Dipartimento di Scienze Sociali
ed Economiche

Sapienza
Università di Roma

ISSN 2385-2755
Working papers
(Dipartimento di scienze sociali ed economiche)
[online]

WORKING PAPERS SERIES

DIPARTIMENTO DI

SCIENZE SOCIALI ED ECONOMICHE

n. 1/2019

INVESTMENT AND SAVING IN A DYNAMIC CONTEXT.

Author:

Claudio Sardoni
Sapienza, University of Rome

Sapienza – University of Rome
P.le Aldo Moro n.5 – 00185 Roma T (+39) 06 49910563 F (+39) 06 49910231
CF 80209930587 - P.IVA 02133771002

INVESTMENT AND SAVING IN A DYNAMIC CONTEXT

C. SARDONI

Abstract. In the 1980s Asimakopulos in dealing with the problems of finance, liquidity, investment and saving, criticized both Kalecki and Keynes for the way they dealt with the problem of the investment multiplier. Kalecki's and Keynes's insufficient attention to the time dimension of the multiplier process led them to underestimate the importance of financing investment projects, especially with regard to the problem of the conversion of the firms' short-term loans into long-term loans. When this issue is taken into due consideration, it appears that the economy's propensity to save plays some role in the determination of the conditions under which firms can carry out their investment plans.
The paper concentrates on the main point made by Asimakopulos. In a dynamical analytical context which takes explicit account of the time dimension of processes, the economy's propensity to save can affect investment, even though this does not imply the rejection of the view that investment 'comes first'.
A dynamic approach has the merit to emphasize the important role that the financial system plays in the process of economic expansion and it allows to look at expansionary policies and their effects in a more articulate and thorough way.
Keywords: Investment; Saving; Multiplier; Finance.
JEL Classification: E10; E12; E43; E44

1. Introduction

In the 1980s Asimakopulos (1983, 1986b) in dealing with the problems of finance, liquidity, investment and saving, criticized both Kalecki and Keynes for the way they dealt with the problem of the investment multiplier. For Asimakopulos, Kalecki and Keynes did not pay enough attention to the process in time through which the multiplier effect of investment brings the economy to a higher equilibrium, where investment and saving return to equality.

More in particular, for Asimakopulos, Kalecki's and Keynes's scarce attention to the time dimension of the multiplicative process led them to deny that the economy's propensity to save plays some role in the determination of the conditions under which firms can carry out their investment plans and to underestimate the importance of financing investment projects, especially with regard to the problem of the conversion of the investing firms' short-term borrowing into long-term borrowing.

* An earlier draft of this paper was presented at the 22nd FMM Conference, Berlin, 25-27 October 2018. I would like to thank the participants in the session and, in particular, J. Bibow and A. Terzi, whose comments and criticisms helped me improve the work.

Asimakopulos's viewpoint attracted the attention of several economists (Kregel, 1984-1985, 1986; Richardson, 1986; Snippe, 1985, 1986; Terzi, 1986), who criticized his analysis and defended Keynes's position.[1] The debate touched upon several topics, many of which Asimakopulos did not intend to discuss. In particular, Asimakopulos did not want to discuss and reject Keynes's and Kalecki's idea that the causal relation between investment and saving goes from the former to the latter and not the other way around (Asimakopulos, 1985, 1986c,a).

The present paper, rather than return to that debate, concentrates on the main point made by Asimakopulos, that is to say that the relation between saving and investment is more complex than usually admitted by Keynes and Keynesian economists. This is done by reinstating Asimakopulos's position in a more formal way in a dynamical analytical context which takes explicit account of the time dimension of processes.

Moreover, a dynamic approach has the merit to emphasize the crucial role that banks and the financial system have in the process of economic expansion. Something that had been pointed and stressed already by Robertson and others in the 1920s and 1930s but was almost totally ignored by Keynes in *The General Theory*, where the multiplier and the relation between saving and investment are essentially approached by comparing different equilibrium positions rather than by looking at the dynamic process leading from one equilibrium to another.

The paper is organized as follows. Section 2 is devoted to a brief exposition of Asimakopulos's criticism of Kalecki and Keynes. Section 3 presents a simple formalization of the multiplier process by explicitly considering its timing and the problem of financing investment both short and long-term. Section 4 looks at the differences between the dynamic approach to the multiplier and Keynes's 'equilibrium method', which are not simply methodological but also differ in terms of policy implications that are still relevant in the present economic context. Section 5 concludes.

2. Saving, investment and credit: Criticisms of Kalecki's and Keynes's approaches

For Asimakopulos (1983, p. 222), neither Keynes nor Kalecki 'paid sufficient attention to the time required (...) for the multiplier effects of a higher level of investment to be worked out'. Kalecki is criticized for not having paid enough attention to the time dimension of the multiplier process and for having virtually ignored the problem of the conversion of firms' initial short-term debt into long-term debt. Keynes is criticized both for having ignored the time dimension of the multiplier in *The General Theory* and for having dealt with the problem of the long-term debt of investment in an unsatisfactory way later on in 1937.

[1]The debate was mainly concerned with Keynes's views rather than Kalecki's.

Kalecki (1935) rightly argued that an increase in the level of investment necessarily requires an expansion of credit. The credit granted to firms by banks is part of a circular flow that returns to the lenders in one period, so that the banks' liquid position can be restored (Asimakopulos, 1983, p. 223) In order that Kalecki's circular flows closes it is necessary that desired saving increases by the same amount as investment. In other words, it is necessary that the multiplier process started by the increase in investment fully operates and the new higher equilibrium is reached. Asimakopulos observes: 'Since Kalecki assumes that the increase in saving is equal to the increase in planned investment by the end of the year, he is assuming that the full multiplier effect is completed within that period' (Asimakopulos, 1983, p. 224).

Apart from the acceptableness of the hypothesis that the full operation of the multiplier takes only one period, Kalecki's approach implies that no attention is given to the problem of the firms' necessity to convert their initial short-term debt with banks into longer-term liabilities: 'Kalecki's treatment of finance, investment and saving was also flawed because of his neglect of the need for long-term financing. Investing capitalists should replace their bank loans by long-term bonds that are a better "match" for the expected life of the capital assets that they have acquired. Borrowing "short" to invest "long" can be very dangerous for a business enterprise' (Asimakopulos, 1983, p. 225).

As for Keynes, it is well known that, in *The General Theory*, he ignored the problem of the finance requirements to expand investment. The multiplier is regarded as a logical concept rather than a process in time.[2] Keynes, however, returned to deal with the problem a year later (Keynes, 1937), when he considered the so-called 'finance motive' among the arguments of the demand for money. Nevertheless Keynes, like Kalecki, retained the hypothesis that the circular flow resolves itself in one period.

Asimakopulos concentrates on Keynes's 1937 article and argues that his approach remains largely unsatisfactory. Keynes's position, argues Asimakopulos, is even more extreme than Kalecki's, as it is based on very special assumptions. Keynes holds that the initial liquidity positions are restored as soon as the investment is made (Keynes, 1937, pp. 247-248), which implies that 'the full multiplier operates instantaneously, with a new situation of short-period equilibrium being attained as soon as the investment expenditure is made' (Asimakopulos, 1983, p. 227).[3]

[2]In *The General Theory*, Keynes's attention is focused on the final equilibrium produced by a larger investment, i.e. 'on the logical theory of the multiplier which holds good continuously without time-lag, at all moments of time' (Keynes, 1936 [1973], p. 122).

[3]Asimakopulos also points out that this is a necessary but not sufficient condition for restoring the initial liquidity positions. For the reasons why it is so, see Asimakopulos (1983, pp. 227-228).

Keynes's approach is made even more problematic by the fact that he, differently from Kalecki, devotes some attention to the firms' conversion of the bank short-term loans into longer-terms debts by issuing liabilities in the financial market. Since it is rational for firms to match their long-term commitments generated by their investment projects, they 'must be assured about the availability of long-term, as well as short-term, finance before committing themselves to investment decisions' (Asimakopulos, 1983, p. 229).

In this respect, financial intermediaries ('speculators') play a crucial role by buying the firms' long-term liabilities: 'They could thus provide the investing firms with long-term finance *before* the full multiplier effects of the increase in investment have been completed by purchasing their long-term bonds with the proceeds of short-term loans from the banks (...) After the full multiplier has operated (...) there is an increase in desired saving that can, if directed to the purchase of long-term securities, relieve the pressure on these intermediaries (speculators) to support this higher rate of investment' (Asimakopulos, 1983, p. 229). There arises, however, the question concerning the terms at which intermediaries are willing to buy the firms' long-term liabilities: 'Is the spread between the short- and long-term rates that they require sufficiently small so as not to discourage investment?' (Asimakopulos, 1983, p. 229)

Asimakopulos recalls Kaldor's criticism of Keynes's analysis (Kaldor, 1960). Kaldor argues that Keynes's position is based on 'on the implicit assumption that speculators would absorb the new issues of long-term securities (obtaining the necessary funds by borrowing at short term) until the increased saving became available for this purpose, without any noticeable change in the term structure of interest rates' (Asimakopulos, 1983, p. 229). However, for Kaldor, provided that the required increase in speculative stocks is not too large with respect to the market dimension, the effect of this sort of operation would not be an increase in the short and long-term interest rates (Kaldor, 1960, p. 50), so that 'the degree of price-stabilizing influence, though not perhaps infinite, is very much larger in the case of long-term bonds than for any other commodity; and this means that the Keynesian theory, though a "special case", gives, nevertheless, a fair approximation to reality' (Kaldor, 1960, p. 52).

For Asimakopulos, Kaldor's conclusion was influenced by the economic situation of the time when he wrote the article, which was characterized by large unemployment, the existence of unused productive capacity and stable prices and wages. In situations characterized by (actual and expected) inflation, there can be downward pressures on the prices of the firms' long-term liabilities (Asimakopulos, 1983, p. 230). In such situations, which a general theory should contemplate, a higher propensity to save can contribute to reduce the pressure on the prices of the firms' liabilities. Thus, in conclusion, 'The independence of investment, and the finance that makes investment possible, from saving is not as robust as

Keynes stated. The investment market *can* become "congested through shortage of saving" ' (Asimakopulos, 1983, p. 230).

Asimakopulos (1983, pp. 230-232) considers also the case of open economies and the case of economies characterized by large government deficits. In both cases, for him, the special nature of Kalecki's and Keynes's assumptions emerges even more clearly. While, for brevity, the case of an open economy is not considered here, we shall return to the problem of government deficits in section 4. In the next section, we present Asimakopulos's argumentation in a more formal way than he did. However, to keep the analysis as simple as possible, some aspects that were discussed by Asimakopulos and Kaldor as well are not taken into consideration. In particular, the model does not consider the possibility that the firms' long-term liabilities are purchased by borrowing short. In this way the analysis is simplified without a significant loss of generality.

3. A formalization

Consider a closed economy with no public sector in which, at time $t = 0$, firms increase investment by I_0. The timing of the process triggered by investment is the following:

(1) Each period $t = 0, 1, 2 \cdots$ is divided into sub-periods $p = p_1, p_2, p_3, \cdots$ Each sub-period p_i is a round of the multiplier process triggered by investment at the beginning of the corresponding period.[4]

(2) At time $t = 0$, firms finance their investment by borrowing short from banks an amount $B_0 = I_0$ at the short-term rate r_b, which for simplicity we take as given and constant.[5] The firms' investment decisions at $t = 0$ depend on the short-term rate r_b but they also depend on the long-term interest rate at $t = 0$, $r_{l,0}$, as better explained below.

(3) In the first sub-period p_1, firms convert their short-term debt B into long-term debt. To do so firms must repay their short-term debt with banks, which amounts to $(1 + r_b)I_0$; therefore they must obtain liquidity from the market by selling long-term liabilities for the same amount. The firms' demand for liquidity at p_1 is

$$L_{d,p_1} = R_b I_0 = R_b B_0 \tag{3.1}$$

with $R_b = (1 + r_b)$.

(4) Firms will make new investment decisions at $t = 1$ when the aggregate output has reached its new equilibrium level as determined by the full operation of the investment multiplier.

[4]For example, $S_{p_1} = sI$ denotes the amount of saving generated by investment I in the first round of the multiplier process.

[5]Firms, therefore, finance their investment entirely with external funds. If part of I_0 were financed with internal funds, this would not affect the analysis below in any significant way.

For now, we concentrate on the effects generated by investment made at $t = 0$; but before proceeding to the analysis of the multiplier process it is necessary to devote some attention to the dynamics of total liquidity and liquidity potentially available to buy the firms' long-term liabilities. If M is the initial stock of money (bank deposits) at $t = 0$, the banks' lending creates an additional amount of liquidity equal to $B = \Delta M$. Firms spend this additional liquidity to carry out their investment projects and create an initial additional income equal to $\Delta M = I_0$. In the first sub-period p_1 a portion $cI_0 = c\Delta M$ of the additional income is used by households to finance their consumption; the remaining portion $sI_0 = s\Delta M$ is saved.

Since the additional saving $s\Delta M$ is initially in money form, at p_1 the total liquidity potentially available for the purchasing of the firms' long-term liabilities is

$$M + sI_0$$

Total liquidity, however, is not necessarily used entirely to purchase the firms' liabilities. The portion of total liquidity 'offered' to firms depends on the economy's liquidity preference, which in turn is a decreasing function of the current long-term interest rate at the sub-period p_1, r_{l,p_1}, when firms enter the market to sell their long-term liabilities. The portion l of total liquidity made available to firms at p_1 is an increasing function of the long-term interest rate r_{l,p_1}.

In general, the supply of liquidity to firms can be expressed as

$$L_{s,p_1} = l(r_{l,p_1})[M + sI_0] \tag{3.2}$$
$$\text{with } \frac{\partial l}{\partial r_{l,p_1}} > 0$$

Here, to make the following analysis more tractable, we set $l(r_{l,p_1}) = \alpha r_{l,p_1}$, with $\alpha > 0$, and we transform equation 3.2 into

$$L_{s,p_1} = \alpha r_{l,p_1} M + sI_0 \tag{3.3}$$

which amounts to assuming that also at a nil interest rate the supply of liquidity to firms remains positive and equal to sI_0. This however does not necessarily mean that all the additional liquidity sI_0 is directed to buying the firms' liabilities: part of M could be destined to the purchasing of the liabilities and part of sI_0 kept in liquid form and the total liquidity supplied at $r_{l,p_1} = 0$ remains equal to sI_0.

It is now time to look at investment in a more detailed way. Firms' investment decisions depend on a number of variables, among which there are both the short and the long-term interest rates. We concentrate on the interest rates; but, since the short-term rate, r_b is taken as given and constant, the crucial variable is the long-term interest rate. We can then write

$$I = I(r_l) \text{ with } \frac{\partial I}{\partial r_l} < 0$$

We make the hypothesis that, at $t = 0$, the firms' investment decisions are based on the current long-term interest rate, so that

$$I_0 = h(r_{l,0}) \tag{3.4}$$

Consequently the demand for liquidity in the first sub-period is

$$L_{d,p_1} = R_b I_0 \tag{3.5}$$

The equilibrium condition for the financial market at p_1, $L_{d,p_1} = L_{s,p_1}$, from (3.3) and (3.5) is

$$R_b I_0 = \alpha r_{l,p_1} M + s I_0 \tag{3.6}$$

and

$$r_{l,p_1} = \frac{1}{\alpha M}(R_b - s) I_0 \tag{3.7}$$

The equilibrium interest rate r_{l,p_1} is decreasing in s, the economy's marginal propensity to save. The long-term rate is also decreasing in α, which expresses the sensitivity of the liquidity supply to the interest rate.

We could consider a more general case in which investment at $t = 0$ is a function of the expected long-term interest rate at p_1, $E[r_{l,p_1}]$. Given the expected interest rate, which can be equal, larger or smaller than $r_{l,0}$, the analysis above would not change.

The long-term interest rate determined at p_1 will remain stable during the following sub-periods $p_2, p_3, \cdots$. In the sub-periods the additional savings created by the multiplier process flow in the financial market and allow the economy to return to its initial liquidity position when the multiplicative process is completed. At $t = 1$, when new investment decisions will be made the current long-term interest rate therefore is

$$r_{l,1} = r_{l,p_1} \tag{3.8}$$

which, as we saw is a decreasing function of the marginal propensity to save.

The analysis carried out so far was concerned with the problem set by Asimakopulos and concentrated on the effects on the interest rate at the first round of the multiplier process when firms decide to change the maturity of their debt. We now turn to an attempt to generalize the analysis by considering the dynamics of the long-term interest rate over time. To do this it is necessary to abandon the previous hypothesis that at time $t = 0$ the long-term rate, $r_{l,0}$ is given. The long-term interest rate at $t = 0$ is determined by the demand and supply of liquidity generated by investment decisions at $t = -1$, i.e.

$$r_{l,0} = \frac{1}{\alpha M}(R_b - s) I_{-1} \tag{3.9}$$

where I_{-1} denotes the investment decisions made at time $t = -1$. The interest rate $r_{l,0}$ is determined in the same way as $r_{l,1}$, i.e. by the demand and supply of liquidity in the first sub-period of the multiplier process triggered by I_{-1}.

Since $r_b, s,$ and M are taken as given, it obviously is

$$r_{l,0} = r_{l,1} \text{ if and only if } I_{-1} = I_0$$

If, for whatever reason, it is $I_0 \neq I_{-1}$ then the long-term interest rate changes from $t = 0$ to t=1, and

$$r_{l,1} > r_{l,0} \text{ for } I_{-1} < I_0$$
$$r_{l,1} < r_{l,0} \text{ for } I_{-1} > I_0$$

More generally, the dynamics of the equilibrium long-term interest rate can be expressed by a first-order difference equation. If we adopt a linear investment function $I_t = A - br_{l,t}$ and we assume, for simplicity, that the short-term interest rate is equal to 0, the difference equation is

$$r_{l,n} = \frac{1}{\alpha M}[-b(1-s)r_{l,n-1} + A(1-s)] \tag{3.10}$$

whose solution is

$$r_{l,n} = \frac{1}{b(1-s)+\alpha M}A(1-s)\left[1 - \left(-\frac{b(1-s)}{\alpha M}\right)^n\right] \tag{3.11}$$

Since the term $\Psi = \left(-\frac{b(1-s)}{\alpha M}\right)$ is certainly negative, the equilibrium long-term rate oscillates over time. However, if the modulus of Ψ is less than 1, $\Psi^n \to 0$ for $n \to \infty$ and the interest rate converges to $\frac{1}{b(1-s)+\alpha M}A(1-s)$, which is decreasing in s. More specifically

$$|\Psi| < 1 \text{ if } b < \frac{\alpha M}{(1-s)} \tag{3.12}$$

Condition 3.12 means that the interest rate converges to a stable value if the sensitivity of investment to the rate of interest (b) is sufficiently small.

So far we have assumed that the firms' demand for long-term loans is equal to the amount of their short-term debt plus interest and independent of the long-term interest rate at the time when they enter the financial market. In other words, we have assumed that firms' demand for long-term loans liquidity is perfectly rigid with respect to the interest rate. Now we remove this hypothesis and we write the firms' demand for liquidity at p_1 as

$$L_{d,p_1} = R_b I_0 - dr_{l,p_1}$$

with $d > 0$. That is to say, the amount of short-term debt that firms want to transform into long-term liabilities is decreasing in the current long-term interest rate.

Therefore, the equilibrium condition in the financial market at p_1 now is

$$\alpha r_{l,p_1} M + sI_0 = R_b I_0 - dr_{l,p_1}$$

from which we obtain the equilibrium long-term interest rate

$$r_{l,p_1} = \frac{1}{(\alpha M + d)}(R_b - s)I_0 \tag{3.13}$$

The new equilibrium interest rate is still decreasing in s and α but lower than in the previous simpler case (3.7).

Now, however, firms have to renew their short-term debt and enter the financial market again to complete the change of maturity of their liabilities. To keep things simple, let us suppose that firms complete the change of maturity of their debt at p_2, so that their demand for liquidity at p_2 is

$$L_{dp_2} = R_b^2[I_0 - (R_b I_0 - dr_{l,p_1})] \tag{3.14}$$

while the supply of liquidity is

$$L_{s,p_2} = \alpha r_{l,p_2} M + s(1+c)I_0 - (R_b I_0 - dr_{l,p_1}) \tag{3.15}$$

In fact, at p_2, the new savings generated by I_0 (scI_0) must be added to the remaining available liquidity $(M - R_b I_0 - dr_{l,p_1})$.

Therefore the equilibrium long-term interest rate at p_2 is

$$r_{l,p_2} = \frac{1}{\alpha M}\left\{[R_b^2(1 - R_b) - s(1+c)]I_0 + R_b^2 dr_{l,p_1}\right\} \tag{3.16}$$

r_{l,p_2}, which is decreasing in s and α, will remain stable until the completion of the multiplier process started by I_0, so that

$$r_{l,1} = r_{l,p_2} \tag{3.17}$$

The analysis above could be further generalized by lifting the hypothesis that firms complete the change of maturity of their debt in the second sub-period and consider the case in which they re-enter the financial market in subsequent sub-periods $p_3, p_4 \cdots$ or by considering the dynamics of investment and interest rates over time like in the case of equation 3.10. For the sake of simplicity we do not consider these possible generalizations.

The analysis carried out in this section yields two main results that confirm Asimakopulos's less formal argumentation.

(1) At the time when firms enter financial markets to lengthen the maturity of their debt, the amount of saving generated by their investment decisions, and directed to financial markets, is one of the variables that determine the interest rate at which firms can borrow long.
(2) The magnitude of the effect of marginal propensity to save on the long-term interest rate and investment depends on the parameters and the shape of the functions used in the model. In particular, such magnitude depends on the sensitivity of the supply of liquidity to the interest rate (equation 3.2 and 3.3) and the sensitivity of investment to the interest rate (equation 3.4).

(3) The long-term interest rate at which firms can borrow long is likely to affect their future investment decisions. Since this interest rate is dependent also on the economy's marginal propensity to save, the latter affects future investment decisions.

It is in this sense that saving decisions have an impact on investment. This has nothing to do with the question whether it is saving that determines investment or the other way around. It is obviously true that it is investment that determines saving. If there was not the initial firms' investment decision, there would be no additional saving to talk about! The initial investment decisions are not constrained by the amount of existing saving, since firms can borrow from banks which create the necessary liquidity to start the process.

However, the relationship between saving and investment cannot be looked at by simply reasserting that investment 'comes first'. This would be sufficient whether it is assumed that the multiplier process started by investment completes itself at the same time when firms enter financial markets to borrow long or whether the multiplier concept is reduced to a merely logical concept.

If, instead, the analysis is carried out dynamically, i.e. by paying attention to processes taking place in time, it is possible to see and point out the more complex nature of the relationship between investment and saving decisions. This is the essential point that Asimakopulos intended to make.

4. Some methodological and policy considerations

Although in a more formal way, the analysis of the multiplier process carried out in the paper follows the same methodological approach adopted by Asimakopulos, that is to say a sequential dynamic method rather than Keynes's 'equilibrium method'. The differences between the two approaches have been pointed out since the 1930s debates about Keynes's *General Theory*.

In the preface to the 1949 edition of *Banking Policy and the Price Level* (Robertson, 1926[1949]) Robertson pointed out the difference between his and Keynes's approaches to the relation between saving and investment. Robertson adopted the sequential approach to the problem, but Keynes became critical of it. By referring to the 1926 first edition of his book, Robertson observes: 'While Keynes must at the time have understood and acquiesced in my step-by-step method, it is evident that it never, so to speak, got under his skin; for in his two successive treatment of the savings-investment theme in his two big books he discarded it completely' (Robertson, 1926[1949], p. xi). Keynes, for Robertson, 'forgot' to take into consideration and analyze the period of transition between the initial increase in investment and the realization of the final equilibrium, at which investment is necessarily equal to saving. Robertson acknowledged that Keynes made some steps forwards in the correct direction in 1937 by introducing the finance motive, which implies accepting, to a certain extent, his own sequential analytical method. However, for him, Keynes's analysis remained unsatisfactory in several respects.[6]

Disregarding the time dimension of the multiplicative process generated by investment implies the overlooking, or at least the downplaying, of the role that banks and financial markets play in the process. Presley (1978, p. 86) clearly the difference between Robertson and Keynes in this respect: expounds 'The finance required for investment to take place is instantaneously provided by voluntary saving, so there is no need either for the banks to create credit to finance the investment or for forced saving to be imposed on the public. ... Given the multiplier, and a static approach, the equality of saving and investment is guaranteed'.[7]

The sequential approach, as well known, was also a distinctive feature of the Swedish School. Keynes in discussing with Ohlin, one of the exponents of the School, reasserted his criticism of the sequential method and, in particular of the ex ante/ex post method. In a letter to Ohlin of January 1937, Keynes held that his own method was preferable when 'something truly logical and properly watertight' has to be proved and that '...the *ex post* and *ex ante* device cannot be precisely stated without very cumbrous devices. I used to speak of the period between expectation and result as "funnels of process", but the fact that the funnels are all of different lengths and overlap one another meant that at any given time there was no aggregate realised result capable of being compared with some aggregate expectation at some earlier date' (Keynes, 1973, p. 185).

Keynes may have been right to underline the difficulties of sequential analysis and, in particular, the difficulty to provide a precise definition of the length of periods. Nonetheless, it is true that sequential analysis represents a clearer conceptual framework to cope with processes that occur in time. The analysis of the multiplier effects of investment is one of the cases in which the occurring of events in time should not be ignored. To overlook the occurring of the multiplier process over time implies to underestimate, or ignore altogether, significant analytical and conceptual aspects like the relation between saving propensity and investment decisions.

Keynes's refusal to follow a sequential approach and the adoption of the equilibrium method caused difficulties also to his theory of investment, based on the notion of a decreasing marginal efficiency of capital. In chapter 11 of *The General Theory*, he explained why the marginal efficiency of capital is a decreasing function of investment by conflating events and decisions that necessarily take place at different times, so that his analytical results are flawed.[8]

---

[6]In particular, with respect to the process through which the initial liquidity positions are restored. See Robertson (1937, pp. 432-433) and Robertson and Keynes (1938, p. 319). See also Asimakopulos (1983, p. 228n) and Ingrao and Sardoni (2019, chapters 3 and 5).

[7]On this see also Leijonhufvud (1981).

[8]Asimakopulos (1971), inspired by Kalecki (1936 [1990]), criticized also this aspect of Keynes's theory. See also Sardoni (1996) for a discussion of the topic.

The differences between the sequential and equilibrium approaches to the multiplier are not only analytical and methodological. The two approaches differ also in terms of policy implications. Asimakopulos (1983, pp. 231-232) had already pointed out that, in situations characterized by large public deficits, which imply a larger demand for liquidity in financial markets, a higher marginal propensity to save can play a positive role by contributing to reduce the pressure on interest rates, and hence private investment. A high marginal propensity to save can make deficit spending policies necessary to keep aggregate demand at a certain desired level; but these policies should be such as to minimize, if not eliminate, the pressure on interest rates. In a long-term perspective, public expenditures financed in deficit should be such as to have a positive impact on the economy's rate of growth thanks to their positive effect on the economy's productivity.[9]

Analogous considerations can be made for policies aiming to change the income distribution in favor of workers, who have a lower marginal propensity to save than profit earners. The marginal propensity to save s considered in the previous section is the economy's average marginal propensity to save. If we make the hypothesis that there are two classes, workers and capitalists, with different marginal propensities to save and, in particular, that it is $s_w < s_k \leq 1$ (s_w is the workers' propensity to save and s_k the capitalists' propensity to save), then s is the weighted average of s_w and s_k:

$$s = \frac{{}_w\Omega + s_k\Pi}{Y}$$

(Ω is the wage share and Π is the profit share) which is increasing in the profit share.

Therefore, the higher is s and, hence, the higher is the profit share, the easier is for firms to obtain their required long-term funding at a given interest rate. We have a sort of 'paradox': the lower is the economy's propensity to save the stronger is the multiplier effect of investment, but the higher is the economy's propensity to save the easier and cheaper is for firms to start and carry out investment. An income distribution more favorable to workers generally has a positive 'short-term' effect on the multiplier, but it can generate negative 'long-term' effects if the lower (average) propensity to save implies higher interest rates, with negative effects on future investment, growth and employment. If these long-term effects are taken into account, redistributive policies should be accompanied by other measure that help reduce the pressure on financial markets generated by a lower overall marginal propensity to save.

[9]Here, it is not possible to delve further into this problem. For a more detailed analysis of this issue, see Sardoni (2016) and Bhatt and Sardoni (2016).

5. Conclusions

The analysis carried out in this paper, inspired by Asimakopulos's work, shows that the relation between saving and investment is more complex than usually acknowledged by Keynes and Keynesian economists. In section 3, we show that the economy's marginal propensity to save affects the long-term interest rate and, through it, investment. A higher marginal propensity to save contributes to reduce the pressure on the financial markets when firms convert their short-term debt into longer-term liabilities. The long-term interest rate that is determined in the market at the time of the debt conversion can affect future investment decisions. The lower is the long-term interest rate at the time when the maturity of the firms' debt is lengthened, the larger will future investment be.

In this sense, a higher propensity to save plays a positive role in the multiplier process triggered by investment. Thus, the conventional Keynesian view that the lower is the propensity to save the larger is the impact of investment on income must be qualified. If the analysis is carried out by not considering the timing of the multiplier process and the problem of financing investment, the negative effect of a higher propensity to save is obvious. If the analysis is carried out by explicitly considering the timing of the process and, hence, also the problem of the firms' debt conversion, a higher propensity to save can play a positive role. A lower marginal propensity to save certainly implies a larger multiplier effect of investment made at a certain point in time; but it is also true that a lower marginal propensity to save can determine a higher interest rate and, hence, affect future investment plans negatively.

To acknowledge that the relation between saving and investment is more complex than usually admitted does not imply to reject the idea that it is investment that generates saving and not the other way around. If there was not the initial firms' investment decision, there would be no additional saving to talk about.

Finally, the dynamic approach to the multiplier effect of investment. with its emphasis on the role that the marginal propensity to save has in the process from an equilibrium to another, allows us to look at expansionary policies from a more articulate and complex perspective. In assessing deficit spending or redistributive policies, it is not sufficient to take into considerations their immediate effect on aggregate demand; it is necessary to take account also of their secondary effects on interest rates, which can at least partly impair their primary positive effect on demand if not adequately dealt with.

References

Asimakopulos, A. (1971), 'The determination of investment in Keynes's model,' *Canadian Journal of Economics*, **4** (3), 382–8.

Asimakopulos, A. (1983), 'Kalecki and Keynes on finance, investment and saving,' *Cambridge Journal of Economics*, **7** (3/4), 221–233.

Asimakopulos, A. (1985), 'Finance, saving and investment in Keynes's economics: A comment,' *Cambridge Journal of Economics*, **9** (4), 405–407.

Asimakopulos, A. (1986a), 'Finance, investment and saving: a reply to Terzi,' *Cambridge Journal of Economics*, **10** (1), 81–82.

Asimakopulos, A. (1986b), 'Finance, liquidity, saving, and investment,' *Journal of Post Keynesian Economics*, **9** (1), 79–90.

Asimakopulos, A. (1986c), 'Richardson on Asimakopulos on finance: a reply,' *Cambridge Journal of Economics*, **10** (2), 199–201.

Bhatt, A. and Sardoni, C. (2016), 'Public expenditure and growth: The Indian case,' Working Paper 7/2016, Dipartimento di Scienze Sociali ed Economiche, Sapienza University of Rome.

Ingrao, B. and Sardoni, C. (2019), *Banks and finance in modern macroeconomics: An historical perspective*, Chelthenam: Edward Elgar, forthcoming.

Kaldor, N. (1960), 'Speculation and economic stability,' in *Essays on Economic Stability and Growth. Collected Economic Essays by Nicholas Kaldor*, London: Duckworth, vol. 1 of *Collected Economic Essays*, first edn., pp. 17–58.

Kalecki, M. (1935), 'A macrodynamic theory of business cycles,' *Econometrica*, **3** (3), 327–44.

Kalecki, M. (1936 [1990]), 'Some remarks on Keynes's theory,' in J. Osiatyński (ed.), *Capitalism. Business Cycles and Full Employment*, Oxford: Clarendon Press, vol. 1 of *Collected Works of Michal Kalecki*, pp. 223–32.

Keynes, J. M. (1936 [1973]), *The General Theory of Employment Interest and Money*, vol. 7 of *The Collected Writings of John Maynard Keynes*, London: Macmillan.

Keynes, J. M. (1937), 'Alternative theories of the rate of interest,' *Economic Journal*, **47** (186), 241–252.

Keynes, J. M. (1973), *The General Theory and After. Part II, Defence and Development*, vol. 14 of *The Collected Writings of John Maynard Keynes*, London: Macmillan.

Kregel, J. A. (1984-1985), 'Constraints on the expansion of output and employment: real or monetary?' *Journal of Post Keynesian Economics*, **7** (2), 1398–152.

Kregel, J. A. (1986), 'A note on finance, liquidity, saving and investment,' *Journal of Post Keynesian Economics*, **9** (1), 91–100.

Leijonhufvud, A. (1981), 'The Wicksell connection: Variations on a theme,' in *Information and Coordination. Essays in Macroeconomic Theory*, Oxford and New York: Oxford University Press, pp. 131–202.

Presley, J. R. (1978), *Robertsonian Economics*, London: Macmillan.

Richardson, D. R. (1986), 'Asimakopulos on Kalecki and Keynes on finance, investment and saving,' *Cambridge Journal of Economics*, **10** (2), 191–198.

Robertson, D. H. (1926[1949]), *Banking Policy and the Price Level. An Essay in the Theory of the Trade Cycle*, Fairfield, NJ: Augustus M. Kelley Publishers, 4th edn.

Robertson, D. H. (1937), 'Alternative theories of the rate of interest: Three rejoinders-II,' *Economic Journal*, **47** (187), 428–436.

Robertson, D. H. and Keynes, J. M. (1938), 'Mr. Keynes and "finance",' *Economic Journal*, **48** (190), 314–322.

Sardoni, C. (1996), 'Prices, expectation and investment,' in S. Pressman (ed.), *Interactions in Political Economy*, London and New York: Routledge, pp. 93–109.

Sardoni, C. (2016), 'A note on the sustainability of full employment in the presence of budget deficits,' *Review of Political Economy*, **28** (1), 79–89.

Snippe, J. (1985), 'Finance, saving and investment in Keynes's economics,' *Cambridge Journal of Economics*, **9** (3), 257–269.

Snippe, J. (1986), 'Finance, saving and investment in Keynes's economics: a reply,' *Cambridge Journal of Economics*, **10** (4), 373–377.

Terzi, A. (1986), 'Finance, investment and saving: a comment on Asimakopulos,' *Cambridge Journal of Economics*, **10** (1), 77–80.