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in the *General Theory***

Olivier ALLAIN

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EFFECTIVE DEMAND AND SHORT-TERM ADJUSTMENTS IN THE *GENERAL THEORY*

OLIVIER ALLAIN¹

ABSTRACT. *Keynes' principle of effective demand constitutes a pillar for Post Keynesians theories. But Keynes' presentation remains difficult to interpret, mainly because the aggregate demand function is based on entrepreneurs' expectations. The problem is then to demonstrate how these entrepreneurs (whose only concern is making profits) are led to produce the effective demand (which partially results from the consumers' and investors' behaviour). Previous studies by authors like Weintraub or Davidson highlight the trial and error procedure here at stake. However, since their analyses are not built on a precise accounting of monetary flows, they fail to formally demonstrate the coherence of the whole adjustment process. The aim of this article is to provide such a formal demonstration. We thus concentrate on the General Theory to verify how it constitutes a coherent framework to analyse temporary equilibriums (at the end of every elementary period) and short-term dynamics which bring the economy towards the stationary equilibrium.*

Keywords: Keynesian economics, *General Theory*, macroeconomics, effective demand, short-term expectations

LA DEMANDE EFFECTIVE ET LES AJUSTEMENTS DE COURT TERME DANS LA THÉORIE GÉNÉRALE

RÉSUMÉ. *Le principe de demande effective de Keynes est au cœur des théories postkeynésiennes. Mais la présentation de Keynes reste ambiguë, essentiellement car la fonction de demande agrégée dépend des anticipations des entrepreneurs. La difficulté consiste à montrer comment ces entrepreneurs (préoccupés par leurs profits) sont amenés à produire la demande effective (qui résulte partiellement du comportement des consommateurs et des investisseurs). Les travaux d'auteurs comme Weintraub ou Davidson éclairent la procédure de type essai-erreur qui permet d'y parvenir. Mais, parce que ces travaux ne reposent pas sur une comptabilité précise des flux monétaires, ils ne démontrent pas formellement la cohérence de l'ensemble du processus d'ajustement. Le but de cet article est de fournir une telle démonstration. Nous nous concentrons donc sur la Théorie Générale pour vérifier qu'elle constitue un cadre cohérent pour analyser les équilibres temporaires (à la fin de chaque période élémentaire) et la dynamique de court terme qui conduit l'économie à l'équilibre stationnaire.*

Mots-clés: économie keynésienne, Théorie Générale, macroéconomie, demande effective, anticipations de court terme

Codes JEL: B20 - B22 - E12

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1. Introduction²

In the funereal homage he paid to Keynes in 1946, Samuelson criticises the *General Theory* as “a badly written book, poorly organised (...). It is not well suited for classroom use (...). It abounds in mares’ nests of confusion (...). Warning the young and innocent away from Book 1 (especially the difficult chapter 3)” (quoted by Stiglitz, 1966, p. 1521). We disagree with the idea that the *General Theory* is poorly organised. But we are convinced that several core points of chapter 3 (*The principle of effective demand*) remain difficult to interpret today. It would not have been so if Keynes had applied the advice he gave in a *Lecture* of 1937, namely to emphasise “the forces determining the position of equilibrium” rather than “the technique of trial and error by means of which the entrepreneur discovers where the position is” (Keynes, 1973b, p. 182). But, when defining the effective demand in section I of chapter 3, Keynes took the opposite direction.

Let Z be the aggregate supply price of the output from employing N men, the relationship between Z and N being written $Z = \phi(N)$, which can be called the *Aggregate Supply Function*. Similarly, let D be the proceeds which entrepreneurs expect to receive from the employment of N men, the relationship between D and N being written $D = f(N)$, which can be called the *Aggregate Demand Function*.

Now if for a given value of N the expected proceeds are greater than the aggregate supply price, *i.e.* if D is greater than Z , there will be an incentive to entrepreneurs to increase employment beyond N (...) up to the value of N for which Z has become equal to D . Thus the volume of employment is given by the intersection point between the aggregate demand function and the aggregate supply function; for it is at this point that the entrepreneurs’ expectation of profits will be maximised. The value of D at the point of the aggregate demand function, where it is intersected by the aggregate supply function, will be called *the effective demand*. (Keynes, 1936, p. 25)

Obviously, this definition does not relate to *the forces determining the position of equilibrium*, would it be only because Keynes mentions neither the propensity to consume nor the inducement to invest (two notions introduced later in section 2 of chapter 3). On the contrary, the quotation relates to *the technique which brings to the equilibrium*. It justifies why Keynes adopts the entrepreneurs’ point of view to define the aggregate supply as well as the aggregate demand functions.

Moreover, the latter function is based on the entrepreneurs’ expectations. They result from Keynes’ adoption of a Marshallian framework in which time is divided into elementary periods (*cf.* chapter 5 of the *General Theory*). Every elementary period is defined by the succession of three operations: hiring precedes production which precedes the sale of output on the market.³ Accordingly, *short-term* expectations “[are] concerned with the price which a manufacturer can expect to get for his ‘finished’ products at the time when he commits himself to starting the process which will produce it” (Keynes, 1936, p. 46).⁴ And since it is difficult for entrepreneurs to make conjectures, even in the short-term, they tend to base their current decisions on conservative expectations (Keynes, 1936, p. 50–51).

² The author is indebted to R. du Tertre for many enlightening discussions and helpful comments. Thanks are also due to J. Lallement and M. Lavoie for their comments on earlier drafts.

³ The elementary period thus corresponds to “the shortest interval after which the firm is free to revise its decision as to how much employment to offer” (Keynes, 1936, p. 47, footnote 1).

⁴ Of course, short-term expectations should not be confused with *long-term* expectations which concern the inducement to invest for entrepreneurs (Keynes, 1936, pp. 46–47).

Furthermore, what arises from chapter 5 is that Keynes describes an entrepreneur who is not omniscient, does not have in mind the complete model of the economy, but makes his choices in a decentralised and pragmatic way. These considerations are of a great importance because they lead to an accurate distinction between two demand functions. On the one hand, the *aggregate demand function* (D) proceeds from the entrepreneurs who wonder about their outputs without any consideration for the macroeconomic level. On the other hand, the *global expenditure function* (E) takes into account, at the macroeconomic level, the propensity to consume and the inducement to invest. In this article, we show that these two functions cannot be combined into a single one.

With conservative expectations, errors in expectations are bound to happen. They express themselves by differences between the expected prices and those established on the market at the time of the exchange. Keynes does not make the mode of unit price setting explicit. Two solutions can be considered. The first consists in admitting that prices are set at the end of the period, during the exchanges (when supply is perfectly rigid). The second consists in admitting that prices are set by entrepreneurs at the beginning of the period. Then, adjustments are made through stocks variation at the end of the period.⁵ In this paper, we compare the implications of these two modes of price setting.

Errors in short-term expectations being the rule, it is crucial to know whether they influence the level of effective demand or not. Keynes' answer is definitely negative:

It is not relevant to my immediate purpose for me to superimpose the complication of entrepreneurs' making mistakes. (...) Effective demand always reflects the current expectation of actual demand whether it is arrived at by a careful attempt at elaborate foresight on the part of the entrepreneurs, or merely by revision at short intervals on the basis of trial and error. (Keynes, 1973a, p. 603)

I began (...) by regarding this difference [due to a mistake in the short-period expectations] as important. But eventually I felt it to be of secondary importance, emphasis on it obscuring the real argument. For the theory of effective demand is substantially the same if we assume that short-period expectations are always fulfilled. (Keynes, 1973b, p. 181)⁶

These quotations highlight Keynes' strategy. When writing chapter 3 of the *General Theory*, he implicitly assumes that entrepreneurs' short-term expectations are fulfilled.⁷ Consequently, effective demand corresponds to a *stationary equilibrium*: agents have nothing to gain by modifying their behaviour because profits are maximised and demand is satisfied.

But what happens when short-term expectations are not fulfilled? Keynes evades this question in the *General Theory*. In chapter 5, he appears confident with regard to the existence of a trial and error procedure that brings entrepreneurs to produce effective demand, but he does not make this procedure explicit in a thorough demonstration. In chapter 10, he

⁵ Keynes (1936, p. 51, footnote 1) seems to favour this solution. Yet, price setting during the exchanges must not be neglected, were it only because certain goods cannot be stocked.

⁶ Keynes is not so explicit in the *General Theory*. The first quotation is extracted from a letter which he sent to Hawtrey as early as 1935. The second is taken from the *Lecture* of 1937 already quoted above.

⁷ Hawtrey then suggested to Keynes to avoid all confusion by removing the term « expectation » from his arguments (Keynes, 1973a, p. 611). Keynes replied that he preferred to continue his reasoning in terms of expectations in order to be realistic.

mentions *temporary equilibriums*,⁸ stating that these equilibriums enhance the multiplier theory,⁹ but still failing to give a formal demonstration.

To sum up, the difficulties in reading chapter 3 of the *General Theory* arise from a double inconsistency in Keynes' reasoning. Firstly, instead of emphasising the forces determining the position of equilibrium, Keynes leads the reader towards the question of trial and error procedure by which entrepreneurs discover where this position lies. But secondly, by supposing that short-term expectations are fulfilled, he does not specify this procedure of trial and error. Thus, the reader can legitimately wonder whether it works or not, or more precisely whether it works within Keynes' framework of hypotheses.

Although the principle of effective demand remains central for Post Keynesians, recent literature does not really help to answer this question because it distances from Keynes' writings. As suggested by King (1994, p. 26–27), “most theorists must have found the Z, N apparatus cumbersome” and thus prefer the P, Q apparatus. More importantly, the demand function is hardly formulated from the entrepreneurs' point of view, and hardly anyone puts the stress on short-term expectations.

As it is closer to Keynes' framework, earlier literature provides greater help. Such is the case for Vandenborre (1958) and Wells (1962)¹⁰ who emphasise the above-mentioned distinction between the aggregate demand and the global expenditure functions. Their studies, however, encounter two limits at least: they do not liberate themselves from a specification of the expenditure function in real terms; they only dedicate a few unsatisfactory lines to the short-term adjustment.

These critical remarks cannot be aimed at Weintraub (1957)¹¹ who also establishes a distinction between two demand functions (the *intended outlay* and the *demand-outlay functions*). Moreover, Weintraub explains in simple terms how the demand-outlay function corresponds to the temporary equilibriums which result from the confrontation between the entrepreneurs' short-term expectations and the agents' desired spending. But the analysis remains basically intuitive. Neither Weintraub nor his followers give a formal demonstration of the coherence of the whole adjustment process, which would have required a precise accounting of monetary flows at the macroeconomic level.¹²

The aim of this article is to go beyond this earlier literature to verify that the *General Theory* provides a coherent framework to analyse temporary equilibriums (at the end of every elementary period) and short-term dynamics (towards the stationary equilibrium) which bring entrepreneurs to produce the effective demand.

To this end, it is necessary to take up Keynes' reasoning in detail. The first section is dedicated to the *aggregate supply function* (Z). Then we present the crucial distinction between the *aggregate demand function* (D) and the *global expenditure function* (E). In particular, we prove that the latter cannot have a given shape in the Z, N space as it depends on money income rather than on employment. In the third section, we show how the consistency of the three functions allows us to define the effective demand provided that the

⁸ These equilibriums are reached after trade, at the end of the elementary periods. Those are *equilibriums* because, in accounting, expenditure is always equal to the entrepreneurs' receipts. But those are only *temporary* because certain agents gain by modifying their behaviour.

⁹ “The logical theory of the multiplier (...) holds good continuously, without time-lag, at all moments of time” (Keynes, 1936, p. 122).

¹⁰ They were followed by authors like Casarosa (1981) or Amadeo (1989).

¹¹ And, following him, authors like Davidson and Smolensky (1964, pp. 155–156), Roberts (1978) and Davidson (1994). See also du Tertre (2000, pp. 583–588) who deepens Weintraub's model.

¹² For example, Davidson (1994, p. 21) does not explain how, in the aggregate, the planned demand (*i.e.* the money income available to be spent) may exceed the receipts (*i.e.* the money income perceived and redistributed by the entrepreneurs).

short-term expectations are fulfilled, as supposed by Keynes. We also lay the foundations of a more general analysis on the hypothesis that these expectations are not fulfilled.

The theoretical foundations being given, we analyse the properties of the temporary equilibriums and short-term dynamics with the two following adjustment mechanisms: through the stocks of consumption goods (fourth section) and through the price of consumption goods (last section).

Our analysis leads us to four essential and original results.

1. The mode of price setting does not affect either the stationary or the temporary equilibriums.

2. Errors in short-term expectations bring about a difference between expected and realised profits. This unexpected money income may or may not be distributed to the households. It, thus, may or may not influence the consumption expenditure. Therefore, the temporary equilibriums depend on what happens to the unexpected income. We show that, contrary to Keynes' claims, it implies that the theory of the multiplier is not systematically verified outside the stationary equilibrium.

3. The surprise on profits urges entrepreneurs to review their short-term expectations at the start of the next elementary period.¹³ Then, several periods are necessary to converge towards a stationary equilibrium. The trial and error procedure relies on the fulfilment of the money income expected by the entrepreneurs. It thus fits into a real, temporal frame, which has nothing to do with the auctioneer-led procedure used by Walras.

4. Finally, we show that the trial and error procedure brings the entrepreneurs (who formulate imperfect short-term expectations and are only worried by their own profits) to produce the effective demand (which partially results from the consumers' and investors' behaviour). Our analysis thus strengthens the internal coherence of the *General Theory*.

2. "Our old friend, the supply function"

Section I of chapter 3 of the *General Theory* begins with the analysis of the aggregate supply function. Keynes himself admits that his approach is not different from that of Marshall with regard to substance.¹⁴ The only difference lies in the choice of units (*cf.* chapter 4 of the *General Theory*). As long as the goods are homogeneous, it is possible to use the traditional method of relating quantities of goods to unit prices. But, when considering the economy as a whole, Keynes refuses to deal with concepts as vague as that of the volume of output or the general level of prices. He then uses two units of quantities: *quantities of employment* (labour is supposed to be homogeneous) and *quantities of money-value*. For a firm, the latter may correspond to the unit price multiplied by the produced quantity (the *proceeds*) or by the sold quantity (the receipts). We move to the economy as a whole by adding up employment quantities on the one side, and quantities of money-value on the other.

The supply function relies on the classical assumption of profit maximisation.¹⁵ Total profit is the difference between firm receipts (A) and prime cost which is composed by factor cost (F) and user cost (U). Under a few simplifying hypotheses, the user cost is the opposite of the variation of the liquid capital ($U = -I_L$).¹⁶ It results that:

¹³ Our analysis lies within the framework of Kregel's (1976, pp. 214-215) "stationary equilibrium", *i.e.* adjustments of short-term expectations leave long-term expectations unchanged. It is opposed to the "shifting equilibrium" model where adjustments of short-term expectations affect long-term expectations.

¹⁴ Our own interpretation is here similar to that of authors like Weintraub (1957), Wells (1962) or Davidson and Smolensky (1964).

¹⁵ "The entrepreneur's profit (...) is, as it should be, the quantity which he endeavours to maximise when he is deciding what amount of employment to offer" (Keynes, 1936, pp. 23-24).

¹⁶ Keynes (1936, p. 66) shows that user cost can be expressed as $U = A_1 - I$, where A_1 is the amount spent by entrepreneurs to buy each other fixed and working capital. Total investment (I) includes the expenses between

$$\Pi = A - (F + U) = A - F + I_L.$$

Proceeds (or total income) of the economy are thus:

$$Y = \Pi + F = A + I_L. \quad (1)$$

In this section, let us suppose that entrepreneurs do not modify their stocks of finished products ($I_L = 0$), either because they have already constituted the stocks they wish, or because the prices are set during the exchange (the liquid capital is nil). For convenience, as do Keynes, we also assume that competition is pure,¹⁷ and that marginal returns are decreasing (Keynes, 1936, p. 17). Besides, the stock of capital and state of technology are given. In this simplified frame, we present the supply function for a typical firm producing homogeneous goods, and then for the economy as a whole.

2.1. The supply function of a typical firm

The recruitment of n_i workers allows the entrepreneur i to produce the volume of goods $q_i(n_i)$. The proceeds he hopes to obtain depends on his expected unit price p_i^e , that is:

$$d_i^e = p_i^e q_i(n_i) = f_i(n_i, p_i^e). \quad (2)$$

The entrepreneur recruits so as to maximise his expected profit:

$$\pi_i^e = p_i^e q_i(n_i) - wn_i,$$

where w is the exogenous money wages and wn_i the *factor cost*. In pure competition, the condition of profit maximisation is given by equalling marginal cost to unit price, that is:

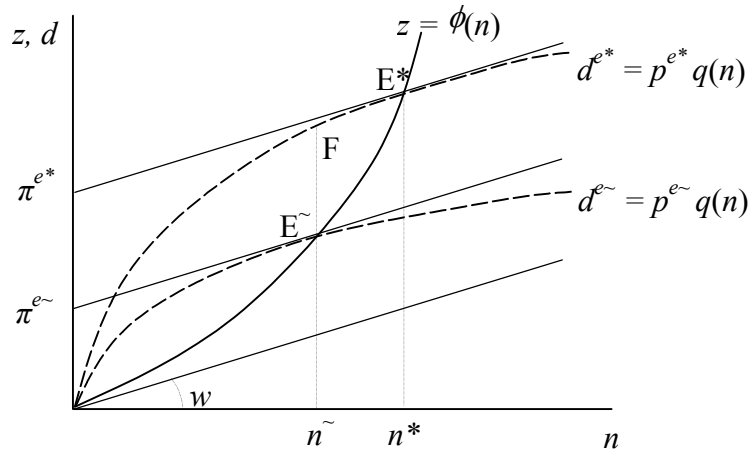
$$\frac{w}{q_i'(n_i)} = p_i^e.$$

We see that Keynes never deviates from Marshall with regard to substance. However, he adopts a form that brings out the levels of *employment* (along the Y-axis in *Figure 1*) and *money value* (along the X-axis). The bisecting line of slope w corresponds to the factor cost wn_i . If the entrepreneur i expects the unit price on the market $p_i^{e\sim}$, the curve $d_i^{e\sim} = p_i^{e\sim} q_i(n_i)$ represents their expected proceeds for each level of employment. He then maximises his expected profit by recruiting $n_i^{\sim}$ workers (at point $E^{\sim}$, $p_i^{e\sim} = w / q_i'(n_i^{\sim})$). If he expects a higher unit price (p_i^{e*}), he recruits more (n_i^* at point E^*) and increases his expected profit (π_i^{e*}).

firms (A_1), the consumption of fixed and working capital (C_K), and the variation of the liquid capital (I_L), that is $I = A_1 - C_K + I_L$. We deduce that $U = C_K - I_L$. To lighten our presentation, we do not take into account the working capital and we suppose that the depreciation of the fixed capital is nil. It results that $A_1 = I_F$, $U = -I_L$ and $I = I_F + I_L$ where I_F represents the fixed capital investment and I_L the stock of finished products.

¹⁷ The *General Theory* is meant to apply regardless of the degree of competition (Keynes, 1936, p. 245). But, Keynes generally reasons in a pure competition framework, as shows his support for the first postulate of classical theory: “the wage is equal to the marginal product of labour” (1936, p. 5).

Figure 1 The firm's supply function (the i indices have been omitted to make it simpler)



Keynes defines the *supply price* as the proceeds which are *just sufficient* to induce the entrepreneur to recruit a certain volume of employment.¹⁸ The *supply function* of the firm then corresponds to the geometrical area of all supply prices, which is:

$$z_i = \frac{w}{q'_i(n_i)} q_i(n_i) = \phi_i(n_i).$$

Finally, as in the neoclassical analysis, two forces bring the entrepreneur to reach his supply curve: his wish to maximise profit and competition (brought out by the fact that his decision depends on the market price that he expects).

2.2. The aggregate supply function

We can move to the level of the economy as a whole through the aggregation of individual supply functions: $Z = \sum_i \phi_i(n_i) = \phi(N)$ with $N = \sum_i n_i$. The aggregate supply function, without having the same form, retains the properties of a Marshallian function. As Keynes explains, Z “is only a re-concoction of our old friend the supply function” (Keynes, 1973a, p. 513).

To conclude, let us highlight that no entrepreneur expects aggregate supply. Each one concentrates on his own business. Furthermore, the curves z_i are not expected: they only take into account the technical constraints of production. They thereby allow each entrepreneur to choose his own level of employment according to the unit price he expects: different expectations do not lead to different curves, but to the choice of different points on these curves. Mistaken expectations therefore do not question, either the position of the curves z_i , or that of the aggregate curve Z (Kregel, 1976, p. 215).

3. The distinction between the aggregate demand function and the global expenditure function

As indicated in the introduction, Keynes analyses demand by adopting alternately the point of view of entrepreneurs and that of consumers and investors. He refers to an *aggregate demand function* (D) in the first case, to a *global expenditure function* (E) in the second case.

¹⁸ “The aggregate supply price of the output of a given amount of employment is the expectation of proceeds which will just make it worth the while of the entrepreneurs to give that employment” (Keynes, 1936, p 24). Let us remind that this supply price must not be confused with a *unit* price.

3.1. The aggregate demand function

Keynes (1936, p. 25) contents himself with a unique sentence to define the aggregate demand function as “the proceeds which entrepreneurs expect to receive from the employment of N men, the relationship between D and N being written $D = f(N)$.” The following three observations are necessary to specify this function exactly.

Firstly, Keynes expresses this definition in section I of chapter 3 without having ever evoked the notions of propensity to consume and of inducement to invest. Conversely, when he introduces them in section II of chapter 3, he does not write that their sum corresponds to the D function. These two notions are thus of no use to build the aggregate demand function.

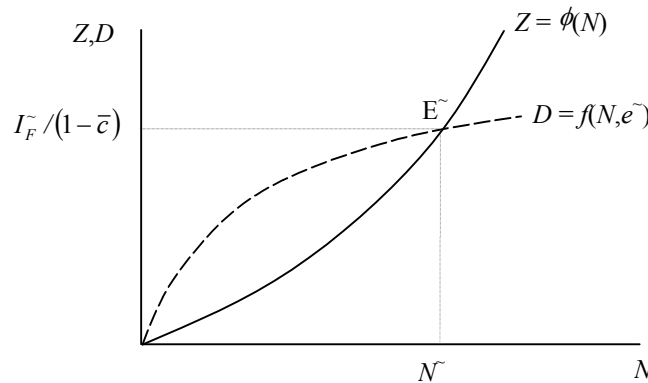
Secondly, the paragraph which follows the definition of this function¹⁹ shows clearly that that $D = f(N)$ participates in the decisions of hiring and production. These decisions being taken in a decentralised way, every entrepreneur has to expect the demand function for their own firm.

Thirdly, markets are supposed purely competitive. Consequently, the demand function for the entrepreneur i relies on the unit price he expects on the market of his output, p_i^e .²⁰

In conclusion, entrepreneur i calculates the various proceeds he can obtain from the sale of various volumes of goods for his expected price p_i^e . We find again the expected proceeds (equation (2)): $d_i^e = p_i^e q_i(n_i) = f_i(n_i, p_i^e)$. It simply signifies that, for a given price, proceeds are lower by selling less than by selling more. Demand in the economy as a whole obviously depends on the state of entrepreneurs' expectations (e) with regard to unit prices. The aggregation of individual functions gives $D = \sum_i f_i(n_i, p_i^e) = f(N, e)$ with $N = \sum_i n_i$.²¹

Function D is drawn up in the same way as function Z . As previously, entrepreneurs do not expect aggregate demand, but each one concentrates on his own function $f_i(n_i, p_i^e)$. On the other hand, contrary to function Z , function $D = f(N, e)$ is an expected function: its position in the plane (N, Z) therefore depends on the state of expectations e .

Figure 2 Aggregate supply and demand functions



In Figure 2, the curve $D = f(N, e^{\sim})$ represents the aggregate demand function conditioned by $e^{\sim}$. Its concavity is derived from the decrease of marginal returns. As a result, there is a single intersection point with the Z curve (point $E^{\sim}$). If D is greater than Z , there will be an incentive

¹⁹ “Now if for a given value of $N...$ ” (*cf. supra*).

²⁰ The reasoning must be amended in an imperfect competition world, but without any fundamental consequences on the whole argument.

²¹ This approach was used by authors like Vandenborre (1958), Wells (1962), Roberts (1978), Casarosa (1981), or Amadeo (1989).

for entrepreneurs to increase employment beyond N^* . Entrepreneurs therefore try spontaneously to reach point E^* , where their expected profits are maximised (e^* being given).

One is forced to recognise that this mechanism closely corresponds to the one presented by Keynes in section I of chapter 3. With, nevertheless, an essential difference: in our reasoning, the intersection point between Z and D depends on the state of expectations. It thus has no reason for being unique, while Keynes insists on the uniqueness of effective demand. We shall soon go back to this fundamental point.

3.2. The global expenditure function

In section II of chapter 3, Keynes elaborates another function without naming it: the global expenditure function. This one is based on the concepts of propensity to consume and inducement to invest.²²

In the first place, consumption expenditure (C) depends on the *fundamental psychological law* according to which “when our income increases our consumption increases also, but not by so much” (Keynes, 1936, p 29). The marginal propensity to consume is therefore less than one. To simplify, let us suppose that it is independent of income, that there is no autonomous consumption, and that its normal value is $c = \bar{c}$.

Let us remind that total income (Y) may include an accumulation of liquid capital (I_L ; equation (1)) which does not allow any consumption expenditure. This expenditure is then only based on money income:

$$R = Y - I_L. \quad (3)$$

Money income is divided into wages and profits. Thus, consumption expenditure amounts to $C = \bar{c}R$ when profits are entirely redistributed and the money income is normally spent.

In the second place, investment expenditure in fixed capital (I_F) depends on the inducement to invest, which is a result of the confrontation between the *long-term* expected returns of new equipment (marginal efficiency of capital) and the current interest rate in the economy. This investment expenditure is therefore independent of current income.

Under the preceding hypotheses, the global expenditure function is:

$$E = g(c, R, I_F) = cR + I_F.$$

Three crucial properties have to be underlined. Firstly, no agent does anticipate this function. It is the aggregation of the wished expenditures. As we shall see further down, it is the aggregation of the realised expenditures. It thus corresponds to the receipts of the firms ($E = A$).

Secondly, this function is global from the entrepreneurs' point of view. Of course, we can imagine that they try to estimate it. But, even if they manage to do so, this evaluation would not be helpful for them to determine their own employment in a decentralised way. The function $E = g(c, R, I_F)$ is thus different from the function $D = f(N, e)$. As Casarosa (1981, p. 192) points out, these two functions are based on different foundations and it would be deceptive to try to combine their properties in a single formulation.

Thirdly, the volume of employment (N) does not appear among the explanatory variables of the global expenditure function. This ensues from the fact that employment determines *real* income whereas expenditure depends on *money* income (R). Of course, $Z = \phi(N)$ corresponds to the real income valued at the expected prices. But, as we soon shall see, R deviates from $\phi(N)$ when expectations are erroneous. That is why, as a general rule, the function E depends

²² Keynes analyses these two concepts in detail in books III and IV of the *General Theory*. In this article, we content ourselves with the simplified presentation which he proposes in chapter 3.

on the money income and not on the volume of employment.²³ As a consequence, it is not possible to draw the global expenditure function in the Z, N space.

4. Effective demand

Keynes defines effective demand as the intersection between the aggregate supply and demand functions. This definition raises a double difficulty: on the one hand, there are as many intersection points as states of expectations; on the other hand, the intersection between Z and D does not take into account the behaviour of consumers and investors. We show first that the implicit hypothesis according to which short-term expectations are fulfilled (*cf.* the introduction of this article) allows Keynes to solve this double difficulty. We then bring the first elements of an analysis in a more general frame by supposing that the short-term expectations are not fulfilled.

4.1. Fulfilled short-term expectations and stationary equilibrium

The implicit hypothesis according to which short-term expectations are fulfilled implies that supply satisfies demand at the expected unit prices, which gives $Z = E$ and $c = \bar{c}$. Now, expenditure corresponds to money income (R). Besides, the stocks of finished products (when there are any) remain unchanged ($I_L = 0$). Thus expected proceeds (Z) equal total income (Y ; equation (1)). We deduce $Z = Y = E = A = R$, or expressed in another way:

$$R = Y = \phi(N) = \bar{c}\phi(N) + I_F = \frac{I_F}{1 - \bar{c}}.$$

Point $E^\sim$ on *Figure 2* corresponds to the effective demand when the investment expenditure in fixed capital is $I_F^\sim$.²⁴ The equilibrium level of employment is $N^\sim$. Consumption amounts to $\bar{c}\phi(N^\sim)$. The only state of expectations which leads to produce the effective demand is $e^\sim$ which verifies $\phi(N^\sim) = f(N^\sim, e^\sim) = I_F^\sim / (1 - \bar{c})$. We measure here the key role played by the hypothesis according to which short-term expectations are fulfilled, and this on two accounts.

On the one hand, this hypothesis allows Keynes not to dwell on the distinction between functions D and E (because $D = E$ at point $E^\sim$) while using them alternately in his analysis. In section I of chapter 3, Keynes refers to D because he focuses on the behaviour of the entrepreneurs. As a result, “demand is qualified as ‘effective’ (...) because it corresponds to the amount of demand expected by entrepreneurs which should allow them to maximise their profits and which, on this account, induces their ‘effective’ commitment to production” (du Tertre, 2000, p. 343). After section I of chapter 3, Keynes refers to E because he focuses on ensuring coherence on a macroeconomic level. Demand is then ‘effective’ for another reason, because current supply at that point satisfies a creditworthy demand.

On the other hand, Keynes’ implicit hypothesis comes down to supposing that entrepreneurs adopt at once the state of expectations $e^\sim$. It thus allows him to evade the problems raised by the errors in expectations in chapter 3 of the *General Theory*.

4.2. Errors in short-term expectations and temporary equilibriums

After chapter 3, Keynes returns on the errors in expectations twice, but each time in a superficial way. In chapter 5, he asserts his confidence in the existence of a trial and error procedure which allows the entrepreneurs to correct their errors, but he does not clarify this

²³ In other words, we can say that this function is specified in real terms when it depends on N rather than on R , even if it relates to a monetary expenditure.

²⁴ Note that this result was obtained without formulating the global expenditure as a function of N .

In the specific case mentioned by Keynes, capital goods producers are not supposed to make errors in expectations. The rise of fixed capital investment therefore corresponds to a shift along their own supply curve (*cf. Figure 1*): they recruit more to answer a new demand. At the aggregated level, the increase from I_F^- to I_F^* goes together with the shifting of the aggregate demand function from $f(N, e^-)$ to $f(N, e_A)$, and with the rise of employment from N^- to N_A .

For their part, consumption goods producers content themselves with recruiting the necessary number of workers to answer the same expenditure as in the previous period:

$$\bar{c}\phi(N^-) = \bar{c}[\bar{c}\phi(N^-) + I_F^-].$$

However, demand from the capital goods industry is no longer $\bar{c}I_F^-$, but $\bar{c}I_F^*$, which represents an increase of $\bar{c}(I_F^* - I_F^-)$. This situation raises two further questions: what temporary equilibrium does the economy reach at the end of the period? How do entrepreneurs react at the start of the following period?

Naturally, the answers can be dependent on the mode of unit price setting. We consequently distinguish the two mechanisms of adjustment: through the variation of the stocks of consumption goods; through the flexibility of the unit prices. Let us also remind that we suppose that the adjustments of short-term expectations leave long-term expectations unchanged.

5. The analysis of the adjustment through the stocks of consumption goods

In this section, we admit that prices are set at the start of every elementary period. In that case, the excess demand generates a reduction of stocks which entails unexpected money income for the consumption goods producers. We show first that the temporary equilibrium depends on the use of this unexpected income (is it entirely saved or partially spent?). We then wonder about the validity of the multiplier in the short-term. We finally examine the short-term dynamics which leads to the stationary equilibrium.

5.1. Temporary equilibrium and the question of unexpected money income

Let us start from an equilibrium state (point E⁻) and suppose that the investment in fixed capital rises from I_F^- to I_F^* . Let us suppose that, because of their short-sightedness, every consumption goods producer maintains their unit price at the level which appears in the calculation of $\phi(N^-)$. The proceeds of the economy (*cf. point A on Figure 4*) corresponds to the *expected* proceeds, that is:

$$Z = \bar{c}\phi(N^-) + I_F^* = \phi(N_A).$$

Prices and volume of output having already been set, the only possibility to satisfy the demand in excess consists in drawing from the stocks of finished products. Consumption expenditure then reaches the level wished by the households, that is:

$$C = \bar{c}\phi(N^-) + \bar{c}(I_F^* - I_F^-) = \bar{c}\phi(N_A) = \bar{c}Z. \quad (5)$$

Global expenditure amounts to:

$$E = \bar{c}\phi(N_A) + I_F^* = Z + \bar{c}(I_F^* - I_F^-).$$

As underlined by Godley (1999), the accounting of liquid capital is quite difficult. In equation (5), it is valued at market prices which is logical because it relates to the expenditure. But it has to be valued at production costs to obtain the total income. As costs are lower than prices, the value of the stock reduction in total income ($-I_L$) is lower than $\bar{c}(I_F^* - I_F^-)$. The combination of equations (1), (3) and (5) then leads to $Z < Y < E = A = R$.

$$C = \bar{c}Y = \bar{c}\left[R - \bar{c}\left(I_F^* - I_F^-\right)\right] = c'R, \quad \text{with } c' = \frac{\bar{c}Z}{R} < \bar{c}.$$
$$I_F^* = (1 - \bar{c})R + \bar{c}^2(I_F^* - \tilde{I}_F) = (1 - c')R.$$

²⁷ Conversely, we have $c' > \bar{c}$ when the fixed capital investment decreases. It is here again necessary to suppose that the entrepreneurs commit themselves at the beginning of the period on the dividends they will redistribute, or that households set their consumption on the basis of the 'normal' payments for their production factors, *i.e.* without taking into account the decline of dividends connected to an unexpected loss.

income $\bar{c}^2(I_F^* - I_F^-)$ which is again redistributed, *etc.* This process involves an increase of the money income during the given elementary period. Up to what point does it continue? Simply until the wish for consumption is satisfied, which happens when consumption expenditure is $C = \bar{c}R$. In that case, money income and consumption expenditure respectively amount to:

$$R = \bar{c}R + I_F^* = \frac{I_F^*}{1 - \bar{c}} = \phi(N^*), \text{ and}$$

$$C = \bar{c}\phi(N^*) = \bar{c}\phi(N^-) + \bar{c}[\phi(N^*) - \phi(N^-)],$$

where $\bar{c}[\phi(N^*) - \phi(N^-)]$ measures the cut in stocks valued at market prices. The process thus stops when the money income equals the effective demand. Of course, the economy does not reach point E^* because the production remains the same as the one which is obtained by N_A workers. The temporary equilibrium is at point A'' . Firms produce fewer goods than at point E^* , sell them cheaper (the prices are those which appear in the Z function at point A), but the exchanged volumes are greater owing to the stocks cut. Besides, the profits being entirely redistributed, the purchase of capital goods (I_F^*) is completely financed by the households' savings.

5.2. The validity conditions of the multiplier

According to Keynes, the multiplier theory holds good continuously. Does our analysis confirm this assertion? When the equilibrium is at point A' , proceeds $\phi(N_A)$ are written:

$$\phi(N_A) = \bar{c}\phi(N_A) + I_F^* - \bar{c}(I_F^* - I_F^-) = \frac{I_F^* - \bar{c}(I_F^* - I_F^-)}{1 - \bar{c}}.$$

We infer that:

$$\phi(N_A) - \phi(N^-) = \frac{[I_F^* - \bar{c}(I_F^* - I_F^-)] - I_F^-}{1 - \bar{c}}.$$

As Keynes underlines,²⁸ the decline of stocks constitutes a disinvestment which affects equation (4) only by reducing the numerator. Here is the theory of the multiplier confirmed.

It is not any more the case when temporary equilibrium is at point A'' . Indeed, the decline of stocks is broader than at point A' . It results that:

$$\phi(N_A) > \frac{I_F^* - \bar{c}(I_F^* - I_F^-)}{1 - \bar{c}}.$$

Keynes' assertion is not confirmed here, which suggests that Keynes had in mind the mechanism which brings temporary equilibrium to point A' .

5.3. Short-term dynamics

The equilibrium reached at the end of the elementary period is only *temporary*. Indeed, stocks variations constitute a surprise that induce consumption goods producers to revise their

²⁸ "In so far as there is a depletion of stocks, aggregate investment increases for the time being by less than the increment of investment in the capital-goods industries, — *i.e.* the thing to be multiplied does not increase by the full increment of investment in the capital-goods industries" (Keynes, 1936, p. 124).

expectations. With conservative expectations, they adjust unit prices and employment to obtain the same receipts as in the previous period by maximising their profits.

When temporary equilibrium is at point A'' on *Figure 4*, the economy immediately reaches stationary equilibrium at point E*.

On the other hand, when temporary equilibrium is at point A', the employment increases to N_B (point B). The expectations are again unfulfilled because the new workers generate a rise of the money income and thus a new demand which can only be satisfied by some reductions of stocks (point B'), *etc.* Several elementary periods are thus necessary to reach point E* by following the pattern of the function $\bar{c}\phi(N) + I_F^*$.²⁹

Three remarks complete this presentation. Firstly, entrepreneurs wish to reconstitute their stocks when they think that short-term dynamics has reached its term. This explains why employment exceeds the equilibrium level for a while.³⁰ This also explains why the process is not hindered once stocks are empty. Indeed let us suppose that the adjustment at point A' requires to take the entire stocks of the consumption goods. Then the entrepreneurs hire more than N_B to satisfy the expected demand and reconstitute their stocks. But the excess demand brings them to draw from these new stocks at the end of the period. Thus they continue increasing their employment, until they obtain the stocks they wish.

Secondly, the global expenditure function is drawn in two different ways in *Figure 4*. The first is the curve $E = \bar{c}\phi(N) + I_F^*$ which is generally taken for the aggregate demand function. It is a mistake: this function is not induced by the entrepreneurs expectations of proceeds, but it corresponds to their realised proceeds under the particular hypothesis according to which unexpected money income is entirely saved.³¹ When this hypothesis is removed, the global expenditure function is the horizontal curve which passes by point E*, *i.e.* $E = I_F^* / (1 - \bar{c})$. In this case, the global expenditure does not depend any more on the volume of employment.

Thirdly, the economy converges towards effective demand even though entrepreneurs set their prices before trade takes place. This convergence ensues from the fact that unit prices are revised at the start of every elementary period: the *fixity* of unit prices does not prevent their *flexibility*; it should therefore not be confused with the assumption of *rigidity* put forward by the neoclassical synthesis. Moreover, in the next section, we will show that the same stationary equilibriums is reached when supposing that unit prices are determined during trade and that entrepreneurs do not accumulate any stocks of finished products.

6. The analysis of the adjustment through the prices of consumption goods

Let us go back to *Figure 3*. At the initial equilibrium (point E~), expected prices are those that figure in the calculation of the aggregate demand function $f(N, e^~)$. Consumption expenditure amounts to $\bar{c}\phi(N^~)$. The equilibrium level of employment is $N^~$.

Let us assume now that capital goods producers expect rightly a rise of their unit prices, whereas consumption goods producers continue to expect the previous prices. The state of

²⁹ Of course, investment expenditure must remain equal to I_F^* in order that stationary equilibrium remains unchanged at point E*.

³⁰ "The restoration of stocks to their previous figure causes the increment of aggregate investment to be temporarily greater than the increment of investment in the capital-goods industries" (Keynes, 1936, p. 124).

³¹ There are only two differences between this function and the aggregate supply $Z = \phi(N)$: firstly, the value of the constant is I_F^* (and not zero); secondly, the slope is less than that of Z . But this function remains convex due to the accelerated increase in money income issuing from the accelerated increase in unit prices along Z . In most writings, the aggregate demand function is supposed concave without any relevant justification.

Once again, the theory of the multiplier is confirmed, but providing that equation (4) is modified to take into account the decrease of the marginal propensity to consume.

Now, let us suppose that the unexpected profits are redistributed then normally spent. The only consequence is to generate a new rise of unit prices, and therefore of money income. If the prices of capital goods increase like those of consumption goods, the excess demand cannot be reduced. But, as the equilibrium of capital goods markets precedes that of consumption goods markets, investment expenditure remains equal to I_F^* . Money income increases faster than global expenditure until it catches up with it, when consumption expenditure reaches $\bar{c}\phi(N^*)$. The temporary equilibrium is then at point A'' where proceeds are:

$$Y = R = E = \phi(N^*) = \bar{c}\phi(N^*) + I_F^*.$$

The marginal propensity to consume keeps its normal value $\bar{c}$. The formula of the multiplier is strictly that of equation (4) because proceeds, pulled by the price increase, equalise the effective demand. Thus, Keynes' assertion is more than ever confirmed.³⁵

As for stocks adjustment, short-term dynamics depends on the temporary equilibrium reached at the end of the period. When this equilibrium is at point A', unit prices correspond to the state of expectations e_A' . Those are the prices that entrepreneurs take into account, with conservative expectations, to determine their employment at the start of the next period. Therefore they try to get to point B in order to obtain the proceeds $Z = \phi(N_B)$. At the end of the period, they realise however new unexpected profits, which induce them to recruit more, etc. The marginal propensity to consume gets progressively closer to its normal value.

When temporary equilibrium is at point A'', unit prices correspond to the state e_A'' . Entrepreneurs try to get to point C. Employment is then greater than the equilibrium level. But, the excess supply entails a decrease of prices. Prices are even weaker than in stationary equilibrium because firms realise the same receipts $\phi(N^*)$ with a higher volume of exchanges. Entrepreneurs therefore hire a number of workers lower than N^* , etc. Of course such a cobweb dynamics is most unrealistic. But we should not rely too much on it since it depends on the strong hypothesis that marginal propensity to consume keeps its normal value.

Finally, adjustments through stocks or through prices lead to very close results: the temporary equilibriums are identical; the short-term dynamics ends by the same stationary equilibrium. Only two secondary differences remain. The first concerns the path of the dynamics (as the entrepreneurs base themselves on the receipts or on the unit prices of the previous period). The second concerns the definition of proceeds (and therefore of the multiplier) which are determined at the beginning of the period when prices are set by entrepreneurs, or at the end of the period when prices are set on the markets.

7. Conclusion

In chapter 3 of the *General Theory*, Keynes' main objective is to show that insufficient investment expenditure generates a lower stationary equilibrium than the full employment equilibrium. For this, he concentrates on the specification of a *global expenditure function* (E) based on the propensity to consume and the inducement to invest. Stationary equilibrium is situated at the intersection between this function and the *aggregate supply function* (Z) which corresponds to the Marshallian supply function.

³⁵ However, Keynes (1936, p. 124) does not hold this mechanism. He only evokes the variation of the stocks and the flexibility of the unit prices combined with an adjustment of the marginal propensity to consume.

However, for the demonstration to be complete, Keynes has to show that the spontaneous mechanisms of the economy make entrepreneurs produce the effective demand. The main difficulty then lies in the fact that the global expenditure function does not provide any useful information for employers to decide their level of employment in a decentralised way. Indeed, this decision only depends on the unit prices at which they expect to sell their output. These unit prices are the basis of the *aggregate demand function* (D) that Keynes defines in section I of chapter 3. The intersection between D and Z gives the level of employment to which the expected profits are maximised. It depends on the state of the short-term expectations, and does not take into account consumption nor investment behaviours. As a consequence, nothing guarantees that it allows to produce the effective demand.

Keynes solves this problem by implicitly supposing that the short-term expectations of entrepreneurs are always fulfilled. The *stationary equilibrium* is then reached instantaneously. Demand there is ‘effective’ because supply satisfies a creditworthy demand, but also because as it is expected by entrepreneurs, it incites their ‘effective’ commitment to production.

However, in practice, it is obvious that entrepreneurs commit errors in expectations. In this article, we have shown that competitive mechanisms allow the economy to spontaneously converge towards effective demand. This process comprises two main stages.

The first concerns the end of every period, when mistaken expectations lead to an excess supply or demand of consumption goods. Two mechanisms enable the economy to reach a *temporary equilibrium*: the variation of the stocks of consumption goods (when unit prices are set by the entrepreneurs at the start of the elementary period); the flexibility of consumption goods unit prices of consumption goods (when they are set during trade).

The second stage concerns the beginning of the following period. The previous equilibrium expresses itself by a difference between expected and realised profits. This surprise incites the entrepreneurs to modify their decisions. The dynamics towards the *stationary equilibrium* then consists in a trial and error procedure which can continue over several periods. We must note that, with such a procedure, it is absolutely useless to assume that entrepreneurs expect the *global expenditure* of the economy; the assumption that they concentrate on with their own affairs is amply sufficient. Furthermore, the mode of price setting (at the start or at the end of the period) does not affect stationary equilibrium at all: price setting by entrepreneurs therefore does not imply in any way their rigidity.

Our analysis shows the strategic role played by the implicit hypothesis that short-term expectations are always fulfilled. It firstly exempts Keynes from having to exactly distinguish the aggregate demand and global expenditure functions, because he is only interested by their intersection. It secondly allows him to evade the problems raised by the fact that the global expenditure function does not depend on the level of employment but on the money income (and thus on the redistribution of unexpected money income between savings and consumption). It thirdly spares him having to delve into the complexity of adjustment mechanisms when the short-term expectations are erroneous.

In front of questions raised by the role of the short-term expectations, Keynes had intended to clarify his analysis.³⁶ But he did not achieve this project. Our purpose was to fill this gap. By putting realistic hypotheses concerning the entrepreneurs’ behaviour (profit maximisation, conservative expectations, ignorance of the complete model of the economy), we have clarified the trial and error procedure which brings to the effective demand. Our analysis thus consolidates the internal coherence of the *General Theory*.

³⁶ “I now feel that if I were writing the book again I should begin by setting forth my theory on the assumption that short-period expectations were always fulfilled; and then have a subsequent chapter showing what difference it makes when short-period expectations are disappointed” (Keynes, 1973b, p. 181).

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