



Characteristics of the Equilibrium Model - Use in Macroeconomic Analyzes

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Abstract

The equilibrium model is one that, based on the analysis of the considered variables, gives a certain point where the economy evolves correctly, without making over-stocks or without producing products according to the market requirement. The production model at the equilibrium point can be considered after we have done a study of the way in which the production evolves and in which the distribution for consumption is achieved within the national economy. The graphical representations as well as the series of data over a longer period of time, indicate the points where the production reaches a point of stability, of equilibrium and in parallel and the consumption reaches through the game of the market to a point of such equilibrium. It is interesting in the macroeconomic analysis to identify those moments, those points in which the realization of production and its absorption through consumption and investment, reach a point of stability, considering from here that this is that point of macrostability. The model by calculated parameters gives the possibility to estimates, which ultimately determines adjustments on how the production is carried out in close accordance with the degree of absorption and how to avoid making unusable stocks, which are sometimes huge financial expenses, or lack of products on the market.

Key words

Equilibrium, Production, Consumption, Investments, Model, Stocks

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1. Introduction

In this article the equilibrium model of the national economy, the authors started from the study of the macroeconomic evolution, of its distribution in consumption and investments, managing to highlight the way in which discrepancies in the evolution of the production indicator appear, materialized through the Gross Domestic Product realized in every time period, and consumption, that is, part of this macroeconomic result, is consumption oriented.

Graphic representations are used to show the effect of the evolution of the production and its degree of absorption on the market. Absorption means the distribution for consumption and investments and through the curves we identify those moments that give the possibility that what is produced may be necessary, usable and in this way the economy, which often due to the free market, has the tendency of oscillating developments, to be brought each time at a level of balance.

The level of equilibrium is the point where the production is satisfied on the one hand, the consumption and investment needs, and on the other hand, it ensures a harmonious evolution in which the inefficient expenses are avoided.

Thus, in the study, we referred to the fact that there are mathematical and statistical-econometric relations that indicate the evolution trends. In this article, we considered only production and consumption, being able to extend the way of analysis also on production and investments or in a more complex way production, consumption and investments.

The article is accompanied by some charts that clearly highlight how the problem of establishing the balance and then of maintaining it, that is, applying a macroeconomic strategy that ensures a production structure in accordance with the needs of the market for consumption and the need for investment, to ensure the growth of the production from time to time.

2. Literature review

Andersen *et al.* (1993) approaches the analysis of statistical models that are based on counting processes. Anderson, R.L. (1942) it addresses problems related to the correlation coefficient distribution. Anghelache *et al.* (2019a) analyzes some econometric concepts and models for analyzing macroeconomic performance. Anghelache *et al.* (2019b) analyzes models used in dynamic series analysis. Bollerslev and Wooldridge (1992) are concerned with estimating the probabilities and interference of dynamic models that are time-varying. Hansen and Lunde (2006) addresses issues related to forecasts for volatile models. Iacob (2019) analyzes in his work various statistical-econometric methods for analyzing economic phenomena. Linton, O. (2016) is concerned in his work with probabilistic statistical-econometric analyzes. Ruth and Hannan (2012) they turn their attention to their analysis of dynamic economic systems. This article addresses problems related to non-parametric estimation and analyzes the degree of sensitivity of the predicted deficiency (Scaillet, 2004).

3. Methodology, data, discussions, results

By studying the data in table 1, we can see that there is only one situation in which the system is in balance.

Table 1. Macroeconomic equilibrium model

| | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| production (P) | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 |
| consumption (C) | 60 | 73 | 87 | 97 | 106 | 113 | 120 | 126 | 130 | 134 | 137 |
| investment (I) | -30 | -13 | 0 | 7 | 15 | 21 | 24 | 27 | 30 | 32 | 34 |
| total absorption (I+C) | 30 | 60 | 87 | 104 | 121 | 134 | 144 | 153 | 160 | 166 | 171 |
| effective accumulation (P-C) | -60 | -53 | -47 | -37 | -26 | -13 | 0 | 14 | 30 | 46 | 63 |
| accumulation of surplus [P-(I-C)] deficit accumulation [(P-C)-I] | -30 | -40 | -47 | -44 | -41 | -34 | 24 | -13 | 0 | 14 | 29 |

Thus, at a production of 160, the total absorption is also 160; the desired accumulation is equal to the effective accumulation (30) and there is no accumulation of surplus or deficit. At all outputs less than 160 the total absorption exceeds the production; the amount that the company is willing to accumulate exceeds what it manages to accumulate and there is an increase in the deficit. Thus, at a production of 140, the consumption is 126, so the actual accumulation is 14. The amount that people want to accumulate is 27. The company is concerned and the production will increase. Similarly, if production is 180, consumption is 134, so the actual accumulation will be 46. People want to accumulate only 32, so there will be an excess accumulation of 14, and future production will be reduced to try to get rid of surplus.

This model is illustrated graphically in figure 1, in which the power is measured on the horizontal axis, and the consumption and accumulation on vertical axes. It should be remembered that these measurements are actual production or consumption indices and that the chosen indices must be representative. This means that the relative structure of the prices used to calculate an index must be the same for all indices. CC' is the consumption curve, corresponding to the consumption function of elements 1 and 2, table 1. II' is the investment curve or BB' accumulation curve is the vertical sum of these two

curves or the total absorption curve (columns 1 and 4 of table). We draw an OB line, from the origin at an angle of 45 degrees to each axis, intersecting the curve BB' at point Be. The 45 degree line represents the identity $P = C + A$. The point Be, represents the equilibrium exit from the output axis OO_e , because at this exit point, $OO_e = O_eB_e = O_eC_e + C_eB_e = O_eC_e + O_eA_e = C + A$. The equilibrium point can be found in two other ways. One method is to plot the real accumulation curve AA' (rows 1 and 5 in table 1). This is given by the vertical distance between line CC' and line 45 degrees OB_e . If curve AA' intersects curve II, at the point where the actual accumulation is equal to the expected accumulation, this is the equilibrium point.

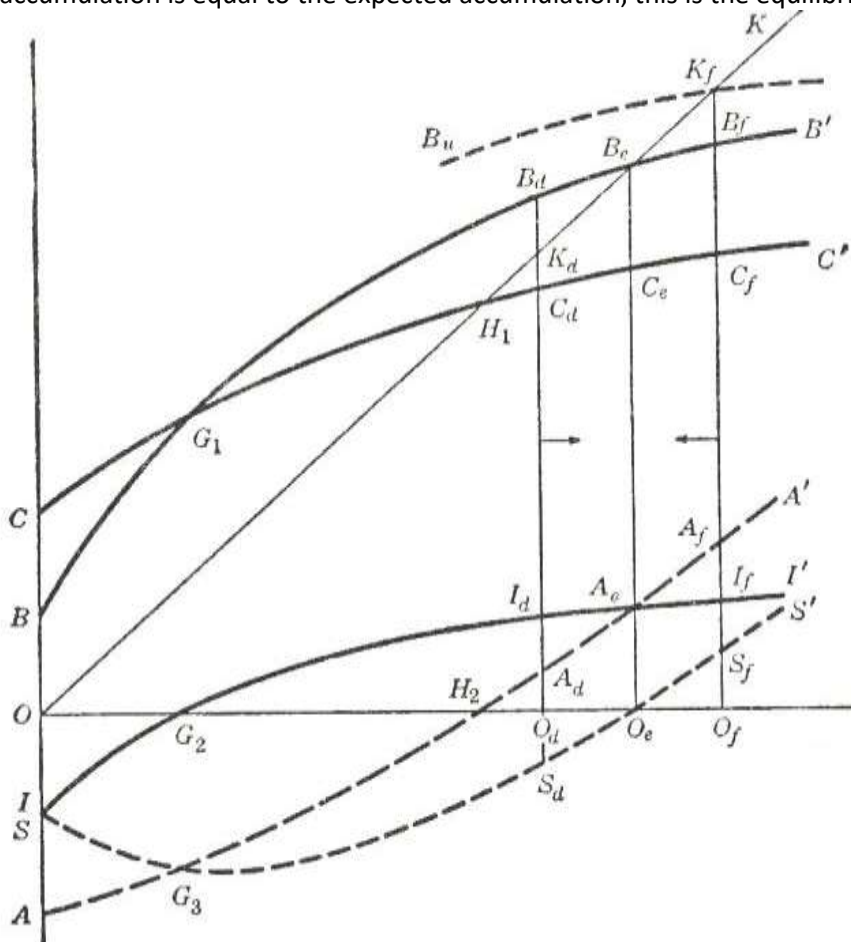


Figure 1. Macroeconomic equilibrium

Another method of analysis consists of the SS' surplus-deficit accumulation curve (rows 1-6 in table 1). If it intersects the horizontal axis, i.e. where the accumulation of surplus or deficit is zero, we determine the equilibrium point. This diagram illustrates the stability of the balance. If we assume that the output was below the equilibrium level, let's say OO_d results in consumption according to the line O_dC_d . Therefore, the current accumulation would be C_dK_d , where K_d is on the 45 degree line and $O_dK_d = OO_d$. The expected accumulation is $C_dB_d = O_dI_d$. Therefore, there is a real accumulation deficit below the expected level, which rises to $B_dK_d = I_dA_d = O_dS_d$. This deficit will lead to an increase in production and, therefore, the whole system will be in balance. Similarly, if the output is out of balance, I say OO_f , there will be a surplus accumulation $B_fK_f = I_fA_f = O_fS_f$, which will cause output reductions to bring it to the equilibrium value OO_e .

• *The effect of an increase in the absorption curve*

This model is eloquent in explaining the movements of aggregate incomes and business cycles. First of all, we will find that an increase in consumption curves or investments, or both, will lead to an increase in balance. In figure 2 we consider a total absorption curve b_1B_1 , with the equilibrium level point at B_1 , OB_1 being the 45 degree line. If the total absorption curve increases to b_2B_2 , if the total consumption and accumulation is higher, at each level of production compared to the previous one, the equilibrium production will increase from OE_1 to OE_2 . Similarly, a fall in the absorption curve results in a decrease in

equilibrium output. These changes in the total absorption curve can have several origins. There may be a spontaneous increase in the consumption function. It can also be an increase in absorption by the government, without reducing the absorption of private individuals.

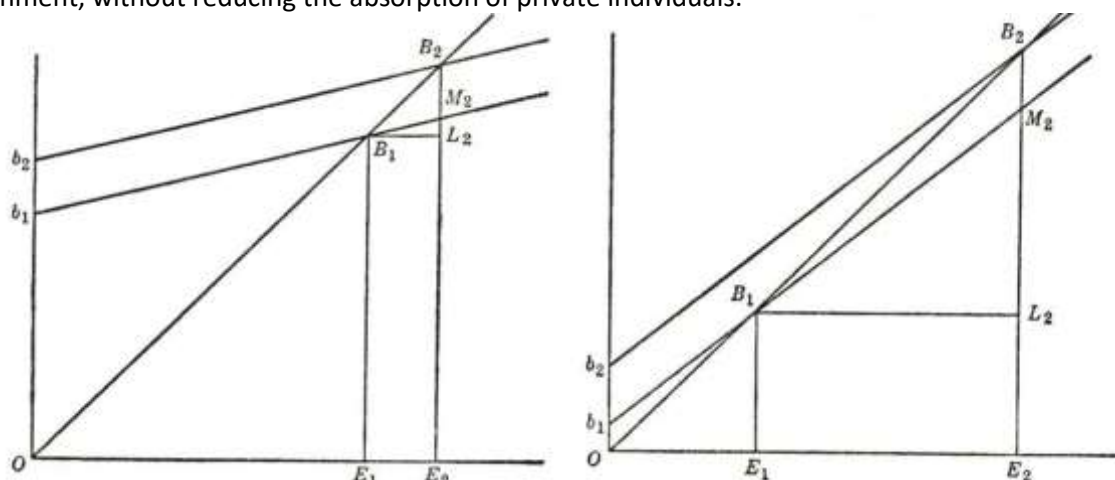


Figure 2. Consumption curves

- *The inclination to absorb and the statistical absorption multiplier*

Whatever the cause, there is a relationship between the extent of the product's uptake and the increase of its equilibrium output. In figure 3 we have drawn the total absorption curve along a straight line. By changing Keynesian terminology, we can consider the slope of this line, as the inclination to absorb. The tendency to absorb is to increase the total absorption of the desire to exit, which is a result of an increase in output. If an increase of the production of 10 units would result in an increase of the voluntary absorption of consumption and of the investments of 8 units, the inclination towards absorption in this interval would be 8/10 or 0.8. In Figure 3, if the perpendicular decreases from B_1 to E_2B_2 to L_2 , the absorption inclination is L_2M_2/B_1L_2 . The ratio of the vertical increase of the absorption function to the resulting increase of the equilibrium output is called a multiplier. The historical significance of this term is that it was used for the first time in relation to the increase of income (production), which would result from a unitary growth of investments, the investment being assumed to be independent of production, so that the multiplier is the sum with which the increase initial investment multiplies in the production of income. The multiplier m , is the ratio B_1L_2/M_2B_2 i.e. the quantity with which the output increases for a vertical increase of the absorption function.

The mathematical relation between the multiplier m and the inclination to absorb α , shown in figure 3 through $B_1L_2 = L_2B_2$ is the following:

$$m = \frac{B_1L_2}{M_2B_2} = \frac{L_2E_2}{M_2E_2} = \frac{L_2E_2}{L_2E_2 - L_2M_2} = \frac{1}{1 - \frac{L_2M_2}{L_2E_2}} = \frac{1}{1 - \alpha} \quad (1)$$

From this mathematical relation it follows that, how much α is closer to 1, the larger the multiplier. If $\alpha = 1$ the multiplier is infinite; the absorption curve is then at a 45 degree inclination and will coincide with the 45 degree identity line. In this case the balance is indeterminate. If the inclination to absorb at the equilibrium point is greater than 1, the equilibrium is unstable.

The relationship between the inclination to the absorption and the multiplier can be graphically visualized by comparing the figure 2 on the left, where the inclination to absorb is small by about 0.25 and where the multiplier is also small by about 1.33, with figure 2 the right side, where the inclination for absorption it is about 0.8 and the multiplier is about 5. The same upward change in the absorption curve in both figures, b_1b_2 , produces a much larger change in the production of B_1L_2 in figure 2 (right side) than in figure 2 (left side).

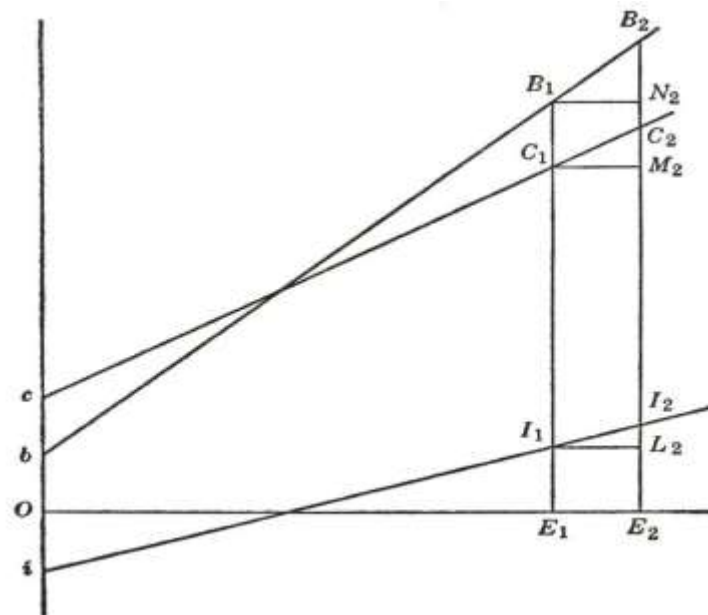


Figure 3. The inclination to consume and invest

- *The inclinations to consume and invest*

The inclination to absorb is the sum of two similar quantities means the inclination to consume and the inclination to invest. This is shown in Figure 3, in which I_1I_2 , C_1C_2 and B_1B_2 are segments of an investment curve, a consumption curve and the total absorption curve. Equality results from the presented method:

$$E_1I_1 + E_1C_1 = E_1B_1 \text{ and } E_2I_2 + E_2C_2 = E_2B_2 \quad (2)$$

From the above relationship, we deduce that:

$$E_2I_2 - E_1I_1 + E_2C_2 - E_1C_1 = E_2B_2 - E_1B_1 \text{ or } L_2I_2 + M_2C_2 = N_2B_2 \quad (3)$$

Then by referring to E_1E_2 or its equivalent, we obtain:

$$\frac{L_2I_2}{I_1L_2} + \frac{M_2C_2}{C_1M_2} = \frac{N_2B_2}{B_1N_2} \quad (4)$$

Where, L_2I_2 / I_1L_2 is the tendency to invest, α_i - that is, the increase of the accumulation desired for a unitary increase of the production. M_2C_2 / C_1M_2 is the tendency to consume, that is to say increase in consumption per unit increase in production.

N_2B_2 / B_1N_2 is the tendency to absorb, α_c . So we have $\alpha = \alpha_i + \alpha_c$

Keynesian system, which proposes that the investment is zero, unless there are, induced investments. If the inclination to invest is zero, then $\alpha = \alpha_c$ and we deduce:

$$m = \frac{1}{1 - \alpha} \quad (5)$$

It seems likely that the tendency to invest is a positive figure. The bigger the higher the inclination to absorb and therefore increase the multiplier.

- *Limitations of equilibrium*

The concept of multiplier was developed, as mentioned above, in an attempt to determine the increase in production, income or national employment, which would result from a spontaneous increase in investment or government spending. The limitations that must be put into this model to make it meaningful are restrictive, reducing its usefulness in the analyzes. We should assume that the consumption function has been unchanged, although the investments have changed and that there was no investment induced before the formula (2). However, the multiplier, or what is practically the same thing to a different

extent, the inclination to absorption, is an extremely important property of the model, because it measures the degree of displacement of the equilibrium position. If the multiplier is small, as in figure 2 (left side), the change of the basic determinants of the system, as reflected in a change in the position of the absorption curve, will not produce a very large change in the position of the equilibrium. In contrast, when the multiplier or absorption trend is large, as in figure 2 (right side), the rather small evolutions under the basic conditions will produce large changes in the national income or output.

This fact is important for the highly industrialized modern economies, as it is a possible pertinent explanation of the great instability of these economies. The tendency to absorb in some industrialized states seems to be at least of the order 0.8. Therefore, quite slight changes in behavior patterns can lead to large changes in the equilibrium position; a slight decrease in the level of absorption function can lead to devastating depression and unemployment, and an equally slight increase may result in full employment, prosperity and even inflation.

4. Conclusions

The article building the equilibrium model, by the way it is approached in the presentation, offers some theoretical and practical conclusions. From a theoretical point of view it follows that the equilibrium model is the essential element that interests us in establishing a macroeconomic strategy without disturbances and without sliding up or down. By the way the authors analyzed these aspects; we find that the deviations in the statistical-econometric models ensure the return to the equilibrium point. It is obvious that within some national economies there are such slips as a result of the coordination that the market gives, but they can appear at different times. Here we can talk about the monetary mass in circulation, we can talk about the evolution of prices, we can talk about the evolution of stocks that affect prices and consequently the recovery of the expenses incurred and so on.

This model is based on mathematical relationships that give by abstracting the general tendency of the system considered and then by statistical-econometric relations, formalized in functions and models, based on which the estimation parameters are calculated, which ensures an evolution towards equilibrium and maintaining equilibrium. Another conclusion is that the domestic and international evolution has influences in one way or another on maintaining the balance we talked about.

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