Great Recession and macroeconomic theory: a critical analysis of the Blanchard, Amighini and Giavazzi textbook

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This work is dedicated to the memory of Giorgio Lunghini

Abstract

The global financial crisis of 2007-2008 and the subsequent Great Recession have pushed many economists to acknowledge a fundamental limit in the theoretical models elaborated after the monetarist counter-revolution started with Friedman's criticism of the Phillips curve: these models neglect the financial system. The years following the Great Recession have thus been marked by the development of what can be called 'Financial Frictions Approach' based on the addition of the financial system to the New Keynesian DSGE model. The results of this line of research are beginning to appear also in macroeconomics textbooks. Significant examples are the publication of the seventh edition of Blanchard's textbook (Blanchard 2017), and the publication of the third edition of the textbook co-authored by Blanchard, Amighini and Giavazzi (2017). The authors acknowledge that the mainstream economic model presented in the previous editions of their textbooks is unable to offer a significant explanation of the causes of the crisis as it completely neglects the role of the financial system. In the revised editions of their textbooks they present a new theoretical model taking into account the financial system. The objective of this work is twofold: i) to show that the new model does not allow to elaborate a coherent explanation of the Great Recession and: ii) to present the pillars of an alternative theoretical model based on the lessons of Keynes, Schumpeter and Minsky.

JEL Classification: E10, E20, E30, E40, E44.

Key words: Financial markets, Crises, Keynes, Schumpeter, Minsky.

Introduction

The global financial crisis of 2007-2008 and the subsequent Great Recession have pushed many economists to acknowledge a fundamental limit in the theoretical models elaborated after the monetarist counter-revolution started with Friedman's criticism of the Phillips curve: these models neglect the financial system.

The years following the Great Recession have thus been marked by the development of what can be called 'Financial Frictions Approach' (hereafter FFA) based on the addition of the financial system to the New Keynesian DSGE model.[1] The results of this line of research are beginning to appear also in macroeconomics textbooks. Significant examples are the publication of the seventh edition of Blanchard's textbook (Blanchard 2017), and the publication of the third edition of the textbook co-authored by Blanchard, Amighini and Giavazzi (2017, hereafter BAG).[2] The distinctive feature of the new editions of these textbooks, compared to other well-known textbooks such as that by Mankiw (2016), consists in recognizing that the New Keynesian DSGE model elaborated over the last decades is unable to offer a significant explanation of the causes of the Great Recession because it completely neglects the role played by the financial system in modern market economies. To explain the origins of the Great Recession BAG have therefore developed a new version of their theoretical model explicitly taking into account the financial system.

[1] See, for example, Blanchard (2014, 2015, 2018b), Vines and Mills (2018), Ghironi (2018), Lindé (2018), Hendry and Muellbauer (2018), Gertler and Gilchrist (2018), Galì (2018), Christiano *et al.* (2018) and Kehoe *et al.* (2018).

[2] The results of the FFA are widely used not only in undergraduate textbooks, but also in intermediate and advanced textbooks. Among these see, in particular, Carlin and Soskice (2015) and the fifth edition of David Romer's Advanced Macroeconomics.

The aim of this work is twofold. First, to show that the new BAG's theoretical model, which reassumes the results of the FFA, is unable to offer a significant explanation of the causes of the Great Recession. This conclusion is confirmed by the fact that BAG are forced to use concepts and relationships that are at odds with the foundations of their theoretical framework. To overcome this contradiction, it is necessary to develop a different theoretical model consistent with the concepts and relationships used by BAG to explain the economic phenomena observed over the last decades. The second objective of this work thus consists in presenting the pillars of an alternative theoretical paradigm based on the theories developed by Keynes, Schumpeter and Minsky who underlines the reasons justifying the non neutrality of money and finance and explain the endogenous nature of economic crises.

The paper is divided into three parts. In the first part we summarize the main features of the theoretical model developed by BAG and their interpretation of the origins of the Great Recession. In the second part we analyze the limits of this model and of the FFA. Finally, in the third part we present the basic elements of an alternative theoretical paradigm allowing to explain the endogenous nature of the contemporary crisis.

1. The model of Blanchard, Amighini and Giavazzi

1.1 *The Great Recession and the 'Financial Frictions Approach'*

In the new edition of their textbook BAG (2017) acknowledge that the Great Recession has highlighted the failure of macroeconomics. According to BAG, the limit of the mainstream macroeconomic model developed over the four decades preceding the outbreak of the crisis was the failure to take into account the role played by the financial system:

> There is no question that the crisis reflects a major intellectual failure on the part of macroeconomics. The failure was in not realizing that such a large crisis could happen, that the characteristics of the economy were such that a relatively small shock, in this case the decrease in U.S. housing prices, could lead to a major financial and macroeconomic global crisis. The source of this failure, in turn, was insufficient focus on the role of the financial institutions in the economy. By and large, the financial system, and the complex role of banks and other financial institutions in the intermediation of funds between lenders and borrowers, was ignored. (BAG 2017, p. 518)

Over the last hundred years, two significant and unexpected events have led the economics profession to abandon the generally accepted theory of the time and to replace it with a different paradigm. In the 1930s the Great Depression undermined the confidence in the neoclassical theory, according to which economic crises were nothing more than accidental phenomena bound to die out spontaneously thanks to the normal functioning of the markets. In 1936 the publication of Keynes's *General Theory of Employment, Interest and Money* unveiled the elements of a revolutionary theoretical approach whereby economic crises were structural phenomena. The second turning point occurred in the 1970s when Western economies were hit by a new global economic crisis characterized by a combination of low growth and high inflation that became known as 'stagflation'. The crisis of the 1970s led Milton Friedman to strongly criticize the then dominant theoretical approach, and to emphasize that Keynesian policies can be effective only if workers are affected by 'monetary illusion'.

Past experience therefore leads to wonder whether the Great Recession will be followed by a new theoretical revolution. Gärtner et al. (2013) have tried to answer this question through an inquiry that involved 768 teachers working at 512 colleges and universities in Western Europe and in the United States. Only 10 percent of respondents

believe that "modern macroeconomics possesses the models and concepts needed to understand and deal with such crises" (Gärtner 2013, p. 408). The great majority of respondents (72 percent) instead recognizes that the Great Recession has revealed significant limitations of the New Keynesian DSGE models. Nevertheless, these respondents are convinced that New Keynesian DSGE models should not be abandoned. Just a small minority of respondents (17 percent) argues for the necessity to elaborate an alternative theoretical paradigm.

These results have been confirmed by the investigation conducted by Aigner *et al.* (2018), which compares the contents of economic literature before and after the crisis through a bibliometric approach. Further confirmation can be found in the work of Vines and Wills (2018, p. 1), who "asked a number of leading macroeconomists to describe how the benchmark New Keynesian model might be rebuilt in the wake of 2008 crisis."[3] Vines and Wills conclude that the generality of economists surveyed has underlined the necessity to develop a new version of the benchmark DSGE model based on the abandonment of the 'frictionless finance' hypothesis and the introduction of the FFA.[4]

Oliver Blanchard is among the most prestigious supporters of the FFA. He recognizes that the crisis has induced economists to rediscover the concept of hysteresis since the data of advanced economies show that after the Great Recession "the level of output appears to

[3] These leading macroeconomists are: O. Blanchard, S. Wren-Lewis, J. Stiglitz, R. Wright, R. Reis, P. Krugman, W. Carlin and D. Soskice, F. Ghironi, A. Haldane and A. Turrell, J. Lindé, D. Hendry and J. Muellbauer, and W. McKibbin and A. Stoeckel. Their answers have been published by *The Oxford Review of Economic Policy*, vol. 34, 1-2, 2018.

[4] "Given that the 2008 crisis originated in the financial sector, which the benchmark DSGE model assumed works frictionlessly, it is natural that almost all authors in this issue mention financial frictions. The assumption of 'frictionless finance' had the deep implication that finance had no causal role to play. […] There is general agreement that there is a need to focus on the deep mechanisms underlying these frictions." (Vines and Wills 2018, p. 21)

have permanently been affected by the crisis and its associated recession" (Blanchard 2017, p. 98). According to Blanchard, these data are not sufficient to reject the 'natural' rate hypothesis on which DSGE models are founded, but there are at least three lessons that can be drawn from the crisis to improve the benchmark DSGE model.

The first lesson concerns the necessity to elaborate new versions of the DSGE model based on the explicit consideration of the financial system (Blanchard 2015). The second lesson instead regards the need to recognize that the economic system is unstable and that, after a shock, it is unable to quickly return to the equilibrium position. Thus, crises must be managed through proper macroeconomic policies.[5] Finally, the third lesson consists in acknowledging that to develop better DSGE models it is necessary to take into account different theoretical approaches. In particular, Blanchard points out that DSGE modelling should evolve along two lines:

> First […] it has to become less insular. […] In short, DSGEs should be the architecture in which the relevant findings from the various fields of economics are eventually integrated and discussed. Second, it has to become less imperialistic. Or, perhaps more fairly, the profession […] must realize that different model types are needed for different tasks. (Blanchard 2018, p. 47)

Blanchard (2015) cites Minsky and Kaldor as examples of heterodox economists whose theoretical approaches may offer significant instruments to overcome the limitations of the

[5] "In my opinion, the crisis has made it clear that the idea that economies are stable – that, when they are hit by a shock, they return to equilibrium on their own – is simply wrong. […] I think I have become much more skeptical about the ability of the economy to self-regulate, and this has an obvious implication. If I was already quite supportive of using macroeconomic policies ten years ago, today I feel the need to implement an aggressive macroeconomic policy at the earliest warnings that something is going wrong." (Blanchard 2019, p. 9)

benchmark DSGE model.[6] The seventh edition of Blanchard's textbook and the third edition of the textbook co-authored by Blanchard, Amighini and Giavazzi have been developed with the aim of taking the three lessons mentioned above explicitly into account.

1.2 *The BAG's theoretical model and the Great Recession*

The characteristics of the DSGE benchmark model have been clearly described by Christiano *et al.*:

> Prototypical pre-crisis dynamic stochastic general equilibrium models built upon the chassis of the real business cycle model to allow for nominal frictions, both in labor and goods markets. These models are often described as New Keynesian DSGE models, but it would be just as appropriate to refer to them as Friedmanite DSGE models. The reason is that they embody the fundamental worldview articulated in Friedman's (1968) seminal Presidential Address to the American Economic Association. According to this view hyperinflations aside, monetary policy has essentially no impact on real variables like output and the real interest rate in the long run. However, due to sticky prices and wages, monetary policy matters in the short run. (Christiano *et al.* 2018, pp. 115-6)

The benchmark DSGE model is thus based on two elements: i) the concept of 'natural' equilibrium defined by Friedman; ii) the presence of rigidities and frictions allowing the distinction between the short and the long run. In their textbook, BAG (2017, p. 48) underline that the benchmark DSGE model describes an economy characterized by the production of a single homogeneous good, which "in the medium run, say a decade, […] tends to return to the level of output determined by supply factors: the capital stocks, the level of technology and the size of the labour force" (BAG 2017, p. 35). However, in the short run the

[6] For a thorough analysis of Blanchard's thinking see Brancaccio and Saraceno (2017), Gallegati (2019), and Brancaccio and Califano (2019).

achievement of the 'natural' equilibrium can be prevented by the rigidity of prices and wages. The short run is therefore marked by Keynes's principle of effective demand.

There are three important differences between the macroeconomic model described in the latest edition of BAG's textbook and its earlier versions. The first concerns the adjustment mechanism driving the economic system towards its 'natural' equilibrium. In the previous editions of their textbook BAG specify a mechanism based on the flexibility of prices and wages: when income exceeds its 'natural' level, the increase of wages and prices leads to a reduction of the real quantity of money accompanied by an increase of the rate of interest, which in turn brings income and employment back to their 'natural' values. In the opposite case, income and employment return to their 'natural' values as a consequence of a decrease of the rate of interest caused by the reduction of wages and prices.

This adjustment mechanism is based on the assumption that the central bank controls the nominal quantity of money and that the rate of interest is determined by the equilibrium between the demand and the supply of money. However, BAG (2017, p. 177) point out that today central banks directly control the level of the monetary rate of interest. Thus, in contemporary economies the convergence towards Friedman's 'natural' equilibrium depends on the behavior of the monetary authorities. The central bank increases the rate of interest when rising inflation signals that income exceeds its 'natural' level, and reduces the rate of interest in the opposite case.

According to BAG, the fact that monetary authorities are able to set the level of the rate of interest is not a sufficient condition for the return of the system towards its 'natural' equilibrium. To understand this point, we must consider the second difference with the earlier editions of their textbook, which regards the Wicksellian concept of 'natural' rate of interest (BAG 2017, p. 178). In the latest edition of their textbook BAG underline that the

level of the 'natural' rate of interest can be even negative. This circumstance undermines the efficacy of monetary policy as central banks cannot set negative policy rates (BAG 2017, p. 180).

Finally, in the latest edition of their textbook BAG explicitly consider the banks, bank money and the financial system. BAG explain the relevance of the banks following the FFA. This approach is based on the neoclassical theory of credit, which, according to Schumpeter (1954, p. 1113), represented the conventional wisdom among the generality of economists at the beginning of the 20th century. The neoclassical approach explains the role played by the financial system starting from the dissociation between saving and investment decisions. This approach underlines close link between saving decisions and the supply of credit on the one hand, and between investment decisions and the demand of credit on the other hand.[7]

An important implication of this approach is the explicit separation of the process of money creation from the process of credit creation. Friedman and Schwartz (1982) explain this point with particular clarity. After pointing out that the fundamental function of money consists in being a medium of exchange they conclude that the price of money is the amount of goods that can be purchased with a unit of money. In the view of Friedman and Schwartz, the price of money is therefore represented by the reverse of the price level: if the general price level doubles, the price of money is halved. The price of credit is instead the rate of

[7] "It is easy to imagine a world in which there is a high level of saving and investment, but in which there is an unfavorable climate for financial intermediaries. At the extreme, each of the economy's spending units – whether of the household, business, or government variety – would have a balanced budget on income and product account. For each spending unit, current income would equal the sum of current and capital expenditures. There could still be saving and investment, but each spending unit's saving would be precisely matched by its investment in tangible assets. In a world of balanced budgets, security issues by spending units would be zero, or very close to zero. The same would be true of the accumulation of financial assets. Consequently, this world would be a highly uncongenial one for financial intermediaries; the saving–investment process would grind away without them." (Gurley and Shaw 1956, pp. 257–258)

interest. Any imbalance between the supply and the demand of credit will be eliminated by a change of the level of the rate of interest, but not by a change of the general price level. According to this theory, monetary authorities control the quantity of money but not the supply of credit, which instead depends on the saving decisions of economic agents.

These considerations allow explaining why have been developed theoretical models that are focused on saving and investment decisions, without taking into account the financial system.[8] Brunnermeier *et al.* (2013, p. 1) stress that "in a setting without financial frictions it is not important whether funds are in the hands of productive or less productive agents and the economy can be studied with a single representative agent in mind."

The relevance of the financial system emerges in the presence of financial frictions impeding the smooth transfer of funds from savers to businesses. The most significant example of financial frictions consists in information asymmetries making businesses "much better informed than potential ouside investors about their investment projects" (D. Romer 2019, p. 464). Since the 1990s Akerlof's seminal work on information asymmetries (Akerlof

[8] Bennett McCallum illustrates the reasons why the mainstream approach focuses on the money market and neglects the financial markets as follows: "[C]an it be sensible to discuss monetary economics with little attention devoted to the workings of financial markets? […] The question's answer is […] fairly straightforward. It rests basically on the fact that in making their borrowing and lending decisions, rational households (and firms) are fundamentally concerned with goods and services consumed or provided at various points in time. They are basically concerned, that is, with choices involving consumption and labor supply in the present and in the future. But such choices must satisfy budget constraints and thus are precisely equivalent to decisions about borrowing and lending – that is, supply and demand choices for financial assets. Thus, for example, a household that chooses to consume this year in excess of this year's income equivalently chooses to borrow (or to draw down its assets) to the required extent. Consequently, there is no need to consider *both* types of decisions explicitly. The practice adopted in this book is to focus attention on consumption/saving decisions rather than on borrowing/lending decisions, letting the latter be determined implicitly." (McCallum 1989, pp. 29–30)

1970) has thus been widely used to develop a theoretical approach that applies his conclusions to the working of the credit market.[9]

According to this approach, the presence of financial intermediaries like the banks essentially depends on their ability to specialize in collecting information about the qualities of potential borrowers and of their investment projects. This implies that investment decisions and, more generally, spending decisions are not influenced only by the level of the rate of interest, but also by the availability of credit offered by the banks in agreement with their creditworthiness criteria:

> A common way to make financial market frictions endogenous is to introduce […] some type of informational asymmetry that leads borrowers to be more informed than creditors. […] Accordingly, rational lenders in this setting will impose constraints on the terms of lending, like credit limits, collateral requirements, and bankruptcy contingencies. […] [Informational asymmetry] makes raising funds externally more expensive than using internal funds, which Bernanke and Gertler (1989) call the 'external finance' premium. […] The link between borrower balance sheets and the external finance premium leads to mutual feedback between the financial sector and the real activity. A weakening of balance sheets raises the external finance premium, reducing borrowing spending, and real activity. The decline in real activity reduces cash flows and asset process, which weaken borrower balance sheets, and so on. (Gertler and Gilchrist 2018, pp. 5-6)

BAG use these concepts to explain the financial crisis of 2007-2008 and the subsequent Great Recession. In their view, the crisis was triggered by a malfunctioning of intermediation mechanisms resulting in a sudden and strong reduction of the availability of credit offered by the banks:

[9] See, for example, Bernanke (1992–1993, 2007), Bernanke and Blinder (1988), Bernanke and Gertler (1995), Bernanke and Lown (1991), Bernanke *et alia* (1999), Wurgler (2000), Stulz (2001), Gorton and Winton (2002), Levine (2002, 2004), and Stiglitz and Greenwald (2003).

> In normal times [financial intermediaries] function smoothly. They borrow and lend, charging a slightly higher interest rate than the rate at which they borrow so as to make a profit. Once in a while, however, they run into trouble, and this is indeed what happened in the recent crisis. (BAG 2017, p. 110)

To describe the reasons for the troubles suffered by the banks, BAG introduce three analytical elements: i) the risk of insolvency; ii) speculation and speculative bubbles; iii) the relationship between bank money and credit. BAG (2017, p. 111) underline that a bank is insolvent when the value of its net worth is lower than the value of its assets, and that the banking system as a whole becomes insolvent when a sharp fall in the value of assets affects a significant number of banks.

According to BAG, the fall of the value of assets that affected the balance sheets of banks, thereby causing the Great Recession, was triggered by the collapse of housing prices in the United States since the second half of 2006. The sharp decrease of housing prices interrupted a period of unprecedented growth of the housing price index, which jumped from 100 to 226 between 2000 and mid-2006 (BAG 2017, p. 116). BAG explain this strong increase of housing prices and their subsequent collapse through the concepts of 'speculation' and of 'speculative bubbles'. They remark that economies may experience "deviations of [stock and other asset prices] from their fundamental value, namely bubbles or fads" (BAG 2017, p. 300), and that in speculative markets exchanges are based on expectations concerning the future price of particular assets (BAG 2017, p. 302). BAG claim that the real estate bubble that developed in the United States was fueled by low interest rates and by the choice of the banks to grant a growing quantity of 'subprime' loans to low-income earners, who were encouraged to subscribe mortgages based on their expectations of a continuous rise of housing prices. The behavior of the banks is explained with the spread of

compensation schemes in which the distribution of bonuses is linked to the obtainment of pre-determined performance objectives. The managers of the banks were thus encouraged to make a distorted use of securitization techniques that caused a reduction of the quality of the loans (BAG 2017, pp. 116-120).

The third element introduced by BAG to explain the origins of the Great Recession concerns the description of the macroeconomic effects of the collapse of housing prices. BAG (2017, p. 117) underline that in mid-2008 the losses linked to mortgages granted by US banks were estimated around $ 300 billion, a figure that was not very high compared to the size of the US economy. For this reason, economists believed that the financial crisis would not produce significant effects on the levels of income and employment. According to BAG economists had underestimated the impact of the collapse of housing prices on the propensity of the banks to provide loans to households and businesses. They point out that the collapse of housing prices led to a reduction of the value of the assets of the banks which caused a reduction of their net worth and an increase in their leverage. The banks thus chose to reduce the supply of credit in order to reduce their leverage (BAG 2017, p. 119).

In Chapter 6 of their textbook, BAG describe the macroeconomic consequences of the burst of the housing bubble through an IS-LM model with the following two characteristics: i) the central bank directly controls the monetary rate of interest, which implies that, in correspondence with the policy rate, the LM curve is horizontal; ii) businesses finance their activities by borrowing from the banks. Investment decisions are thus a function of the rate of interest set by the banks, which apply a risk premium x to the policy rate r set by the monetary authorities. Given the level of the policy rate, the position of the IS curve depends on the risk premium x. A financial crisis can cause an increase of x "because one financial institution has gone bankrupt and investors have become worried about the health of other

banks, starting a run, forcing the other banks to reduce lending" (BAG 2017, pp. 114-5). This will produce recessive effects moving the IS curve to the left. Furthermore, BAG recognize that the recessive effects of the financial crisis are transmitted not only through an increase of the rate of interest on loans, but also through the decision of the banks to reduce the credit supply at a given level of the rate of interest, that is, through the rationing of credit to households and businesses (BAG 2017, p. 517).

2. A critique of the 'Financial Frictions Approach' and of the BAG's model.

As noted earlier, before the outbreak of the crisis the choice to neglect the financial system within DSGE models was not motivated by a desire to simplify the analysis, but by the acceptance of a particular theory of finance which separates money and credit and maintains that in a frictionless economy the principle of neutrality of money and finance holds. Economists should therefore recognize that the explanation of the importance of the financial sector and of the origins of the crisis necessarily requires the adoption of a different theoretical framework in which money and finance are not neutral.

However, this is not the direction followed by the supporters of the FFA. In fact, the consideration of information asymmetries cannot be sufficient to question the validity of a theory that explains the role of the financial system describing an ideal world without frictions that is characterized by the irrelevance of the financial system. As seen in the preceding paragraph, the presence of imperfect information leads to the birth of institutions like the banks specialized in gathering information on the qualities of potential borrowers and of their investment projects. According to this approach, the function of the banks consists in ensuring the achievement of the results that would be obtained in an ideal world

with perfect information. But this means that banks cannot be at the origin of any economic crisis.

To refute this conclusion, the supporters of the FFA claim that, although established to solve the problems associated with information asymmetries, banks are not able to completely offset these kind of frictions.[10] Yet, this argumentation is not coherent with the theory of finance implicitly adopted in the DSGE models. As recalled earlier, according to this theory the role of the financial system is explained starting from the dissociation between saving and investment decisions, which means that banks are seen as mere intermediaries between savers and businesses whose presence does not change the nature of credit.

The acceptance of the neoclassical theory of credit thus implies to conclude that banks *must* be able to solve the problems caused by the presence of information asymmetries. In fact, the neoclassical theory holds only in a world, such as that of a corn economy, characterized by the production of a single homogeneous good in which saving and investment decisions can be defined in kind.[11] Stiglitz and Weiss (1990), for example, describe the role of the banks in the presence of information asymmetries with reference to an agricultural economy in which the object of credit consists of corn that can be used as seed in plots of land with different levels of productivity.[12]

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[10] For example, David Romer observes that due to the presence of information asymmetries "institutions such as banks, mutual funds, and bond-rating agencies that specialize in acquiring and transmitting information play central role in financial markets. But even they can be much less informed than the firms or individuals in whom they are investing their funds" (D. Romer 2019, p. 464). Hyman Minsky (1992-93, p. 79) was very doubtful with regard to the validity of an approach in which the "non neutrality [of money] depends upon borrowers being smart and bankers being dumb."

[11] We remember that both the model described by BAG (2017, p. 48) and the benchmark DSGE model are based on this assumption. On this point see, for example, Brunnermeier *et al.* (2018) and D. Romer (2019).

[12] The need for credit arises from the discrepancy between individuals' resource endowments and investment opportunities. This can be seen most simply if we imagine a primitive agricultural economy, where different

In the economy described by Stiglitz and Weiss it is hardly imaginable that the banking system lacks the ability to evaluate the productivity of the plots of land. Obviously, a single bank may be unable to evaluate the quality of the borrowers. In this case, the value of its assets will decrease until its net worth will be written off. However, it is completely unrealistic to assume that every bank suddenly becomes unable to evaluate the creditworthiness of the borrowers and that the value of the credits granted by the whole banking system is therefore doomed to depreciate.

Thus, the FFA applies to a system in which economic crises cannot occur. In a corn economy the three elements used by BAG to illustrate the origins of the Great Recession ((i) the risk of insolvency; ii) speculation and speculative bubbles; iii) bank money) do not play any significant role. The risk of insolvency is relevant only in a system in which economic decisions are taken under conditions of uncertainty. Blanchard (2016) recognizes the importance of uncertainty, underlining that: "John Maynard Keynes rightly insisted on the role of animal spirits. Uncertainty, pessimism, justified or not, decrease demand and can be longely self-fulling." Furthermore, in chapters 15 and 16 of their textbook BAG address the issue of uncertainty stressing that "investment decisions, just as consumption decisions, depend […] very much on expectations of the future" (BAG 2017, p. 316). According to

individuals own different plots of land and have different endowments of seed with which to plant the land. (For simplicity we assume that seed is the only input.) The marginal return to additional seed on different plots of land may differ markedly. National output can be increased enormously if the seed can be reallocated from plots of land where it has a low marginal product to plots where it has a high marginal product. But this requires *credit*, that is, some farmers will have to get more seed than their endowment in return for a *promise* to repay the loan in the next period, when the crop is harvested. Banks are the institutions within this society for screening the loan applicants, for determining which plots have really high marginal returns, and for monitoring, for ensuring that the seeds are actually planted, rather than, say, consumed by the borrower in a consumption binge. (Stiglitz and Weiss 1990, pp. 91–92)

BAG, expectations about future profits influence the inclination and the position of the IS curve as "firms are not likely to change their investment plans very much in response to a decrease in the current real interest rate if they do not expect future real interest rates to be lower as well" (BAG 2017, p. 332).

Nevertheless, in a corn economy expectations about future profits are not relevant since the results of production decisions can be defined in terms of quantities of goods,. Given the existing technology, the relationship between the input of productive factors and the quantity of the final product is univocally defined. As a consequence, in a corn economy the results of production decisions are known with certainty.[13]

With regard to the concepts of 'speculation' and of 'speculative bubbles', the second element used by BAG to explain the origins of the Great Recession,[14] the problem lies in the impossibility to introduce speculative markets in a world in which banks are mere intermediaries, and savings and investment flows can be defined in real terms. The phenomena of speculation and speculative bubbles can be explained only with reference to an economy characterized by the importance of the concept of wealth. Wealth includes all the financial assets and durable goods (e.g. residential and land properties) owned by an individual at a certain point in time. Wealth can vary over time depending on the flows 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.

[13] Even in a corn economy farmers can go bankrupt because of bad weather conditions, wars, earthquakes or plagues, that is, phenomena that Schumpeter (1939, p. 1) defined as "factors acting from without [the economic sphere](let us call them External factors)". These factors should therefore be excluded from the economic analysis.

[14] These concepts have been widely used to explain the roots of the Great Recession. See, for example, Taylor (2009), Rajan (2009), Bernanke (2010), Carlin and Soskice (2014), Gertler and Gilchrist (2018), Christiano (2017) and Christiano *et al.* (2018).

The relationship between saving decisions and wealth is hard to explain in the context of a corn economy. If savings consist of unconsumed corn, it is unrealistic to imagine a process by which, from year to year, an individual amasses an ever-growing quantity of corn. It is more reasonable to assume that a corn economy is characterized by a physiological limit to the willingness to accumulate goods.

In a famous essay of 1930, Keynes described an economic system with these features, predicting that, within few generations, the economic problem of mankind would be solved. Keynes's prediction was based on the hypothesis of satiety of needs characterizing economies in which needs are given and limited.[15]

Finally, BAG have explained the origins of the Great Recession through the presence of bank money. To highlight the relationship between the financial crisis and the Great Recession BAG recognize that banks are not mere intermediaries lending out the resources previously collected from the savers, but institutions that are able to offer credit through the creation of new money. BAG acknowledge that in an economy characterized by the use of bank money the separation between money and credit tends to disappear since to demand money implies to demand means of payment created by the banks, and hence borrowing from the banks,.

[15] "Now it is true that the needs of human beings may seem to be insatiable. But they fall into two classes – those needs which are absolute in the sense that we feel them whatever the situation of our fellow human beings may be, and those which are relative in the sense that we feel them only if their satisfaction lifts us above, makes us feel superior to, our fellows. Needs of the second class, those which satisfy the desire for superiority, may indeed be insatiable; for the higher the general level, the higher still are they. But this is not so true of the absolute needs – a point may soon be reached, much sooner perhaps than we all of us are aware of, when these needs are satisfied in the sense that we prefer to devote our further energies to non-economic purposes." (Keynes 1930, p. 326)

Wicksell tried to show that the validity of the quantity theory of money and of the neoclassical theory of credit was not undermined due to the use of bank money. In fact, by introducing the concept of 'natural' rate of interest, which is the rate determined in a system in which savers and businesses directly exchange capital goods in kind without the use of money, Wicksell was able to claim that, notwithstanding the use of bank money, the structure of modern market economies does not differ from that of a corn economy.

However, the validity of Wicksell's thesis is limited to the case of an economic system in which the production of a single homogeneous good occurs through an unchanging technology. By definition, in such circumstances the presence of bank money cannot change the structural features of the system (on this point see Donzelli (1988) and Desai (2010, 2014)). But if these hypotheses are abandoned, Wicksell's thesis can no longer be supported. We can explain this conclusion in two ways.

First, we must remember that the Wicksellian distinction between the rate of interest on money and the 'natural' rate of interest has been incorporated in the DSGE models and that in contemporary advanced economies central banks set the level of the policy rate in order to align it to the 'natural' rate of interest. After the outbreak of the financial crisis, monetary authorities have claimed that they were unable to achieve this objective because, in correspondence with negative values of the 'natural' rate of interest, the rate of interest on money cannot fall below zero (see Constâncio (2016), and Bertocco and Kalajzić (2018a)).

The fact that the rate of interest on money cannot assume the same value of the 'natural' rate of interest is the first element that allows us to reject the Wicksellian thesis that the presence of bank money does not change the structural features of modern market economies compared to those of a corn economy. The second element can be shown by highlighting that contemporary economies are characterized by the production of a plurality

of goods. Thus, innovations do not consist only in the introduction of new technologies increasing the productivity of corn, but also in the creation of new goods and services. The principle of neutrality of money and finance underlying Wicksell's argument cannot hold in a world in which, by creating new money, banks influence not only the *level* but also the *composition* of investments, namely the process leading to the production of new goods and services.

We can conclude that the FFA which accepts the principle of neutrality of money and finance, cannot explain the burst financial crises. In a corn economy a crisis such as the Great Recession cannot occur because of the irrelevance of the risk of insolvency and the impossibility to justify the presence of speculative markets and of bank money. Furthermore, in a corn economy even crises caused by exogenous shocks cannot occur. In fact, sudden changes to production technologies, to population, to the propensity to consume or to invest do not cause economic crises, but changes of the price of labor or of the rate of interest.

Paul Romer (2016), who is very critical towards the macroeconomics elaborated during the past thirty years,[16] underlines the need to develop a different theoretical approach based on the recognition that economic crises are endogenous phenomena: "Macroeconomists got comfortable with the idea that fluctuations in macroeconomic aggregates are caused by imaginary shocks, instead of actions that peaple take, after Kydland and Prescott (1982) launched the real business cycle (RBC) model" (P. Romer 2016, p. 4).[17]

[16] "I have observed more than three decades of intellectual regress" (P. Romer 2016, p. 2).

[17] Similarly, Stiglitz remarks that: "[…] in (most) DSGE models, downturns are caused by an exogenous technology shock. In agriculture, we know what a negative technology shock means – bad weather or a plague of locusts. But what does that mean in a modern industrial economy – an epidemic of some disease that resulted in a loss of collective knowledge of how to produce? By contrast the shocks giving rise to economic fluctuations in many, if not most case, is clearly endogenous. The 2008 shock was endogenous, caused by the breaking of

Starting from the writings of Keynes, Schumpeter and Minsky, in the last part of this work we present the pillars of an alternative theoretical model that, being based on the principle of non-neutrality of money and finance, allows explaining the endogenous nature of the Great Recession.

3. The alternative theoretical model

3.1 The rediscovery of Hyman Minsky

In the years following the global financial crisis of 2007-2008 many economists have rediscovered Hyman Minsky's financial instability hypothesis. Yet, in some cases Minsky's name has been cited inappropriately. Brunnermeier *et al.* (2013, p. 1), for example, cite Keynes and Minsky among the economists that have "emphasized the importance of financial frictions". In reality, the concepts of neutrality of money and finance underlying the FFA are absolutely extraneous to Minsky's analysis. Minsky elaborated an interpretation of Keynes's *General Theory* completely opposed to the interpretation of the supporters of the so-called Neoclassical Synthesis. Minsky's interpretation emphasizes the importance of the financial system for the explanation of the evolution of capitalist economies, but also underlines that finance is at the roots of their structural instability:

> [T]he primary policy message of Keynes – that slumps are unnecessary and a waste of both human and nonhuman resources – has become a fundamental political axiom guiding economic policy. […] However, this victory for Keynes's policy objectives and activist policy posture obscures the fact that implicit in his analysis is a view that a capitalist economy is fundamentally flawed. This flaw exists because the financial system necessary for capitalist vitality and vigor – which translates entrepreneurial

the housing bubble – something that markets created, and to which misguided policies may have contributed." (Stiglitz 2018, pp. 78-79)

> animal spirits into effective demand for investment – contains the potential for runaway expansion, powered by an investment boom. This runaway expansion is brought to a halt because accumulated financial changes render the financial system fragile, so that not unusual changes can trigger serious financial difficulties. Because Keynes arrived at his views on how a capitalist economy operates by examining problems of decision-making under conditions of intractable uncertainty, in his system stability, even if it is the result of policy, is destabilizing. (Minsky 1975, pp. 11–12)[18]

As 'tranquil periods' produce the conditions eventually leading to a crisis, according to Minsky stability generates instability and capitalist economies do not converge towards a 'natural' equilibrium. Following Minsky's analytical approach, which is based on the integration of the thinking of Keynes and Schumpeter (Minsky 1986a, 1990, 1993), in the third part of this work we aim at specifying the pillars of a theoretical approach allowing to explain the endogenous nature of the Great Recession. The common element in the analyses of Keynes, Schumpeter and Minsky is the research of the reasons for the non-neutrality of money and finance.

Currently, the economics profession is dominated by the idea that political economy does not differ from hard sciences like physics, chemistry and biology, which are characterized by progressive theoretical discoveries.[19] It is therefore appropriate to recall the reasons justifying the recovery of theories elaborated during the first part of the past century. The fundamental reason for this choice is the existence of different theoretical approaches whose validity can be questioned by the occurrence of breaking events such as deep

[18] For an analysis of Minsky's thinking see Minsky (1975, 1980, 1982, 1986), Tymoigne and Wray (2013), Wray (2016), and Nicolaidi and Stockhammer (2017).

[19] As observed by Reis (2018, p. 134), this attitude leads to attribute importance only to the recent developments of the discipline: "Mortality imposes that the future of macroeconomics will be shaped by the youngest members of the profession. There is something wrong with a field when bright young minds no longer find its questions interesting, or just reproduce the thoughts of closeminded older members."

economic crises (see Lunghini 2012). The Great Recession triggered by the global financial crisis of 2007-2008 has highlighted the limits of analytical settings that, like the FFA, are based on the principle of neutrality of money and finance. It is thus time to rediscover the lessons of Keynes and Schumpeter, who stressed the reasons of the non-neutrality of money and finance.

3.2 Keynes, Schumpeter and the non-neutrality of money

The concept of non-neutrality of money characterizing the analyses of Keynes and Schumpeter profoundly differs from the concept of non-neutrality that can be found within DSGE models. In DSGE models the concept of non-neutrality of money is used to underline that monetary policy decisions produce only temporary effects on the levels of employment and production when these decisions are adopted in a context marked by the rigidity of prices and wages or because they surprise economic agents.

According to Keynes, money cannot be neutral since it deeply affects the structure of the economic system. To emphasize the importance of money Keynes (1933a) replaced the distinction between a barter economy and a monetary economy with a classification based on the separation between a *real-exchange economy* and a *monetary economy*:

> The distinction which is normally made between a barter economy and a monetary economy depends upon the employment of money as a convenient means of affecting exchanges – as an instrument of great convenience, but transitory and neutral in its effect. […] Money, that is to say, is employed, but is treated as being in some sense *neutral.* That however, is not the distinction I have in mind when I say that we lack a monetary theory of production. An economy, which uses money but uses it merely as a neutral link between transactions in real things and real assets and does not allow it to enter into motives or decisions, might be called – for want of a better name – a *real-exchange economy*. The theory which I desiderate would deal, in contradistinction to this, with an economy in which money plays a part of its own and affects motives and

> decisions and is, in short, one of the operative factors in the situation, so that the course of events cannot be predicted, either in the long period or in the short, without a knowledge of the behaviour of money between the first state and the last. And it is this which we ought to mean when we speak of a *monetary economy*. (Keynes 1933a, pp. 408–409)

Keynes (1933b) explains the differences between a real-exchange economy and a monetary economy by making use of two formulas originally developed by Marx. The sequence C (commodity) → M (money) → C' (commodity), which Keynes employs to describe the characteristics of a real-exchange economy, corresponds to the system analyzed by the classical theory. A real-exchange economy has three fundamental features. First, the production of goods is essential to demand other goods. Secondly, money is no more than a tool that allows lowering the costs of exchanges compared to those taking place in a barter economy. Thirdly, the production of goods represents the necessary condition to demand and obtain other goods: in a real-exchange economy supply creates its own demand. In other words, a real-exchange economy is characterized by the validity of Say's Law.

Keynes instead uses the sequence M (Money) →C (Commodity) →M' (Money) to describe the features of a monetary economy. This sequence allows highlighting three fundamental characteristics of a monetary economy: i) the availability of money is the necessary condition to produce goods; ii) the importance of uncertainty; iii) the presence of speculative markets. The M → C → M' sequence thus reveals that in a monetary economy money does not represent simply a means of exchange. While in a real-exchange economy the production of goods is the necessary condition to obtain the money needed to buy other goods, in a monetary economy money is indispensable to start up the production processes organized by businesses.

Schumpeter's analysis of the role of bank money in a capitalist economy shows why money represents the necessary condition for the production of goods. According to Schumpeter, the fundamental characteristic of a capitalist economy is the process of change triggered by the innovations introduced by entrepreneurs. Schumpeter does not identify innovations only with the introduction of machines enhancing the productivity of the labor force employed in the production of the existing goods. In fact, he argues that innovations consist also in the production of new goods that deeply modify the consumption habits of households. This means that in the world described by Schumpeter needs are not exogenous, but that they continuously vary depending on the innovations introduced by entrepreneurs (Schumpeter 1939, p. 47).

In Schumpeter's view money represents a crucial element of the process of change characterizing capitalist economies. He therefore developed a new theory based on "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 money used in capitalist economies coincides with bank money. Accordingly, his heresy consists in considering bank money as a fundamental element of the process of change triggered by the introduction of innovations. In other words, without bank money in capitalist economies innovations would not be realized.

To explain this heresy Schumpeter remarks that the introduction of innovations requires special skills since the decisions taken by entrepreneurs-innovators deeply change the structural features of the economic system. In fact, when planning production, entrepreneurs-innovators are forced to anticipate the possible reactions of a not yet existing world (Schumpeter 1912, p. 66). Schumpeter thus concludes that, generally, it is 'new men'

who introduce innovations. But unlike entrepreneurs running existing businesses, these 'new men' do not control the basic production factors (i.e. labor and land). The introduction of innovations can therefore take place only if the new entrepreneurs can subtract the control of part of the productive factors from existing businesses. In Schumpeter's view (1912, p. 71), the instrument allowing the reallocation of existing productive resources is bank money[20]

Schumpeter's analysis shows that a monetary economy is not populated by self-manufacturers, but by entrepreneurs-innovators who can realize investments and innovations only if they dispose of the purchasing power required to employ a certain number of workers.

The second characteristic of a monetary economy concerns the nature of production processes. In a monetary economy production decisions are taken in condition of uncertainty. In order to explain this point we can observe that the sequence M→C→M' suggests that the goal of economic activities is not to produce goods, but to obtain money, that is, the production of goods represents the means allowing the obtainment of money. This may sound as an obvious truth: entrepreneurs are not interested in accumulating the goods produced, but in making money by selling goods to households. This obvious truth allows Keynes to use the sequence M→C→M' to underline that in a monetary economy investment decisions and in general, production decisions, are taken in condition of

[20] To explain the role of bank money, Schumpeter hypothesizes the existence of full employment conditions. But despite Schumpeter's claims, it can be shown that the fundamental role of bank money in capitalist economies does not depend on the presence of full employment. Furthermore, regardless of the existence of full employment conditions, in modern market economies the credit agreement needed to fund innovations cannot be concluded through an exchange of real goods, but must be necessarily concluded in monetary terms (on this point see Bertocco and Kalajzić (2019a, 2019b)).

uncertainty. To explain this point we can observe that in a monetary economy investments have the characteristics of Schumpeter's innovations.[21]

Uncertainty does not concern the first part of the sequence (M → C), which describes the relationship between the amount of money (M) required to pay the workers employed in the production of a new good, for example the construction of a railway, and the outcome of the production process (C), which in our example corresponds to the number of tracks, locomotives and wagons produced. As in the case of the production of corn, we can hypothesize that the number of workers required to realize tracks, locomotives and wagons is certain because it is defined by the available technology.

The importance of uncertainty emerges with reference to the second part of the sequence (C → M'). As noted above, in a monetary economy the final goal of entrepreneurs does not consist in the production of goods, but in obtaining monetary revenue from the sale of the goods produced. Uncertainty therefore concerns the impossibility to calculate the probability to sell a certain amount of goods and, thus, the probability to obtain a certain monetary profit. In other words, in a monetary economy uncertainty depends on economic factors.[22]

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[21] The investment decisions described by Keynes in *The General Theory* correspond to Schumpeter's innovations: "The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. 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)

[22] "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

Finally, the third characteristic of a monetary economy consists in the presence of speculative markets. In *The General Theory* Keynes explains the presence of speculative markets by introducing the concept of wealth and by specifying the link between wealth and saving decisions. Keynes's savers are individuals moved by the desire to accumulate an unlimited amount of purchasing power in order to be able to buy any unspecified good at any unspecified future time. [23]

In section 2 we have underlined that such a behavior is hard to explain within a corn economy. Since in a corn economy savings consist of the part of corn that has not been consumed, it is unrealistic to assume that individuals may wish to pile up limitless amounts of corn. The relationship between saving decisions and wealth instead emerges if economic actors have unlimited needs, that is, only in economies characterized by the principle of insatiability. In a world in which needs are insatiable resources are necessarily scarce. To explain the presence of individuals wishing to accumulate wealth because they have unlimited need, we return to the concept of innovation. Schumpeter emphasized that the introduction of innovations constantly changes the consumption patterns of households thereby expanding the boundaries of their needs. Due to the continuous introduction of innovations, households never precisely know the quality nor the quantity of the goods they will purchase in the future. They are thus pushed to accumulate a potentially unlimited amount of wealth.

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expects to increase his money profit, even though this profit represents a smaller quantity of product than before." (Keynes 1933b, p. 82)

[23] "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)

Moreover, the continuous introduction of innovations is accompanied by the emission and the subsequent accumulation of a growing amount of financial assets consisting of debt instruments or of stocks matching the value of innovative investments. As underlined by Keynes, a saver is therefore a wealth owner who first decides to save a certain amount of his income and then chooses "in *what form* he will hold the command over future consumption which he has reserved, whether out of his current income or from previous savings" (Keynes 1936, p. 166).

The process of wealth accumulation based on the relationship between savings decisions and wealth represents the necessary condition for the explanation of the presence of speculative markets. Keynes introduced the term 'speculation' to emphasize that financial markets differ from markets characterized by the validity of the law of supply and demand. In traditional markets buyers purchase goods to satisfy their needs. Thus, goods are not subject to subsequent exchanges. In financial markets, instead, debt securities and shares can be traded again and again, and the decisions concerning the composition of wealth depend on the expected yield of the assets representing an alternative to money.

3.3 The relationship between money and economic crises

The analysis of the preceding paragraph shows that Keynes's monetary economy is characterized by all the elements used by BAG to explain the origins of the Great Recession: i) bank money; ii) uncertainty and risk of insolvency; iii) speculative markets. Furthermore, the reasons explaining the non-neutrality of money identified by Keynes and by Schumpeter allow emphasizing a further fundamental feature of a monetary economy, namely the endogenous nature of economic crises.

The relationship between money and economic crises is crucial within Keynes's theoretical framework: "[…] booms and depressions are phenomena peculiar to an economy in which […] money is not neutral" (Keynes 1933a, p. 411). In 1933, while writing the first drafts of *The General Theory*, Keynes underlined the need to elaborate a *monetary theory of production* to clarify that the origin of economic crises lies in the reasons for the non-neutrality of money. Starting from the analysis of the preceding paragraph, a monetary theory of production can be developed based on the following two elements: i) the principle of effective demand; ii) the presence of speculative markets.

According to BAG, Keynes's principle of effective demand holds only when, during the short run, prices and wages are rigid. BAG thus consider Keynes's analysis as a particular case within the more general neoclassical theoretical framework that does not cast doubts on the convergence of the economy towards its 'natural' equilibrium. BAG recall that the 'natural' equilibrium is defined by the equilibrium on the labour market.[24] Moreover, they point out that in the short run the levels of income and employment can differ from their 'natural' values because: "The price level may well turn out to be different from what was expected when nominal wages were set." But, since "[…] expectations are unlikely to be systematically wrong […] forever" (BAG 2017, p. 148), in the medium run the system returns towards these values.

The BAG's claim that the system converges towards the levels of income and employment determined by the equilibrium on the labour market implies the acceptance of Say's Law, according to which income and employment depend solely on production

[24] "We have derived the natural rate of unemployment and, by implication, the associated level of output, under two assumptions. First, we have assumed equilibrium in the labour market. Second, we have assumed that the price level was equal to the expected price level. (BAG 2017, p. 148)

decisions. Production decisions, which are represented through labour supply and labour demand functions, create the conditions for the existence of a flow of aggregate demand that absorbs any quantity of goods produced. In particular, aggregate demand always adapts to the volume of aggregate supply due to changes of the rate of interest. BAG adopt the Wicksellian concept of 'natural' rate of interest to identify the value of the rate of interest associated to the 'natural' equilibrium of the system. BAG thus recognize the existence of a positive or negative value of the rate of interest generating a level of aggregate demand sufficient to absorb the 'natural' level of production.

Actually, as underlined earlier, according to Wicksell the 'natural' rate of interest characterizes only a system, such as a corn economy, in which savings are exchanged in kind. In that case, the equilibrium on the labour market determines the number of workers that will be hired by businesses. Given the available technology, this number allows defining the 'natural' level of production. A part of the corn produced will be consumed, while the remaining part will be saved and offered on the capital market. The rate of interest will then assume the value that ensures that the whole amount of corn saved by households will be invested by entrepreneurs.

However, the concept of 'natural' rate of interest cannot be applied to a monetary economy in which: i) money coincides with bank money and the rate of interest on money cannot assume negative values; ii) economic development depends on the introduction of innovations and on the decisions of the banks to offer credit by creating new money. In a monetary economy there does not necessarily exist a positive or negative value of the rate of interest leading businesses to realize a flow of investments coherent with the level of income corresponding to the equilibrium on the labour market.

As recalled above, in a monetary economy investments have the characteristics of Schumpeter's innovations. This implies that the realization of a flow of demand consistent with full employment depends not only on the level of the rate of interest, but on two further conditions: i) the presence of entrepreneurs-innovators who, inspired by their animal spirits, plan to realize a flow of investments consistent with full employment; ii) the willingness of the banks to finance the investment projects of entrepreneurs-innovators. The fulfillment of these conditions does not depend on a particular level of the rate of interest. In other words, even if the rate of interest is zero or equal to negative values, full employment may not be achieved.[25] In fact, given the level of the rate of interest set by the banking system, investments first depend on the willingness of entrepreneurs to carry out innovative investment projects. In the absence of these entrepreneurs, unemployment emerges even when the rate of interest is zero or equal to negative values.

Furthermore, not even the presence of entrepreneurs-innovators planning to realize a flow of investments consistent with full employment represents a sufficient condition for the achievement of the 'natural' equilibrium. In fact, given the rate of interest set by the banking system, full employment also requires that banks are willing to finance the investments of entrepreneurs-innovators. But there is no guarantee that they will fulfill this condition. In a monetary economy banks finance investments by creating new money, and, similarly to entrepreneurs-innovators, they take their decisions under conditions of uncertainty. Their evaluations of the quality of investment projects may therefore profoundly differ from the

[25] In a monetary economy it is possible to imagine the presence of negative interest rates if the costs of holding cash are higher than zero. Nevertheless, it is difficult to assume that the rate of interest can reach significant negative 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."

evaluations of entrepreneurs. For example, banks may consider the project to build a railway as the idea of an eccentric individual that has no chances of success. Thus, innovative investments may not be realized, and the system can remain stuck in an underemployment equilibrium.

Accordingly, we conclude that in a monetary economy Say's Law does not hold, and that even in the medium and long run a monetary economy is characterized by the principle of effective demand. In other terms, in a monetary the level of income may be constantly lower than the level determined by the intersection of the labour demand curve with the labour supply curve (Y_n), if the flow of investments is lower than the flow of savings corresponding to full employment income (Y_n).[26]

A further critique to the concept of 'natural' equilibrium derives from the fact that its existence presupposes that the curves representing the real wage offered by businesses and the actual or expected real wage demanded by workers, have certain characteristics. For example, BAG (2017, p. 144) assume that labour is the only factor of production, and that the labour productivity is constant and equal to A. This implies that the cost of labour for unit of output corresponds to W/A, with W representing the monetary wage. Furthermore, BAG assume that businesses set the price of a unit of output (P) by applying a mark-up $(1 + m)$ to the cost of labour for unit of output. Thus, we have:

1) $P = (1 + m) \cdot W/A$,

from which we obtain:

2) $W/P = A/(1 + m)$.

[26] To obtain this result it is not necessary to assume that the expectations of entrepreneurs-innovators are negatively influenced by deflation. It is sufficient to assume that investment decisions are taken under conditions of uncertainty and that they depend not only on the level of the rate of interest but, also and foremost, on the availability of credit (see Messori (2012)).

The latter expression indicates the real wage that businesses are willing to offer to the workers. This value is independent from the number of available workers. On the plan that shows the real wage (W/P) on the axis of the ordinates and the number of workers (N) on the axis of the abscissas, the real wage offered by businesses can thus be represented as a line parallel to the abscissas in correspondence to the value $A/(1+m)$. Moreover, BAG presume that the actual or expected real wage demanded by workers is a growing function of the number employed workers (N). The point of intersection between the two curves therefore allows identifying what BAG define as the 'natural' level of employment and, as a consequence, the 'natural' level of income. The 'natural' levels of employment and income will both be reached in the medium run when even the rate of interest will have reached its 'natural' level.

As observed by Brancaccio and Califano (2019), the characteristics of the curves representing the real wage offered by businesses and the real wage demanded by workers depend on the hypotheses about the degree of conflict between firms and workers. For example, if the workers are in a condition of bargaining weakness, they may be pushed to accept the real wage offered by businesses. In this case: "[…] we might assume the curve for the real wage demanded to be horizontal, in fact overlapping with the curve of the wage offered by firms" (Brancaccio and Califano 2019, p. 53). One may thus wonder if the 'natural' level of employment does exist, or what it would correspond to, in such a circumstance. The answer can be very different depending on whether we consider a corn economy or a monetary economy.

In the case of a corn economy, which corresponds to the economy described by BAG, the answer is simple. If every worker accepts the real wage offered by businesses in accordance with their profit objective, all workers will be hired because the real wage offered

$(W/P = A/(1+m))$ is lower than the marginal productivity of labour, which is equal to A. For example, if we suppose that the number of available workers (N^*) is 1,400, the productivity of an agricultural worker (A) corresponds to 10 quintals of corn, the monetary wage amounts to 5 units of money, and that businesses apply a mark-up (m) equal to 1 to fix the selling price of corn, we will have:

3) $P = (1+m) \cdot W/A = (1+1) \cdot 5/10 = 1$.

As the price of a quintal of corn is 1, the real wage offered by businesses is equal to $W/P = 5$, which corresponds to 5 units of money and to 5 quintals of corn. Accordingly, the productivity of labour $(A = 10)$ is higher than the real wage, which means that all the 1,400 available workers will be hired by businesses. The overall production will thus amount to $A \cdot N = 14{,}000$ quintals of corn, while entrepreneurs will pay wages corresponding to $1{,}400 \cdot 5 = 7{,}000$ quintals of corn and earn profits equal to $14{,}000 - 7{,}000 = 7{,}000$ quintals of corn.

A part of the production of corn will be consumed and the remaining part will be saved. For the sake of simplicity, we assume that the workers consume their whole salary, while entrepreneurs do not consume corn. Thus, savings correspond to the profits earned by entrepreneurs. Savings will be invested directly by the savers or, in case of dissociation between saving and investment decisions, offered on the capital market to entrepreneurs planning to produce new quantities of corn by means of corn. The equilibrium between saving and investment decisions, that is, between the demand and the supply of corn on the capital market, will be ensured by the flexibility of the rate of interest. In particular, the equilibrium on the credit market will be reached in correspondence to the 'natural' rate of interest defined by Wicksell. In synthesis, a corn economy is characterized by the validity of Say's Law.

The situation radically changes in a monetary economy in which investments correspond to Schumpeterian innovations, goods are produced under conditions of uncertainty and the goal of entrepreneurs does not consist in the production of a certain amount of goods, but in the obtainment of a monetary profit. This goal is shared even by the farmers. In fact, they will not hire all the 1,400 available workers not even if their marginal productivity were higher than their real wage in terms of corn, because they want to gain a monetary profit and not a profit expressed in terms of a certain amount of corn. If the farmers hired the 1,400 available workers they would produce $1{,}400 \cdot 10 = 14{,}000$ quintals of corn. Since only employed workers buy corn, farmers would be able to sell no more than 7,000 quintals of corn corresponding to a monetary revenue of $1{,}400 \cdot 5 = 7{,}000$ units of money, which equals the wage bill paid to the 1,400 available workers. Thus, farmers would not earn a monetary profit and 7,000 quintals of corn would go wasted.

This simple example shows that in a monetary economy farmers cannot take production decisions without formulating hypotheses about the quantity of corn they will be able to sell. Since only employed workers demand corn, their production decisions depends on their expectations on the overall number of employed workers, which is a function of the investments that will be realized by the entrepreneurs-innovators. For example, if farmers believe that all the available workers (1400) will be employed, they expect a demand for 7,000 quintals of corn (1400.5). As the productivity of each agricultural worker (A) is equal to 10 quintals of corn, the farmers will hire 700 workers. This implies that the farmers presume that entrepreneurs-innovators will realize investment projects requiring the employment of the remaining 700 workers. But to this end, two conditions must be fulfilled: i) that entreprenurs-innovators actually plan the realization of the investments-innovations, for example the construction of a railway, whose realization require the employment of 700

workers; ii) that the banks are willing to fund the entrepreneurs-innovators by creating new money. In particular, since the unit monetary wage corresponds to 5 units of money, entrepreneurs-innovators will need a loan of $700 \cdot 5 = 3{,}500$ units of money. If the banks deem the project of the entrepreneurs-innovators creditworthy, they will grant the loan and other 700 workers will be hired to build the railway.

Like the agricultural workers, also the workers employed to realize the railway will use their wages to buy corn. As seen above, based on their expectations the farmers have employed 700 workers to produce 7,000 quintals of corn. Thus, the total demand for corn is satisfied, and the sale of corn generates proceeds corresponding to 7,000 units of money against production costs of 3,500 units of money instead corresponding to the wage bill paid to the 700 agricultural workers. In the end, farmers will earn a profit of 3,500 units of money, which equals their savings and the value of the investments for the construction of the railway. We can conclude that in a monetary economy investment decisions determine saving decisions, and Say's Law does not hold.[27]

The second element necessary to elaborate a monetary theory of production is the presence of speculative markets. The principle of effective demand and the presence of speculative markets allows explaining why, according to Minsky, in capitalist economies stability generates instability. In fact, starting from the relationship between bank money, investment decisions and uncertainty described in the previous paragraphs it is possible to illustrate the reasons for the shift from 'tranquil' to booming periods underlined by Minsky. An economy in which investment decisions are adopted under conditions of uncertainty may

[27] This example is based on the linear model presented in Bertocco and Kalaizić (2019a, 2019b), which illustrates the validity of the principle of effective demand within a monetary economy characterized by the production of a plurality of goods.

experience periods of euphoria. During these periods, entrepreneurs and bankers remove the memories of previous crises and may assume 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 entrepreneurs and bankers, but also by the financial markets, in which, as seen earlier, the shares and the debt securities, representing a significant part of the wealth of households are exchanged on a continuous basis. The euphoric business atmosphere leads to a significant increase of the stock prices of businesses involved in investments marking the passage to a 'new era'. This tendency can affect the behavior of speculators, who aim at obtaining a profit by anticipating the 'psychology of the market'. Following Keynes's teaching, we can thus observe that a monetary economy characterized by the relationship between bank money and innovations described by Schumpeter, is structurally unstable and exposed to catastrophic crises when 'speculation' prevails over 'enterprise' (Keynes 1936, p. 159).[28]

Conclusions

The new edition of BAG's textbook represents an important opportunity to assess the impact of the Great Recession on macroeconomic theory. BAG believe that ten years after the burst of the real estate bubble in the United States economists have learned the lesson of the crisis. They argue that from the beginning of the 1970s until the outbreak of the Great Recession economists have been responsible for the development of an analytical approach that completely neglects the role of the financial system. Based on the principles of the 'Financial

[28] For a detailed description of the endogenous nature of the contemporary crisis, see Bertocco (2017), and Bertocco and Kalaizić (2018b)

Frictions Approach' (FFA), the theoretical model presented in the new edition of their textbook therefore explicitly considers the role of the financial system, and in particular the role of the banking sector.

In accordance with the 'financial frictions approach', BAG explain the presence of banks through the existence of imperfections hindering savers in directly financing businesses. The function of banks is to eliminate the effects of these imperfections, thereby reproducing the characteristics of a world without imperfections in which banks would have no reason to exist. However, it is difficult to explain the origins of the Great Recession by making use of a theoretical model that is based on the principle of neutrality of money and finance, and on the assumption that the economy always converges towards a 'natural' equilibrium.

This contradiction clearly emerges from the interpretation of the origins of the Great Recession elaborated by BAG. Their interpretation may be valid in an economy with different characteristics from those described in the theoretical model presented in the new edition of their textbook. According to BAG, the crisis occurred in an economic system marked by: i) the presence of banks that can go bankrupt; ii) the presence of speculative markets and the possibility that banks adopt speculative behaviors; iii) the independence of the supply of credit from saving decisions because the supply of credit depends only on the decisions of the banking system.

We have shown that these elements characterize what Keynes defined as a monetary economy, that is, an economy in which money and finance are not neutral. We have used the lessons of Keynes, Schumpeter and Minsky to define the pillars of a monetary theory of production that allows explaining the endogenous nature of the Great Recession.

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