

CHAPTER 18 OF THE *GENERAL THEORY* “FURTHER ANALYSED”: THE THEORY OF ECONOMICS AS A METHOD

Anna M. Carabelli & Mario A. Cedrini

Dipartimento di Scienze Economiche e Metodi Quantitativi
Università del Piemonte Orientale “A. Avogadro” – Alessandria, Novara, Vercelli
Via Perrone 18, 28100 Novara (Italy)
anna.carabelli@eco.unipmn.it - mario.cedrini@eco.unipmn.it

Abstract

This paper revisits chapter 18 of Keynes’s *General Theory* in the light of *A Treatise on Probability*. It shows that the notions of cause and independence used to discuss the relationships between the variables of the *General Theory* are related to the concept of “independence for knowledge”, which concerns logical connections between arguments rather than material connections between events. We demonstrate that such logical connections are rediscussed in chapters 19-21, where Keynes allows for probable repercussions between the factors and removes the simplifying assumptions previously introduced. After stressing the methodological continuity this method provides with the analysis of credit cycles in *A Treatise on Money*, we argue that chapter 18 is an indispensable tool to decode the text structure of the *General Theory*, and show that Keynes’s economic theory is in truth an analytical method allowing readers to emulate his efforts to grasp the complexity of the economic material.

Keywords: John Maynard Keynes, *The General Theory*, complexity, economic methodology
JEL codes: B31, B41, A10

INTRODUCTION

In a now famous article of 1987, Greenwald and Stiglitz accused Keynes of having relied too much upon the “neoclassical and Marshallian tools” in drawing the summary of the *General Theory* in chapter 18 of the book. Keynes had “a novel, and markedly non-neoclassical vision of how the economy worked”, they wrote, yet both the codification of Keynesian economics by Hicks, among others, and its presentation “in the form of a simple model as in chapter 18 of the *General Theory*” (p. 120) offered classical thinking an unhopd-for chance to resurge:

It is a matter for regret that Keynes’ summary of his arguments in chapter 18 of the *General Theory*, and the formal modelling of Keynes’ thinking by many later writers, relied so much upon the neoclassical and Marshallian tools which then, as now, were the style of the day. A much richer picture emerges from the *General Theory* taken as a whole (p. 127).

Greenwald and Stiglitz even went so far as to define chapter 18 of the *General Theory* as “an early example” (p. 120) of Keynesian economics as opposed to, according to Leijonhufvud’s (1968) famous distinction, the economics of Keynes. This result may have been produced, they added in a footnote, by Keynes’s (and his expositors’) intention to demonstrate that by removing only a few “basic assumptions” of classical theory it would have been possible to obtain “dramatically different results” (Greenwald and Stiglitz 1987, p. 127). Yet the substance of the arguments remains the same: chapter 18 is a betrayal of the *General Theory* and of Keynes’s own revolutionary reasoning. A summary of the *General Theory* made on neoclassical-Marshallian bases is at any rate misleading and obscures the reachness of the *General Theory* “taken as a whole”.

These remarks have particular relevance, since Greenwald and Stiglitz are certainly not hostile to Keynes’s thinking, whereas traditional criticisms of the *General Theory* have accused Keynes of being too much detached from neoclassical economists. It comes therefore as no surprise that the post-Keynesian strand has immediately tried to challenge Greenwald and Stiglitz’s interpretation. Sardoni can claim the merit of pioneering research in this precise regard: in his 1989-90 article, he showed that drastically different interpretations of chapter 18 were possible and, to some extent, had already been advanced in the literature: Shackle (1967), in Sardoni’s view, had rightly considered chapter 18 as the expression of “a new philosophy of explanation of economic reality” (Sardoni 1989-90, p. 293). The aim of our paper is to throw light on the reasons which have wrongly induced Greenwald and Stiglitz to condemn Keynes’s summary of the *General Theory* in chapter 18, and to suggest an explanation of the chapter itself as both an indispensable tool offered by the author to its readers to decode the text structure of the *General Theory* and as a guide to the analysis of a complex economic material. In so doing, great value is assigned to the theoretical continuity between the *General Theory* and Keynes’s “essay on method”, the *Treatise on Probability*.

After a brief outline of the chapter and a presentation of the taxonomy of given factors, independent variables and dependent variables proposed by Keynes in it (section 1), we examine

Keynes's methodological criticism of the "classical theory" (section 2) and in particular the rejection of the "atomic hypothesis" on which the latter rests (section 3). We then show that the notions of cause and dependence used to discuss the relationships between independent and dependent variables in chapter 18 are in truth related to the concept of "independence for knowledge", which concerns logical connections between arguments rather than material connections between events (section 4). The paper therefore insists on the difference between the Marshallian partial equilibrium analysis and Keynes's analytical method, by showing that the logical connections established in chapter 18 are explicitly rediscussed in chapters 19-21, where Keynes allows for probable repercussions between the factors (section 5.1) and removes the simplifying assumptions previously introduced (section 5.2). Section 6 draws on the methodological continuity this method provides with the analysis of credit cycles in *A Treatise on Money*, and on the importance of reader's involvement in the *General Theory*. In the Conclusions, we claim that chapter 18 performs a fundamental role in helping the readers understand the text structure of the *General Theory*. This allows the paper to further an interpretation of the *General Theory* as a vademecum to the complex economic world and of Keynes's theory of economics as a method, to be used by readers in order to emulate the author's efforts to grasp the complexity and interdependence of the economic material.

1. CHAPTER 18: AN OVERVIEW

There will be an inducement to push the rate of new investment to the point which forces the supply-price of each type of capital-asset to a figure which, taken in conjunction with its prospective yield, brings the marginal efficiency of capital in general to approximate equality with the rate of interest. That is to say, the physical conditions of supply in the capital-goods industries, the state of confidence concerning the prospective yield, the psychological attitude to liquidity and the quantity of money (preferably calculated in terms of wage-units) determine, between them, the rate of new investment.

But an increase (or decrease) in the rate of investment will have to carry with it an increase (or decrease) in the rate of consumption; because the behaviour of the public is, in general, of such a character that they are only willing to widen (or narrow) the gap between their income and their consumption if their income is being increased (or diminished). That is to say, changes in the rate of consumption are, in general, *in the same direction* (though smaller in amount) as changes in the rate of income. The relation between the increment of consumption which has to accompany a given increment of saving is given by the marginal propensity to consume. The ratio, thus determined, between an increment of investment and the corresponding increment of aggregate income, both measured in wage-units, is given by the investment multiplier.

Finally, if we assume (as a first approximation) that the employment multiplier is equal to the investment multiplier, we can, by applying the multiplier to the increment (or decrement) in the rate of investment brought about by the factors first described, infer the increment of

employment (CW7, pp. 248-249).

“The above is a summary of the General Theory” (p. 249), writes Keynes in chapter 18. A delusory summary, according to Greenwald and Stiglitz, since it closes the *General Theory*, in their view, in the restricted boundaries of a “simple model”. Before moving to the chapter’s last section, dealing with some “conditions of stability” (p. 250) which help explain why the economic system is not “violently unstable” (p. 249), Keynes adds a relevant part of the story and concerns himself with absolving the schematism of his reconstruction:

An increment (or decrement) of employment is liable, however, to raise (or lower) the schedule of liquidity-preference; there being three ways in which it will tend to increase the demand for money, inasmuch as the value of output will rise when employment increases even if the wage-unit and prices (in terms of the wage-unit) are unchanged, but, in addition, the wage-unit itself will tend to rise as employment improves, and the increase in output will be accompanied by a rise of prices (in terms of the wage-unit) owing to increasing cost in the short period.

Thus the position of equilibrium will be influenced by these repercussions; and there are other repercussions also. Moreover, there is not one of the above factors which is not liable to change without much warning, and sometimes substantially. Hence the extreme complexity of the actual course of events. Nevertheless, these seem to be the factors which it is useful and convenient to isolate. If we examine any actual problem along the lines of the above schematism, we shall find it more manageable; and our practical intuition (which can take account of a more detailed complex of facts than can be treated on general principles) will be offered a less intractable material upon which to work (ib.).

As already noted by Hansen (1953), by referring to “other repercussions” exerting their influence on the position of equilibrium, Keynes is straightforwardly – and unsuccessfully, as the early reception of the *General Theory* would seem to indicate – directing attention to the complexity of the economic system, to the extent that the schematism of the summary can be justified only by the usefulness and convenience to isolate some factors for purpose of offering a “more manageable” problem and a “less intractable material” to the economist.

Keynes has already explained how to achieve this result in the first section of the chapter, which relates to the nature of the factors and variables introduced into the analysis and the latter’s resulting schematism. The taxonomy includes:

1. Given factors:

“the existing skill and quantity of available labour, the existing quality and quantity of available equipment, the existing technique, the degree of competition, the tastes and habits of the consumer, the disutility of different intensities of labour and of the activities of supervision and organisation, as well as the social structure including the forces, other than our variables set forth below, which

determine the distribution of the national income" (CW 7, p. 245)

2. Independent variables:

"the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest" (ib.)

3. Dependent variables:

"the volume of employment and the national income (or national dividend) measured in wage-units" (ib.).

Yet both "given factors" and "independent variables" deserve further analysis. As to the former, Keynes specifies that he is not assuming them to be constant, "but merely that, in this place and context, we are not considering or taking into account the effects and consequences of changes in them" (CW 7, p. 245). Moreover, these factors "influence our independent variables", he stresses, but "do not completely determine them" (pp. 245-46): this is the case of the marginal efficiency of capital, which depends on the existing quantity of equipment (which is a given factor) but also on long-term expectations (which are not). By contrast, all other factors (e.g. "what level of national income measured in terms of the wage-unit will correspond to any given level of employment", p. 246) which are completely determined by the given factors should be considered as being themselves given. As to the independent variables, in chapter 14 Keynes defines the propensity to consume, the marginal efficiency of capital and the rate of interest as the "determinants" (p. 183) of the system. In chapter 18, however, he reminds that the schedule of the marginal efficiency of capital depends also on the prospective yields of capital-assets, while the interest rate depends on both the liquidity-preference and on the quantity of money (measured in wage-units). Therefore, the new taxonomy is as follows:

1a. "Factors which we have taken as given" (but not as constant; p. 245):

Factors outlined in 1. (see above) plus factors completely determined by them

2a. "Ultimate independent variables" (p. 246; *but*: see below in the text):

"(1) the three fundamental psychological factors, namely, the psychological propensity to consume, the psychological attitude to liquidity and the psychological expectation of future yield from capital-assets, (2) the wage-unit as determined by the bargains reached between employers and employed, and (3) the quantity of money as determined by the action of the central bank" (pp. 246-47);

3a. Dependent variables:

the volume of employment.

Still, Keynes warns soon afterwards that we are not in presence of “ultimate atomic independent elements” (CW 7, p. 247), since the given factors and independent variables “would be capable of being subjected to further analysis” (ib.). In this regard, he holds that

The division of the determinants of the economic system into the two groups of given factors and independent variables is, of course, quite arbitrary from any absolute standpoint. The division must be made entirely on the basis of experience, so as to correspond on the one hand to the factors in which the changes seem to be so slow or so little relevant as to have only a small and comparatively negligible short-term influence on our *quaesitum*; and on the other hand to those factors in which the changes are found in practice to exercise a dominant influence on our *quaesitum*. Our present object is to discover what determines at any time the national income of a given economic system and (which is almost the same thing) the amount of its employment; which means in a study so complex as economics, in which we cannot hope to make completely accurate generalisations, the factors whose changes *mainly* determine our *quaesitum*. Our final task might be to select those variables which can be deliberately controlled or managed by central authority in the kind of system in which we actually live (ib.).

This passage has attracted the attention of a number of economists strongly disagreeing with Greenwald and Stiglitz’s criticism (Sardoni 1989-90, Harcourt and Sardoni 1994, Fontana 2001). Such authors consider Keynes’s reference to “experience” for drawing the distinction between given factors and independent variables as an introduction to the third section of the chapter, where the author, before proceeding with the analysis, reminds readers that

the actual phenomena of the economic system are also coloured by certain special characteristics of the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest, about which we can safely generalise from experience, but which are not logically necessary (CW 7, p. 249).

Keynes then describes four conditions of stability, which “together are adequate to explain the outstanding features of our actual experience; – namely, that we oscillate, avoiding the gravest extremes of fluctuation in employment and in prices in both directions, round an intermediate position appreciably below full employment and appreciably above the minimum employment a decline below which would endanger life” (p. 254). First, as concerns the marginal propensity to consume, the multiplier relating the volume of consumption to an increase of output is greater than unity but not very large; the marginal efficiency of capital is such that changes in new investment are not in great disproportion to the change in the prospective yield of capital or in the rate of interest; money wages tend to vary in the same direction as changes in unemployment but not in great disproportion to them; finally, a change in the rate of investment begins to react (favourably or unfavourably) on the marginal efficiency of capital if continued for a period which

is not very large (so that fluctuations in one direction tend to reverse themselves in due course). Here too, Keynes specifies that such “‘natural’ tendencies” (ib.) do not determine a “mean position” by “law of necessity”: “the unimpeded rule [these tendencies “are likely to persist, failing measures expressly designed to correct them”] of the above conditions is a fact of observation concerning the world as it is or has been, and not a necessary principle which cannot be changed” (ib.).

In sum, chapter 18 raises at least three major issues, roughly corresponding to the three sections in which it is divided: first, a seemingly reductionist summary of the *General Theory* with respect to the “much richer picture” emerging from the work “as a whole”; second, a flexible or tolerant taxonomy of the given factors, independent elements and dependent variables entering the analysis; third, the role, in particular, of those “psychological propensities” which believed to ensure a certain degree of stability to the economic system.

2. KEYNES’S METHOD AND THE CLASSICAL THEORY

Chapter 18 is a somewhat surprising chapter. As the last of book IV, it should bring to conclusion Keynes’s remarks on “The Inducement to Invest”. Yet the chapter restates the whole *General Theory*: as seen, the summary of the book is preceded by a description of the independent and dependent variables of the system and the factors Keynes takes as given in the analysis; then, Keynes enumerates a series of “special characteristics” of the three independent variables, which explain why the system tends to oscillate round a position of less than full (but fairly above the minimum value of) employment. Furthermore, there are no evident reasons (exception made for a minor reference included in chapter 20; CW 7, p. 281) to believe that chapter 18 serves as a sort of prolegomena to book V (“Money-wages and Prices”). Chapter 18 seems to enjoy a special status, even in the context of a book which has a complex structure and presents chapters having “the nature of a digression” (CW 7, p. 37). It is thus reasonable to suppose that the chapter’s position in the volume conforms to specific requirements laid out by the author, although the reader might find it difficult to grasp their essence.

An outstanding feature of the chapter is Keynes’s frankness in admitting the limitations of his summary of the *General Theory*. Nor could his reiterated insistence on the division of the elements of the analysis into the three groups of given factors, independent variables and dependent variables easily go unobserved. In general, and paradoxical as it may seem, the reader is left with the impression that the author felt it necessary to answer in advance to potential criticisms of the same character of those made by Greenwald and Stiglitz; as if Keynes were anxious to remind the readers that there was much more in “the General Theory taken as a whole”. There is – even on a pure linguistic level – a close connection between this latter remark by Greenwald and Stiglitz and Keynes’s intention to write a *general* theory, aiming at redefining neoclassical theory as one among many of its possible special cases. Suffice it to recall the Preface to the French edition of the *General Theory*, where Keynes states:

I have called my theory a *general* theory. I mean by this that I am chiefly concerned with the behaviour of the economic system as a whole ... I argue that important mistakes have been made through extending to the system as a whole conclusions which have been correctly arrived at in respect of a part of it taken in isolation (CW 7, p. xxxii).

Keynes therefore locates a main flaw of the classical theory in the fallacy of composition which it engenders by wrongly “extending to the system as a whole” conclusions which “have been correctly arrived at in respect of a part of it taken in isolation”. Chapter 19 is the most vivid illustration of Keynes’s attempt to construct a *general* theory: in discussing the “supposedly self-adjusting character of the economic system” as seen by the classics, and the “assumed fluidity of money-wages” (CW 7, p. 257) on which the argument rests, Keynes explicitly refers to “*ignoratio elenchi*” (p. 259), one of the thirteen types of fallacy of argument listed by Aristotle in *Sophistical Refutations* (1928). In logic, *ignoratio elenchi* is regarded as an informal fallacy of relevance, occurring when the premises of an argument are irrelevant to, and incapable of, establishing the truth of the conclusion of the argument. In Keynes’s view, classical economists’ argument on the fluidity of money-wages relied on an unauthorized transposition, “without substantial modification” (CW 7, p. 259), of demand and supply schedules for different products of a given industry to “industry as a whole” (ib.). Unauthorized, since

the demand schedules for particular industries can only be constructed on some fixed assumption as to the nature of the demand and supply schedules of other industries and as to the amount of the aggregate effective demand. It is invalid, therefore, to transfer the argument to industry as a whole unless we also transfer our assumption that the aggregate effective demand is fixed. Yet this assumption reduces the argument to an *ignoratio elenchi* (ib.),

for “the precise question at issue is whether the reduction in money-wages will or will not be accompanied by the same aggregate effective demand as before measured in money” (ib.). Keynes bitterly concludes that “if the classical theory is not allowed to extend by analogy its conclusions in respect of a particular industry to industry as a whole, it is wholly unable to answer the question what effect on employment a reduction in money-wages will have. For it has no method of analysis wherewith to tackle the problem” (p. 260; see also Gerrard 1997).

It is no coincidence that Keynes uses the term “method” in this passage: the author of the *General Theory* is also the author of an essay on probability (*A Treatise on Probability*, 1921) outlining a general approach to epistemology which he later applied to economics in his economic writings. Chapter 19 is entirely centered on the distinction between the classics’ and Keynes’s “method”: there, Keynes explicitly highlights the “difference of analysis” (CW 7, p. 257) which separates his work from that of the classical theory; this difference is of a methodological character. Keynes maintains that “it would have been an advantage if the effects of a change in money-wages could

have been discussed in an earlier chapter” (ib.), but that this was not possible “until our own theory had been developed. For the consequences of a change in money-wages are complicated” (ib.). And he soon afterwards specifies that his “difference of analysis” with respect to the classical theory “could not be set forth clearly until the reader was acquainted with my own method” (ib.). Then, the reader infers that the problem with the “money-wages” argument of classical theory is that it offers a “general explanation [which is] quite a simple one. It does not depend on roundabout repercussions, such as we shall discuss below” (ib.).

The passage helps understand why Fontana (2009, p. 30) can argue that theory and method have an “interdependent existence” in Keynes’s economics. But there is more: one would not be abusing of the meaning of “theory” in Keynes’s thought if s/he were to use the term as a direct synonym of “method”. In the introduction to the Series of Cambridge Economic Handbooks (of 1922-23), Keynes states that

the theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, which helps its possessor to draw correct conclusions (CW 12, p. 151).

In contrast to classical economists and to the positivist application of the method of physical sciences to economics, Keynes defines the latter as a “moral” rather than a pseudo-natural science, dealing with “motives, expectations, psychological uncertainties” (CW 14, p. 300) – that is with introspection and ethical values – so that “one has to be constantly on guard against treating the material as constant and homogeneous” (ib.). As a now wide literature has demonstrated, it is in the *Treatise on Probability*, which is in truth “a work of philosophy and ethics, concerning the application of probability to the field of moral sciences and human conduct” (Carabelli 1988, p. 5), that Keynes fully developed his anti-positivist stance on the theoretical foundations of economics. His approach to probability stands in firm opposition to the frequency theory of probability: the *Treatise* deals with probability of propositions and, more in general, with the process of reasoning, rather than with events and their occurrence. In accepting the logical theory of probability, however, Keynes rehabilitates limited knowledge as against the belief of classical theory that perfect knowledge is the only type of knowledge valid for science. Rather, Keynes holds that probability is “the general, because the commonest, case of knowledge” (ib., p. 16), thereby establishing probability rather than perfect knowledge as the main tool of science and economics with it. In so doing, Keynes draws attention to arguments which have a non-demonstrative and non-conclusive nature, that is to arguments justified by their connections with probability and limited knowledge rather than truth and perfect knowledge. “In economics”, he writes, “you cannot *convict* your opponent of error – you can only *convince* him of it” (CW 13, p. 470).

This approach to epistemology provides clear continuity with Keynes’s definition of economics “as a method rather than a doctrine” or, as Keynes stresses in a 1938 exchange with Roy Harrod concerning the latter’s *Scope and Method in Economics*, as “a branch of logic, a way of

thinking" (CW 14, p. 296), whose object, Keynes writes in the *General Theory*, is

not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organised and orderly method of thinking out particular problems (CW 7, p. 297).

The use, in such definitions of economics, of terms such as "machine", "settled conclusions", "method of blind manipulation", "infallible answer", reflect both Keynes's dislike for Harrod's analogy between economic behaviour and the mechanical movement of physical bodies but also, and more in general, his rejection of positivism and his full awareness of the difficulty inherent to the attempt to applicate mathematical discourse to a moral science like economics. Economics is for Keynes a branch of logic, an apparatus of probable reasoning. Without logic, economists risk losing themselves in a mathematical wood of "pretentious and unhelpful symbols". Not "to lose sight of the complexities and interdependencies of the real world" in this labyrinth of symbols, the economist must adopt Malthus's method, or at least the method of Malthus as revisited by Keynes himself, who praises the former for his "profound economic intuition and an unusual combination of keeping an open mind to the shifting picture of experience and of constantly applying to its interpretation the principle of formal thought" (CW 10, p. 108).

This passage, and particularly the reference to the "shifting picture of experience", is of the utmost importance to understand what Keynes meant by logic. Keynes was in fact interested in developing a contingent form of non-demonstrative reasoning relative to contexts of shifting reality. In fact, Keynes considered logical relations as objective; yet, believing that both thought and reality were multidimensional, he rejected the basic assumptions of metaphysical realism. In the absence of an absolute, universal theoretical point of view, theoretical categories must be selective, that is related to contingent cognitive circumstances. This transforms, in Keynes's thought, the strong category of rationality into the weaker one of reasonableness (that is, relative to changing circumstances), and allows Keynes himself to develop a theory of knowledge as probability, based on non-demonstrative and non-conclusive arguments. In defining economics as a "method rather than a doctrine, which helps its possessor to draw correct conclusions", therefore, Keynes establishes the main task of the *General Theory* as that of helping economists avoid logical fallacies in reasoning of the kind of those affecting the classical theory. Hence the attempt to construct, on the same bases on which his early criticism of Bernoulli's principle of indifference, of induction and statistical inference rested in the *Treatise on Probability* (see Carabelli 1988), a methodological criticism of the classical theory, consisting in making explicit to the reader the tacit assumptions classical economists had introduced into their analysis.

At a first approximation, the classical theory seems to be an "organised and orderly method" helping its possessor to "draw correct conclusions". "Brought up in the citadel" (CW 13, p. 489), Keynes explicitly recognizes the strength of the classical theory, despite evidence of a "cleavage between the conclusion of economic theory and those of common sense" (CW 7, p. 350). But

Keynes believes that this cannot be *the* (nor the main) argument for rejecting it: the “heretics” (CW 13, p. 488) of his days mistakenly supposed that “common observation is enough to show that facts do not conform to the orthodox reasoning” (p. 489). On the contrary, for Keynes, observation is theory-laden, that is every act of observation implicitly includes a theoretical hypothesis about the material one is observing (see Carabelli 1988; in the *Treatise on Probability*, Keynes writes: “our ‘observations’ are often the result of some manipulation, and the particular shape in which we get them is not necessarily fixed for us”, CW 8, p. 231). This means for him that theory and logic, rather than mere observation, are required to raise doubts on a theory. Consistently, Keynes argues that critics of the classical theory cannot reject the latter’s conclusions without discarding its premises, since the classical theory is, in this regard, perfectly consistent: “if orthodox economics is at fault, the error is to be found not in the superstructure, which has been erected with great care for logical consistency, but in a lack of clearness and of generality in the premisses” (CW 7, p. xxi).

Rather, it is the task of chapter 19 to show that the classical theory is to be criticised exactly on methodological bases (see Carabelli 1991). The fallacy of composition referred to by Keynes as *ignoratio elenchi* is a logical mistake invalidating the generality of the theory, which extends to the system as a whole “conclusions which have been correctly arrived at in respect of a part of it taken in isolation”. The problem with classical theory is its unwillingness to make explicit those *tacit* assumptions introduced into the analysis to support the generality and validity of its arguments, and in particular those connected with the notion of independence. Classical economists had in effect relied on the tacit assumption of independence of the real variables of the economic system from changes in the value of money; they had tacitly assumed the system to be always operating to its full capacity; finally, in passing from the individual to the general level, they had tacitly introduced a hypothesis of independence from changes in the level of community income (see Carabelli 1991; Gerrard 1997). Universality of space and time was inherent to these three tacit classical assumptions: “Say was *implicitly* assuming that the economic system was *always* operating up to its full capacity, so that a new activity was *always* in substitution for, and never in addition to, some other activity” (CW 7, p. xxxv, emphases added); “the view that *any* increase in the quantity of money is inflationary ... is bound with the *underlying* assumption of the classical theory that we are *always* in a condition where a reduction in the real rewards of the factors of production will lead to a curtailment in their supply” (p. 304; emphases added).

The *General Theory* is Keynes’s attempt to demonstrate that the tacit conditions imposed by classical economists have very limited validity. In the Preface to the *General Theory*, Keynes invites his “fellow economists” to “re-examine critically certain of their basic assumptions” (CW 7, p. xxi), and, in the “Concluding notes” of the book, he restates his work as an attempt to point out that the classical theory’s “tacit assumptions are seldom or never satisfied” (p. 378). The conclusions of this theory are as limited as their premises in generality and validity; and the generality of the theory irremediably reduced (“Only if the equality held good, as the classical theory assumes, for *all* levels of output, would it be true that there is nothing to check the increase of employment”, CW 13, p. 427; emphases added).

3. MAKING SCIENCE WITH A COMPLEX WORLD: THE ATOMIC HYPOTHESIS

How does chapter 18 enter this general story? There is a *fil rouge* linking Keynes's insistence on the concepts of cause and independence in that chapter to his criticism of the classical theory and the construction of an alternative theory, but it resembles more a complex skein which readers are required – the ambivalent reception of chapter 18 shows the difficulty of the task – to disentangle. A main problem is that relevant parts of the thread pass outside the *General Theory*. In the *Treatise on Probability*, Keynes deals with the logical foundations of analogy and inductive reasoning. Analogy is possible, he writes, in case of “limited independent variety” (CW 8, p. 280), that is when the premises of an argument belong to a finite system of facts – where “finite” means that the amount of “independent variety” made up by the system's constituents and the laws of connection between them is inferior to the number of its members. Keynes points out the logical nature of this principle: the application of the “atomic hypothesis” of limited independent variety to the material world amounts to considering it as a set of atomic units “each of them exercis[ing] its own separate, independent and invariable effect” (p. 277). This means that the “atomic hypothesis” which justifies inductive reasoning and mathematical calculus cannot be applied to organic complex systems (see Carabelli 1988). It cannot be applied to probability, in Keynes's view, since probability has an organic nature (“a degree of probability is not composed of some homogeneous material, and is not apparently divisible into parts of like character with one another”, CW 8, p. 32), nor to, in more general terms, the whole range of social disciplines, and economics makes no exception. In his 1926 *Essay on Edgeworth*, Keynes maintains that

The atomic hypothesis which had worked so splendidly in physics breaks down in psychics. We are faced at every turn with the problem of organic unity, of discreteness, of discontinuity – the whole is not equal to the sum of the parts, comparison of quantity fails us, small changes produce large effects, the assumptions of a uniform and homogeneous continuum are not satisfied (CW 10, p. 262).

The above catalogue of problems invalidating the use of the atomic hypothesis in psychics should be kept constantly at mind by readers of the *General Theory*, who find references, in the book, to the “complexities and interdependencies of the real world” (CW 7, p. 298). In Keynes's view, the economic material possesses attributes of complexity which should induce the economist to reject, in his analysis, the blind application of mathematics and statistics, with their assumptions of homogeneity, atomism and independence, to an object that is essentially vague and indeterminate, not homogeneous, not divisible in homogeneous independent parts, not finite, and is characterized by organic interdependence. Yet the problem is not confined to an unqualified use of mathematics in economic analysis: indeed, it concerns science in general.

In his youth papers on aesthetics (see Carabelli 1988, O'Donnell 1995, Dostaler 2007),

Keynes discusses the relationship between science and art, and argues that science possesses procedures which are similar to those of art. In particular, scientists make use of creativity and intuition, talents traditionally associated with the artist's ability to appreciate beauty. In an early undated paper, Keynes (undated, p. 2) condemns the "supposed antagonism between the precise and verbal notions of philosophy and the organic, indivisible perceptions of beauty and feeling, between those things which we perceive piecemeal and those which we perceive as wholes". Rather, he stresses the need of combining "the analytical and intuitive powers", the need for a collaboration of reason and intuition, of the piecemeal perception of the scientist-analyst and the synthetic perception of the artist, so that "knowledge and creation may advance together" (ib.). The point is raised again in Keynes's 1909 essay "Science and Art", where he maintains that scientists, like artists, manifest a creative attitude in their research, and writes of a "sudden insight" required to see through the obscurity of a scientific argument.

Now, as Keynes wrote as early as 1913, in *Indian Currency and Finance*, when confronted with a coherent economic system, wherein "every part fits into some other part" (CW 1, p. 181), the economist must keep in mind that

It is impossible to say everything at once, and an author must needs sacrifice from time to time the complexity and interdependence of fact in the interest of the clearness of his exposition. But the complexity and the coherence of the system require the constant attention of anyone who would criticize its parts. This is not a peculiarity of Indian finance. It is the characteristic of all monetary problems (pp. 181-82).

The analysis of monetary problems thus requires a theory and a method able to tackle organic interdependence among the variables at play without theoretically reducing the complexity of the system under investigation. Once organicism is introduced into the analysis, however, it "poses the problem of paralysis: what can one say except that everything depends on everything else?" (Chick 2003, p. 318). In stressing the organic nature of a monetary economy, the economist adopts the synthetic perspective which informs the artist's ability to perceive things as a whole; but science requires a certain degree of decomposability, not to speak of the need to communicate the results of the analysis, at an epoch when the techniques of the modern economics of complexity were yet to be discovered.

In line with a tradition established in the *Treatise on Probability*, also the *General Theory* restricts the validity of the mathematical formalisation of a system of economic analysis resting on the introduction of assumptions of "strict interdependence":

It is a great fault of symbolic pseudo-mathematical methods of formalising a system of economic analysis, such as we shall set down in section VI of this chapter, that they expressly assume strict independence between the factors involved and lose all their cogency and authority if this hypothesis is disallowed; whereas, in ordinary discourse, where we are not blindly manipulating but know all the time what we are doing and what the words mean, we

can keep 'at the back of our heads' the necessary reserves and qualifications and the adjustments which we shall have to make later on, in a way in which we cannot keep complicated partial differentials 'at the back' of several pages of algebra which assume that they all vanish. Too large a proportion of recent 'mathematical' economics are merely concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependencies of the real world in a maze of pretentious and unhelpful symbols (CW 7, pp. 297-98).

For such formalisation to be possible, the economist needs an "atomic hypothesis" which however, as seen, does not hold in a complex, organic system. Yet, it is Keynes himself, in chapter 18, who divides the "determinants" of the system into the two subgroups of "given factors" and "independent variables", and the literature has stressed the role of the *ceteris paribus* condition employed by Keynes to make theory possible. The adoption of this Marshallian tool in Keynes's economics is easy to explain: Marshall too had a conception of economics as fundamentally complex, and the *ceteris paribus* hypothesis – which consists in "breaking up a complex question, studying one bit at a time, and at last combining ... partial solutions [thus obtained] into a more or less complete solution of the whole riddle" (Marshall 1961, p. 366) – is regarded by Keynes's teacher as an analytical instrument required to make science with a complex material.

In Keynes's view, Marshall believes that the economic interpretation of "the complex and incompletely known facts of experience" requires the economist to go beyond the "bare bones of economic theory" (CW 10, p. 86). Abstract reasoning, too rigid in itself, must then be supplemented by "trained common sense", and by the use of everyday language, which allow for "shades of meaning" which can be interpreted "by the context" (Marshall 1961, p. 51; see Marchionatti 2010). As the complexity of the subject increases, however, the role of abstract reasoning is less important than in the earlier stages of economic analysis, and economic reasoning becomes, in Marshall's (1898, p. 39) conception, "more biological in tone". This amounts to recognizing the limited role of mathematics: the mathematician "takes no technical responsibility for the material, and is often unaware how *inadequate* the material is to bear the strains of his powerful machinery" (Marshall 1961, p. 781). Marshall's legacy is certainly of the utmost importance for Keynes's economics, which rejects the blind manipulations of mathematics and gives a prominent role to ordinary language. As seen, moreover, the summary of the *General Theory* appearing in chapter 18 rests on the identification of "factors which it is useful and convenient to isolate", offering to the economist a "more manageable" problem and a "less intractable material upon which to work" to his "practical intuition". Yet, in chapter 19, Keynes gives an account of his own method of economic analysis which neutralizes the use of the *ceteris paribus* condition as a means to obtain partial equilibrium: the "nature of economic thinking" requires the economist to exceed the limits of the *ceteris paribus* condition by deliberately repudiating those same "provisional conclusions" reached when assuming, within a purely logical, strictly finite time interval, "all other things" to be equal.

The object of our analysis is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organised and orderly method of thinking out particular problems; and, after we have reached a provisional conclusion by isolating the complicating factors one by one, we then have to go back on ourselves and allow, as well as we can, for the probable interactions of the factors amongst themselves. This is the nature of economic thinking. Any other way of applying our formal principles of thought (without which, however, we shall be lost in the wood) will lead us into error (CW 7, p. 297).

What emerges with clarity from this passage is that Keynes's is a multifaced revolution. His attack on the classical theory denounces the introduction of tacit assumptions of independence into a vision of the economic system which is in truth intrinsically, and positively, modelled on the concept of interdependence. Keynes acknowledges the need of such assumptions to make science with a complex social world, but wants the economist to make them explicit in the course of the analysis, as happens with a declared use of the *ceteris paribus* condition. However, this latter too easily conduces towards partial equilibrium analyses of the economic system, so that the economist ends up with losing sight of the complexity and interdependency of the real world. A truly general theory is therefore, in Keynes's view, a theory which does not depend on the introduction of tacit assumptions of independence; a theory which is not universal in time and space, but is able to cope with different hypothetical cases characterized by different levels of dependence among the variables; a theory which allows for change and variability and permits them to play a central role in the analysis (see Carabelli 1991).

4. ON THE NOTIONS OF CAUSE AND INDEPENDENCE IN THE *GENERAL THEORY*

Gerrard (1997) has provided a masterly account of the analytical method proposed by Keynes in the *General Theory*. Yet the central theoretical elements of chapter 18, that is the notions of cause and independence, seem to deserve further attention and, in particular, a careful analysis of the legacy of the *Treatise on Probability* in this regard. As seen, for Keynes, the classical theory is to be blamed for the introduction of three tacit assumptions of "logical independence from" having the characteristic of universality in space and time. Keynes's is a criticism of logical relevance. The concepts of logical relevance or irrelevance, and those of logical dependence or independence as well, are among the most important ones dealt with in the *Treatise on Probability* (this section draws on Carabelli 1988). It is in the context of a discussion on Bernoulli's principle of indifference, and on the comparison of probabilities of different arguments in order to assess the preferability of one of them as a basis for belief, that Keynes distinguishes between judgements of preference or indifference and judgements of relevance or irrelevance. The former concern comparisons of the probabilities of arguments which have same evidence but different conclusions; the latter concern

situations in which the arguments have the same conclusions but different evidence. Direct judgements of logical relevance concern the effect that the probabilities of an argument are affected or not by the inclusion in the evidence of certain particular details. It is to be remembered that for Keynes, judgments of logical relevance are not absolute but relative to the “quaesitum”, as well as to the particular circumstances in which the latter is raised. In the *Treatise on Probability*, Keynes considers a judgement of independence as a judgement of logical irrelevance; judgements of independence lie at the basis of the atomic hypotheses which justify the application of the mathematical probability theory. The same goes for classical theory: the assumption of “independence from” is but a judgement of “logical irrelevance” of changes in the value of money, in the value of output and of income; judgements of independence and (that is) the introduction of atomic hypotheses justify formalisation through “symbolic pseudo-mathematical methods” and inform the use of partial equilibrium analysis.

As to the concepts of cause and independence in chapter 18, we have already noted Keynes’s reluctance to assign to the variables he qualifies as independent the role of “ultimate atomic independent elements” or even that of “ultimate independent variables”. The reader is induced to interpret the continuous refinement proposed by Keynes of the taxonomy given factors-independent variables-dependent variables in terms of the author’s concern for a possible *regressio ad infinitum* in the analysis of the independent variables of the system. This is not a wrong impression. Yet, more probably, Keynes is trying to distance himself from a rigid interpretation of the notions of “cause” and “independence”. And, more precisely, he is following a procedure he himself had described in the *Treatise on Probability*, in a three-page note on the use of the term “cause”. In the *Treatise*, as already observed, he chooses not to focus on the material connection between events, but on the analysis of the cognitive conditions which surround the assertion of a causal connection. The first formulation of such contrast is given by Keynes through distinguishing between *causa essendi*, or “the cause why a thing is what it is”, and *causa cognoscendi*, or “the cause of our knowledge of the event” (CW 8, p. 308); a second formulation is offered by the distinction between “causal dependence”, which concerns material connections, and “dependence for knowledge”, which concerns the cognitive conditions of the connection which is asserted.

Keynes does not associate the concept of independence with that of causality (rather, he established a connection, as seen, with that of relevance): this is because he deliberately chooses not to tackle the problem of the relationship between logical and empirical (material) relevance, that is the relation between *causa essendi* and *causa cognoscendi*. Yet, just as he perfectly knows that, albeit the two aspects are often confused, the adoption of the hypothesis of atomic uniformity in science should not be interpreted as the acceptance of empirical uniformity, he also clearly distinguishes between objective dependence and “dependence for knowledge”: in the *Treatise*, he contrasted Cournot’s and Yule’s views of probability to his own, stressing that the latter was based on a form of “independence for knowledge” which “must be different from either of these objective forms of independence” (CW 8, p. 184). In a vision of economics as a branch of probable

logic, “cause” is therefore a relative cognitive concept, a logical ground for believing, which is relative to particular circumstances. It is no coincidence that Keynes refers to “causal analysis” as “strictly logical” in the 1933 draft of the *General Theory* (CW 29, p. 73). Causality is, in Keynes’s analysis, a rule to form propositions, resting on the use of the concept of *causa cognoscendi* and the attention this latter draws on having reasons for holding probable beliefs.

More in general, Keynes’s preference for an organic rather than an atomic approach to economics is connected with the use of ordinary rather than mathematical language. In the *Treatise on Probability*, Keynes stresses that the logic of probability is an open logic, unlike artificial languages (such as mathematical formalisation) with their members in finite number and their exhaustive alternatives: the idea is developed, for instance, when Keynes compares the logic of probability to the logic of colours and of similarity (CW 8, pp. 38-39). Only through ordinary language can the economist cope with the complexity of the economic material, Keynes remarks when opposing the “strict independence between the factors involved” assumed by “symbolic pseudo-mathematical methods of formalising a system of economic analysis” to the possibility, offered in the context of an “ordinary discourse” of keeping “‘at the back of our heads’ the necessary reserves and qualifications and the adjustments which we shall have to make later on” (CW 7, pp. 297-298; see also Vercelli 1991).

Now, when, in chapter 14, Keynes notes that the determinants of the system (the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest) “are, indeed, themselves complex and each is capable of being affected by prospective changes in the others. But they remain independent in the sense that their values cannot be inferred from one another” (CW 7, p. 183); when, in chapter 18, Keynes specifies that he does not “assume these factors to be constant; but merely that, in this place and context, we are not considering or taking into account the effects and consequences of changes in them” (p. 245); and when, in that same chapter, he draws the causal connections on which the summary of the *General Theory* rests, he is in truth using a “strictly logical” causal analysis and applying to the economic material the notions of logical relevance (that the values of independent variables cannot be inferred from one another is another way of saying that the judgment of relevance concerning these variables is unmodified) as well as of direct judgements of dependence or independence “for knowledge”.

Variables are always “taken as”, and never shown to be, independent; the distinction itself, within the determinants of the system, between given factors and independent variables is “quite arbitrary from any *absolute* standpoint” (CW 7, p. 247, emphasis added); and after revisiting his taxonomy of given factors-independent variables-dependent variables, Keynes specifies that “we can *sometimes* regard our ultimate independent variables as consisting of ...” (p. 246, emphasis added), only to say, a few lines later, that the three independent variables just outlined “would be capable of being subjected to further analysis, and are not, so to speak, our ultimate *atomic* independent elements” (p. 247, emphasis added). In short, in assigning the role of independent elements, Keynes is establishing connections between arguments and propositions, rather than between events. “Given”, “independent” and “dependent” are relative to the economist’s

“quaesitum”: here too, the Keynes of the *Treatise on Probability* (where he maintains that judgements of relevance are relative to “some only of the known characteristics of the *quaesitum*, those characteristics, namely, which are *relevant* in the circumstances”, CW 8, p. 113, emphases in the original) is just using his conception of judgements of relevance as not absolute but relative to the economist’s practical purpose of the analysis and the particular circumstances in which this *quaesitum* is raised. Then, Keynes specifies that the “final task” of the analysis is to “select those variables which can be deliberately controlled or managed by central authority in the kind of system in which we actually live” (CW 7, p. 247), while in his 1937 article in the *Quarterly Journal of Economics*, he remarks that the *General Theory* might be summed up by saying that

given the psychology of the public, the level of output and employment as a whole depends on the amount of investment. I put it in this way, not because this is the only factor on which aggregate output depends, but because it is usual in a complex system to regard as the *causa causans* that factor which is most prone to sudden and wide fluctuation (CW 14, p. 121).

As seen, in summing up the *General Theory* in chapter 18, Keynes adopts – despite “the extreme complexity of the actual course of events” (CW 7, p. 249) – a criterion of usefulness and convenience (“these seem to be the factors which it is useful and convenient to isolate”, *ib.*), so as to make the problem “more manageable” for our “practical intuition”, “which can take account of a more detailed complex of facts that can be treated on general principles” (*ib.*). In so doing, Keynes is arguing that the economic material retains its complex nature even after the introduction of such schematism; and that only our practical intuition, our “ordinary language” logic can tackle this complexity. That is, those intuitive direct judgements implied in the choice of independent and dependent variables also play a fundamental role in the second, wholly probabilistic (see Vercelli 1991) part of the analysis. It is Keynes himself to confirm this view, when describing this second part of the analysis as a stage in which – it is worth mentioning, here, that he is using the term “probable” in the sense of the *Treatise on Probability*, which adopts, as seen, a (neither frequentist nor subjectivist, but) logical conception of probability itself –, “after we have reached a provisional conclusion by isolating the complicating factors one by one, we then have to go back on ourselves and allow, as well as we can, for the *probable* interactions of the factors amongst themselves” (CW 7, p. 297, emphasis added).

5. THEORY, METHOD AND COMPLEXITY IN THE *GENERAL THEORY*

5.1 *ROUNDAABOUT REPERCUSSIONS*

Since Keynes argues that the economic material retains its complexity even after introducing a distinction between variables according to a criterion of “dependence for knowledge”, and – what is more – that a general theory is such only if it refrains from introducing assumptions (worse, tacit assumptions) of independence, the hypothesis of independence inherent to the use of

independent variables in chapter 18 is is nothing but, exactly, a hypothesis. “Acquainted with [the author’s] own method” (CW 7, p. 257) as requested by Keynes himself, we are now in a position to understand the exact meaning of the “roundabout repercussions” analysed in chapter 19. Keynes’s method is directly opposed to the classical analysis, which rests on the tacit introduction of a hypothesis of fixed aggregate demand (“whilst no one would wish to deny the proposition that a reduction in money-wages *accompanied by the same aggregate effective demand as before* will be associated with an increase in employment, the precise question at issue is whether the reduction in money-wages will or will not be accompanied by the same aggregate effective demand as before measured in money”, p. 259), but also

Let us, then, apply our own method of analysis to answering the problem. It falls into two parts.

(i) Does a reduction in money-wages have a direct tendency, *cet. par.*, to increase employment, 'cet. par.' being taken to mean that the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest are the same as before for the community as a whole? And (2) does a reduction in money-wages have a certain or *probable* tendency to affect employment in a particular direction through its certain or *probable* repercussions on these three factors (p. 260, emphases added)?

In Keynes’s two-stages analysis, the *ceteris paribus* hypothesis used in part (1) with respect to those variables which can be “sometimes regard[ed as] our ultimate independent variables” (p. 246) immediately leaves room for a study, in part (2), of the repercussions of the reduction in money-wages on the three factors, which is conducted in fully probabilistic (in the sense, recalled above, of the *Treatise on Probability*) terms.

After answering negatively to question (1) – the volume of employment depends on the volume of effective demand, which in its turn depends on changes in the propensity to consume, in the marginal efficiency of capital and in the rate of interest –, Keynes analyses those “probable repercussions” which are lacking in the classical theory, and enumerates seven of them. The first repercussion is due to the reduction of money-wages inducing a reduction of prices, which leads to a redistribution of real income from wage-earners to other factors of the production, and from entrepreneurs to rentiers. Keynes explicitly admits that this transfer is likely to diminish the propensity to consume. The same for the third repercussion, which, as happens with the second (though the final result is the opposite), is relative to an international system, where the reduction of money-wages relatively to money-wages abroad is likely to induce a raise of investments through the increase of the balance of trade but also, for the same reason, to worsen the terms of trade, with the result that the reduction in real incomes may tend to increase the propensity to consume. The fourth and fifth repercussions concern expectations: the reduction of money wages, by increasing the marginal efficiency of capital, will be favourable to investment (repercussion number 4), writes Keynes, if it is expected to be a reduction relatively to money-wages in the future, while it will have the opposite effect if the community expects money-wages to further

diminish in prospect. Yet the reduction will reduce in any case the schedule of liquidity-preference for the community as a whole, thus raising investments (repercussion number 5); but here again, expectations play a fundamental role, although their effect will be of an opposite tendency with respect to the dynamics outlined in the fourth repercussion. Repercussions number 6 and 7 deal respectively with the effects of a reduction in money-wages in terms of the general tone of optimism or pessimism they can produce on entrepreneurs (so that, in the most favourable case, they “may break through a vicious cycle of unduly pessimistic estimates of the marginal efficiency of capital and set things moving on a more normal basis of expectation”, CW 7, p. 264) and workers, and the negative influence of a greater burden of debt on the former.

Keynes then confirms that nothing positive may derive from the repercussions affecting community’s propensity to consume. Of the utmost importance for our purposes is however not the result of his reasoning, as the implications of the method here adopted. Keynes tells us that a reduction of money-wages cannot alter employment unless it affects effective demand, that is unless there are significant repercussions on the three factors outlined above, namely the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest. At the end of the analysis, he maintains that “there is ... no ground for the belief that a flexible wage policy is capable of maintaining a state of continuous full employment” (CW 7, p. 267). In the course of the analysis, however, he implicitly directs attention to the fluid nature of the taxonomy of variables sketched in chapter 18. After defining the three factors recalled above, in opposition to the classics, as the real “determinants” of the system, Keynes clarifies that they are “themselves complex and each is capable of being affected by prospective changes in the others”, and that “they remain independent in the sense that their values cannot be inferred from one another”, which is exactly what he shows in relation to the marginal efficiency of capital and the rate of interest in chapter 19. But he also maintains that a reduction in money-wages negatively affects the community’s propensity to consume, and has psychological repercussions affecting liquidity-preference and expectations of future yield from capital-assets: which means that in what we have here defined as the second stage of the analysis, a change in the value of an independent variable (money-wages) has repercussions on variables which are also defined as “independent” in chapter 18 (the point is noted by Gerrard 1997; see also Asimakopulos 1991; and Togati 2006 for a discussion of the variables taken as independent by Keynes).

In the first proof of the *General Theory* (chapter 18 was sent to the publisher at the end of March 1935: see Hirai 2008), Keynes points out that

in some contexts it will reasonable to take, also, the motives affecting the readiness to consume, which I have distinguished in chapter II under the category “subjective”, as amongst the given factors of the system; since they are of a kind which as a rule (though not invariably) are unlikely to change materially within a short period of time. In this case we are left with *two* independent variables, the schedule of marginal efficiency of capital and the rate of interest (CW 14, p. 503).

This is a further confirmation of the fact that the notion of “independence” used in chapter 18 is in truth, and more correctly, “independence for knowledge”, and that the second stage of the analysis, allowing for the “probable interactions among the factors themselves”, permits to get rid of the schematism when this same interaction induces to redefine the relationships between the variables themselves.

5.2 EXPLICIT SIMPLIFYING ASSUMPTIONS AND POSSIBLE COMPLICATIONS

After repercussion number seven, Keynes explains that it was “not a complete catalogue of all the possible reactions of wage reductions in the complex real world. But the above cover, I think, those which are usually the most important” (CW 7, p. 264). The catalogue cannot be complete, Keynes argues, because the real world is complex, and in a complex real world, “we are faced at every turn with the problem of organic unity, of discreteness, of discontinuity – the whole is not equal to the sum of the parts, comparison of quantity fails us, small changes produce large effects, the assumptions of a uniform and homogeneous continuum are not satisfied” (CW 10, p. 262). Interestingly, from chapter 18 on, Keynes seems literally anxious to reveal to the reader, in his analysis, the complexity of the economic material he is investigating on. This way, Keynes strengthens the methodological positions he has expressed in the four chapters which occupy an intermediate position between the *pars destruens* (chapters 2-3) and the *pars construens* of the *General Theory* (from chapter 8 on). Chapter 4 in particular is devoted to “the choice of units of quantity appropriate to the problems of the economic system as a whole” (CW 7, p. 37), a problem raised by the complexity characterizing the central concepts and the economic magnitudes involved in the analysis of effective demand. The volume of real output or income, that of real net output, the stock of real capital and the general price level are defined as “incommensurable collections of miscellaneous objects” (p. 39); “the community’s output of goods and services”, in particular, is “a non-homogenous complex which cannot be measured” (p. 38), since complex magnitudes, as Keynes writes in the *Treatise on Money* with respect to the value of money and the general price level, are “capable of variations of degree in more than one mutually incommensurable direction at the same time” (CW 5, p. 88).

There is nothing new in the *General Theory* approach to complex magnitudes, which Keynes had already tackled in at least four previous writings: the *Treatise of Probability*, as seen, which distinguishes between non-comparable (the general case), comparable and numerically comparable probabilities, and treats individual beliefs themselves as complex magnitudes; the 1909 essay on “The Method of Index Numbers” (CW 11, pp. 49-56), where Keynes refers to quantities that are in themselves incapable of measurement, such as individual prices, the general price level, the esteem standard and the wage standard; the *Tract on Monetary Reform* and the *Treatise on Money*, with their analysis of the price level (see Carabelli 1992). To reassure readers, Keynes explains, in chapter 4 of the *General Theory*, that such “conundrums ... of no solution” engendered by the need to treat complex, vague magnitudes are in truth not unsurmountable,

provided economists renounce using “quantitatively vague expressions” (CW 7, p. 39) and opt for ordinary language:

[these difficulties] are “purely theoretical” in the sense that they never perplex, or indeed enter in any way into, business decisions and have no relevance to the causal sequence of economic events, which are clear-cut and determinate in spite of the quantitative indeterminacy of these concepts (ib.).

Still, on one side, Keynes is compelled, by the want to avoid such otherwise inevitable conundrums, to use the quantity of employment as a proxy for the volume of output; and “the causal sequence of economic events” itself shows evident traces of the complexity characterizing the economic material under investigation.

In the summary of chapter 18, he brings problems of discreteness and discontinuity to the reader’s attention: no one of the factors he finds it “useful and convenient” to isolate “is not liable to change without much warning, and sometimes substantially” (CW 7, p. 249). Chapter 19 is wholly centered on the need to show that the economic material cannot tolerate the atomic hypothesis. Keynes in fact blames the classical theory for offering a “simple” (p. 257) “money-wages” argument: an echo of the *Treatise on Probability*, where, recalling Augustin-Jean Fresnel, the French physicist (“la nature ne s’est pas embarrassée [sic] des difficultés d’analyse, elle n’a évité que la complication des moyens”), he maintains that “simplicity is a dangerous criterion” (CW 8, p. 239); and he attributes this fault to the lack of “roundabout repercussions” (which by the way appear, on the contrary, even at the end of the summary of the *General Theory* in chapter 18) of changes in money-wages on the determinants of the system, which he tackles in the chapter. Chapter 20 begins with expressing concern for problems of organic interdependence among variables and consequently of measurement (thereby involving failures in the comparison of quantity, but also discreteness, discontinuity, the lack of a uniform and homogeneous continuum), inducing Keynes to substitute the “employment function for the ordinary supply curve”: this is held to be “consonant with the methods and objects of this book”, he argues, since the employment function “expresses the *relevant* facts in terms of the units to which we have decided to restrict ourselves, without introducing any of the units which have a *dubious quantitative character*” and “lends itself to the problems of industry and output as a whole” (CW 7, p. 281, emphases added; see Carabelli 1992).

The two-stages analytical method is employed, in the *General Theory*, as concerns not only the hypothesis of independence, but also the one of proportionality: Chapter 20 provides various illustrations of circumstances in which small changes produce large effects, or anyway of a lack of proportionality between causes and effects. Initially, Keynes assumes that to every level of aggregate demand there corresponds a unique distribution of it between the products of each individual industry of the system. When aggregate expenditure changes, however,

the corresponding expenditure on the products of an individual industry *will not, in general, change in the same proportion*; partly because individuals will not, as their incomes rise, increase the amount of the products of each separate industry, which they purchase, in the same proportion, and partly because the prices of different commodities will respond in different degrees to increases in expenditure upon them (CW 7, p. 286, emphasis added).

Keynes therefore brings the reader to recognize that

the assumption upon which we have worked hitherto, that changes in employment depend solely on changes in aggregate effective demand (in terms of wage-units), is no better than a first approximation, if we admit that there is more than one way in which an increase of income can be spent. For the way in which we suppose the increase in aggregate demand to be distributed between different commodities may considerably influence the volume of employment (ib., emphases added).

Moreover, with two final “practical qualifications” (CW 7, pp. 289-290) directing attention to the asymmetry between inflation and deflation of effective demand, Keynes violates the “crude quantity theory of money” ensuring the system’s equilibrium: once again, as in chapter 19, (positive) changes in an independent variable, that is money-wages (positively), affect another variable previously considered as independent, the propensity to consume, to the disadvantage of the rentier; and the process is likely to begin before full employment is attained, so that “if the rentier is less prone to spend than the entrepreneur, full employment will be reached with a smaller increase in the quantity of money and a smaller reduction in the rate of interest than will be the case if the opposite hypothesis holds” (p. 290). And this same hypothesis may be subjected to change as a result of the rentier’s impoverishment.

But the most interesting example of Keynes’s attempt to cope with the complexity of the economic material in the *General Theory* is probably offered by chapter 21 (Marchionatti 2010 takes it as an example of “right method of thinking” as against the “method of blind manipulation”, p. 134), where the author elaborates a theory of prices. Once again, the analysis is divided into two stages: first, Keynes introduces the

simplification of assuming that the rates of remuneration of the different factors of production which enter into marginal cost *all change in the same proportion*, i.e. in the same proportion as the wage-unit (CW 7, p. 295, emphases added).

Yet he immediately feels the necessity to

simplify our assumptions still further, and assume (1) that all unemployed resources are *homogeneous* and *interchangeable* in their efficiency to produce what is wanted, and (2) that the

factors of production entering into marginal cost are content with *the same money-wage* so long as there is a surplus of them unemployed (ib., emphases added).

Keynes is thus able to reformulate the quantity theory of money as follows:

So long as there is unemployment, *employment* will change in the same proportion as the quantity of money; and when there is full employment, *prices* will change in the same proportion as the quantity of money (p. 296).

Once these “simplifying assumptions” are introduced, the second stage of the analysis requires the economist to allow for those “possible complications which in fact influence events” (ib.):

- (1) Effective demand will *not change in exact proportion* to the quantity of money.
- (2) Since resources are *not homogeneous*, there will be diminishing, and not constant, returns as employment gradually increases.
- (3) Since resources are *not interchangeable*, some commodities will reach a condition of inelastic supply whilst there are still unemployed resources available for the production of other commodities.
- (4) The wage-unit will tend to rise, *before full employment* has been reached.
- (5) The remunerations of the factors entering into marginal cost will *not all change in the same proportion* (ib., emphases added).

As evident from this catalogue, Keynes is reaffirming the complex character of the economic material: the assumptions of proportionality on which the quantity theory of money rests are in truth not satisfied, since the “complex real world” is characterized by lack of proportionality between causes and effects, as well as of homogeneity and interchangeability. But there is even more to be noted: it is in fact no coincidence that Keynes explains the “nature of the economic thinking” (implying the need for the two-stages analysis in economics) immediately after discussing the nature of these “complicating factors” (CW 7, p. 297). As seen, Keynes has accustomed his readers to interpret the ensemble of the “simplifying assumptions” introduced from time to time in the course of the analysis as the first logical step of a more complicated work, requiring the economist to remove them and allow for probable repercussions. In chapter 21, Keynes wants the reader to avoid supposing those same “possible complications” introduced to correct the illusory simplicity of the classical theory as “strictly independent” only in reason of their being considered “each of them in turn”:

We will consider each of them in turn. But this procedure must not be allowed to lead us into supposing that they are, strictly speaking, independent. For example, the proportion, in which an increase in effective demand is divided in its effect between increasing output and raising

prices, may affect the way in which the quantity of money is related to the quantity of effective demand. Or, again, the differences in the proportions, in which the remunerations of different factors change, may influence the relation between the quantity of money and the quantity of effective demand (p. 297).

The above is an example of ordinary discourse at work, permitting to “keep 'at the back of our heads' the necessary reserves and qualifications and the adjustments which we shall have to make later on, in a way in which we cannot keep complicated partial differentials 'at the back' of several pages of algebra which assume that they all vanish” (CW 7, pp. 297-298). Reserves, qualifications and adjustments are necessary if the objects of investigation are “the complexities and interdependences of the real world” (p. 298). “The primary effect of a change in the quantity of money”, writes Keynes using a variant of his concept of *causa causans*, “is through its influence on the rate of interest” (ib.). This makes the analysis quite easy: it suffices to derive this effect from the schedule of (a) liquidity-preference (which gives the reduction of interest rate needed to induce holders to absorb the new money); (b) the schedule of marginal efficiencies (for the relationship between the reduction of interest rate and the increase of investments), and (c) the investment multiplier (for the relationship between increased investment and consequent increment of effective demand).

But this analysis, though it is valuable in introducing order and method into our enquiry, presents a deceptive simplicity, if we forget that the three elements (a), (b) and (c) are themselves partly dependent on the complicating factors (2), (3), (4) and (5) which we have not yet considered. For the schedule of liquidity-preference itself depends on how much of the new money is absorbed into the income and industrial circulations, which depends in turn on how much effective demand increases and how the increase is divided between the rise of prices, the rise of wages, and the volume of output and employment. Furthermore, the schedule of marginal efficiencies will partly depend on the effect which the circumstances attendant on the increase in the quantity of money have on expectations of the future monetary prospects. And finally the multiplier will be influenced by the way in which the new income resulting from the increased effective demand is distributed between different classes of consumers (pp. 298-299).

The reader may note that Keynes introduces a recursive argument into the analysis (“the schedule of liquidity-preference itself depends on how much of the new money is absorbed into the income and industrial circulations, *which depends in turn on how much effective demand increases*”, emphasis added), and might give importance to the fact that the catalogue of possible repercussions, as often in the *General Theory*, is partial (“Nor, of course, is this list of possible interactions complete”, p. 299). Nevertheless, he argues,

if we have all the facts before us, we shall have enough simultaneous equations to give us a determinate result. There will be a determinate amount of increase in the quantity of effective demand which, after taking everything into account, will correspond to, and be in equilibrium with, the increase in the quantity of money (ib.).

Yet, this is of little interest to Keynes. He simply notes that “it is only in highly exceptional circumstances that an increase in the quantity of money will be associated with a *decrease* in the quantity of effective demand” (CW 7, p. 299). Then, he remarks the affinity linking the ratio between the quantity of effective demand and the quantity of money with the concept of “income-velocity of money”, and criticises the use of the latter. While in chapter 15 he has reminded the reader that the suggestion the concept carries of a “presumption in favour of the demand for money as a whole being proportional, or having some determinate relation, to income” (p. 194) is misleading, since the concept induces to overlook the role played by the interest rate, now he adds that the concept is “in itself, merely a name which explains nothing. There is no reason to expect that it will be constant”, for it depends “on many complex and variable factors. The use of this term obscures, I think, the real character of the causation, and has led to nothing but confusion” (ib.). As the income-velocity of money is allowed to vary, it becomes possible to write down a “generalised statement of the quantity theory of money” (p. 305) in mathematical formulas. However, Keynes attaches little value “to manipulations of this kind”, since

they involve just as much tacit assumption as to what variables are taken as independent ... as does ordinary discourse, whilst I doubt if they carry us any further than ordinary discourse can. Perhaps the best purpose served by writing them down is to exhibit the extreme complexity of the relationship between prices and quantity of money, when we attempt to express it in a formal manner (ib.).

What in fact captures Keynes’s attention is a phenomenon whose understanding depends on the possible complications from (2) to (5), and one which cannot be usefully expressed in a formal manner: the combination of rising labour-costs (when wages are given irrespectively of workers’ efficiency) as output increases (with the rates of remuneration of different factors showing “varying degrees of rigidity”, CW7, p. 302) and “bottle-necks” in the supply of particular commodities, both elements causing prices to increase before full employment is reached (thereby invalidating the quantity theory of money). This material proves to be quite intractable in a formal manner: bottle-necks are more easily reached when changes in effective demand are large and unforeseen rather than moderate, while “the psychology of the workers” (p. 301) on one side and “the policies of employers and trade unions” (ib.) on the other concur to determine a series of “points of discontinuity” (“In actual experience the wage-unit does not change continuously in terms of money in response to every small change in effective demand; but discontinuously”, ib.) at which “an increasing effective demand tends to raise money-wages though not fully in

proportion to the rise in the price of wage-goods; and similarly in the case of a decreasing effective demand" (ib.). These positions of "semi-inflation" (ib.), Keynes argues, have "a good deal of historical importance. But they do not readily lend themselves to theoretical generalisations" (p. 302).

6. ON THE *GENERAL THEORY* AS AN OPEN SYSTEM OF THOUGHT: HINTS FROM THE *TREATISE ON MONEY*

In the summary of chapter 18, Keynes mentions three possible "repercussions" of a change of the volume of employment on the schedule of liquidity-preference, but states that "there are other repercussions also" (CW7, p. 249). In chapter 19, he argues that his catalogue of possible reactions of wage reductions is not complete. In chapter 21, the ensemble of possible complications invalidating the use of the simplifying assumptions previously introduced is left open-ended. The author of the *General Theory* constantly reminds its readers that in what we have here referred to as the second stage of the analysis, the list he offers of probable interactions between factors previously isolated for sake of convenience is never complete, so that readers themselves are allowed to enlarge the catalogue with new "possible complications". After all, Keynes is not new to solicitations of this kind: the expedient is used also in the *Treatise on Money*. Chapter 20 of the volume is entitled "An Exercise in the Pure Theory of the Credit Cycle". Keynes knew that "some" of his readers "may prefer to leave this chapter out" (CW 5, p. 274); yet, to our knowledge, the literature has almost completely neglected the chapter, thereby failing to notice the methodological continuity it provides with the *General Theory*.

In the terminology of the *Treatise on Money*, credit cycles are episodes of disequilibria of purchasing power (Keynes explains through the use of his fundamental equations that the price level is governed by the volume of money earnings of the factors of production, by the volume of current output and the relation between saving and investment) brought about by changes due to "investment factors" (on credit cycles as described by Keynes in the *Treatise on Money*, see Vicarelli 1984). The expression refers to divergences between the market rate and the natural rate of interest: the former may change either because of "altered conditions in the loan market due to a change in monetary factors" (CW 5, p. 232) or due to "the necessity of maintaining equilibrium between the rate of foreign lending and the foreign balance" (p. 233), while the latter may react to "a change in the attractiveness of investment or in that of saving" (p. 232). A credit cycle is thus defined as "the alternations of excess and defect in the cost of investment over the volume of saving and the accompanying seesaw in the purchasing power of money due to these alternations" (p. 249). Still, investment factors are only one of three sources of potential disturbance for purchasing power, the other two being monetary factors and industrial factors. Keynes reminds the reader the "broad distinction that [disturbances due to monetary factors] are due to changes on the supply side and [disturbances due to investment factors], generally speaking, to changes on the demand side" (p. 248), and notes that while the former induce a passage from one equilibrium price level to another,

the latter produces an oscillation about an “approximately unchanged” price level. Yet, he also remarks that

The causes of disequilibrium to be discussed in this chapter [changes due to investment factors] are not always separated by a sharp line from those discussed in the preceding chapter [changes due to monetary factors], and, after the initial stage has been passed, they shade off into one another. For a disturbance initially due to monetary factors will soon set up some disturbance on the investment side, and similarly a disturbance due to investment factors is likely, as we shall see, to cause some modification to monetary factors (ib.).

Moreover, credit cycles are also affected by “income inflation” and “income deflation”, that is by the ups and downs of costs of production, which “are unlikely to remain stable throughout the course of a credit cycle” (CW 5, p. 249). In sum, Keynes maintains that

the actual course of events observable at any time will be a complex phenomenon resulting from the combined effects of changes in the costs of production and of the phases of the credit cycle proper. In common usage the term *credit cycle* has been applied to this complex phenomenon; and it will often be convenient to follow this looser usage (ib.)

Finally, Keynes analyses credit cycles into three types – increased investments may in fact derive from i) substitution of production of capital goods in place of consumption goods, total output being unchanged; or from increased working capital corresponding to increased output due ii) to additional production of capital goods or iii) to additional production of consumption goods – “although those which actually occur are generally complex in type and partake of the character of all three” (p. 252). To this one should add that

A phenomenon partaking of the characters of (i), (ii) and (iii) in varying degrees may also be complicated by the presence of some measure both of income inflation (i.e. of rising costs of production) and of capital inflation (i.e. a rise of the price level of new investment goods relatively to their cost of production) (p. 253).

Commodity and capital inflation tend to cause profit inflation, and this latter is likely to bring about income inflation due to increased competition among entrepreneurs to secure additional factors of production. Yet Keynes holds that “*theoretically at least* – it is possible to disentangle from these complications the element of commodity inflation which constitutes a credit cycle” (ib., emphasis added).

What precedes provides striking methodological continuity with the analytical method of the *General Theory*. A credit cycle is a complex phenomenon mainly deriving from investment factors, which however interact with monetary factors in the course of the cycle. It follows that

investment factors are only provisionally taken as independent variables, that is, the notion of independence used in the analysis has in truth the nature of “independence for knowledge”: the closure is valid on a theoretical level only. Moreover, before summing up the characteristic phases of a credit cycle, Keynes observes that

The possible varieties of the paths which a credit cycle can follow and its possible complications are so numerous that it is impracticable to outline all of them. One can describe the rules of chess and the nature of the game, work out the leading openings and play through a few characteristic end-games; but one cannot possibly catalogue all the games which can be played. So it is with the credit cycle. We will begin, therefore, by examining the three openings and then proceed to an analysis of the characteristic secondary phase (CW 5, p. 253).

This surprising passage clearly reminds us of Herbert Simon’s later contributions (see, in general, Simon 1982) on bounded and procedural rationality, drawing on an analysis of chess game which perfectly matches such remarks by Keynes (see also Hoover 2006). In the introduction to chapter 20, Keynes illustrates a “method” of analysis implying the introduction of “simplifying assumptions” which make the example (of a “particular type of credit cycle”) “somewhat artificial”:

I propose in this chapter to take a particular type of credit cycle and to work it out in full detail. Owing to the simplifying assumptions which have to be introduced in order to rule out the various complexities which are usually present in actual life, the example taken is somewhat artificial. Since, moreover, it does not add to the previous argument but only illustrates it, some readers may prefer to leave this chapter out. The method and ideas of the preceding chapters will, however, be better illustrated in this way than if I were to cover more ground less intensively (CW 5, p. 274).

Still, after describing the particular model of credit cycle based on eight “simplifying assumptions”, Keynes “abate[s] the rigour of [the] assumptions” (CW 5, p. 280) and finally removes these “limitations” (p. 284), thereby allowing for “complications” which are “non-essential” (p. 275) only in respect to the purpose of the analysis – that is, “to set out the essential mechanism”:

Let us begin by simplifying the problem so as to set out the essential mechanism (which, as we shall find, is substantially similar in the more generalised case) in a manner which is free from non-essential complications. Our initial assumptions, which will be removed later on, are as follows (pp. 274-275).

Among the simplifying assumptions, Keynes obviously enumerates simplifications implicit in drawing the “standard case” (p. 274) of a credit cycle (for instance, current savings equal net new investment; the duration of the productive process is the same for all commodities, and so on), but also limitations in the absence of which the case under investigation ceases to be simple and artificial and becomes complex: it is thus assumed that there is no income inflation, that is that the money costs of production are constant; and Keynes underlines that it would be possible to treat “various irregularities” in this respect, but they “do not lend themselves to a generalised description”, p. 288). Likewise, it is assumed that “the banks create just enough additional money for the industrial circulation, after allowing for any fluctuations in the amount of the financial circulation, to allow the absorption of the unemployed factors of production into employment at a steady rate ... This amounts to the banks’ supplying the entrepreneurs with whatever they require”, p. 275). Nor can the economist always be content with removing a single limitation, since the non-fulfilment of the assumption, for instance that current savings equal net new investment makes the cycle “more complicated, and one can only describe its exact course if one first makes an assumption as to its exact character” (p. 285). Finally, it is to be noted that the eight simplifying assumptions, exactly as happens with those introduced in chapter 21 of the *General Theory*, are not independent one from another: for instance, the removal of the “no-hoarding hypothesis” (p. 288) or of the assumption of equal length of process for all commodities require the author to distinguish between a situation in which the course of the credit cycle is “correctly foreseen” and one wherein “mistaken expectations” (p. 289) prevail, that is between a situation in which the eighth assumption (“whatever mistakes may have been made in the past, all those concerned accurately forecast the subsequent course of the credit cycle”, p. 276) is met and one in which it is not.

Now consider the chapter’s epilogue, where Keynes invites the reader to apply the author’s “general system of thought here exemplified” for any possible extension of the argument:

Evidently the possible ramifications and extensions of the foregoing argument are so numerous that one could continue for many more pages amplifying, qualifying and generalising it. Perhaps, however, it has been carried far enough to enable a reader, who has entered the general system of thought here exemplified, to apply it for himself to any further interesting cases which may occur to him (CW5, p. 292).

When Keynes’s writings are analysed in a linguistic perspective (see Gotti 2009, Marzola and Silva 1994, Henderson 1995, Rossini Favretti 1989), “reader involvement” (Gotti 2009, p. 291) appears as an issue of the utmost importance: suffice it to note that the *General Theory* includes twenty-two appeal to the reader or instructions given to her/him (Henderson 1995). Gotti (1994) notices the attention posed by Leontief to a sort of “implicit theorising” in Keynes’s work. According to Leontief (1966, p. 64), Keynes (as do all “those who most often use the method of implicit solutions”) “formulate[s] a number of implicit theorems, extend the argument one or two steps

forward or backward, and then let the reader find the way home by himself" (quoted in Gotti 1994). In a similar vein, as Fontana (2009) recalls, Clower and Leijonhufvud (1975, p. 182) argue that "the Keynesian model imposes virtually no analytical discipline upon its users and thereby grants them essentially unrestricted analytical license". Gotti (1994) takes a different stance, and a less pessimistic one: in his opinion, Keynes "wished to stimulate the reader into a cooperative effort of interpretation of the book" (p. 175). In a passage worth quoting in full, Keynes himself confirms this view:

When we write economic theory we write in a *quasi-formal style*; and there can be no doubt, in spite of these disadvantages, that this is our *best available means of conveying our thoughts to one another*. But when an economist writes in a quasi-formal style, he is composing neither a document verbally complete and exact so as to be capable of a strict legal interpretation, nor a logically complete proof. *Whilst it is his duty to make his premises and his use of terms as clear as he can, he never states all his premises and his definitions are not perfectly clear-cut*. He never mentions all the qualifications necessary to his conclusions. He has no means of stating, once and for all, the precise level of abstraction on which he is moving, and he does not move on the same level all the time. It is, I think, of *the essential nature of economic exposition* that it gives, not a complete statement, which, even if it were possible, would be prolix and complicated, to the point of obscurity, but *a sample statement*, so to speak, out of all the things which could be said, *intended to suggest to the reader the whole bundle of associated ideas*, so that, if he catches the bundle, he will not in the least be confused or impeded by the technical incompleteness of the mere words which the author has written down, taken by themselves. This means, on the one hand, that *an economic writer requires from his reader much goodwill and intelligence and a large measure of co-operation*; and, on the other hand, that there are a thousand futile, yet verbally legitimate, objections which an objector can raise (CW 13, pp. 469-70, emphases added).

The passage perfectly exposes that, in a general conception of the relationship between scientists (economists) and their subject of study (beliefs held by economic agents) as capable of reciprocal influence, Keynes believes in the possibility of change, and consequently uses persuasion as a tool for changing beliefs and opinions; but the concept of persuasion as applied to his economic work has nothing to do with the artificial, merely rhetorical expedient easily associated with it. Rather, it is in the *Treatise on Probability* that the concept finds its roots: Keynes's persuasion is a non-demonstrative logic consisting, coherently with a view of economics as a way of thinking, in providing (some) reasons for holding probable beliefs. But the passage also sheds light on the inevitable tension between what Keynes defines as the duty of the economist – that is, to make explicit the hidden atomic hypotheses introduced by scientist who tend to sacrifice the organic complexity of the economic material to the purpose of making science with more convenient theoretical tools – and the practical result of his theoretical effort. Yet Keynes clarifies that this tension should not be considered as a fatal and irremediable weakness of the manner in

which this new way of thinking in economics is conveyed: the author must suggest to the reader “a sample statement”, “a bundle of associated ideas”, which the latter will catch only if endowed – as shown in Chick (2006) – with “much goodwill and intelligence and a large measure of co-operation”. Gotti’s (2009) linguistic analysis of the *General Theory* in particular demonstrates that the apparent obscurity and ambiguity of Keynes’s work is “often employed to make his text more persuasive” (p. 299), the “subtlest and most effective strategy [being] that which gives the readers the impression of not being conditioned by him, while they are actually being led along the argumentative path which corresponds to the author’s original compositional plan” (pp. 299-300). In so doing, however, Keynes assigns to his readers “not merely the role of decoders and recipient of his views but a far more demanding role as his collaborators in working out the final form and the exact meaning of a new economic theory” (p. 298).

CONCLUSIONS: CHAPTER 18 AS A GUIDE TO THE READING OF THE ECONOMIC MATERIAL AND OF THE *GENERAL THEORY* ITSELF

As Keynes writes (CW 7, p. 245) at the beginning of chapter 18, “we have now reached a point where we can gather together the threads of our argument” and suggest an interpretation of the three major issues recalled above raised by chapter 18 itself, taking them, again with Keynes, “in the reverse order to that in which we have introduced them” (ib.). Let us begin, therefore, with the “hypothetical psychological propensities” on which the stability of the economic system rests.

Dissimilarly from the above recalled strand of the post-Keynesian literature on chapter 18 (Sardoni 1989-90, Sardoni and Harcourt 1994, Fontana 2009), we do not consider the third section in particular of the chapter as the *loci* where to find the fundamental difference between Keynes’s theory and general equilibrium models (while in the former, in Sardoni’s 1989-90 view, “the crucial variables on which the results depend are observable in reality – though in a different way from natural sciences – and, therefore, they can be given values – also observed in reality – that yield a relatively stable economy, in general equilibrium models, observation of reality does not help because one cannot observe the crucial variables of these models”, p. 306). As already noted, Keynes believes observation to be theory-laden, so that the non-orthodox economist is bound to challenge the classical theory through logic and theory, and must not be content with registering the gap between the facts and orthodox reasoning through “common observation”. For sure, “experience” plays a fundamental role in the process of identifying the stability conditions of the system, but for Keynes the critic of the German historical school (which is content with historical facts and results, with using “empirical methods, and discards “formal analysis”, CW 7, p. xxv), facts do not speak for themselves. When referring to those “special characteristics of the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest, about which we can *safely* generalise from experience” (p. 249, emphasis added), Keynes is writing as the author of the *Treatise on Probability*, suggesting that if it is possible to “safely generalise from experience” about, say, the propensity to consume, this is because, despite obvious differences in

human consumption behaviour, this “independent variety” is “limited”, so that generalisation about this social phenomenon is safe, that is justified (though it must be remembered that “in a study so complex as economics, ... we cannot hope to make completely accurate generalisations”, *ib.*). Even when posing a stress on experience, Keynes always filters it through logic, as this passage makes evident:

Now, since these facts of experience [that is, the economic system is not violently unstable] do not follow of *logical necessity*, one must *suppose* that the environment and the psychological propensities of the modern world must be of such a character as to produce these results. It is, therefore, useful to consider what *hypothetical* psychological propensities would lead to a stable system; and, then, whether these propensities can be *plausibly* ascribed, on our *general knowledge* of contemporary human nature, to the world in which we live (p. 250, emphases added).

In the first proof of the *General Theory*, Keynes himself has established the seeds, in what later became chapter 18, for a fruitful collaboration between logic and experience, which however rests on a declared primacy of the former on the latter. Here is the original formulation (CW 14, p. 504) of the passage concerned (the additional sentence, which does not appear in the final version of the *General Theory*, is in square brackets):

Our present object is to discover what determines at any time the national income of a given economic system and (which is almost the same thing) the amount of its employment; which means in a study so complex as economics, in which we cannot hope to make completely accurate generalisations, the factors whose changes *mainly* determine our *quaesitum*. [Thus we begin our theoretical study with the premiss that changes in effective demand are what matters; and we then proceed interspersing our logic with practical judgements based on experience, to analyse the variables which can be regarded as chiefly significant in changing effective demand] Our final task might be to select those variables which can be deliberately controlled or managed by central authority in the kind of system in which we actually live (CW 7, p. 247).

Of course, the “psychological propensities” do not follow of “logical necessity” (they do not form “a necessary principle which cannot be changed”, p. 254), since otherwise, they would raise to the status of a law of nature and make the system enslave of determinism, whereas Keynes believes in the possibility of human intervention by design (see Carabelli and De Vecchi 1999). In Keynes’s view of economics as a branch of probable, non-demonstrative logic, abstract reasoning is “vitalized ... by the introduction of extraneous fact from the actual world” (CW 5, p. 125); history and experience may (and actually) alter the judgements of relevance lying behind the core of limited independent variety which Keynes exposes in chapter 18, and even the specific choice of

the independent variables: suffice it to think about the *Economic Consequences of the Peace*, to the stability conditions of the pre-war order described by Keynes in the opening pages of the book, resting on “society [being] so framed as to throw a great part of the increased income into the control of the class least likely to consume” (CW 2, p. 11), and to the effect of war on the “psychology of society” (ib.), in particular that of disclosing “the possibility of consumption to all and the vanity of abstinence to many” (p. 13). In short, the judgments of relevance related to the choice of the independent variables draws on historical circumstances and social conditions, but the hypothesis of relevance is of a logical, neither empirical nor material nature, and strictly depends on the economist’s *quaesitum*.

The above provides a framework to understand also the second issue raised by chapter 18, the flexible taxonomy of the given factors, independent elements and dependent variables entering the analysis, which has already been tackled in section 4. Yet, in our interpretation, this second issue is strongly connected with the first one, that is with the starting point of this investigation, the reductionist character of the summary of the *General Theory* drawn by Keynes in the chapter. Paradoxically though it may seem, Greenwald and Stiglitz are right, at least to a certain extent (that is, they grasp only a part, the initial one, of the story), when claiming that the summary rests upon Marshallian-neoclassical tools. It is significant, in this regard, that in the first draft of the book, chapter 18 (chapter 20 of the first draft) was entitled “The Equilibrium of the Economic System” (CW 14, p. 502). Kriesler and Nevile (2002) interpret the change of the title as a sign of “declining concern with equilibrium” (p. 105) on the part of the author, whose main interest is to study changes in output and employment. As a result of the investigation proposed in this paper, however, we rather think it reasonable to advance a different interpretation of the title change. The original title would have characterized chapter 18 mainly as the final destination of the theoretical journey proposed by Keynes in chapters from 1 to 17, whereas, in the light of what precedes, chapter 18 should also be considered as the starting point (hence the need of “restating” the *General Theory*) of a journey which is yet to begin.

The summary of chapter 18 is a synthetic representation of the results obtained exploiting in full the first stage of Keynes’s analytical method: in chapters from 1 to 17, Keynes has reached provisional conclusions on the macroeconomic system “by isolating the complicating factors one by one”, that is by the use of Marshallian *ceteris paribus* hypothesis, of causal analyses and assumptions of independence of classical flavour. Yet, that same chapter signs at the same time the beginning of the second stage of the analysis, when the economist “goes back on himself” and “allows for the probable interactions of the factors amongst themselves”; a task to be accomplished in chapters from 19 to 21. Keynes’s analysis up to chapter 18 is extremely revolutionary in content, if compared to the classics’ work, but the revolution is not complete, inasmuch as Keynes has not yet shown where exactly to find that “difference of analysis” which distinguishes the *General Theory* from the classics. Not by chance has Keynes pointed out, in chapter 19, that his theory “could not be set forth clearly until the reader was acquainted with my own method”. This means that despite the Marshallian-neoclassical tools employed in

summarising the *General Theory*, chapter 18 includes an account of the author's revolutionary methodological positions, which, however, the reader might fail to grasp due to the interdependence of method and theory in Keynes's economics. Still, in a way, it must be so: since, consistently with his own method, Keynes could not win the struggle against the classic citadel except by explicitly adopting, at an initial stage, the methodology of the classical theory, which he abandons later on, when he passed to the second stage of the analysis.

Where Keynes departs from the classical methodology is exactly in making explicit, in the summary of the volume, the assumptions of independence tacitly introduced into the analysis of chapters from 1 to 17. As the appendix to chapter 19 perfectly shows, in fact, Keynes considers the introduction of tacit assumptions into the analysis as the principal fault of classical theory, accused of a lack of adequate understanding of the relationship between the characteristics of the theoretical tools adopted and those of the material to be treated by them. In the effort to make explicit the hidden hypotheses introduced by the classics, Keynes clearly assigns a fluid character to the independent variables, and frankly admits, making them subject to a potentially endless "further analysis", the impossibility to indicate the ultimate, atomic independent elements of his analysis. In truth, he simply cannot do so, since the notion of independence he uses in the *General Theory* (chapter 18 playing a fundamental role in revealing this) is more precisely "independence for knowledge", which is the only kind of independence allowed to play a role in a study of the complex economic material. This explains Keynes's proceeding (until chapter 18) by "provisional closures" which he removes later on: for instance, writes Chick (2004; for the open-system interpretation of the *General Theory*, see Chick and Dow 2001, Jespersen 2008), chapter 3 introduces the marginal propensity to consume as key to understand the relationship between demand and income, "but makes no attempt to explain investment when aggregating to output as a whole: it is taken as given" (Chick 2004, p. 9), as happens with both long-period and short-period expectations, and the latter are also taken as correct. Then, in chapter 5, Keynes removes the assumption that short-period expectations are correct, although the level of aggregate demand is still taken as given. This latter assumption is removed in chapters 8-10, which make an attempt to explain it through the consumption function, the multiplier and shifts in long-term expectations. Something similar occurs to chapter 19, as implicit in what precedes: up to that chapter, Gerrard (1997) notes, Keynes takes the wage-unit as a fixed independent variable.

Chapters 19 to 21 of the *General Theory* are constructed in such a way as to highlight the relevance of all those characteristics of complexity which induce Keynes to deny validity to the use of the atomic hypothesis in social sciences and to reject the Marshallian "partial equilibrium" method. In these chapters, the author concerns himself with the interplay between presumed independent variables, and is bound to revisit the results of his analysis in the light of any possible repercussion dependent variables may have on independent elements. Chapter 21 in particular is conceived as an exercise in complexity, where simplifying assumptions previously introduced are removed later on, with an explicit admission that even the possible complications thus derived should not be treated as independent one from another. A relevant antecedent of this specific

method is detectable in the *Treatise on Money*, and particularly in the analysis of the credit cycle (chapter 20), where Keynes allows for roundabout repercussions between variables heretofore enclosed in a seemingly rigid causal structure and gradually removes simplifying limitations, not without warning readers, as in the *General Theory*, that the list of possible complications can never be complete. Both the title (“An Exercise in the Pure Theory of the Credit Cycle”) and the structure of the chapter, truly conceived as a didactic exercise in pure theory, strengthen the interpretation here proposed of Keynes’s intention to provide the reader not a complete blueprint for understanding economic reality, but a vademecum – his works assuming the form of flexible, open-structure theoretical systems of thought – allowing the reader, and at the same time requiring from him, to emulate the author’s efforts to grasp the complexity of the economic material. It has been rightly noted (Henderson 1995, p. 160) that after summarizing the *General Theory* in chapter 18, Keynes uses the personal pronoun “we” instead of “I”:

If we examine any actual problem along the lines of the above schematism, we shall find it more manageable; and our practical intuition (which can take account of a more detailed complex of facts than can be treated on general principles) will be offered a less intractable material upon which to work (CW7, p. 249).

In truth, the *whole* chapter uses “we” instead of “I”. This linguistic expedient is employed to stimulate cooperation between the author and its readers: the reader is constantly invited, in the *General Theory*, to “retrace with the author its route to knowledge” (Marzola 1994, p. 197), to follow Keynes in his emancipation from the classics. Interestingly, Keynes uses this expedient in both Chapter 18 of the *General Theory* and in chapter 16 of the *Treatise on Money*, “A Classification of the Causes of a Disequilibrium of Purchasing Power”. The two chapters present a similar structure and *de facto* perform the same role: they provide the reader with a theoretical framework which, resting upon a concept of “independence for knowledge”, needs to be “further analysed” so as to allow for the probable interactions of the factors (previously isolated) amongst themselves. This authorizes the historian of economic thought to detect in the book implicit or even explicit invitations to the readers to adopt the author’s method and continue exploring the economic material accordingly.

In the *General Theory*, Keynes is not so explicit as in the *Treatise on Money* in inviting the reader to apply his system of thought to “any further interesting cases which may occur to him”. This is due to the particular nature of the *General Theory* itself as a text whose internal structure reflects the theoretical one of Keynes’s argumentation. The open-ended structure of the book embodies the ambiguity inherent to making science in a complex world: the economist must decompose the material under investigation if he is to reach valuable conclusions about its dynamics, but his attempt is destined to crash against the complexity and interdependence which characterizes the material itself. This compels the author to offer its readers not only, and not so much, a complete theory about the economic system as a whole, but above all, and maybe only, a

method to tackle its complexity. In truth, it could not be otherwise. As seen, Keynes's definition of economics as a moral science, and as "a method rather than a doctrine", is tantamount to a rejection of positivistic methods and the "mechanical theory" of physical science (Keynes 1905). In Keynes's economics, the analysis is voluntarily and explicitly left open-ended because there exists no theoretical limit to "further analysis": all closures are provisional, all simplifying assumptions are temporary, and the list of probable repercussions is never complete. This is remindful of Keynes's own remarks, in the *Treatise on Probability*, on the problem of how far the analytical process is to be pursued by an individual before taking a decision on how to act. Keynes's approach is quite similar to the one developed by Sigmund Freud (1937) in one of his last articles, *Analysis Terminable and Interminable*, where he maintains that the termination of an analysis is a practical matter: the analysis may be an endless business (see Carabelli 1988). And it is certainly so, in Keynes's work. This is due to the anti-positivistic nature of his theory of economics, which "does not furnish a body of *settled* conclusions immediately applicable to policy" (CW 12, p. 151, emphasis added), and does not even aim at offering "an *infallible* answer" (CW 7, p. 297, emphasis added). What Keynes's theory does offer to his readers is in truth a method of analysis: if theory and method, in Keynes's economics, seem to have an "interdependent existence" (Fontana 2009, p. 30), this is because, in the end, *they are the same thing*. Bringing the argument to its conclusion, since the *General Theory* offers a method, or a theory as method, rather than a theory in the sense traditionally associated with the term, reader's involvement is a necessary, not dispensable, requisite of Keynes's own work.

Chapter 18 plays a fundamental role in the *General Theory*. It may be said to accomplish three different but interconnected tasks: first, it offers a powerful illustration of how Keynes believed it possible to make science, some decades before the development of complexity science, in a complex social world; second, it drives its readers to the analysis of a complex economic material; third, it provides them with a guide to the reading of the *General Theory* itself. Greenwald and Stiglitz are once again, and finally, right: "a much richer picture emerges from the *General Theory* taken as a whole". What they failed to note is that this is exactly what the indispensable chapter 18 helps us understanding.

References

- Aristotle (1928) *Sophistical Refutations*, edited by William D. Ross. Oxford: Clarendon Press.
- Asimakopulos, Athanasios (1991) *Keynes's General Theory and Accumulation*. Cambridge: Cambridge University Press.
- Carabelli, Anna M. (1992) "Organic Interdependence and Keynes's Choice of Units in the *General Theory*". In *The Philosophy and Economics of J. M. Keynes*, edited by Bill Gerrard and John Hillard, pp. 3-31. Aldershot: Edward Elgar.
- Carabelli, Anna M. (1991) "The Methodology of the Critique of the Classical Theory: Keynes on Organic Interdependence". In *Keynes and Philosophy*, edited by Bradley W. Bateman and John B. Davis, pp. 104-125. Aldershot: Edward Elgar.
- Carabelli, Anna M. (1988) *On Keynes's Method*. London: Macmillan, 1988.

- Carabelli, Anna M. and Nicolò De Vecchi (1999) "'Where to Draw the Line'? Keynes Versus Hayek on Knowledge, Ethics and Economics". *European Journal of the History of Economic Thought*, 6 (2): 271-296.
- Chick, Victoria (2006) "The General Theory Is Difficult: Whose Fault Is That?". *Revista de Economia*, 32 (2): 135-151.
- Chick, Victoria (2004) "On Open Systems". *Brazilian Journal of Political Economy*, 24 (1): 3-16.
- Chick, Victoria (2003) "Theory, Method and Mode of Thought in Keynes's *General Theory*". *Journal of Economic Methodology*, 10 (3): 307-327.
- Chick, Victoria and Sheila C. Dow, "Formalism, Logic and Reality: A Keynesian Analysis". *Cambridge Journal of Economics*, 25 (6): 705-722.
- Clower, Robert W. and Axel Leijonhufvud (1975) "The Coordination of Economic Activities: A Keynesian Perspective". *American Economic Review*, 65 (2): 182-188.
- Dostaler, Gilles (2007) *Keynes and His Battles*. Cheltenham: Edward Elgar.
- Dow, Sheila C. (2010) "Preliminary Draft: Was There a (Methodological) Keynesian Revolution?". In *Keynes's General Theory After Seventy Years*, edited by Robert W. Dimand, Robert A. Mundell and Alessandro Vercelli, pp. 268-286. London: Palgrave Macmillan.
- Fontana, Giuseppe (2009) *Money, Uncertainty and Time*. London and New York: Routledge.
- Fontana, Giuseppe (2001) "Keynes on the 'Nature of Economic Thinking'. The Principle of Non-Neutrality of Choice and the Principle of Non-Neutrality of Money". *American Journal of Economics and Sociology*, 60 (4): 711-743.
- Freud, Sigmund (1937) "Analysis Terminable and Interminable". *International Journal of Psycho-Analysis*, 18: 373-405.
- Gerrard, Bill (1997) "Method and Methodology in Keynes's *General Theory*". In *A 'Second Edition' of the General Theory*, Volume 2, edited by Geoffrey C. Harcourt and Peter A. Riach, pp. 120-148.
- Greenwald, Bruce and Joseph E. Stiglitz (1987), "Keynesian, New Keynesian and New Classical Economics". *Oxford Economic Papers*, New Series, 39 (1): 119-133.
- Gotti, Maurizio (2009) "Aspects of Individuality in J.M. Keynes's *General Theory*". In *Commonality and Individuality in Academic Discourse*, edited by Maurizio Gotti, pp. 279-302. Bern: Peter Lang.
- Gotti, Maurizio (1994) *The 'General Theory' as an Open-ended Work*. In *John Maynard Keynes: Language and Method*, edited by Alessandra Marzola and Francesco Silva, pp. 155-191. Cheltenham: Edward Elgar.
- Hansen, Alvin H. (1953) *A Guide to Keynes*. New York: McGraw-Hill Book Company.
- Harcourt, Geoffrey C. and Claudio Sardoni (1994) "Keynes's Vision: Method, Analysis and 'Tactics'". In *The State of Interpretation of Keynes*, edited by John B. Davis, pp. 131-152. Boston: Kluwer.
- Henderson, Willie (1995) *Economics as Literature*. London and New York: Routledge.
- Hirai, Toshiaki (2008) *Keynes's Theoretical Development. From the Tract to the General Theory*. London and New York: Routledge.
- Hoover, Kevin D. (2006) "Doctor Keynes: Economic Theory in a Diagnostic Science". In *The Cambridge Companion to Keynes*, edited by Roger E. Backhouse and Bradley W. Bateman, pp. 78-97. Cambridge: Cambridge University Press.
- Jespersen, Jesper (2008) *Macroeconomic Methodology. A Post-Keynesian Perspective*. Cheltenham: Edward Elgar.
- Keynes, John M. (1971-1989) *The Collected Writings of John Maynard Keynes*, edited by Elizabeth Johnson and Donald E. Moggridge. London: Macmillan.
Vol. 1. *Indian Currency and Finance* (1913), 1971

- Vol. 2. *The Economic Consequences of the Peace* (1919), 1971
- Vol. 5. *A Treatise on Money. I. The Pure Theory of Money* (1930), 1971
- Vol. 7. *The General Theory of Employment, Interest and Money* (1936), 1973
- Vol. 8. *A Treatise on Probability* (1921), 1973
- Vol. 10. *Essays in Biography* (1933), 1972
- Vol. 11. *Economic Articles and Correspondence: Academic*, 1983
- Vol. 12. *Economic Articles and Correspondence: Investment and Editorial*, 1983
- Vol. 13. *The General Theory and After. Part I: Preparation*, 1973
- Vol. 14. *The General Theory and After. Part II: Defence and Development*, 1973
- Vol. 29. *The General Theory and After. A Supplement (to vols XIII and XIV)*, 1979
- Keynes, John M. (1909) "Science and Art" (20 February). King's College Archive Centre, Cambridge, The Papers of John Maynard Keynes.
- Keynes, John M. (1905) "Miscellanea Ethica" (31 July). King's College Archive Centre, Cambridge, The Papers of John Maynard Keynes.
- Keynes, John M. (undated) "On Beauty and Art. On Art Criticism and the Appreciation of Beauty". King's College Archive Centre, Cambridge, The Papers of John Maynard Keynes.
- Kriesler, Peter and John Nevile (2002) "IS-LM and Macroeconomics After Keynes". In *Money, Macroeconomics and Keynes*, edited by Philip Arestis, Meghnad Desai and Sheila C. Dow, pp. 103-114. London and New York: Routledge.
- Leijonhufvud, Axel (1968) *On Keynesian Economics and the Economics of Keynes: A Study in Monetary Theory*. Oxford: Oxford University Press.
- Leontief, Wassily (1966) *Essays in Economics. Volume One*. Oxford: Basil Blackwell
- Marchionatti, Roberto (2010) "J. M. Keynes, Thinker of Economic Complexity". *Journal of Economic Ideas*, 18 (2): 115-146.
- Marshall, Alfred (1961) *Principles of Economics* (revised edition). London: Macmillan [1920].
- Marshall, Alfred (1898) "Distribution and Exchange". *Economic Journal*, 8 (29): 37-59.
- Marzola, Alessandra and Francesco Silva (1994), eds *John Maynard Keynes: Language and Method*, Cheltenham: Edward Elgar.
- O'Donnell, Rod (1995) "Keynes on Aesthetics". In *New Perspectives on Keynes*, edited by Allin F. Cottrell and Michael S. Lawlor, pp. 93-121. Durham and London: Duke University Press.
- Rossini Favretti, Rema (1989) *Il linguaggio della Teoria Generale. Proposte di analisi*. Bologna: Patron Editore.
- Sardoni, Claudio (1989-90) "Chapter 18 of the *General Theory*: Its Methodological Importance". *Journal of Post-Keynesian Economics*, 12 (2): 293-307.
- Shackle, George L.S. (1967) *The Years of High Theory*. Cambridge: Cambridge University Press.
- Simon, Herbert A. (1982). *Models of Bounded Rationality. Behavioral Economics and Business Organization*. Cambridge (MA): MIT Press.
- Togati, Dario T. (2006) *The New Economy and Macroeconomic Stability: A Neo-modern Perspective Drawing on the Complexity Approach and Keynesian Economics*. London and New York: Routledge.
- Vercelli, Alessandro (1991) *Methodological Foundations of Macroeconomics: Keynes and Lucas*. Cambridge (MA): Cambridge University Press.
- Vicarelli, Fausto (1984) *Keynes. The Instability of Capitalism*. Philadelphia: University of Pennsylvania Press.