Neo-Kaleckian Growth Models Mark II and The Sraffian Super-Multiplier Approach

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Neo-Kaleckian Growth model (Bhaduri-Marglin Version)

$p = \varphi w a_0$ (8.1)

$m = \dfrac{z}{(1+z)}$ (8.2)

$\sigma = \dfrac{S}{K} = s_\pi m u$ (8.3)

$g = h(m, u)$ (8.4)

$g = \sigma$ (8.5)

The specification of investment function

- The rate of capital accumulation is a separable function in m and u.

- This means, for example, that if the degree of utilization of productive capacity increases, while the share of profits remains constant; that is, if firms are faced with a larger demand with the same profit margin, then they will be induced to invest more (Blecker, 2002, pp. 135-136).

- This situation differs from that portrayed by the canonical model, inasmuch as it is compatible with a situation in which firms faced with a higher demand but with a lower profit margin are also encouraged to invest more.

- In this context, the specification of the investment function seems to be more general and plausible than the specification of this function made in the canonical model.
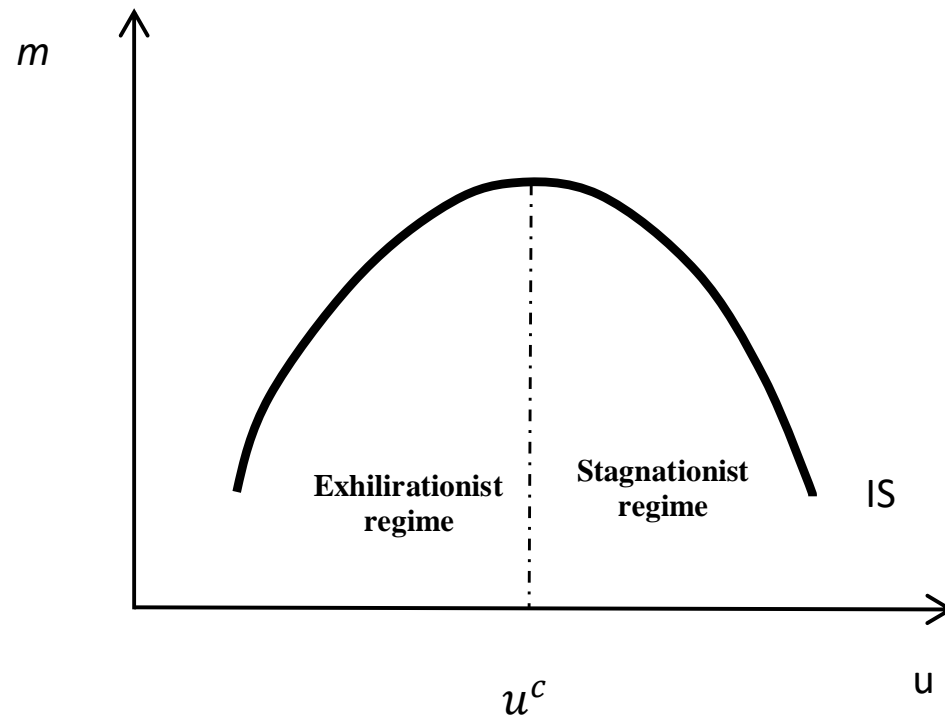
Solving the model

$$s_\pi mu = h(m, u) \ (8.6)$$

$$\left(\frac{\partial u}{\partial \pi}\right)_{IS} = -\frac{(s_\pi u - h_\pi)}{(s_\pi m - h_u)} \ (8.7)$$

$$\left(\frac{\partial u}{\partial \pi}\right)_{IS} < 0 \leftrightarrow (s_\pi u - h_\pi) < 0 \leftrightarrow u > \frac{h_\pi}{s_\pi} = u^c \ (8.8)$$

Demand Regimes

Growth and Accumulation Regimes

- To determine the nature of the growth regime we will apply the natural logarithm in equation (8.3) and differentiate the resulting expression with respect to m.

- We have, then, that:

  - **(d lng) / (d lnm) = 1 + (d lnu) / (d lnm)** (8.3ª)

- In equation (8.3) we can see that if the demand regime is exhilirationit, that is, if the elasticity of the degree of utilization of productive capacity in relation to the share of profits in income ((d lnu) / (d ln m)) is greater than zero; then (d ln g) / (d lnm)> 0, that is, the accumulation regime will be profit-led.

- If the elasticity of the degree of utilization of productive capacity in relation to the share of profits in income ((d lnu) / (d lnm)) is negative, that is, if the demand regime is stagnationist; then the sign of (d ln g) / (d lnm) will be ambiguous.

- If the elasticity in question is smaller than the unit in modulo, that is, if | (d lnu) / (d lnm) | <1; the growth regime will be profit-led. For the growth regime to be wage-led in the case where the demand regime is accelerationist it is necessary that | (d lnu) / (d lnm) |> 1.

- In other words, a wage-led growth regime is only possible in the case where the elasticity of the degree of utilization of productive capacity in relation to the share of profits in income is negative and greater than one in magnitude.

The Sraffian Supermultiplier Model Approach

- The Sraffian Supermultiplier Model Approach (SSM) was developed initially by Serrano (1995), Bortis (1997) and Dejuan (2005), as a new adjustment mechanism between savings and investment and for the determination of the level of output and employment in the long run.

- The SSM Models in this tradition start from the following hypotheses:
  - there are non-capacity-generating components of autonomous demand;
  - investment expenditure is fully induced, even in the short term
  - the investment function follows the principle of the adjustment of capital stock.

- Investment is still the determinant of aggregate saving, but the adjustment variable is no longer the degree of capacity utilization, as in neo-Kaleckian growth models, or the income distribution between profits and wages, as in neo-Keynesian growth models; but the relationship between the non-capacity-generating autonomous expenditure and aggregate income.

- The SSM model gained notoriety recently after the controversy generated by two major exponents of Heterodox Approaches, Marc Lavoie and Peter Skott, whom discusses the specification of investment function of Neo-Kaleckian models of growth and distribution.

The Relationship Between Investment and Savings

- One of the major implications of the so-called *Principle of Effective Demand* is the determination of aggregate savings by aggregate investment.
    - In the model developed by Keynes, an increase in the planned investment by firms will induce an expansion of such magnitude in the level of employment and income that, at the end of the process, aggregate savings will have increased in the same magnitude as investment (Amadeo, 1989).
    - As a result of this argument, it follows that there cannot be a "shortage" of savings in the economic system because investment always creates a similar amount of aggregate savings.

- This result is also true for an open economy, although the composition of savings between domestic savings and external savings is a variable that depends on, among other factors, the real exchange rate (Bresser-Pereira, Oreiro and Marconi, 2015).
    - Thus, an increase in private investment will always produce an equivalent increase in total savings, but domestic savings may not keep up with the rise in the investment if the real exchange rate is overvalued.
    - In this case, the corresponding increase of savings will be attended by "external savings", thereby increasing the external fragility of the economy in consideration.

- The extension of the PED for the long run was made by authors belonging to the so-called *Cambridge School of Economics* (United Kingdom), which ended up being called *Post-Keynesians*. In this group, we can highlight Roy Harrod, Nicholas Kaldor, and Luigi Pasinetti.
    - The models developed by these authors have as their main hypothesis that, in the long run, the normal state of a capitalist economy would be characterized by full utilization of productive capacity.
    - In this context, the adjustment of aggregate savings to the level of investment couldn´t be made through variations in the degree of capacity utilization, but by changes in income distribution between wages and profits, which became an endogenous variable to the growth.
    - Making the fundamental assumption that the average propensity to save of the economy as a whole is a weighted average of the propensity to save from wages and profits, each multiplied by the share of the corresponding income class in the national income; and that propensity to save out of profits is higher than propensity to save out of wages it follows that profit share can be taken as an adjustment variable between investment and savings

The Neo-Ricardians

- More recently, many self-proclaimed "Neo-Ricardian" or "Sraffian" authors, including Serrano (1995), Bortis (1997) and Dejuan (2005), have developed a new mechanism of adjustment between savings and investment that
  - (i) would keep the "Keynesian position" of determination of savings by investment;
  - (ii) would be compatible with the economy operating in a long run equilibrium position in which aggregate demand and productive capacity would be fully adjusted one to the other, such that the degree of capacity utilization would be equal to the "normal" long run level, exogenously determined;
  - (iii) would be compatible with an income distribution between wages and profits that is exogenous to the economic system; and
  - (iv) exogenous changes in the share of wages in income would be compatible with an increase in the level of income and capital stock along the long run growth path; although it has no permanent effect over the growth rate of these variables, which would be determined by the growth rate of the non-capacity-generating autonomous expenditure.
    - This expenditure may be the share of household consumption that is financed through increased indebtedness (Fagundes, 2016, Chapter. 4), residential investment, exports, or government spending. In the simplest version of this mechanism, consumption financed by indebtedness is chosen as the engine of growth of autonomous demand.
- This adjustment mechanism became known as the SSM Model.

The Model

$$S = s.Y - Z$$

$$\frac{S}{Y} = s - z$$

Where: $z = \frac{Z}{Y}$.

$$\frac{I}{Y} = h$$

$$h = s - z$$

$$\frac{dh}{dt} = h.(u - u_n)$$

$$\frac{dz}{dt} = z.(g_z - g)$$

$$\frac{du}{dt} = u.(g - g_k)$$

Steady-State Solution

$$\frac{dh}{dt} = \frac{dz}{dt} = \frac{du}{dt} = 0$$

$$u = u_n$$

$$g_z = g$$

$$g = g_k$$

Steady-state and transition dynamics

- In the SSM model, the capacity utilization is determined by the supply conditions of the economy in the long run, but the growth rate of the output and the capital stock is determined by the growth rate of the autonomous demand component that does not create capacity (non-capacity-generating autonomous demand).

  - It is a model in which Say's Law applies to the level of capacity utilization, but the PED is valid for the growth rate of the output and capital stock.

- An increase in the growth rate of autonomous consumption will accelerate the growth rate of aggregate demand relative to the growth rate of the capital stock (g_k), resulting in an increasing level of capacity utilization (u), which will become higher than the normal level of capacity utilization (u_n).

- As this happens private sector, pressured by competition, will accelerate its investment plans, thereby increasing the investment rate (h), which will accelerate the growth rate of the capital stock (g_k) and therefore reduce the level of capacity utilization.

- The increase in h, in turn, will reduce the value of z, so that throughout the process of transition to the new long- run equilibrium the level of output and capital stock should grow faster than autonomous consumption.

- At the end of the process, there will have been a permanent increase in the growth rate of output and capital stock and an equally permanent increase in the level of output and capital stock, but the degree of utilization of the productive capacity will have returned to its normal value.

The Controversy Between Peter Skott and Marc Lavoie

The Controversy Between Peter Skott and Marc Lavoie

- To understand the recent controversy between Skott and Lavoie regarding the specification of the investment function in the neo-Kaleckian models of growth and distribution, a brief introduction is required.

- These models were developed from Rowthorn's (1981) seminal paper as an alternative to the Cambridge school's models of growth and distribution in which the functional income distribution was the adjustment variable between savings and investment and the economy operated with full utilization of productive capacity ($u = u_n$) along a balanced growth path.

- In the neo-Kaleckian models of growth and distribution, the profit share in income is determined at the microeconomic level, based price decisions taken by firms that operates in non-competitive markets.

- A monopolistic competition environment is assumed where firms can set a price above marginal cost, but in which the level of atomization in the market is still large enough to prevent firms from being forced to take into account, in its pricing strategy, the reaction of its competitors.

$$s_k = s_2.(1-w).u.a$$

$$g_k = b + c.(u - u_n)$$

$$s_k = g_k$$

$$b + c.(u - u_n) = s_2.(1-w).u.a$$

$$u^* = \frac{(b - cu_n)}{s_2(1-w)a - c}$$

Stability condition

$$s_2.(1-w).a-c > 0$$

Demand regime and accumulation regime

$$\frac{\partial u}{\partial(1-w)} < 0$$

$$\frac{\partial g}{\partial u} = c > 0$$

$$\frac{\partial g}{\partial(1-w)} = \left(\frac{\partial g}{\partial u}\right)\left(\frac{\partial u}{\partial(1-w)}\right) < 0$$

Skott´s criticism to the neo-kaleckian model

- Skott (2010; 2012) argues that the degree of capacity utilization in the standard neo-Kaleckian model is hypersensitive to changes in the propensity to save out of profits.

- To understand this issue, it is necessary to calibrate the model that we presented previously.
  - Consider that:
    - $c = 0,01; \ w = 0,6; \ a = 0,5; \ b = 0,0; \ s_2 = 0,11$ e $u_n = 0,85$.
- In these conditions, an 81.8% increase in propensity to save (from 0.11 to 0.2) leads to a 60% decrease in the capacity utilization and a 27.2% fall in the rate of capital accumulation, so the degree of capacity utilization is 2.2 times more sensitive to a shock on the propensity to save than the rate of capital accumulation.

The origin of the hypersensivity problem

- This problem of hypersensitivity of the degree of capacity utilization to shocks over the propensity to save arises from the specification of the investment function.

- According to Skott (2012, p. 4), the main problem of the investment function in the neo-Kaleckian growth models is that the investment response to changes in the degree of capacity utilization is low and constant over time.

- In particular, the short run sensitivity of the rate of capital accumulation to changes in the degree of capacity utilization is considered to be equal to the long run sensitivity of that variable.

  - In the short run, it is reasonable to assume that the investment is relatively unresponsive to the degree of capacity utilization and, besides that, low sensitivity is also a necessary condition for the stability of the short run equilibrium in the Neo-Kaleckian models.

  - But this is an unacceptable hypothesis for the long run since changes in aggregate demand generally have lagged effects over investment, which will act to increase the long run sensitivity of capital accumulation to the level capacity utilization

Lavoie´s defence of the neo-kaleckian model and the SSM

- The defense of the neo-Kaleckian models was presented by Lavoie (2016, 2017), probably inspired by the paper of Freitas and Serrano (2015).

- To deal with the problem of specifying the investment function, Lavoie bought the idea of the neo-Ricardians that investment in expansion of capacity utilization is full endogenous.

- Thus, the term b may be constant in the short run, but in the long run, it should be adjusted based on the following equation:

$$\frac{db}{dt} = b.(g - g_k)$$

The SSM enters in the story

- When output growth rate is higher than the capital stock growth rate, the autonomous component of the capital stock growth rate should accelerate, which in practice, means an increase in the propensity to invest.

- The problem with this mechanism is that it leaves the rate of output growth indeterminate.

- This is the moment when SSM enters in the story.

- Lavoie (2016) assumes that the consumption of capitalists has an autonomous component that increases the rate g_z.
  - Thus, in the long run equilibrium, the output and capital stock growth will be determined by the growth of the non-capacity-generating autonomous demand (growth of autonomous capitalist consumption); and,
  - The degree of utilization of the productive capacity will converge to the normal level in the long term, thus addressing the criticisms made by Marxist authors such as Duménil and Levy (1995, 1999) for whom neo-Kaleckian models were not applicable to the long run dynamics of capitalist economies precisely because of the non-convergence of the degree of utilization of the productive capacity to its normal value in the long-run.

Problems with Lavoie´s solution

- The rescue operation of the neo-Kaleckian models of growth and distribution by Lavoie involved the integration of various aspects of the SSM approach.

- First, Lavoie accepted the full endogenization of investment in the expansion of production capacity, eliminating any autonomous component of the investment function.
  - The problem with this choice is that he kicked up an extremely important theoretical element for Keynesian economists that *is the role of animal spirits as an element of instability in the economic system*.
  - This point was raised in the paper by Dávila-Fernandes, Oreiro, and Punzo (2019) for whon Lavoie was abandoning the spirit of the "Keynesian message" with his solution.

The second problem: the engine of growth

- The second problem is that the engine of autonomous demand growth ceased to be the investment in capacity expansion and became the growth of capitalists´ consumption.
  - Besides being an inversion of the *causa causans* of economic activity proposed by Keynes in the General Theory; if capitalist consumption is the engine of long run growth, then the higher is the concentration of wealth (not necessarily income) on the hands of capitalists higher will be the expected long run growth, since higher should be the rate of growth of capitalists´ consumption.
  - This result seems to be incompatible with the progressive position advocated by Lavoie and the other neo-Kaleckian economists

What remains?

- What remained of the original neo-Kaleckian approach was the exogenous nature of income distribution, which is determined at microeconomic level by the pricing decisions taken by the firms.

- But this was only possible because the SSM approach also requires that functional income distribution to be exogenous to the growth process.

- What differentiates the neo-Kaleckian approach from the SSM approach is just the explanation of the income distribution between wages and profits.

- For Neo-Kaleckians income distribution is determined at the microeconomic level, for neo-Ricardians it is determined by *social conventions* and by the state of *class struggle*.

Criticisms of the Sraffian Supermultiplier, the Thirwall Model and the Developmental Macroeconomics

- Regardless of the theoretical and political economy problems that the incorporation of the SSM into the formal structure of the neo-Kaleckian models of growth and income distribution can cause remains a fundamental theoretical question that consists of evaluating the robustness of the SSM approach.

  - In other words, are SSM models robust in the sense that they present results that do not depend on restrictive assumptions about the functioning of the economic system? *The answer to that question is definitely no*.

Nikiforos (2018)

- The robustness of the SSM approach was criticized in a recent paper by Nikiforos (2018).

- According to Nikiforos, the SSM approach has two main problems.
  - First, it considers the normal degree of capacity utilization as an exogenous variable and independent of aggregate demand.
    - The problem with this hypothesis is that the role of demand in determining the level of productive capacity utilization disappears and the model becomes similar to the "classic model" in the long run.
    - However, the idea that the normal degree of capacity utilization is a technological factor or determined by the *conventions* prevailing among entrepreneurs is incorrect.
    - Indeed, it can be shown that if the economy operates with increasing returns to scale, then the normal degree of capacity utilization becomes an endogenous variable so that an increase in aggregate demand will result in an increase in the normal or desired level of capacity utilization.

Nikiforos (2018)

- Another criticism of Nikiforos to the SSM is that it disregards the implications in terms of the relationships between flows and stocks of autonomous spending financed through debt.

- Let's consider that the autonomous consumption of households is financed by bank credit as in the model developed by Freitas and Serrano (2015).

  - Financing by bank credit generates an intrinsic dynamic for the stock of debt of households with commercial banks and, therefore, for the level of household indebtedness, that is, the debt-to-income ratio.

  - While household indebtedness should stabilize at some level in the long run, increasing households' financial fragility during the transition to long run equilibrium may increase the perceived risk of commercial banks, leading them to raise interest rates on bank loans and eventually to practice credit rationing.

  - The increase in the cost of credit associated with reduced credit availability due to credit rationing may lead households to reduce the growth rate of their spending.

  - But in this case, *autonomous consumption will have ceased to be autonomous*

Oreiro and Costa Santos (2019)

- Another critical line of the SSM approach was developed recently by Oreiro and Costa Santos (2019).

- These authors elaborate an SSM model for a small open economy with government activities.

- However, rather than considering the existence of a single growth driver for autonomous demand that does not create capacity as Freitas and Serrano (2015), the authors consider an economy in which exports and government spending grow at an exogenous rate, though not necessarily equal to each other.

- The authors assume other assumptions such as:
  - (a) the real exchange rate is fixed at the level of purchasing power parity;
  - (b) the marginal propensity to import is constant, and the distribution of income between wages and profits is exogenous;
  - (c) capital mobility is zero so that deficits in the trade balance can only be financed through the reduction of international reserves, up to the point where they reach zero.

Oreiro and Costa Santos (2019)

- The authors then examine the long run equilibrium properties and the local stability conditions in three different scenarios.
  - In scenario 1, the growth rate of exports equals the growth rate of government spending.
  - In scenario 2, the growth rate of exports is higher than the growth rate of government spending.
  - Finally, in scenario 3, the growth rate of exports is lower than the growth rate of government spending.
- The results obtained by the authors show that:
  - In scenario 1, the economy converges to a long run equilibrium in which the international reserves/GDP ratio and the public debt/GDP ratio are both constant and positive. It is a scenario that can be considered as economically feasible;
  - In scenario 2, the economy converges to a long run equilibrium in which the reserves / GDP ratio is constant and positive, but the ratio of public debt to GDP is negative.
    - It is a scenario in which the external solvency condition of the economy is respected, but in which the government becomes a net creditor of the private sector.
    - Although a situation in which government is a creditor, rather than a debtor, of the private sector seems extremely improbable, it does not represent an economically impossible situation, so scenario 2 cannot be dismissed in purely analytical terms; and
  - Finally, in scenario 3, the economy converges to a long run equilibrium position in which the public debt/GDP ratio is constant and positive, but the international reserves/GDP ratio is negative.
    - The problem is that if the economy in question does not issue the international reserve currency, then, in scenario 3, the economy converges to an economically impossible position to sustain, i.e., it cannot be a long run equilibrium.

Thirwall Model and New Developmental School

- The results of the model developed by Oreiro and Costa Santos (2019) show that the SSM model only applies to the case where the growth engine of autonomous demand that does not create capacity is exports.
  - A similar result was also found by Nah and Lavoie (2017).

- But in this case, the SSM model becomes indistinguishable from the balance-of-payments growth model developed by Thirwall (1979).

- The idea that the long run growth of small open economies that do not have a reserve or convertible currency can only be led by exports is one of the central aspects of the *Brazilian New Developmental school*, whose theoretical foundations are exposed in Bresser-Pereira, Oreiro and Marconi (2015).