenditure related to mission-oriented innovation policies see Deleidi and Mazzucato (2018).

role of government expenditure also in the downturn.

Lastly, we argue that there is plenty of scope for future research, specially to investigate parameters related to autonomous and induced consumption exploiting the personal dimension of inequality. This is particularly promising facing the recent statistical efforts to merge data from surveys and national accounts.

References

Atkinson, A. B. and Piketty, T. (2007), *Top incomes over the twentieth century: a contrast between continental european and english-speaking countries*, OUP Oxford.

Atkinson, A. B. and Piketty, T. (2010), 'Top incomes: A global perspective. volume ii'.

Atkinson, A. B., Piketty, T. and Saez, E. (2011), 'Top incomes in the long run of history', *Journal of economic literature* **49**(1), 3–71.

Barba, A. and Pivetti, M. (2008), 'Rising household debt: Its causes and macroeconomic implications—a long-period analysis', *Cambridge Journal of Economics* **33**(1), 113–137.

Barbieri Góes, M. C. (2018), Personal Income Distribution and Progressive Taxation in a Neo-Kaleckian Model: Insights from the Italian case, Conference Paper, 22nd FMM Conference: "10 Years after the Crash: What have we learned?", Hans Böckler Foundation.

Brochier, L. and Silva, A. C. M. e. (2018), 'A supermultiplier stock-flow consistent model: the "return" of the paradoxes of thrift and costs in the long run?', *Cambridge Journal of Economics* **43**(2), 413–442.

Carr, M. D. and Jayadev, A. (2015), 'Relative income and indebtedness: evidence from panel data', *Review of income and wealth* **61**(4), 759–772.

Carvalho, L. and Rezai, A. (2015), 'Personal income inequality and aggregate demand', *Cambridge Journal of Economics* **40**(2), 491–505.

Cynamon, B. and Fazzari, S. (2013), 'Inequality and household finance during the consumer age (levy economics institute no. 752)'.

Cynamon, B. Z. and Fazzari, S. M. (2008), 'Household debt in the consumer age: source of growth–risk of collapse', *Capitalism and Society* **3**(2).

Dejuán, Ó. (2013), The debt trap, *in* 'Post-Keynesian Views of the Crisis and its Remedies', Routledge, pp. 99–120.

Dejuán, Ó. and Dejuán-Bitriá, D. (2018), 'A predator–prey model to explain cycles in credit-led economies', *Review of Keynesian Economics* **6**, 159–179.

Dejuán, Ó. and McCombie, J. S. (2018), The supermultiplier-cum-finance. economic limits of a credit driven system, Technical report, Centro di Ricerche e Documentazione" Piero Sraffa".

Deleidi, M. and Mazzucato, M. (2018), 'Putting austerity to bed: Technical progress, aggregate demand and the supermultiplier', *ISI Growth Working Paper* (2018).

Fisher, I. (1933), 'The debt-deflation theory of great depressions', *Econometrica* **1**(4), 337–357.
URL: *http://www.jstor.org/stable/1907327*

Frank, R., Levine, A. and Dijk, O. (2014), 'Expenditure cascades. review of behavioral economics, 1 (1-2): 55-73'.

Freitas, F. and Serrano, F. (2015), 'Growth rate and level effects, the stability of the adjustment of capacity to demand and the sraffian supermultiplier', *Review of Political Economy* **27**(3), 258–281.

Girardi, D. and Pariboni, R. (2015), 'Autonomous demand and economic growth: some empirical evidence', *Centro Sraffa Working Papers* **13**.

Girardi, D. and Pariboni, R. (2016), 'Long-run effective demand in the us economy: An empirical test of the sraffian supermultiplier model', *Review of Political Economy* **28**(4), 523–544.

Guttmann, R. (2016), *Finance-led capitalism: shadow banking, re-regulation, and the future of global markets*, Springer.

Kalecki, M. (1954), *Theory of Economic Dynamics: An Essay on Cyclical and Long-run Changes in Capitalist Economy*, Rinehart & Company.
URL: *https://books.google.fr/books?id=lAS4AAAAIAAJ*

Keynes, J. (1936), *The General Theory of Employment Interest and Money*, Reprinted in 1970, Macmillan.
URL: *https://books.google.it/books?id=DfahmgEACAAJ*

Krishna Dutt, A. (2016), 'Growth and distribution in heterodox models with managers and financiers', *Metroeconomica* **67**(2), 364–396.

Lavoie, M. (2009), 'Cadrisme within a post-keynesian model of growth and distribution', *Review of Political Economy* **21**(3), 369–391.

Lavoie, M. (2014), *Post-Keynesian Economics: New Foundations*, Edward Elgar Publishing Limited.
URL: *https://books.google.com.ua/books?id=bv72AwAAQBAJ*

Lavoie, M. (2016), 'Convergence towards the normal rate of capacity utilization in neo-k aleckian models: The role of non-capacity creating autonomous expenditures', *Metroeconomica* **67**(1), 172–201.

Levrero, E. (2017), 'Sraffa on taxable income and its implications for fiscal policy', *Cambridge Journal of Economics* **42**(4), 1087–1106.

Minsky, H. P. (1972), 'Financial instability revisited', *Hyman P. Minsky (1982)* pp. 117–161.

Minsky, H. P. (1986), 'Stabilizing an unstable economy'.

Nikiforos, M. (2018), 'Some comments on the sraffian supermultiplier approach to growth and distribution', *Journal of Post Keynesian Economics* **41**(4), 659–675.

Nikolaidi, M. and Stockhammer, E. (2017), 'Minsky models: A structured survey', *Journal of Economic Surveys* **31**(5), 1304–1331.

Palley, T. I. (2014), 'The middle class in macroeconomics and growth theory: a three-class neo-kaleckian–goodwin model', *Cambridge Journal of Economics* **39**(1), 221–243.

Pariboni, R. (2016), 'Household consumer debt, endogenous money and growth: A supermultiplier-based analysis', *PSL Quarterly Review* **69**(278).

Piketty, T. (2014), *Capital in the Twenty-First Century*, Harvard University Press.
URL: *https://books.google.com.ua/books?id=J222AgAAQBAJ*

Prante, F. J. (2018), 'Macroeconomic effects of personal and functional income inequality: theory and empirical evidence for the us and germany', *Panoeconomicus* **65**(3), 289–318.

Ricardo, D. (1891), *Principles of political economy and taxation*, G. Bell.

Serrano, F. L. (1995), 'The sraffian supermultiplier'.

Sraffa, P. (1932), 'Dr. hayek on money and capital', *The Economic Journal* **42**(165), 42–53.

Tavani, D. and Vasudevan, R. (2014), 'Capitalists, workers, and managers: Wage inequality and effective demand', *Structural Change and Economic Dynamics* **30**, 120–131.

Teixeira, L. A. d. S. (2015), Crescimento liderado pela demanda na economia norte-americana nos anos 2000: uma análise a partir do supermultiplicador sraffiano com inflação de ativos, PhD thesis, Universidade Federal do Rio de Janeiro.

Zezza, G. (2008), 'Us growth, the housing market, and the distribution of income', *Journal of Post Keynesian Economics* **30**(3), 375–401.