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Abstract: Recently, Dosi and his co-authors have developed a 'Keynes+Schumpeter' model which "endogenously generates self-sustained growth patterns together with persistent economic fluctuations ...". The aim of this work is twofold. First, to show that the K+S model developed by Dosi and his co-authors does not allow to explain the instability that characterizes a capitalist economy. This limitation is due to the fact that the model overlooks some key elements of Schumpeter's analysis. The second objective is to show that a solid K+S model can be built starting from the elements of Schumpeter's theory neglected by Dosi and his co-authors.

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Introduction

Over the years, many economists have underlined the opportunity to integrate the lessons of Keynes and Schumpeter.[1] Recently, Dosi and his co-authors (Dosi 2012, Dosi et al. 2010, Dosi et al. 2013, Dosi et al. 2015a, Dosi et al. 2015b) have developed a 'Keynes+Schumpeter' model (hereafter K+S), which "endogenously generates self-sustained growth patterns together with persistent economic fluctuations punctuated by deep downturns" (Dosi et al. 2015b, p. 1). The aim of this work is twofold. The first objective is to show that the K+S model developed by Dosi and his co-authors does not allow explaining the instability that characterizes a capitalist economy. This limitation depends on the fact that they overlook some key elements of Schumpeter's analysis concerning the role of bank money and the characteristics of innovations.

The second objective is to demonstrate that a solid K+S model can be built starting from the elements of Schumpeter's theory neglected by Dosi and his co-authors. The K+S model presented in this paper highlights that the relationship between bank money and innovations described by Schumpeter is paramount to define the three fundamental elements of what Keynes (1933a) has called a *monetary theory of production*, a theory aimed at explaining the relationship between money and economic crises, that is: i) the

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[1] See, for example, Minsky (1986a, 1993), Morishima (1992), Goodwin (1993), Vercelli (1997), Bertocco (2007) and Mazzucato and Wray (2015).

presence of uncertainty; ii) the principle of effective demand; iii) the presence of speculative markets. In other words, it will be shown that Keynes's theory holds within an economic system characterized by the process of economic development described by Schumpeter.

The paper is divided into two parts. In the first part we specify the elements of Schumpeter's analysis overlooked by Dosi and his co-authors. Furthermore, we highlight the reasons for which these neglected elements are essential to elaborate a K+S model. In the second part of the paper we present a simple version of the K+S model that shows how the same mechanisms generating Schumpeter's process of economic development expose capitalist economies to the crises described by Keynes.

1. The pillars of Schumpeter's theory and the Keynes+Schumpeter model

1.1. The limits of the K+S model developed by Dosi and his co-authors

Dosi and his co-authors emphasize the limitations of the mainstream theory and the need to develop an alternative model "that bridges Keynesian theories of demand generation and Schumpeterian theories of technology-fuelled economic growth" (Dosi 2012, p. 27). The model of Dosi and his co-authors "endogenously generates self-sustained growth patterns together with persistent economic fluctuations punctuated by deep recessions" (Dosi et al. 2015b, p. 1).

The K+S model elaborated by Dosi et al. relates to an economic system made up of heterogeneous subjects (entrepreneurs, workers and bankers). There are two groups of firms. The first group produces the only existing consumer good by employing labor and machines, without introducing any innovation. Innovations are instead introduced by the

firms of the second sector producing the machines used by the consumption-good firms. Innovations allow reducing the cost of manufacturing the machines, and increasing the productivity of labor used to produce the only existing consumer good.

The second distinctive feature of Dosi's K+S model concerns the role of the banks. Dosi et al. (2016) justify the presence of banks based on the existence of imperfections in the capital market hampering the transfer of resources from savers to firms. In particular, they refer to the work of Stiglitz and his co-authors, Weiss and Greenwald, who applied the conclusions of information economics to the analysis of the working of the financial markets (Dosi et al. 2010, p. 1753). Furthermore, Dosi et al. assume that only the consumption-good firms go into debt with the banks.[2] In other words, banks do not finance the firms that introduce innovations, but just the firms producing the only existing consumer good. Dosi and his co-authors support this hypothesis by observing that the companies producing the only consumer good pay the machines in advance.[3] They believe that their model is able to represent not only the Schumpeterian process of endogenous growth, but also the instability of a monetary economy that is at the core of Keynes's theory (Dosi et al. 2015b, p. 15).

In our opinion, the K+S model developed by Dosi and his co-authors is not able to generate the fluctuations in income and the crises that are central to the work of Keynes. In fact, this K+S model describes an economic system in which a single consumer good is produced by employing labor and capital goods, and in which capital goods are

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[2] "Consumption-good firms have to finance their investments as well as their production, as they advance worker wages. […] More specifically, consumption-firms finance production using their stock of liquid assets. If liquid assets do not fully cover production costs, firms borrow the remaining part paying an interest rate r […]." (Dosi et al. 2010, p. 1753)

[3] Banks do not finance capital-good firms: "as consumption-good firms pay the machines in advance, capital good firms do not need credit to finance their production." (Dosi et al. 2015b, p. 6)

produced by employing only labor. Innovations, which are realized only within the capital goods sector, allow "to produce and sell more productive and cheaper machine tools that are supplied to consumption-good firms" (Dosi et al. 2015b, p. 6). We can imagine, for example, that the only consumer good produced in the economy consists of corn representing the wage good purchased by the workers. The firms that produce capital goods thus employ a certain number of workers to realize spades, ploughs or tractors, that is, tools allowing to increase the productivity of the workers employed in the production of corn.

It is difficult to imagine that such an economic system can be characterized by crises. A corn economy has the characteristics of what Keynes (1936, p. 20) defines as the economy of Robinson Crusoe, that is, an economy based on the validity of Say's Law. In a corn economy, the costs and revenues of firms and economic variables such as income, consumption, savings, investments, wages and profits can be defined in terms of corn. Given the technology, which is the result of the innovations introduced by the firms producing capital goods, over a certain period of time, the firms producing corn will employ all the workers whose marginal productivity (calculated in terms of corn) is higher than the real wage expressed in terms of corn.[4] The corn produced will be partly consumed and partly saved, and the flow of saved corn will be invested, that is, it will be used to pay the wages of the workers employed to build spades, ploughs or tractors. Within a corn economy, the mechanism ensuring that all the saved corn will be invested is based on the fluctuations of the rate of interest described by the neoclassical theory.

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[4] As explained by Keynes: "In a real-wage and co-operative economy there is no obstacle in the way of the employment of an additional unit of labour if this unit will add to the social product output expected to have an exchange value equal to 10 bushels of wheat, which is sufficient to balance the disutility of the additional employment." (Keynes 1933b, p. 78)

Thus, in a corn economy income fluctuations due to a fall in investments and crises, triggered by the insolvency of debtors, cannot occur.[5]

Furthermore, in an economic system characterized by the production of a single good and by the continuous introduction of innovations aimed at increasing labor productivity, an infinite process of growth is not possible. In fact, within a corn economy the process of economic development is bound to stop when the productivity of labor enhanced through the introduction of innovations will become so high to free mankind from the need to work for living. As is well known, this is the conclusion reached by Keynes in his famous essay of 1930 in which he considered the economic possibilities of 'his' grandchildren.[6]

Keynes's prophecy was based on the key assumption that, over a century, the composition of human needs would remain constant. Actually, Keynes recognized the existence of two distinct types of needs. On the one hand, absolute needs, to which the principle of satiety applies, and, on the other hand, relative needs, which are instead dominated by the principle of insatiability. In Keynes's view, absolute needs are prevalent, while relative needs are secondary, as they concern a limited number of individuals whose behavior could not change the essence of his predictions (Keynes 1930, p. 326). In this case, it is unrealistic to assume that an individual would be willing to

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[5] Of course, also in a corn economy an entrepreneur may go bankrupt because of a disease or because of bad weather conditions. Nevertheless, these factors represent what Schumpeter (1939, p. 1) defined as "factors which act from without the economic sphere." Thus, they can be excluded from the economic analysis.

[6] "[…] in the long run […] *mankind is solving its economic problem*. I would predict that the standard of life in progressive countries one hundred years hence will be between four and eight times as high as it is today. […] This means that the economic problem is not – if we look into the *future – the permanent problem of the human race*." (Keynes 1930, pp. 325-326)

continuously pile up a growing quantity of corn, thereby adding, from year to year, the new flow of savings to those accumulated in the past. Conversely, it is reasonable to imagine the existence of a physiological limit to the amount of corn that individuals wish to amass.

1.2. Schumpeter, bank money and innovations

In order to elaborate a significant K+S model it is necessary to recover two elements of Schumpeter's theory that have been neglected by Dosi and his co-authors. According to Schumpeter, capitalist economies present two distinctive characteristics. The first characteristic concerns the process of change caused by the innovations introduced by entrepreneurs. Schumpeter does not identify innovations only with the introduction of machines enhancing the productivity of labor employed in the production of consumer goods. In fact, Schumpeter argues that innovations consist also in the production of new goods that deeply modify the households' consumption habits. He therefore points out that in a capitalist economy the principle of consumer sovereignty does not hold. Production is not subject to the needs of consumers. On the contrary, households' consumption decisions are continually influenced by the innovations introduced by entrepreneurs-innovators.[7]

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[7] "Railroads have not emerged because any consumers took the initiative in displaying an effective demand for their service in preference to the services of mail coaches. Nor did the consumers display any such initiative wish to have electric lamps or rayon stockings, or to travel by motorcar or airplane, or to listen to radios, or to chew gum. The great majority of changes in commodities consumed has been forced by producers on consumers who, more often than not, have resisted the change and have had to be educated up by elaborate psychotecnics of advertising." (Schumpeter 1939, p. 47)

The second distinctive feature of a capitalist economy regards the role of money. Schumpeter points out that money represents a crucial element of the process of change.[8] He therefore developed a new theory based on a heresy, that is, "the heresy that [in a capitalist economy] money [...] perform[s] an essential function, hence that processes in terms of means of payment are not merely reflexes of processes in terms of goods" (Schumpeter 1912, p. 95). Schumpeter underlines that the kind of money used in a capitalist economy is bank money. His heresy thus consists in considering bank money as a fundamental element of the process of change based on the introduction of innovations. In other words, bank money is the element that makes the introduction of innovations possible. Without bank money there would be no innovations.[9]

To explain this heresy, Schumpeter distinguishes between the production of already existing goods and the introduction of innovations by associating the terms 'enterprise' and 'entrepreneur' to the latter activity. He also remarks that the introduction of innovations requires special skills, as the decisions made by an entrepreneur-innovator deeply change the structural characteristics of the economic system. In fact, the

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[8] Hanusch and Pyka (2007) observe that the Neo-Schumpeterian Economics tends to underline the importance of innovations but to neglect the role of finance. They therefore propose to elaborate a: "comprehensive Neo-Schumpeterian approach as a theory composed of three pillars: one for the real side of an economy, one for the monetary side of an economy and one for the public side." (Hanusch and Pyka 2007, p. 279). Similarly, to study the process of propagation of technological revolutions that began in the second half of the eighteenth century, Perez (2011) uses a narrative model based on: "Schumpeter's basic assumptions about innovations based on credit creation as the force behind capitalist dynamics." (Perez 2011, p. 11)

[9] "[C]apitalism [is] defined by three features of industrial society: private ownership of the physical means of production; private profits and private responsibility for losses; and the creation of means of payments – banknotes or deposits – by private banks. The first two features suffice to define private enterprise. But no concept of capitalism can be satisfactory without including the set of typically capitalistic phenomena covered by the third." (Schumpeter 1943 [1951], p. 175).

entrepreneur-innovator is forced to plan his productive activity in an attempt to anticipate the possible reactions of a world that does not yet exist (Schumpeter 1912, p. 66). Schumpeter thus concludes that, generally, it is 'new men', who, unlike those running existing businesses, do not control the basic production factors (i.e. labor and land), that introduce innovations.[10]

Furthermore he assumes that innovations are implemented in conditions of full employment.[11] According to Schumpeter, in a situation of full employment innovations can be introduced only if new entrepreneurs can subtract the control of part of the available productive resources from existing businesses. Schumpeter remarks that it is unreasonable to imagine some form of direct exchange between the owners of existing businesses and the new entrepreneurs, as: "in principle, a loan of the services of labor and land by workers and landlords is not possible" (Schumpeter 1912, p. 96). He explains that entrepreneurs- innovators can subtract part of the production factors controlled by existing businesses thanks to the existence of bank money. By expanding the supply of credit, banks provide new purchasing power to the entrepreneurs-innovators allowing

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[10] "[…] it is not essential to the matter - though it may happen – that the new combinations should be carried out by the same people who control the productive or commercial process which is to be displaced by the new. On the contrary, new combinations are, as a rule, embodied, as it were, in new firms which generally do not arise out of the old one but start produce beside them. […] in general it is not the owner of stage-coaches who builds railways." (Schumpeter 1912 [1949], p. 66)

[11] "[W]henever we are concerned with fundamental principles, we must never assume that the carrying out of new combinations takes place by employing means of production which happen to be unused. In practical life, this is very often the case. There are always unemployed workmen, unsold raw materials, unused productive capacity, and so forth. […] As a rule the new combinations must draw the necessary means of production from some old combinations – and for reasons already mentioned we shall assume that they *always* do so, in order to put in bold relief what we hold to be the essential contour line. The carrying out of new combinations means, therefore, simply the different employment of the economic system's existing supplies of productive means." (Schumpeter 1912 [1949], pp. 67–68).

them to demand labor services. This demand triggers an increase in the level of wages as it adds to the demand of existing businesses. Entrepreneurs-innovators can thus get hold of some of the production factors previously used by existing businesses and employ them for the realization of innovations (Schumpeter 1912, pp. 106–109).

In order to explain the fundamental role of bank money, Schumpeter (1954, p. 1113) criticizes the traditional theory which separates money and credit and states that the nature of credit is independent of the presence of money. According to this theory, banks are mere intermediaries and the real creditors are the savers. This applies both if the object of credit is a real asset (e.g. unconsumed corn), or if it is money. In contrast to the traditional theory, Schumpeter (1954) emphasizes that the presence of bank money profoundly changes the nature of credit, making possible phenomena that otherwise would not occur. In other terms, Schumpeter does not accept the approach of Menger (1892), who considered money as the spontaneous outcome of exchanges between individuals. He defines money as a fundamental institution not only for the explanation of economic phenomena, but also for the explanation of other aspects of society: "Money, like any other economic institution, is an element of the overall social process and as such a matter for economic theory, for sociology, and finally for historical, ethnological, and statistical 'fact research" (Schumpeter 1970 (2014), pp. 12-13).[12]

The phenomenon of credit based on the creation of new money by the banking system represents an essential element of the process of change that characterizes capitalist economies. It is the creation of bank money that allows entrepreneurs-innovators to gain control of the production factors, and in particular of the workforce, required to realize their innovative investment projects. Without banks and credit the

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[12] On Schumpeter's credit theory of money see: Messori (2006) and Lakomsky-Laguerre (2016).

presence of a consistent flow of investments and the process of development of capitalist economies could not be explained.[13] Indeed, Schumpeter (1912 p. 102) stresses that a 'new man' "can only become an entrepreneur by previously becoming a debtor."

In conclusion, compared to the K+S model developed by Dosi and his co-authors, Schumpeter's analysis explains: i) the presence of bank money and of the banks; ii) the role of entrepreneurs introducing innovations under conditions of uncertainty. In other words, Schumpeter's analysis makes allows explaining the existence of heterogeneous groups of subjects made up of entrepreneurs, bankers and workers. In the next pages we will show that, in order to explain the role of bank money within capitalist economies, it is not at all necessary to assume, like Schumpeter does, that the system is characterized by full employment conditions. Furthermore, we will show that bank money and innovations represent a fundamental element for the explanation of the structural nature of economic crises elaborated by Keynes.

2. Schumpeter, Keynes, money and crises

2.1. Schumpeter, Keynes and the monetary nature of uncertainty

Unlike Schumpeter's claim, it can be shown that the fundamental role of bank money in capitalist economies does not depend on the presence of full employment, and that, regardless of the full employment condition, the credit agreement needed to fund

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[13] This is a central point of Schumpeter's analysis: "The banker […] is not so much primarily a middleman in the commodity 'purchasing power' as a *producer* of this commodity. […] He is essentially a phenomenon of development. […] He makes possible the carrying out of the new combinations, authorizes people, in the name of society as it were, to form them. He is the ephor of the exchange economy" (Schumpeter 1912, p. 74). See also Schumpeter (1954) and Minsky (1990).

innovations cannot be concluded through an exchange of real goods. It must be necessarily concluded in monetary terms.

To explain this point, we follow Schumpeter and consider a static economic system, for example, a corn economy, in which, at a certain moment, an entrepreneur-innovator plans to introduce an innovation, for example, the construction of a railway. Let us assume that, in order to complete his project, he needs to hire a certain amount of workers that will use their entire salary to buy corn, which represents the wage good of the system. Following these assumptions, the necessary condition for the construction of the railway is that the productivity of the workers employed in the production of corn will allow producing not only the amount of corn corresponding to their own salaries, but also the amount of corn demanded by the workers employed in the realization of the railway. We assume that this condition is met thanks to the increase in the productivity of agricultural workers made possible thanks to the innovations described by Dosi et al.

One may wonder if this condition is also sufficient to build the railway without the use of money. For example, we can imagine that the producers of corn may lend directly, or indirectly through the intermediation of a bank, a part of the corn produced to the entrepreneur that wants to build the railway, thus enabling him to pay the workers required for the realization of his investment project. Nevertheless, it is difficult to reach a credit agreement of this type, as it is not clear what the debtor will have to return to the creditor. In fact, as the entrepreneur-innovator does not produce corn he cannot commit himself to return a certain amount of corn. Furthermore, we cannot suppose that the entrepreneur-innovator will sell train tickets for a price in terms of corn, as the only amount of corn available is that produced by the workers employed in the agricultural sector, that is, the amount of corn corresponding to their own wages and to the wages of

the workers employed in the construction of the railway. This amount of corn will be entirely consumed (eaten) by the workers.

The credit agreement allowing the construction of the railway must therefore be concluded in monetary terms: the entrepreneur-innovator assumes the commitment to return money to the subjects, the banks, which are able to supply credit by creating new money. For example, he can obtain the money needed to repay his debt by selling train tickets in exchange for money that, once the construction of the railway has been completed, will be created by the banks in order to fund the realization of new investments. Obviously, creating money is different from producing corn, because, as underlined by Keynes (1936, ch. 17), the production of fiat money does not require the employment of work.

The relationship between bank money and innovations that emerges from Schumpeter's analysis allows explaining the three fundamental elements of Keynes's theory of economic crises: i) the presence of uncertainty; ii) the principle of effective demand; iii) the presence of speculative markets. The first element of this explanation concerns the importance of uncertainty. In order to illustrate this point, we have to observe that the investment decisions taken in a corn economy are very different from the investment decisions taken in a capitalist economy characterized by the introduction of innovations.

In the corn economy described by the classical theory, the results of production decisions can be defined in terms of the amount of goods produced. Since the existing technology defines the relationship between the input of productive factors and the quantity of final products, these results can be considered certain. The decisions taken in a monetary economy are instead uncertain. In fact, while the monetary costs incurred by

the entrepreneur can be calculated with certainty, monetary revenues, corresponding to the amount of sold train tickets, are uncertain as they depend on the way consumers welcome the entrepreneur's innovation.

Keynes (1933b) strongly emphasizes this characteristic of a monetary economy. To underline that in a monetary economy the results of a production decision are uncertain, he makes use of two sequences originally developed by Marx. The first sequence, C (Commodity) → M (Money) → C' (Commodity), describes an economic system with two fundamental features that Keynes called *real-exchange economy*. First, the production of goods is the essential condition for demanding other goods. Secondly, money is no more than a tool allowing to lower the costs of exchanges compared to those characterizing a barter economy.

With the sequence M→C→M' Keynes instead describes the distinctive features of investment decisions in a monetary economy. In a monetary economy investment decisions present the same characteristics of Schumpeter's innovations. The link between Keynes and Schumpeter is confirmed by the examples of investment decisions provided by Keynes in the *General Theory*. In fact, these examples present the same characteristics of Schumpeter's innovations.[14] We may thus consider the investments of the Keynesian entrepreneur as the tool allowing the introduction of new products, or the modification of the productive methods used to realize already existing goods. The Keynesian entrepreneur taking investment decisions presents the same characteristics of the

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[14] "Our knowledge of the factors which will govern the yield of an investment some years hence is usually very slight and often negligible. If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London, amounts to little and sometimes to nothing; or even five years hence." (Keynes 1936, pp. 149-150)

Schumpeterian entrepreneur introducing innovations (see, Davidson 2007, p. 112; Knell 2015, pp. 302-303).

Keynes uses the sequence M→C→M' to underline that in a monetary economy the results of a production decision can be defined only in monetary terms, because they do not correspond to the quantity of produced goods, but to the monetary value of the goods that the entrepreneur believes to be able to sell. In fact, entrepreneurs acting in a monetary economy do not evaluate the results of their investment decisions on the basis of the amount of produced goods, but on the basis of the monetary proceeds they expect to obtain from the sale of these goods.[15] The impossibility to forecast the results of production decisions in probabilistic terms does not depend on the obtainment of the desired amount of goods. Uncertainty instead concerns the possibility to sell the goods produced, and thus the possibility to achieve a profit in monetary terms. In other words, in a monetary economy uncertainty depends on economic factors. Monetary quantities therefore do not represent a simple reflection of underlying real quantities. In fact, the use of bank money allows the creation of an accounting system enabling bankers and entrepreneurs to carry out operations that otherwise could not be carried out.

Hence, Schumpeter's analysis (1970/2014) highlights the function of unit of account played by money. To emphasize this function means not only observing that the prices of all goods are expressed in units of money, but, above all, recognizing that money

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[15] "The classical theory supposes that the readiness of the entrepreneur to start up a productive process depends on the amount of value in terms of product which he expects to fall to his share; i.e. that only an expectation of more *product* for himself will induce him to offer more employment. But in an entrepreneur economy this is a wrong analysis of the nature of business calculation. An entrepreneur is interested, not in the amount of product, but in the amount of *money* which will fall to his share. He will increase his output if by so doing he expects to increase his money profit, even though this profit represents a smaller quantity of product than before." (Keynes 1933b [2013g], p. 82)

is essential for the realization of an accounting system allowing to define the costs and revenues and the credit and debit relationships underlying the introduction of innovations and the process of economic development. With regard to the accounting system based on the working of the banking system Messori (2013, p.27) underlines "the function of social book-keeping fulfilled by banks".

2.2. Keynes, Schumpeter and the principle of effective demand: a simple linear model

The second element of Keynes's theory of economic crises is the principle of effective demand. In this paragraph we will show that Schumpeter's theory of the process of economic development allows elaborating a sound explanation of Keynes's principle of effective demand. In a monetary economy, in which investment decisions have the characteristics of Schumpeter's innovations, there does not necessarily exist an 'appropriate' value of the rate of interest pushing businesses to realize a flow of investments coherent with full employment conditions. In fact, in a monetary economy the achievement of an investment flow consistent with full employment does not depend only on the level of the rate of interest. Given the level of the rate of interest, the realization of a flow of investments coherent with full employment depends on two conditions: i) the presence of an adequate number of entrepreneurs-innovators, which, guided by their *animal spirits*, wish to implement the required amount of investment projects, and ii) the willingness of the banks to finance the investment projects submitted by the entrepreneurs-innovators.

Even a rate of interest equal to zero, or a negative rate of interest, may not be sufficient to ensure full employment of the available workforce.[16] Given the level of the rate of interest set by the banking system, the flow of investments depends on the *animal spirits* of entrepreneurs willing to carry out innovative projects. If these entrepreneurs did not exist, unemployment would emerge even if the rate of interest were equal to zero or negative. Moreover, given the level of the rate of interest set by the banking system, even the presence of entrepreneurs-innovators willing to create a flow of investments consistent with full employment does not represent a sufficient condition for the actual achievement of full employment conditions. Indeed, nothing ensures that banks will be willing to finance these projects. In a monetary economy, banks fund investments by creating new money, and, like entrepreneurs-innovators, they take their decisions under conditions of uncertainty. Thus, their evaluations of the investment projects could sharply differ from those formulated by the entrepreneurs. For example, they may consider an entrepreneur planning to build a railway as an eccentric or visionary individual, whose investment project has no chance of success. In this case, the innovative investment could not be realized, and the system would not reach the full employment of the available workforce.

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[16] In an economic system characterized by the use of money, that is, by the use of a non-perishable asset without storage costs, the rate of interest on money cannot reach significant negative values. In fact, while it is possible to imagine the presence of negative interest rates if the costs of holding cash are higher than zero, it is nevertheless difficult to assume that they can reach significant values. As Rogoff (2014, p. 2) argues: "it […] suddenly becomes very hard to push interest rates below levels of, say, -0,25 to -0,50, certainly not on a sustained basis. Hoarding cash may be inconvenient and risky, but if rates become too negative, it becomes worth it."

This explanation of the principle of effective demand can be illustrated by means of a simple linear model with the following characteristics.[17] First, the abandonment of the typical hypothesis underlying macroeconomic models that the economic system produces a single homogeneous good. Instead, we assume that businesses introduce innovations consisting in the realization of new goods, and that these innovations are financed by the banks through the creation of new money. We can thus distinguish two groups of workers. The first group produces the wage good, that is, the good consumed by all the workers. In particular, in our model the wage good consists of corn. The second group of workers is instead employed for the production of innovations, for example, the construction of a railway.

Second, following Schumpeter, we assume that the only factor of production required to produce corn and to realize innovations is labor. Thus, the value of investments corresponds to the wages paid to the workers employed to carry out innovations, for example, the wages earned by the workers employed in the construction of a railway.

Third, for the sake of simplicity, we further assume that every worker uses its whole salary to buy corn, while neither the farmers nor the entrepreneurs-innovators demand corn. The demand for corn will therefore match the overall amount of wages of the two groups of workers. Since only agricultural workers produce corn, the necessary condition to meet the total demand for corn is that the productivity of the agricultural workers

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[17] Stockhammer underlines that an important difference between post-Keynesian and New Keynesian models regards the role of finance. According to the post-Keynesian theory: " […] financial instability is regarded as an intrinsic feature. This is due to the credit-driven endogenous money creation." (Stockhammer 2018, p. 2). With the model presented in the following pages we intend to show that bank money is of fundamental importance to explain the endogenous nature of economic crises in a monetary economy.

allows obtaining the quantity of corn demanded by the workers employed in the construction of the railway. However, although necessary, this condition is not sufficient: as the entrepreneur-innovator does not produce corn, he cannot conclude a credit contract based on the commitment to return the corn borrowed from the farmers in real terms. The credit agreement enabling the entrepreneur-innovator to realize a railway must therefore be defined in monetary terms.

Fourth, we assume that the available workforce amounts to 1,400 workers, and that the money wage, which is the result of bargaining between workers and entrepreneurs, is equal to 5 units of money. Moreover, we assume that the firms fix the price of corn at one unit of money per quintal of corn, and that the real wage, which corresponds to five quintals of corn, does not change when employment changes. In other words, the labor supply function is supposed to be perfectly elastic at a real wage of five quintals of corn. Finally, we assume that the productivity of each worker employed in the production of corn (A) is constant and equal to 10 quintals of corn.

We identify income with Y. Since the price of a quintal of corn equals one unit of money, Y indifferently indicates the value of income in terms of quintals of corn or the value of income in terms of monetary units. Leaving aside the public sector and trade relationships with foreign countries, Y is the sum of consumption (C) and investments (I):

1) $Y = C + I.$

The amount of investments, which corresponds to the wages paid to the workers employed to realize the innovations, depends on two factors. First, the presence of entrepreneurs-innovators planning to undertake investments based on their *animal spirits*

(AS) and on the level of the rate of interest set by the banks (r^*). I_d indicates the amount of investments projected by the entrepreneurs-innovators. Hence:

2) $I_d = f(AS, r^*)$.

Secondly, the amount of investments depends on the choices made by the banking system. As pointed out by Schumpeter, entrepreneurs can carry out their investment projects only if they borrow from the banks. However, after having fixed the level of the rate of interest (r^*), bankers do not automatically accept all the credit applications submitted by the entrepreneurs, but only those that are deemed creditworthy. If we set the flow of credit created by the banks equal to L^*, we obtain:

3) $I = L^* \le I_d$.

Equation 3) shows that the level of investments realized thanks to the credit obtained by the banks is usually lower than the level desired by the firms. Indeed, in a monetary economy banks ration credit.

The amount of consumption (C) corresponds to the monetary value of the corn consumed by the workers employed in the agricultural sector. Thus, consumption (C) is equal to the money wage (w) multiplied by the number of agricultural workers (N_{ag}), which, as shown in equation 4), corresponds to the ratio between the produced corn (Y) and the productivity of each agricultural worker (A):

4) $N_{ag} = \dfrac{Y}{A}$. [18]

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[18] Also the production decisions of the farmers are taken under conditions of uncertainty. In fact, they take their decisions on the employment of agricultural workers based on their expectations about the number of workers that will be hired to carry out the investments-innovations. Equation 4), which specifies N_{ag}, should thus include the level of income expected by the farmers (Y^e) instead of the actual level of income (Y). For the sake of simplicity, the model was built by assuming that $Y^e = Y$.

Consumption is defined by equation 5):

5) $\quad C = wN_{ag} = \left(\dfrac{w}{A}\right)Y.$

The w/A ratio is less than 1, as the condition required to carry out the investments is that the productivity of the agricultural workers (A) is higher than their money wage (w), that is, higher than the amount of corn consumed by each of them.

By substituting equations 3) and 5) in equation 1) we obtain:

6) $\quad Y = \dfrac{1}{\left(1 - \dfrac{w}{A}\right)} L^{*}.$

Income is a multiple of the value of the investments-innovations, which, as we have seen above, is equal to the flow of credit created by the banks. Hence, the level of income depends on the value of investments and the value of the multiplier, which, in turn, depends on the value of the w/A ratio. The higher w/A, the greater the value of the multiplier. By dividing both sides of equation 6) by the level of the money wage (w), we obtain:

7) $\quad \dfrac{Y}{w} = \dfrac{1}{\left(1 - \dfrac{w}{A}\right)} \dfrac{L^{*}}{w}.$

The L^{*}/w ratio identifies the number of workers employed by the entrepreneur-innovators (N_i), while the Y/w ratio represents the total number of employed workers $(N = N_{ag} + N_i)$.[19] The latter is equal to a multiple of the workers employed for the realization of innovations. If w is equal to 5 quintals of corn and A is equal to 10 quintals of corn, the value of the w/A ratio is 0.5, which means that each agricultural worker

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[19] Given that $Y = C + I$, that $C = wN_{ag}$ and that $I = L^{*} = wN_i$, we obtain $Y = w(N_{ag} + N_i)$ and $Y/w = N.$

consumes half of the corn produced by his work. Thus, every worker employed in the agricultural sector realizes a surplus that is equal to his wage and to the wage of a worker employed in the construction of the railway. In this case, the value of the multiplier is 2, and the total number of employed workers (N) corresponds to twice the number of workers employed in the implementation of innovations. Full employment (1,400 workers) therefore requires the realization of a number of investment projects involving the employment of 700 workers. If these investments were not realized, there would not be full employment.

In a monetary economy, there are no mechanisms ensuring a flow of investments consistent with full employment. The rate of interest is a monetary phenomenon determined by the banking system, which can assume any value greater than or equal to zero. However, even a rate of interest equal to zero may not be sufficient to ensure full employment conditions. In fact, given the level of the rate of interest set by the banking system, the flow of investments depends on the *animal spirits* of entrepreneurs willing to carry out innovative projects. If these entrepreneurs did not exist, unemployment would emerge even if the rate of interest were equal to zero.

Moreover, as we have seen earlier, the presence of entrepreneurs-innovators willing to create a flow of investments consistent with full employment is not a sufficient condition for the actual achievement of the condition of full employment. Indeed, nothing ensures that banks will be willing to finance these projects.

These relationships highlight the essential role of money, which is not just a medium of exchange, but the element that shapes the structural features of an economic system. Banks allow the implementation of investments-innovations by creating new money. Investments then generate an equivalent flow of profits and savings. Suppose, for

example, that the value of the multiplier is equal to 2, and that there are entrepreneurs willing to undertake investments requiring the employment of 700 workers. Since the money wage is equal to 5 units of money, they need a loan of 3,500 units of money. If the banks grant these loans, 700 new workers will be hired to build the railway. These workers will then use their wages to buy corn. To meet their demand for corn, farmers will have to hire another 700 workers who will produce an overall amount of 7,000 quintals of corn. The sale of the 7,000 quintals of corn will generate proceeds for 7,000 units of money against a production cost of 3,500 units of money, which corresponds to the total wages paid to the 700 agricultural workers. Thus, farmers would earn a profit of 3,500 units of money, which equals their savings and the value of the investments made to build the railway by employing 700 workers.[20]

We can conclude that, in a monetary economy, the causal relationship between savings and investments is reversed compared to the classical and neoclassical tradition: it is investments that determine savings and not vice versa. More specifically, in a monetary economy, investments and savings are determined in two separate logical steps. In a first step, the firms carry out the investments thanks to the money obtained from the banks. In a subsequent logical step, the change of the level of income causes the emergence of an equivalent flow of savings. The example described above leads to observe that the construction of the railway is not the consequence of the saving decisions of corn producers lending unconsumed corn to the entrepreneur that took the decision to build the railway. On the contrary, the entrepreneur builds the railway only because he obtained the required funds thanks to the new money created by the banks. The realization of the investment induces an increase in the demand for corn pushing the farmers to

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[20] This result is consistent with the conclusions reached by Kalecki (1954).

expand their production in exchange for money. The farmers do not become savers when they decide to produce an amount of corn in excess of what they wish to consume. Instead, they become savers when they choose to accumulate the money received in exchange for the corn sold to the workers employed for the construction of the railway. In other words, the presence of bank money shows that the corn producer, who does not want to accumulate wealth in the form of corn, is instead willing to accumulate wealth in the form of money. In order to explain why the corn producer is willing to accumulate money, we have to consider the third fundamental element of Keynes's monetary theory of production.

2.3. The relationship between saving decisions and wealth

The third fundamental element characterizing what Keynes defined as a *monetary theory of production*, that is, a theory aimed at explaining the relationship between money and economic crises, is the recognition of the importance of the phenomenon of speculation and of the presence of speculative markets. In this paragraph, we show that Schumpeter's analysis of the role of bank money in the process of economic development also allows elaborating a meaningful explanation of the phenomenon of speculation.

As underlined by Keynes in *The General Theory*, the necessary condition to justify the presence of speculative markets is the introduction of the concept of wealth and the specification of the relationship between saving decisions and wealth. The meaning of wealth is easily understandable. In fact, the wealth of an individual comprises all the financial assets or durable goods owned at a given point in time. Over time, wealth can vary depending on the flow of savings. When an individual decides to save part of his income, he adds new financial assets or new durable goods to his pre-existing stock of

wealth. The relationship between saving and wealth decisions is a central element of Keynes's theoretical analysis.[21]

This relationship describes the behavior of individuals wishing to accumulate an unlimited amount of purchasing power to be spent at any time in the future for the purchase of any desired good. Such a behavior is hard to explain in the context of a corn economy. As in a corn economy savings consist of unconsumed corn, it is unrealistic to assume that an individual may accumulate wealth by continuously piling up a growing quantity of corn. In fact, it is reasonable to suppose the existence of a physiological limit to the amount of corn that individuals wish to accumulate. As seen in paragraph 1.1, in 1930 Keynes elaborated his prophecy about the economic possibilities of 'his' grandchildren with reference to an economic system based on the principle of satiety of needs.

The importance of the relationship between saving decisions and wealth emerges if we consider an economic system characterized by the principle of insatiability of needs, that is, a system in which individuals have unlimited needs. If needs are insatiable, resources are necessarily scarce. The presence of individuals wishing to accumulate wealth because their resources are scarce compared to a set of unlimited needs can be explained through the concept of innovation. Schumpeter emphasized that the introduction of innovations by firms constantly changes the consumption patterns of households expanding the size of their needs. The continuous introduction of innovations

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[21] "An act of individual saving means – so to speak – a decision not to have dinner to-day. But it does *not* necessitate a decision to have dinner or to buy a pair of boots a week hence or to consume any specified thing at any specified date. […] the act of saving implies […] a desire for 'wealth' as such, that is for a potentiality of consuming an unspecified article at an unspecified time." (Keynes 1936, pp. 210-211)

pushes households to accumulate purchasing power because they do not know neither the quality nor the quantity of goods they will desire in the future.

The process of wealth accumulation can be described by extending the model presented in the previous paragraph to a succession of periods. The link between different periods is defined by two elements: i) the innovations that continuously change the consumption patterns of households; ii) the debt and credit relationships between entrepreneurs and banks, which, as pointed out by Minsky, highlight the significance of the concepts of past, present and future within a monetary economy: "[o]ur economy has a past, which is present today in maturing payment commitments, and a future, which is present today in debts that are being created" (Minsky 1982, p. 18).

Let us return to the example of the construction of the railway. We now assume that 700 workers have been employed for the construction of the railway and that the system has reached a condition of full employment. In the period following the realization of the railway, it is no longer necessary to employ 700 workers to build tracks, locomotives and stations. We assume that, in this second period, 100 workers are sufficient to organize and manage the railway lines. The entrepreneur who invested in the construction of the railway will record a profit and repay its debt only if he is now able to sell a sufficient number of train tickets. Thus, we must define the conditions allowing our entrepreneur-innovator to sell the train tickets. To this end, we can introduce different hypotheses. For example, let us suppose that the workers will be able to buy train tickets, and that, like corn, train tickets become a wage-good. This will be possible, if the salary paid to the workers rose, for example, to six units of money. In that case, each worker would be able

to buy not only 5 quintals of corn, but also train tickets corresponding to the value of one unit of money.[22]

Under the assumption that the available workforce is still equal to 1,400 units, if all workers were employed and received a salary equal to 6 units of money, the entrepreneur that realized the railway would earn 1,400 units of money. Since the cost of the 100 workers ensuring the management of the railway amounts to 600 units of money, the entrepreneur-innovator would record a profit of 800 units of money, which would enable him to repay part of his debt.

As seen earlier, the necessary condition to reach full employment is the existence of a flow of investments-innovations allowing to employ all the workers not employed in the production of corn or in the management of the railway (100 workers). What is therefore required are innovations enabling to occupy 600 workers (1,400 - 700 - 100).[23] This is possible only if there were entrepreneurs-innovators planning to realize new goods and banks willing to fund them. Suppose that during the second period a new entrepreneur-innovator intends to invest in the production of a telephone line, and that the realization of his project requires 600 workers. If the banks approve his innovative investment project, the entrepreneur will receive a loan of 3,600 units of money.

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[22] In our example, the individuals saving and accumulating wealth are not the workers, but the entrepreneurs. To justify the decision of the entrepreneurs to accumulate an unlimited amount of wealth, it is necessary to expand the model to take into account not only the realization of new wage-goods, but also the realization of innovations implying the production of goods meeting the tastes of wealth owners, such as houses in exclusive residential areas, jewels, top-ranked restaurants, high fashion clothes etc. Such an extension of the model goes beyond the limits of this work, and will be the subject of further discussions.

[23] As the productivity of an agricultural worker is equal to A, which corresponds to 10 quintals of corn, and since every employed worker consumes 5 quintals of corn, the production of the amount of corn needed to meet the demand of 1,400 workers will require the employment of 700 agricultural workers.

In this case, also in the second period all the 1,400 available workers will be employed. In particular, they will receive wages equal to 8,400 (1,400x6) units of money, which will be spent to buy 7,000 quintals of corn corresponding to 7,000 units of money (1,400x5), and train tickets corresponding to 1,400 (1,400x1) units of money. GDP will be equal to the overall value of the goods sold, that is, it will be equal to 8,400 units of money. This value can be decomposed into consumption (C) and investment (I). Consumption corresponds to the wages paid to the agricultural workers (700x6 = 4,200), and to the wages paid to the workers involved in the management of the railway (100x6 = 600). Overall consumption thus amounts to 4,800 units of money. Investments instead correspond to the wages paid to the workers employed to realize the telephone line, that is, they are equal to 3,600 units of money (600x6). Therefore we have:

8) $Y(8,400) = C(4,800) + I(3,600)$.

The amount of investments corresponds to the amount of savings: $S = Y - C$. Since we assumed that the workers do not save, it is the entrepreneurs that realize savings. We further assumed that entrepreneurs do not consume. This means that their savings correspond to the flow of profits. In our example, the profits of farmers correspond to the difference between their income, which is equal to 7,000 units of money, and the costs incurred to pay the wages of the 700 agricultural workers, which instead are equal to 4,200 units of money (700x6). The profits of the farmers thus amount to 2,800 units of money. The profits of the entrepreneur that realized the railway are instead equal to 800 units of money, which is the difference between the proceeds from the sale of train tickets (1,400 units of money) and the costs corresponding to the employment of the 100 workers required to manage the railway (600 units of money). Overall, profits are equal to 3,600

units of money, an amount equal to the value of savings and investments (Minsky 1982, 1986b).

The specification of what happens during the second period offers a first description of the process of wealth accumulation and the relationship between savings and wealth decisions. The flow of savings realized in the second period (3,600 units of money) is added to the flow of savings realized in the first period (3,500 units of money). At the end of the second period, total wealth thus amounts to 7,100 units of money. This wealth corresponds to the sum of the value of the railway realized in the first period (3,500, which corresponds to the production costs) and the value of the telephone line (3,600) realized in the second period. In other words, the total amount of wealth stems from the debts of the entrepreneur-innovators. This implies that wealth corresponds to the total value of the debts with the banking system and of the shares issued to realize the innovations.

In order to introduce shares, let us now assume that the entrepreneur that realized the railway and was able to obtain a profit of 800 units of money, decides to use his profits to repay part of the loan obtained by the banks. In this case, his wealth would amount to the difference between the value of the railway, which we assume to be equal to the production costs corresponding to the wages paid to the 700 workers employed during the first period (3,500 units of money), and the remaining debt to the banks (2,700 units of money). We can therefore assume that the wealth of this entrepreneur is given by the value of the railway's net worth (net capital). At the end of the second period, the wealth of the farmers will instead amount to 6,300 units of money (3,500 + 2,800), which corresponds to the sum of the savings realized in the first period (3,500 units of money) and in the second period (2,800 units of money). This value equals the amount of bank

money created to finance the construction of the railway (2,700 units of money corresponding to the difference between the initial value of the loan (3,500) and the profits (800) used to repay a part of the debt with the banks), and the bank money created to finance the construction of the telephone line (3,600 units of money).

This amount of wealth could be used to finance the innovations that will be necessary to ensure full employment also in the third period. In this case, the entrepreneurs-innovators will finance their projects by issuing bonds or shares to be purchased by wealth-holders. These financial instruments are continuously exchanged within markets with special characteristics. Financial markets are speculative markets working in accordance with the description offered by Keynes in Chapter XII of *The General Theory*.

In speculative markets, supply and demand depend on expectations about the future value of financial instruments elaborated under conditions of uncertainty. In the *General Theory*, Keynes contrasts the concept of 'speculation' with the concept of 'enterprise'. With the term enterprise, he describes the activity of an entrepreneur evaluating the opportunity to undertake an investment, such as the construction of a railway, based on its expected future revenues. Keynes instead suggests "to appropriate the term *speculation* for the activity of forecasting the psychology of the market" (Keynes 1936, p. 158). To fully understand the meaning of Keynes's definition of speculation, it is worth recalling that he identifies two separate categories of speculators. The first consists of the 'professional' speculators, that is, individuals who have the necessary information and skills to properly assess the present situation and the prospective returns of a company. The second category of speculators consists of "a large number of ignorant individuals

[...] who do not manage and have no special knowledge of the circumstances, either actual or prospective, of the business in question" (Keynes 1936, pp. 153-154).

The existence of these two groups of speculators is essential to explain how prices of financial assets may reach values that are very far from those consistent with a professional evaluation of the prospective yield of a firm. Keynes underlines that the choices made by ignorant speculators, which are influenced by "factors which do not really make much difference to the prospective yield" (Keynes 1936, p. 154), might well prevail. In fact, the presence of 'ignorant individuals' affects the behavior of the professional speculators as they may decide to act not on the basis of their informed and knowledge-based estimates of a company's future performance, but according to their expectations of how the mass of ignorant operators will evaluate the company's situation. Professional speculators will thus specialize in foreseeing the 'psychology of the market' (Keynes 1936, p. 154). The easiest choice for a professional speculator is to follow the other operators' behavior, that is, to 'follow the herd', for, according to Keynes, "[w]orldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally" (Keynes 1936, p. 158). Thus, 'speculation' can prevail over 'enterprise' and cause catastrophic crises (Keynes 1936, p. 159).

2.4. Money and crises

Schumpeter's lesson about the role of bank money in the process of economic development allows the elaboration of a K+S model offering a more solid explanation of the structural nature of the crises affecting capitalist economies than that developed by Dosi and his co-authors. We have shown that Schumpeter's theoretical approach is essential to explain three aspects of Keynes's *monetary theory of production*, a theory

aimed at explaining the relationship between money and crises, that is: i) the importance of uncertainty; ii) the principle of effective demand; iii) the presence of speculative markets. In what follows, we analyze the last aspect that should be underlined within a K+S model, that is, the relationship between money and crises.

The lessons of Schumpeter and Keynes highlight the fragility of capitalist economies. In fact, the process of development based on the introduction of innovations can be interrupted by crises originating from the same financial relations allowing the realization of innovative investment projects. We can distinguish at least three types of crises. The first type of crisis depends on a shortage of aggregate demand. We have seen that, according to the principle of effective demand, in a capitalist economy a crisis breaks out if the flow of innovations is not sufficient to ensure full employment. This may depend on the lack of entrepreneurs-innovators motivated by their animal spirits, or on the decisions of the banks not to fund innovative entrepreneurs.

The second kind of crisis is caused by the bankruptcy of entrepreneurs-innovators. In fact, the innovations may prove to be a failure. In this case, entrepreneurs-innovators will not be able to repay their debts, and the value of the debts owed by bankrupt entrepreneurs drops to zero. This has negative consequences on the propensity of entrepreneurs-innovators to realize new innovative investment projects and on the willingness of the banks to offer the required funds. Finally, a crisis may be linked to the phenomenon of speculation.

Hyman Minsky (1975, 1980, 1982, 1986a, 1986b, 1996) is the contemporary economist who more than any other has pointed out the financial nature of the structural instability characterizing a monetary economy. Minsky's financial instability hypothesis highlights that the existence of the conditions allowing indebted companies to obtain the

profits needed to validate their debts does not guarantee that a capitalist economy can be steered towards a stable equilibrium characterized by full employment. In fact, Minsky points out that "stability, even if it is the result of policy, is destabilizing" (Minsky (1975), p. 12).[24]

The shift from 'tranquil' to booming periods can be explained by recalling the relationship between bank money, investment decisions and uncertainty described in the previous pages. In an economy in which investments are undertaken under conditions of uncertainty, it is possible to experience periods of euphoria. During these periods, entrepreneurs and bankers remove the memories of previous crises and are caught by an overoptimistic attitude leading to believe that the economy has entered into a 'new era' and to deride the warnings of those suggesting the opportunity of more cautious behaviors.

A key role in the transition to the booming phase is played not only by the entrepreneurs and the bankers, but also by the financial markets, in which shares and debt securities representing a significant part of the wealth of households are continuously traded. The euphoric business atmosphere is in fact accompanied by a significant increase of the market prices of the stocks of the companies involved in the investment projects marking the passage to a 'new era'. This tendency can affect the behavior of speculators, whose goal is to obtain a profit through the anticipation of the 'psychology of the market'. Following Keynes's teachings, we can thus observe that a monetary economy, which is

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[24] In order to evaluate the importance of Minsky's analysis for the explanation of the roots of the contemporary crisis see, for example: Tymoigne and Wray 2013, Nikolaidi and Stockhammer 2017, Bertocco 2017 and Caverzasi and Tori 2017.

characterized by the relationship between bank money and innovations described by Schumpeter, is not at all a stable structure.

Bezemer (2014) underlines the link between Minsky's 'Financial Instability Hypothesis' and Schumpeter's analytical approach. In particular, he observes that in his *Business Cycles* (1939) Schumpeter distinguishes between a productive use of credit leading to the introduction of innovations, and an umproductive use, which instead feeds speculation.[25] Schumpeter is perfectly aware of the fact that the 'speculative' behavior of banks may trigger dramatic economic crises.[26] For this reason he stresses that, contrary to the conclusions of the quantity theory of money, the fundamental goal of central banks is not the stability of prices, but the stability of the financial system (on this point see Lakomski-Laguerre 2016).

Conclusions

In this paper we presented a Keynes+Schumpeter model that is based on two fundamental points stressed by Schumpeter and neglected by Dosi and his co-authors. The first point

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[25] "Schumpeter […] distinguished the innovation process [and] the credit used in it, from a secondary process of credit for speculative investments. […] He emphasized that the secondary wave of unproductive credit follows naturally from […] the primary wave, and may lead to a crisis in the form of debt deflation" (Bezemer 2014, pp. 937-8). This position differs from that of Knell (2015), which underlines that Keynes and Schumpeter have very different conceptions of the nature of economic crises: "Schumpeter explained instability as the normal consequence of 'real' entrepreneurial activity. […] Innovations may appear destabilizing as it generates disequilibria and intensifies economic fluctuations, but it also fulfils a kind of 'cleansing' operation of the productive structure, making it possible for everyone to enjoy higher real incomes." (Knell 2015, p. 306). On this point see also Caverzasi and Tori (2018).

[26] "[…] bankers may, at some times and in some countries, fail to be up to the mark *corporatively:* that is to say, tradition and standards may be absent to such a degree that practically anyone, however lacking in aptitude and training, can drift into the banking business, find customers, and deal with them according to his own ideas. In such countries or times, wildcat banking develops. This in itself is sufficient to turn the history of capitalist evolution into a history of 'catastrophes'." (Schumpeter 1939, p. 91)

concerns the nature of innovations. Innovations do not consist only in the introduction of new machines that increase the productivity of labor employed in the production of existing wage-goods, but mainly consist in the realization of new types of goods. The second point regards the fundamental role that Schumpeter assigns to bank money and banks. These two elements allow developing a significant explanation of the role of bank money in capitalist economies. A role that is indeed difficult to explain within a world in which only a single consumer good is produced.

Starting from Schumpeter's insights about innovations and the role of bank money we have developed a K+S model allowing to explain three fundamental elements of Keynes's *monetary theory of production*: i) the presence of uncertainty; ii) the principle of effective demand; iii) the process of wealth accumulation and the importance of the phenomenon of speculation.

Two possible developments of this work can be specified. First, the temporal dimension of the model could be described with greater realism in order to: i) define the relationship between the process of wealth accumulation and the phenomenon of financialization of modern economies; ii) specify the conditions allowing entrepreneurs to validate their debts. In the version of the model presented in this paper it is assumed that the demand for innovative products is fueled by the increase of wages. This is an arbitrary hypothesis: on the one hand, it is necessary to develop a theory of income distribution that explains the dynamics of wages and, on the other hand, it is necessary to specify the consumption choices of entrepreneurs.

The second development consists in using this model to explain the endogenous nature of the contemporary crisis according to the lines indicated by Keynes and Minsky. We think that economic crises can be seen as the expression of the fragility of a particular

form taken by capitalism and that they mark the transition from one form of capitalism to another. For example, the Great Depression has created the conditions for the birth of what has been called *regulated capitalism*. The crisis of the 1970s favored the emergence of a new form of capitalism that can be defined *neoliberal capitalism*, a form of capitalism whose fragility has been uncovered by the current crisis.[27] It is thus natural to wonder which form of capitalism will emerge from the contemporary crisis.

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[27] On this point see Galbraith (2014), Kotz (2015), Reich (2015) and Bertocco (2017).

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