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**Genesis and foundations of the multiplier:
Marx, Kalecki and Keynes**

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DEPFID Working Papers - 7 / 2010 - Abstract

Genesis and foundations of the multiplier: Marx, Kalecki and Keynes

Serena Sordi and Alessandro Vercelli

This paper explores the Marxian genetic root of the multiplier in order to clarify its foundations and validity conditions. Though the analysis is restricted to the first two volumes of *Capital* and the early contributions by Kalecki in the 1930s, we argue that we can draw from these works valuable insights into the theoretical and empirical scope of the Kahn-Keynes multiplier.

KEYWORDS: multiplier, reproduction schema, capitalist process of circulation

JEL CLASSIFICATION: B23, B41, E11, E12

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1. Introduction

Although Keynes was not the first, nor the most rigorous, early user of the multiplier, the success of the latter is indissolubly intertwined with the success of Keynesian macroeconomics; and its fortune grew and declined with it. As is well known, its classical formulation by Kahn (1931) soon became a crucial pillar of Keynes's *General Theory* (1936). In a letter to Beveridge written a few months after publication of the *General Theory*, Keynes himself maintained that "half the book is really about it" (Keynes 1973, 57). Subsequently, the *General Theory* version of the multiplier became a building block of the standard version of the Keynesian static model (cross-diagram and/or IS-LM). Its static nature was soon criticized also by followers and sympathetic interpreters who soon worked out a dynamic version of the multiplier and coupled it with the accelerator (Harrod 1936, 1939, Samuelson 1939, Goodwin 1947, 1948, Hicks 1949, 1950). The multiplier-accelerator model rapidly became the prototype model for dynamic Keynesian theory aiming to explain both business cycles and growth. However, notwithstanding the deep link between the multiplier and Keynesian theory, the economic meaning and rationale of the multiplier have been insufficiently spelled out by Keynes himself, as well as by his followers and interpreters.¹ We may say that the foundations of the multiplier in its various versions are still quite shaky. When in the 1970s Keynesian macroeconomics came under frontal attack, the multiplier was bluntly rejected, together with other crucial components of Keynesian theory, for its alleged lack of micro-foundations and its sheer inconsistency with full-employment equilibrium. On the contrary, we believe that the multiplier, correctly understood, is not deprived of sound foundations that are still significant for contemporary macroeconomics. These foundations may be defined as microeconomic although in a sense quite different from that of mainstream economics, since they are rooted in the technology of transactions in a monetary economy and not in the behaviour of rational agents.

There is a huge literature dealing with the genesis of the multiplier. Much of it, however, is mainly concerned with the issue of priority trying to clarify who was the first to contribute, in some sense, to the original 'fabrication' process of the multiplier (see, e.g., Shackle 1967, Dimand 1988, Laidler 1999). This paper is not primarily concerned with priority but with the foundations underlying the multiplier and its

¹ Among the rare exceptions we mention Goodwin (1947, 1948).

genesis. As for priority we believe that it would be possible to track a process of convergence – starting at the end of the 19th century and ending in the 1930s – towards the Kahn-Keynes multiplier of models (such as the Marxian, Marshallian, Wicksellian and American models) rooted in different traditions of thought.

Our focus is on the Marxian genetic root that we believe to be particularly useful for clarifying the rationale of the multiplier. Although the analysis will be restricted almost exclusively to the first two volumes of *Capital*, and to the early contributions by Kalecki in the 1930s, we believe that we may draw from these contributions a few valuable insights into the foundations underlying the multiplier. The discussion of the rationale for the multiplier will help us to clarify the condition under which a sound use of this theoretical instrument is possible. This also helps to explain why similar versions of the multiplier emerged independently, or largely so, in similar circumstances within different traditions of economic thought.

The structure of the paper is as follows. In section 2 we provide the necessary background to the core of the argument by briefly discussing the genesis of the multiplier and its basic meaning. In section 3 we discuss the extent to which Marx may be considered a forerunner of the multiplier, as has often been claimed. We argue that the existing derivations from the reproduction schemes show more a sizable theoretical and methodological distance between the multiplier and the reproduction schemes rather than a significant affinity. On the other hand we show that there is a much deeper link between the multiplier and Marx's analysis of the circulation of capital as introduced in the first volume of *Capital* and developed in the third volume and in many other works. This allows an alternative derivation of the multiplier that clarifies its rationale and its crucial validity conditions. In section 4 we show that the multiplier implicit in the early works of Kalecki retains some of Marx's insights within a modified approach that is much closer to that elaborated in the same years by Keynes. In the light of the insights drawn in the preceding sections, in section 5 we discuss the rationale and the validity conditions of the multiplier. Section 6 concludes.

2. The genesis of the multiplier

In this section we provide a bird's eye view of the genesis of the multiplier – not in order to discuss the vexed question of priority, but rather to set the necessary background for a clarification of its meaning and foundations. To this end we have to consider not only the analytical steps leading to its 'fabrication' (see Laidler 1999) but also the crucial role of the 'pre-analytic' vision (in the sense of Schumpeter 1954)

underlying the contributions to its emergence.² The vision underlying the multiplier is rooted in a structural approach to the analysis of the economy as a whole, one that focuses on the temporal and/or causal relations between the relevant variables, and on the technological and institutional constraints to their interaction. This approach is applied to the circular flow of income and expenditure and requires an analytical apparatus capable of tracing the causal sequences and/or the dynamic path of these flows. A quite sophisticated model of the circular flow of income and expenditure, the celebrated *Tableaux économique*, had been already drafted by Quesnay in 1758. This approach was updated to modern capitalist relations and further developed by Marx, through the reproduction schemas developed in the second volume of *Capital* (1956 [1885]). Many authors have recently derived different versions of the multiplier from the reproduction schemas (see, e.g., the critical survey by Trigg 2006). However the multiplier, as we know it, was not made explicit either by Marx or by his followers, although some of its insights and implications were somehow emerging in the debate between Grossman, Rosa Luxemburg and Tugan Baranowski on the realization of capital and the crisis. Its explicit emergence may be traced back to the turn of the 19th century when a few heterodox, sometimes non-professional, economists advanced the first rudimentary versions (Dimand 1988). Julius Wulff, for example, a member of the Danish parliament and amateur economist, already in 1896, computed the secondary effects of public works through a geometric series converging to a finite value because of the leakage due to imports (see Shackle 1967, 194). Another important early contribution came from the German-American businessman and economist Nicholas Johanssen (1908) who used the term ‘multiplying principle’ in his fairly precise discussion of the effect of investment expenditure on economic activity. However, no one doubts that the modern version of the multiplier that became a crucial component of Keynesian macroeconomics was introduced by Kahn (1931).³ He wanted to show that in a situation of persistent unemployment an increase in public expenditure would employ idle workers and that this would start a sequence of increases in all the sectors of the economy as the additional income of the newly employed workers would translate into higher expenditure and so on. He thus maintained that «the ratio of secondary employment to primary employment» (*ibid.*, 183) could be conceived as the finite sum of a geometric progression $k/(1-k)$ where k represents the leakage, in this

² In what follows we will speak simply of ‘vision’ as we believe that it plays a crucial role in the development and interpretation of economic analysis among other things.

³ As stressed by Shackle (1967, 105 and 114-115), around 1930 a few other scholars such as Gibling, Meade, and Hawtrey put forward arguments very close to those of Kahn’s multiplier, although none of them reached the clarity and rigour of Kahn’s contribution.

case the percentage of the newly generated income spent on domestic goods and services. He clarified that the precise formula of the multiplier depends on the fact that k may be safely assumed to be less than one because part of the new income is spent on imported goods and services. He also emphasized that this simple formula that ignores the effects on prices is fit “at times of intense depression» while «at normal times, when productive resources are fully employed [...] building of roads carries with it little secondary employment and causes a large rise in prices” (*ibid.*, 182). Kahn applied his employment multiplier to an open economy and emphasized the role of imported goods as the main cause of leakage in the propagation process. In 1932 Jens Warming, a Danish statistician, clarified that Kahn’s multiplier works as well in a closed economy provided that we understand that the main leakage that assures a relatively quick convergence to the finite-sum expression is given in this case by the fact that the marginal consumption propensity is typically quite inferior to unity. Warming’s insights were promptly received by Keynes and adopted in his work with the Committee of Economists of the Economic Advisory Council to the British Government (Keynes 1933). This version of the multiplier inspired Keynes to move a crucial step forward. Although Keynes had nothing to add to the Kahn-Warming multiplier from the analytical point of view, he was the first to use it as the crucial determinant of income in the short run. As Goodwin (1947, 482) observed, “he gave it the role it plays today, by transforming it from an instrument for the analysis of road building into one for the analysis of income building”. This genial metamorphosis had a significant cost: all the domestic investment had to be conceived as exogenous to the income-expenditure feedback. In addition he took the multiplier not as a process in time but as a timeless causal relation. Keynes (1936) ‘telescoped’ the process within a single, timeless short-period equilibrium. This gave simplicity and strength to his argument but severed the multiplier from the analysis of business cycles and growth. He had thus to ignore, in particular, the accelerator principle that explains endogenous investment and requires a consideration of changes in the capital stock excluded by his definition of short period. Many economists sympathetic with the Keynesian revolution immediately felt that the new framework of macroeconomic analysis had to be extended from the short to the long period. The first and most important step was moved immediately by Harrod (1936) who understood the importance of modelling the multiplier as a dynamical process occurring in historical time coupling its effects with those of the accelerator (that he called the ‘Relation’).

To fix the ideas for the analysis to be developed in the following sections we have to bear in mind that, in our opinion, the Kahn-Keynes version of the multiplier is characterized by five basic ingredients. First, we have to point out a general institutional

pre-condition that we will discuss further in the following sections. The multiplier presupposes a generalized use of money as medium of exchange. This implies in any sequence of exchanges of goods, factors and services the alternation of an expenditure flow from the buyer and an income flow to the seller. This necessary alternation of income and expenditure plays a crucial role in the multiplier analysis. Second, the multiplier analysis starts from the definition of an impulse affecting the circular flow of expenditure and income. The initial impulse is a flow of exogenous expenditure. The traditional issue underlining the genesis and early development of the multiplier is whether and to what extent an increase or reduction of public expenditure affects the employment and/or the income of the entire economy. Third, in order to assess the effects of an expenditure impulse we have to model the propagation process of the original value flow as modified within the circular flow of income and expenditure. Fourth, the effects of the propagation process converge towards a finite value because the circular flow is characterized by one or more leakages. As we have already stressed, Kahn, as most of the other early contributors, focused mainly on imports of goods and services, while Warming (1932) pointed out the crucial role of domestic saving and the marginal propensity to consume. Of course the higher the leakages, the lower the value of the multiplier as it converges more rapidly towards a finite sum by losing much of its strength at each round of the circuit. Fifth, the evaluation of the cumulative effect of the impulse in the economic circuit may be calculated through a geometric progression under simplifying assumptions: constant prices and marginal propensity to consume, given average lags between subsequent flows of expenditure or income. Kahn (1931) was the first to provide a clear analytic measure of the effects of the multiplier by using the well known formula of converging series, although we may find predecessors also on this specific point (including, as stressed by Shackle 1967, 117-118, Wulff and Johanssen). It is interesting to observe that this analytic result is obtained on the basis of a recursive computational process that mimics in formal terms the reiteration of the circuit.

Taking account of the basic ingredients of the standard multiplier we can represent the circular flow of expenditure and income through a block diagram that may help an intuitive understanding of the underlying vision (see Fig. 1).⁴

⁴ To the best of our knowledge this representation was first applied to economic systems by Phillips (1954) and then made popular among economists by Allen (1967) and Lange (1970).

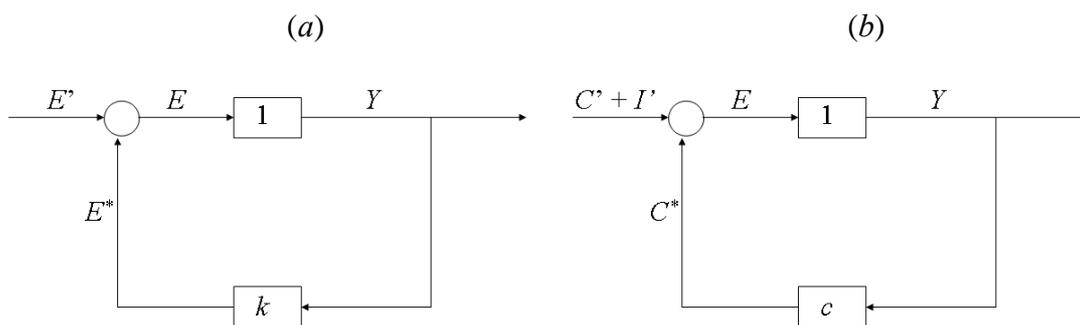


Fig. 1 (a) The standard multiplier and (b) Keynes's multiplier

E' in Figure 1(a) represents the additional exogenous expenditure injected into the economy which, added to the endogenous expenditure E^* , determines the overall aggregate expenditure E that translates into an equivalent value of aggregate income Y received by the sellers of goods and services. In other words:

$$E = E' + E^*$$

$$E^* = kY$$

$$Y = E$$

from which we derive immediately that the increase in aggregate income is a multiple of the increased flow of aggregate exogenous expenditure:

$$\Delta Y = \frac{1}{1-k} \Delta E'$$

where $1/(1-k)$ is the multiplier. The crucial point is that the increase in endogenous aggregate expenditure in the first lap of the circuit is less than the increase in aggregate income because $0 < k < 1$ while $1-k$ represents the leakage in the circuit, and so on at each lap of the circuit. This is, more or less, what the economists had in mind when discussing the extent to which a new programme of public works, or an increased budget deficit, could be beneficial to employment and aggregate income Y .⁵ On the contrary, as we can see in Figure 1(b), Keynes's multiplier assumes that part of

⁵ This representation of the multiplier is consistent with the Kahn-Keynes expenditure multiplier, but we can easily derive an employment multiplier from an expenditure multiplier provided that we know the technological coefficients of a certain economy.

consumption C' and all the domestic investment I' are exogenous, while the feedback is closed by the endogenous consumption C^* that depends on the marginal propensity to consume c .

3. Marx as a forerunner of the multiplier

Marx is widely recognized as the father of modern macrodynamics. The strict link between the reproduction schemas developed in the second volume of *Capital* (Marx 1956 [1885]) and modern growth theory has been often pointed out (Kalecki 1968) and it is no wonder that we find in the literature claims of Marx's priority concerning use of the multiplier. The link with the multiplier has been seen so far in the reproduction schemas (see Trigg 2006). A thorough assessment of this issue would require a careful and lengthy analysis of all the writings of Marx. Taking account of the purposes of this paper we will limit ourselves to considering two crucial pieces of relevant semi-formalized analysis in *Capital*: the reproduction schemas that are the main reference in the literature to the Marxian anticipation of the 'multiplier', and the formulas of circulation of capital introduced at the very outset (Parts 1 and 2) of the first volume of *Capital* (1954 [1885]) whose bearing on the foundations of multiplier analysis, to the best of our knowledge, has never been considered (with the exception of Sordi and Vercelli 2006). The derivations of the multiplier discussed in this section do not justify the claim that Marx was the real originator of the multiplier. The structural approach of Marx is much richer than that of the multiplier so that we should not be surprised that we may derive it from Marxian theoretical constructs through elementary steps that simplify and make explicit these specific relations. These derivations build a bridge between Marx's approach and the multiplier approach that may establish interesting analogies but also makes evident the distance between the two polarities. A thorough assessment of Marx's influence on this literature has to distinguish, following Schumpeter (1954), between vision and analysis. This is quite clear if we focus on the multiplier. The existing derivations start from Marx's reproduction schemas and obtain, after a limited series of algebraic steps, formulas similar to the Kahn-Keynes multiplier (see Trigg 2006). In our opinion, if we examine these derivations in their analytical detail, we have to conclude that they document not only a certain degree of affinity in the underlying vision, but also a significant distance between the Marxian and Keynesian theory. To clarify this point we discuss an elementary derivation based on the simple reproduction schema that aims to be representative of the existing derivations (Trigg 2006).

As is well known, the simple reproduction schema may be written in the following way:

$$\begin{aligned}O_1 &= K_1 + V_1 + S_1 \\O_2 &= K_2 + V_2 + S_2\end{aligned}$$

where the suffix 1 stands for the sector of capital goods and the suffix 2 for the sector of consumption goods. O stands for output, K for constant capital, V for variable capital, and S for surplus. To derive the multiplier we have to insert this system in the process of circulation assuming that all the output is realized so that the aggregate expenditure E brings about equal aggregate net income $Y = O - K$. For the sake of simplicity, we interpret K as the value of exogenous capital expenditure in the period considered, so that aggregate expenditure is given by the sum of consumption C and K . Finally, consumption depends on income, taking account of the coefficient $\lambda = (1 - c_1)\sigma$, where c_1 is the propensity to consume of capitalists and $\sigma = S/Y$ the share of surplus on income. We thus obtain the following system:

$$\begin{aligned}Y &= E \\E &= K + C \\C &= (1 - \lambda)Y\end{aligned}$$

From this we get a formula that has some analogy with the multiplier:

$$Y = \frac{K}{\lambda}$$

Here the leakage is given by the saving of capitalists given by λY because it is assumed that variable capital V translates integrally into consumption. The multiplier depends thus on the consumption propensity of capitalists c_1 and on the share of surplus net income. The greater the saving propensity of capitalists and/or the share of surplus on income, the greater the leakage.

This kind of derivation can be misleading. In the reproduction schemas the relations between the variables are equilibrium conditions and not behavioural relations as in the multiplier (although we could interpret the assumptions about consumption as such). This implies that capital expenditure is not exogenous in this context as its volume is fixed by the equilibrium conditions. The simple reproduction schema implies that under its reproducibility conditions the leakage due to a consumption propensity of capitalists

lower than one, that is saving, is perfectly compensated by capital expenditures made by the same capitalists. That is why the simple reproduction schema can go on for ever. On the contrary in the Keynesian multiplier all the investment has to be exogenous in order to avoid the problem emphasized above. The introduction of induced investment requires a dynamic model so that equilibrium becomes a possibility rather than the rule. Summing up, we believe that the existing derivations of the multiplier from the reproduction schemes do not support any claim of priority but rather make explicit how profoundly different from that underlying the multiplier is the approach pursued by Marx in the reproduction schemes.

We believe, however that a more significant link between Marx and the multiplier may be found in the vision of the structural characteristics of the capitalist process of circulation. To clarify this point we derive directly a version of the multiplier from a crucial feature of Marx's vision as expressed at the very beginning of the first volume of *Capital* (1954 [1867]). As is well known, its first two sections sketch the genesis of the capitalist mode of production and circulation of commodities reconstructed from the conceptual and historical points of view intertwined in a chemical synthesis (Schumpeter 1954). The exposition ends with the statement of the general formula for capital in the sphere of circulation: $M-C-M'$, that is money-commodity-money, where $M' > M$ (Marx 1954 [1867], 155). This formula is expressed from the point of view of capital, not of the people involved in the transactions, consistently with the fetishism of capitalist circulation. However, if we take this formula from the point of view of transactors and we ignore the requirement of a surplus, the necessary alternation of purchase ($M-C$) and sale ($C-M$) translates into the necessary alternation of expenditure e_{ij} of agent i on a given commodity sold by agent j and income y_{ji} of the agent j that sells the commodity to him so that we get:⁶

$$y_{ji} = e_{ijt}$$

for each transaction where t is the instant in which the transaction occurs.

By summing all flows of expenditure carried on by the transactor i ($= 1, \dots, m$) in period t (assumed to be short in the sense of Keynes) and all the flows of income earned by agent j ($= 1, \dots, n$), we get:

$$e_{it} = \sum_{j=1}^m e_{ijt}$$

⁶ The analysis that follows draws on, and clarifies, the discussion in Sordi and Vercelli (2006, 417-418).

and

$$y_{jt} = \sum_{i=1}^n y_{jit}$$

Moreover, we have to distinguish between endogenous (e_{it}^*) and exogenous (e'_{it}) acts of expenditure in relation to a well-defined circuit of monetary flows such that:

$$e_{it} = e_{it}^* + e'_{it}$$

The endogenous act of expenditure is financed by income earned by the buyer in preceding stages of the circuit, while an exogenous act of expenditure is financed by a subject not belonging to the circuit under examination. In what follows, for the sake of a meaningful comparison with Keynes' multiplier, we assume that the circuit refers to the entire private sector of a given closed economy. Therefore, the exogenous acts of expenditure are those financed by public and foreign agents.

The crucial point is that monetary circulation introduces a possible gap between the earning of money and its expenditure so that generally speaking y_{jt} does not translate into an equal amount of expenditure. The money earned may be, at least in part, hoarded or saved rather than immediately used for a new transaction. This introduces a leakage in the circuit of the following type:

$$e_{jt}^* = ky_{jt} \quad 0 < k < 1$$

where k is the coefficient of leakage.

Summing up all the flows of expenditure and income in the period t for all the transactors, we obtain:

$$Y_t = E_t^* + E'_t = E_t \quad (1)$$

where $E_t = \sum_{s=1}^{n+m} e_{st}$, $E_t^* = \sum_{s=1}^{n+m} e_{st}^*$, $E'_t = \sum_{s=1}^{n+m} e'_{st}$ and $Y_t = \sum_{s=1}^{n+m} y_{st}$. The endogenous aggregate expenditure is a function of the aggregate income taking account of the coefficient of leakage k :

$$E_t^* = kY_t \quad (2)$$

The elementary macroeconomic system described by the relations (1) and (2) may be summarized as follows:

$$Y_t = kY_t + E'_t$$

from which we derive immediately the multiplier:

$$Y_t = \frac{E'_t}{1-k}$$

This derivation of the Keynesian multiplier from Marx's general formula of capital circulation is meant to clarify the extent to which the multiplier shares common assumptions with Marx's theory of capital circulation.⁷ What is common is above all acknowledgment of the constraints posed by a monetary economy. First, there is a common assumption of the necessary alternation of purchase and sale that from the point of view of agents implies the necessary alternation of income and expenditure. Second, as Marx emphasizes, the necessary mediation of money in principle "separates purchase and sale" in time and space. This implies that income and expenditure are similarly separated from the temporal and spatial points of view creating within a certain period of time leakages in the income-expenditure circuit. The analogy is over-emphasized by the fact that in this derivation, as in the usual multiplier, the values are expressed in prices and the latter are considered constant. In both cases this also implies that the economy is assumed to be sufficiently far from full employment equilibrium to neglect the impact of the multiplier on money prices. On the other hand we have introduced the distinction between endogenous and exogenous expenditure since the multiplier acts on the exogenous expenditure seen as an instrument of control of the level of economic activity. This assumption does not contradict the tenets of Marx's approach but was not a main concern for a revolutionary outsider who wanted to change the system rather than controlling it. Finally in our derivation we had to assume a short-period horizon as in Keynes, although such an assumption was certainly extraneous to Marx's analysis. For the sake of simplicity we also ignored in this elementary derivation the surplus value and the accumulation of capital.

Summing up, the link between the Marxian approach has to be seen in terms of vision rather than of analysis. Only with Kalecki does the link became significant from the analytical point of view, as he started from a Marxian vision but translated it into a

⁷ "M-C-M' is [...] the general formula of capital as it appears prima facie within the sphere of circulation" (Marx 1954 [1867], 155)

formalized model meant to enable study of the dynamics of business cycle and growth, having a few basic features similar, although not identical, to those of the multiplier level.

4. Kalecki's multiplier

In the 1930s, as a result of the Great Depression, Marxian economics became much more fashionable than before. Even in the academic world, and even in the departments of economics up to then quite refractory to any significant influence from Marxian economics, there was a remarkable diffusion of study groups drawing participants not only from students but also from some teachers and researchers.⁸ We may speculate in the light of our observations in the preceding section that the increasing influence of Marx's vision may have contributed to a climate of opinion favourable to the development of the multiplier. From the point of view of economic analysis, the crucial link between the Marxian tradition and the fabrication of the multiplier in the years of high theory was represented by Kalecki. He freely reformulated the reproduction schemas of Marx in light of the contributions of Grossman and Rosa Luxemburg (both Polish) and Tugan Baranowski with an approach heavily influenced by his engineering background oriented to the control of complex systems. This view pushed him to identify the main relations of the circulation of capital as behavioural relations expressing the decision of capitalists while labour is seen as merely passive having no power on the use of productive means. The crucial driving force of economic dynamics is thus seen in the feedback between the accumulation of capital and profits. This approach requires a clear distinction between endogenous and exogenous variables and this leads him to formulate in explicit form his own version of the multiplier (although this name does not appear in his pre-Keynesian texts) as a crucial founding block of his analysis. At the beginning of section 2, entitled "Assumptions", of his *Outline of the Business Cycle Theory* (Kalecki 1990 [1933], 68-75),⁹ he expresses the following three equations (with notation slightly modified to facilitate comparison with other authors):

$$P = C_c + A \quad (3)$$

⁸ Kaldor (1986, 64), for example, recalled that during the Great Depression Marx became very fashionable even in the most prestigious universities; according to his own direct experience in Harvard there was a seminar and a reading group managed by Mason; at the London School of Economics there was a seminar on Marxian economics managed by the teachers and another one by research students.

⁹ See also Kalecki (1935a, 1935b, 1939).

where P stands for gross real profits, C_c for consumption by capitalists, and A gross accumulation that is «all goods which are used in the reproduction and expansion of fixed capital as well as the increase in inventories» (ibid., 69).

The personal consumption of capitalists C_c is the sum of their exogenous consumption C'_c and their endogenous consumption C_c^* :

$$C_c = C'_c + C_c^* \quad (4)$$

The latter is determined by their profits:

$$C_c^* = \lambda P \quad 0 < \lambda < 1 \quad (5)$$

where λ expresses the consumption propensity of capitalists.

Kalecki derives from equations (4)-(5) the following formula

$$P = \frac{C'_c + A}{1 - \lambda} \quad (6)$$

The main difference from the Keynesian multiplier is obvious: Kalecki's multiplier is meant to determine profits not income, although the latter may be easily derived from profits as soon as we multiply it by the share of aggregate profits over aggregate income. On the other hand, the analogy with Kahn-Keynes multiplier is much closer than in the case of Marx's multiplier. It is derived from behavioural functions (not equilibrium conditions) and 'multiplies' the exogenous expenditure that is clearly identified as such. It is thus fit to be used for control purposes. It expresses in a stylized way the fact that in a 'pure' capitalist economy control is in the hands of capitalists while workers play only a passive role. This is emphasized in its extreme form through the assumption that workers do not save and do not have 'capitalists' incomes (Kalecki 1990 [1933], 69). Under these assumptions he may assert the celebrated 'Kalecki principle': the capitalists earn what they spend, while workers spend what they earn, that clearly epitomizes the asymmetry of power determined by the private property of the means of production. This is clarified by Kalecki (e.g., Kalecki 1968; see also Sardonì 1989) by referring to a somewhat modified version of Marx's schemes of reproduction with three Departments, the first producing investment goods, the second consumer goods for capitalists and the third wage goods (Kalecki 1968, 71):

1	2	3	
P_1	P_2	P_3	P
W_1	W_2	W_3	W
A	C_c	W	Y

We thus have:

$$\begin{aligned}
P_1 &= A - W_1 \\
P_2 &= C_c - W_2 \\
P_3 &= W - W_3 = W_1 + W_2
\end{aligned}$$

from which:

$$P = P_1 + P_2 + P_3 = A + C_c$$

This clarifies the meaning of equation (3), that is to say, that capitalists' expenditure decisions determine profits and not vice versa.

This asymmetry is partially clouded in the usual version of the Kahn-Keynes multiplier that conflates capitalists' and workers' consumption. However, both versions insist on the crucial point that saving is not the 'cause' of investment but the other way around. Analogies and differences with Kahn-Keynes and Marx's multipliers can be further clarified by making explicit the multiplier between exogenous expenditure and income implicit in the Kalecki's approach. Profits may be expressed as follows:

$$P = \sigma Y$$

where σ represents the share of profits over aggregate income Y . The endogenous consumption of capitalists can thus be expressed as

$$C_c^* = \lambda \sigma Y$$

and equation (6) becomes:

$$Y = \frac{C_c' + A}{\sigma(1-\lambda)}$$

This clarifies that the income multiplier crucially depends, besides capitalists' consumption propensity, also on the functional distribution of income. Keynes is fully aware of the importance of distribution of income in the multiplier but his observations on this issue are sparse in different passages of the *General Theory* and did not enter in the standard Keynesian tradition. On the contrary this point shows a clear analogy with Marx's point of view.

With Kalecki the Marxian tradition converges towards the Keynesian model for at least two basic reasons: the multiplier plays a central role in economic dynamics and this role is expressed in terms of dynamic equations. As Joan Robinson (1964, 95) observed commenting on the disputed question of the priority between Kalecki and Keynes, «the interesting thing is that two thinkers, from completely different political and intellectual starting points, should come to the same conclusion».

5. The foundations

We have seen in this paper that the multiplier is well rooted in economic theory and policy and is subject to well-defined empirical conditions of significance. We have to emphasize, however, that these validity conditions deviate from crucial assumptions of standard economics (called by Keynes 'classical' economics).

The first validity condition asserts that we have to drop the crucial assumption of full employment equilibrium as it renders the multiplier meaningless: "the orthodox theory denies the multiplier [...] because it is in fact assuming that there always is full employment, so that output as a whole has a zero elasticity" (letter to Beveridge, 28 July 1936, in Keynes 1973, 58). As soon as full employment is reached, a further increase in aggregate expenditure could not increase production, income and employment but only the price of goods and productive factors. The multiplier thus presupposes disequilibrium in the sense of a significant deviation from full employment equilibrium. Keynes shows, however, that an unemployment position may be a short-run equilibrium in the dynamic sense, since in the short period there may be no forces in the system that tend to reduce such a deviation.

This first validity condition is tantamount to assuming that the short-period state, or temporary equilibrium, depends on the effective demand; this has the clear policy implication that we can reduce unemployment and increase aggregate income by increasing aggregate demand. However, how is it possible that aggregate demand is insufficient to buy the potential aggregate supply? In each transaction demand and supply must be equal ex post otherwise the transaction would not materialize; this

seems to imply that the aggregate value of demand and supply must be equal (Say's law). The explanation of this apparent paradox requires other two crucial conditions of validity. An excess of supply may persist only if prices are not fully flexible. The second deviant assumption asserts that the economy is far enough from full employment equilibrium to justify this assumption and thus the use of the multiplier. This also explains why the multiplier is almost always expressed in terms of given or constant prices.

Finally the third and fundamental condition of validity, underlying the other two conditions, is about the role of money in the economy. As Marx made crystal-clear, the necessary mediation of money in mercantile transactions (C-M-C) breaks the continuity in time and space between demand and supply so that aggregate demand in a certain economy, may be different from aggregate supply. The possibility of disequilibrium becomes a typical state of affairs as soon as the accumulation of money becomes the goal motivating the crucial economic transactions (M-C-M'). This is typical of a monetary economy (as opposed to a barter economy) or of an 'entrepreneur economy' (as opposed to a cooperative economy) as is emphasized by Keynes himself. For example Keynes maintained in a preparatory note for the *General Theory* dated 1933 that:

The distinction between a co-operative economy and an entrepreneur economy bears some relation to a pregnant observation made by Karl Marx...he pointed out that the nature of production in the actual world is not, as economists seem often to suppose, a case of C-M-C', i.e. of exchanging commodity (or effort) for money in order to obtain another commodity (or effort). That may be the standpoint of the private consumer. But it is not the attitude of *business*, which is a case of M-C-M', i.e. of parting with money for commodity (or effort) in order to obtain more money...an entrepreneur is interested, not in the amount of product, but in the amount of *money* which will fall to his share. He will increase his output if by so doing he expects to increase his money profit, even though this profit represents a smaller quantity of product than before.

(Keynes 1979, 81-82).

Therefore, the crucial role of money in a capitalist economy is to propel the circulation of goods, services and productive factors. As was brilliantly synthesized by Clower (1967, 5), in a monetary economy «money buys goods, goods buy money but goods do not buy goods». This elementary but deep and pervasive principle that distinguishes a monetary economy from a barter economy, translates from the point of view of traders into the circular flow of income and expenditure. The expenditure on goods and services has to be financed by income received in advance by the buyers and creates an equivalent income for the sellers of these goods and services; this income received by sellers finances their expenditure, and so on. The multiplier derives very simply from a

thorough understanding of this cash-in-advance constraint in the circular flow of expenditure and income. More precisely, in the light of this constraint, what impact on aggregate income or employment will eventually have an injection of a certain amount of exogenous expenditure in the circular flow? As is obvious, the answer to this question is quite important from the point of view of policy, particularly when persistent structural unemployment plagues the economy. Generally speaking the answer to this question depends on two crucial conditions. First, it depends on the level and nature of unemployment. Whenever the economy is characterized by full employment in labour and other productive factors, the effect of further exogenous expenditure (public and/or international) can only be monetary in the form of accelerating inflation, while on the contrary the effect on the real economy may be beneficial to the extent that there are idle productive factors and resources.

In the light of the three conditions discussed above we may also clarify the empirical scope of the multiplier theory. Interest in some version of the multiplier has always emerged in periods characterized by persistent structural unemployment brought about by insufficient effective demand. This observation clarifies in particular why attention to the multiplier flourished in the 1930s in consequence of the Great Contraction and of the ensuing persistent structural unemployment. We may speculate that the first wave of interest in the multiplier by non-Marxist scholars (such as Wulff and Johanssen) had been stimulated by the lengthy depression at the end of the 19th century. In any case some sort of interest in the multiplier and related concepts (effective demand, rigidity of prices) is strictly connected with explanations of the crisis particularly from under-consumptionist scholars.

6. Concluding remarks

In this paper, by exploring the Marxian roots of the multiplier, we have reached a deeper understanding of the rationale of the multiplier, its theoretical foundations, and the conditions for a sound utilization of its Kahn-Keynes version in economic analysis. As we have argued, the crucial point is institutional. As soon as we take full account of the crucial implications of a monetary economy in the transactions of goods and factors of production the multiplier emerges naturally as a synthesis of the effects of expenditure on the entire economy. Contrary to what is claimed by mainstream economists, the multiplier does not lack microeconomic foundations, although the latter are not rooted in the maximizing behaviour of rational agents but in the institutional structure of exchanges and circulation of money in a capitalist economy. Its sound use,

however, in the form received by Kahn and Keynes, requires two more restrictive conditions: the existence of a significant and persistent rate of unemployment, and a substantial stability of prices. These limitations could be overtaken by elaborating more sophisticated versions of the multiplier able to explain how an expenditure impulse is split between the propagation of income and that of prices.

In the light of these observations, we may understand better the origins and the evolution of multiplier theory in its standard form. We find early statements in the Marxian theory that comply with the three theoretical conditions of validity. This tradition was then transformed by Kalecki in a direction converging with the Keynesian approach although maintaining a few important peculiarities, in particular the focus on the functional distribution of income. In the British tradition, heavily influenced by Marshall, a different root may be found in his distinction between short and long-run periods admitting that in the short period aggregate demand may have a crucial role to play (Marshall's scissors). In the Swedish tradition a crucial root is to be found in the cumulative process that is clearly connected to the monetary character of modern economies and invites an in-depth analysis of the disequilibrium dynamics of the economy. Finally in the American tradition an important root may be seen in the pervasive influence of institutionalism that focused the attention on the institutional features of modern monetary economies, including the crucial role of the money-in-advance constraint (Fiorito 2006, 2007). A thorough analysis of the genesis and evolution of the multiplier in these traditions of thought goes beyond the limits of this paper. Finally, we emphasize that the links between the Marxian tradition and the multiplier are much richer and more detailed than appears from this paper; however, a full reconstruction of these links goes beyond the scope of this work.

We may conclude by observing that the validity conditions of the multiplier in its Kahn-Keynes version have been revived by the structural transformations that have taken place in recent decades and by the Great Recession that began in 2007. The process of financialization generalized the subordination of all exchanges to the creation of cash flows as is implicitly assumed in the multiplier approach. The so-called 'great moderation' that points to the substantial stability of prices along business cycles in developed economies since the early 1980s allows a fairly safe use of the fixprice approach, at least as a first approximation to a satisfactory analysis. Finally the significant and persistent unemployment brought about by the Great Recession calls for an approach in terms of effective demand that exploits the multiplier approach to analysis and policy. We believe that the tradition of thought underlying the genesis and evolution of the multiplier may still give important insights into the causes and consequences of the Great Recession as well as on the policy measures to get out of it.

Of course, the insights that we may still draw from the study of the multiplier have to be updated and developed in such a way as to fit the characteristics of the present sophisticated monetary economy.

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