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a critical analysis

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The New Keynesian Monetary Theory: a Critical Analysis

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Introduction

In the last 20 years, the New Keynesians (henceforth, NKs) have developed a theoretical approach which aims to elaborate an alternative monetary theory to the one traditionally associated with Keynes. The distinctive feature of this new approach is its emphasis on the credit market and the role played by financial intermediaries rather than the money market; the importance given to the credit market is justified by the presence of asymmetrical information.

The objective of this paper is twofold: i) to show that the presence of asymmetric information constitutes a weak premise on which to build a Keynesian theory of credit and financial intermediaries; ii) to outline the elements on which a theory of credit consistent with Keynes's thinking can be built. The paper is divided into four sections. In the first one, the most important aspects of the NKs' theory are described; the limitations of this theoretical approach are then demonstrated in the second section; in the third section, the elements which should characterise a Keynesian theory of credit and financial institutions are outlined; finally, in the fourth section, a macroeconomic model illustrating the characteristics of the theory described in the third section is presented.

1. The theory of credit and financial intermediaries formulated by the New Keynesians.

This presentation of the most important aspects of the NKs' theory is essentially based on the works of J. Stiglitz and his collaborators, in particular B. Greenwald and A. Weiss. They criticize the interpretation of Keynes elaborated by the neoclassical synthesis according to which involuntary unemployment is due to rigidity such as, for example, regulations governing minimum wages or union activity, which hinder the working of the market.¹ The NKs set out to highlight aspects of Keynes's vision neglected by the traditional interpretation.² The NKs' research develops along two

¹ See: Greenwald and Stiglitz 1987, 1993a; Stiglitz 2000, 2002; Akerlof 2002.

² "Keynes himself had a novel, and markedly non-neoclassical vision of how the economy worked. ... But when Keynesian economics came to be codified, and presented in the form of a simple model (as in

lines: the first aims to provide a sound justification for the price rigidity hypothesis³, while the second sets out to furnish a satisfactory explanation of Keynes's theory that the flexibility of prices and wages can accentuate the instability of the economic system.⁴ Following this second approach, the NKs formulate a theory that provides new justifications for the thesis of the non-neutrality of monetary variables. This theory, the subject matter of this paper, is based on the presence of asymmetric information.⁵

The NKs start off by abandoning the perfect capital market hypothesis underlying the neoclassical theorems which support the theory of the irrelevance of money and the financial variables. The NKs maintain that the imperfections in the capital market caused by the presence of imperfect information give it an essential role in explaining how modern economies work.⁶ They stress that the credit market is profoundly different from other markets where a simultaneous exchange of goods for money takes place; in the case of credit, a given amount of goods or of money, available today, are exchanged against the promise of receiving a given amount of goods or money at a future date. The temporal dimension of the credit contract prompts creditors to gather information, which allows them to evaluate the debtors' ability to keep their promise to pay back the loan. The NKs make a distinction between two situations; the first one, in which there is symmetric information, corresponds to the case in which debtors and creditors have equal access to all the available information. In the second situation, characterised by asymmetric information, the creditors do not have at their disposal all the information possessed by the debtors. The conclusions reached by the NKs can be summarised in the following five points: i) the presence of asymmetric information renders the Modigliani-Miller theorem inapplicable; ii) the presence of asymmetric information justifies the existence of financial intermediaries and, in particular, of banks; iii) the presence of asymmetric information can determine a credit rationing equilibrium; iv) the presence of asymmetric information influences the characteristics of the monetary policy transmission mechanism; v) in the presence of asymmetric information, price and wage flexibility does not eliminate involuntary unemployment, but it can increase the instability of the economic system.

The first result obtained by the NKs was to show that it is not the same for a firm to finance an investment project by issuing equities or by borrowing. They criticise Keynes for having assumed that debt and equities were perfect substitutes.⁷ They

chapter 18 of the *General Theory*, and the exposition of others, such as Hicks (1937) and Klein (1948)), earlier mode of thinking crept back. We contend that this vision, captured so well in many of his brilliant passages, provides greater understanding of unemployment and business cycles than do the formal Keynesian models." Greenwald and Stiglitz 1987, p. 120.

³ The principal result of this line of research is the efficiency wages theory; the importance of this theory is highlighted by Stiglitz and Akerlof in their Nobel Lecture; see: Stiglitz 2002, Akerlof 2002.

⁴ See: Greenwald and Stiglitz 1993a.

⁵ The importance of asymmetric information in the NKs' thought is evident in the following statement by Akerlof (2002, p. 411): "For me, the study of asymmetric information was a very first step toward the realization of a dream. The dream was the development of a behavioral macroeconomics in the original spirit of John Maynard Keynes' *General Theory*."

⁶ "Capital is at the heart of capitalism... it is imperfections in the capital market – imperfections which themselves can be explained by imperfect information – which account for many of the peculiar aspects of the behaviour of the economy which macroeconomics attempts to explain." Stiglitz 1992, p. 269. See also: Greenwald and Stiglitz 1991.

⁷ "One weakness was Keynes' aggregation of long term bonds and equities ... these two sets of assets differ in their risk properties... Still more important are the differences in the nature of the firm's

maintain that, in the presence of asymmetric information, it is more costly to get financing by a share issue than by borrowing, and they therefore conclude that the latter is the prevalent form of financing chosen by firms. The NKs reach this conclusion by applying to the capital market the results of a study carried out by Akerlof (1970).⁸ In Akerlof's model, the potential buyers of used cars are unable to discern the quality of the cars; in the case of the capital market, the NKs assume that potential share subscribers know only the expected return on the investment projects, while the firms have at their disposal information allowing them to know what the actual return on their project will be. If it is assumed that the yield expected from all the projects is the same, it must be concluded that the shares of all the firms will be issued on identical terms and that the best firms will be penalised. In this situation it is onerous for the best firms to issue equities; if the best firms finance themselves by borrowing, the firms with the less profitable investment projects will have to do likewise in order to avoid being identified by the market. In conclusion, in the presence of asymmetric information, the prevalent form of investment financing is borrowing.⁹

The second result obtained by the NKs is to show that the form of borrowing used by the firm is not the direct issue of bonds, but rather bank borrowing. Akerlof observed that the presence of asymmetric information stimulates the creation of institutions whose aim is to reduce information costs; in particular, Akerlof drew attention to the activity of the merchants who specialise in evaluating the quality of the goods.¹⁰ The banks play the same role in the capital market as the merchants play in Akerlof's used car market; Blinder and Stiglitz (1983, p. 299), assert that:

“Imperfect information about the probability of default has several fundamental implications for the nature of capital markets... it gives rise to institutions – like banks – that specialize in acquiring information about default risk.”

The similarity between the role of banks and that of Akerlof's merchants is evident when the object of the credit is a good:

“The need for credit arises from the discrepancy between individual's resource endowments and investment opportunities. This can be seen most simply if we imagine a primitive agricultural economy, where different individuals own different plots of land and have different endowments of seed with which to plant the land. ... The marginal return to

commitment: with bonds and loans, the firm is committed to paying back a certain amount on a particular date; with equities no such commitment exists. As a result, for firms as well as investors, these two securities are far from perfect substitutes.” Greenwald and Stiglitz 1987, p. 128.

⁸ “Akerlof's insight that the result of ... information asymmetries was that markets would be thin or absent helped explain why labor and capital markets often did not function well. It provided part of the explanation for why firms raised so little of their funds through equity.” Stiglitz 2002, p. 472. On this point see: Stiglitz 1987, 2000; Ardeni, Boitani, Delli Gatti and Gallegati 1999; Messori 1999; De Meza and Webb 1987, Myers and Majluf 1984.

⁹ “The central role of information imperfections is to restrict a firm's ability to raise equity funds in external capital markets. The empirical evidence suggests that firms simply do not resort to equity markets for raising working capital; overall, new equity issues represent a small fraction of capital raised by firms.” (Greenwald and Stiglitz 1993b, p. 78). On this point see: Myers and Majluf 1984; Greenwald, Stiglitz and Wiess 1984; Greenwald and Stiglitz 1987, 1990, 1993a.

¹⁰ “In our picture the important skill of the merchant is identifying the quality of merchandise; those who can identify used cars in our example and can guarantee the quality may profit by as much as the difference between type two traders' buying price and type one traders' selling price. These people are merchants.” Akerlof 1970, p.117.

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 lands 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 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 seed are actually planted, rather than, say, consumed by the borrower in a consuming binge.”¹¹

The presence of asymmetric information provides a satisfactory answer to the question to which it is widely held that a theory of financial intermediaries should respond. This question is formulated by starting from the seemingly obvious and common sense consideration that the presence of creditors and debtors is the necessary premise to justify the existence of financial intermediaries. In this situation, the recourse to financial intermediaries involves a cost for debtors and creditors, therefore the theory should explain what are the advantages, deriving from the presence of the intermediaries, which can offset costs.¹² The presence of asymmetric information seems to provide a good answer: intermediaries can only emerge in a world in which debtors and creditors exist, and the services offered by the intermediaries consists in information gathering.¹³

The NKs highlight the existence of an important difference between the credit market and Akerlof’s used car market. In the used car market there are no obvious reasons to prevent merchants from accurately assessing the quality of used cars and thus eliminating the asymmetric information between buyers and sellers. The NKs, however, maintain that the banks are unable to perfectly screen firms, in other words, they are unable to gather all the information necessary to fully define the features of every investment project, which the firms intend to carry out. They often describe this situation starting from the hypothesis that every investment project has two features, the expected return and the risk, and they assume that the banks are able to identify the expected return of each project but not the degree of risk.¹⁴ This hypothesis allows the NKs to state that, despite the presence of financial intermediaries, the capital market is still characterised by asymmetric information and so it works in a different way from a world in which there is perfect information:

“The new information economics not only showed that institutions mattered, and helped explain why the institutions arose and the form they took, but showed why they mattered. At the same time, it dispelled a growing misconception ... that non market

¹¹ Stiglitz and Weiss 1990, pp. 91-92.

¹² “... it is useful to observe that, in principle, intermediate finance has one disadvantage: the chain of transactions between the firm and the final investor is longer, and *ceteris paribus*, an increase in the length of the chain of transactions may be taken to entail an increase in transactions costs. Any proposition that intermediated finance is more advantageous than direct finance must therefore be based on a view that the presumed gains from intermediation are more than enough to compensate for the increased transactions costs.” Hellwig 1991, p. 42.

¹³ “Banks are ... agents specializing in the acquisition and dissemination of information.” Stiglitz and Weiss 1990, p. 88.

¹⁴ See: Stiglitz and Weiss 1990; Jaffee and Stiglitz 1990; Greenwald and Stiglitz 1991.

institutions arose to address market failures, and that in doing so, they restored the efficiency of the economy.”¹⁵

If banks were actually able to obtain the same information possessed by the debtors, the condition of perfect information would be created under which the creditors would directly finance the debtors and the intermediaries would not have any *raison d'être*. The NKs maintain that in a world with perfect information, the traditional theory of credit and interest rate according to which the imbalance between the credit demand and supply, which is the result of saving decisions, would be eliminated by interest rate fluctuations, would be valid. This leads the NKs to maintain that the size of the credit market is essentially determined by real factors, and in particular that the credit supply is influenced by savings decisions. This conviction is evident from the definition of the credit market used by the NKs: the key actors which operate in this market are the savers and investors, and the object of the exchange can either be a real good or money. Jaffee and Stiglitz (1990, p.838-839) assert that:

“The need for credit is evidence of change: those who control existing resources, or have claims on current wealth, are not necessarily those best situated to use these resources. They thus transfer control over their resources to others, in return for a promise. ... in the absence of a credit market, those with resources would have to invest the resources themselves, possibly receiving a lower return than could be obtained by others. When credit is allocated poorly, poor investment projects are undertaken, and the nation's resources are squandered.”¹⁶

The fact that asymmetric information persists in spite of the presence of banks, prevents the credit market from reaching an equilibrium consistent with full employment:

“... what impedes the standard equilibrating forces from working? In particular, why does not the interest rate adjust to equilibrate the demand and supply for credit at a full employment, non-inflationary level. Considerations of imperfect information impede the use of the interest rate as equilibrating mechanism.”¹⁷

The NKs hold the traditional interest rate theory to be valid in the presence of perfect information; Stiglitz and Weiss (1990, p. 101) assert that:

“What ensures that the number of individuals certified to be credit worthy, combined with those with cash resources, generates a demand for *current* resources equal to current supplies?... The answer provided by traditional micro-economic analysis is simple: if there is an excess demand for current resources, the real rate of interest will rise: as this happens, the demand for credit, i.e., the number of individuals seeking certification from the banking institutions... is reduced until demand equals supply at full employment for current resources. Similarly, potential borrowers with high expected yield projects will bid more for resources, resulting in an efficient allocation of resources. ... We now argue that,

¹⁵ Stiglitz 2000, p. 1459.

¹⁶ Bernanke (1993, p. 50) also emphasize the link between savings and credit supply: “By credit creation process, we mean the process by which, in exchange for paper claim, the savings of specific individuals or firms are made available for use of other individuals or firms...”

¹⁷ Stiglitz and Weiss 1990, p. 89. This approach is widely shared by scholars of the theory of financial intermediaries; see for example: James and Smith 1994, Lewis 1995; Gorton and Winton 2002.

in economies characterized by ... information imperfections ... the price system may well not serve the information-equilibrating role assigned to it by conventional theory...”

The assumption that the banks are unable to perfectly screen firms allows the NKs to state that despite the presence of financial intermediaries, the credit market works in a different way from a world in which there is perfect information. The most important result that illustrates this conclusion is the demonstration that it is possible to reach a rationing equilibrium on the credit market. This result is the third element that characterises the NKs' theory. Starting from the hypothesis that every investment project has two features, the expected return and the risk, the NKs assume that the banks are able to identify the expected return of each project but not the degree of risk. The banks classify firms into different groups depending on the expected return on their investment project, and they apply the same interest rate to the firms belonging to the same group even if they know that these firms are not perfectly homogenous as far as the degree of risk is concerned.¹⁸ The presence of asymmetric information has an important consequence, as Akerlof points out in his analysis of the used car market: the quality of the good exchanged depends on the price; in the case of the credit market the degree of riskiness of the loans granted by the banks varies in accordance with the interest rate applied. If it is assumed that the expected return on the investment projects is the same for all the firms which belong to the same group, then it can be demonstrated that if the interest rate applied by the banks rises, the probability of the loan being repaid declines, and this can cause a rationing equilibrium. Due to the adverse selection and incentive effects, an increase in the interest rate can bring about a sufficient increase in the riskiness of the loans to cause a reduction in the banks' expected profits. If there is an excessive demand for credit at the interest rate which maximises the banks' expected profit, there will be no reason for them to raise the interest rate, as such a decision would trigger a drop in their expected profits; in such a case, a rationing equilibrium occurs. The NKs maintain that this phenomenon is due to the fact that banks are unable to perfectly screen firms:

“... the interest rate a bank charges may itself affect the riskiness of the pool of loans by either: 1) sorting potential borrowers (the adverse selection effect); or 2) affecting the actions of borrowers (the incentive effect). Both effects derive directly from the residual imperfect information which is present in loan markets after banks have evaluated loan applications.”¹⁹

The fourth result obtained by the NKs concerns the description of the characteristics of the monetary policy transmission mechanism. The significant aspect of the NKs' analysis on this point is its emphasis on the role of the credit market over

¹⁸ “Screening is, of course, never perfect: potential borrowers are placed into different loan categories but the bank is fully aware that, within any loan category, there are some risks (loans) which are better, or much worse, than others. Separating these good and bad risks perfectly is, however, if not impossible, at least too costly.” Stiglitz and Weiss 1990, p. 93.

¹⁹ See: Stiglitz and Weiss 1981, p. 393. Stiglitz and Weiss 1990 p. 98 confirm: “The fact that the return received by lenders may *decrease* with an increase in the interest rate has one further effect: it means that there may be credit rationing... It should be emphasized that these arguments apply so long as the bank does not have *perfect* information concerning borrowers.”

the money market. In a world in which the presence of asymmetric information induces firms to finance themselves predominantly through the banks, investment decisions are strongly influenced by the variations in the amount of credit offered by the banks.²⁰ This leads the NKs to conclude that a monetary policy intervention based on credit supply control is much more efficient than a manoeuvre based on the control of the money supply. Moreover, if the credit market is in a rationing equilibrium, the monetary authorities can trigger substantial variations in the demand for investment goods by means of a monetary base manoeuvre, at a parity of interest rates.²¹ The prominence given by the NKs to the credit market over the money market is not justified only by asymmetric information, but also by the presence in contemporary economies of elements that render control of the quantity of money irrelevant. The NKs maintain that in contemporary economies the presence of short-term bonds eliminates the reasons that justify the presence of a speculative demand for money. They further hold there is no reason to suppose that a stable relation exists between money and income; in fact, the NKs observe that the volume of the transactions does not necessarily depend on the stock of existing money since spending decisions can be carried out using credit and not money.²²

The last result obtained by the NKs is to provide a justification for Keynes's thesis that the price and wage flexibility can exacerbate the instability of the economic system. The justification elaborated by the NKs is based on the conclusion that the presence of asymmetric information makes financing through equity more costly and it encourages firms to get into debt with the banks. The NKs emphasize that in a world in which debt is the main form of firm financing, the price and wage downward flexibility causes a transfer of resources from debtors to creditors and it increases the risk of bankruptcy for firms. In his Nobel lecture, Stiglitz states that:

“The implication (of the neoclassical synthesis) was that unemployment would be eliminated if markets were made more *flexible*, that is, if unions and government interventions were eliminated. Even if wages fell by a third in the Great Depression, they should have, in this view, fallen ever more. There was however an alternative perspective... Indeed, given the nature of the debt contracts, falling prices in the Depression led to bankruptcy and economic disruptions, actually exacerbating the economic downturn. Had there been more wage and price flexibility, matters might have been even worse.

In debt contracts, which are typically not indexed for changes in prices, whenever prices fell below the level expected ... there were transfers from debtors to creditors. In these circumstances, excessive downturn price flexibility ... could give rise to problems. These redistributive changes had large real effects, and could not be insured against because of imperfections in capital markets. Large shocks could lead to bankruptcy, and with bankruptcy ... there was a loss of organizational and informational capital.”²³

2. Some comments on the NKs' theory

²⁰ Greenwald and Stiglitz (1987, p. 131) assert that: “... the mechanism by which investment is affected is not through the change in interest rate or the prices of equities, but through the availability of credit.”

²¹ See: Blinder and Stiglitz 1983; Greenwald and Stiglitz 1990; Stiglitz and Weiss 1992.

²² See: Greenwald and Stiglitz 1991.

²³ Stiglitz 2002, p. 462-3, p. 482. These comments are similar to the ones made by Minsky (1980, 1982).

The NKs set themselves the objective of reformulating the Keynesian monetary theory, giving greater importance to the credit market than the money market. I think this is an important objective and that the treatment of the credit market makes it possible to highlight elements that render the monetary variables non neutral, elements which do not emerge when only the money market is considered. On the other hand, I find that the arguments used by the NKs to justify the relevance of the credit market are somewhat weak; in this section some criticisms of the NKs are put forward, while in the following section a different credit theory is presented.

The first limitation regards the reasons why financial institutions, and in particular the banks, exist. As we have seen, the presence of asymmetric information, which makes the direct financing of debtors by creditors very costly, accounts for the existence of banks. According to the NKs, the credit market has similar characteristics to that of Akerlof's used car market: a) as in the used car market, in the credit market there are two groups of individuals who propose to make an exchange. In the case of the credit market, the subject of the exchange is the real or monetary resources put aside by savers; b) as in the case of the used car market, the presence of asymmetric information hinders the direct exchange between savers and firms and stimulates the emergence of intermediaries who specialise in evaluating the quality of the goods exchanged. In the NKs' framework, the presence of banks constitutes a phenomenon that logically follows the presence of savers and debtors, one which emerges only if asymmetric information exists.

This approach diverges from that of economists such as Wicksell, Schumpeter and Keynes, who stress that with the spread of the use of fiat money constituted by bank money, the object of credit is not the resources set aside by savers, but the money created by the banks. Wicksell remarks that in an economy in which bank money is used, the object of credit is not real goods:

“It is said that what is lent in reality is not money but real capital; money is only an instrument, a way of lending capital and so on. But this is not strictly true; what is lent *is* money and nothing else...”²⁴

Keynes and Schumpeter strongly emphasize that the credit supply is not conditioned by savings decisions, but rather by the choices made by the banks. In an economy in which bank money is used, the credit market is founded on the relation between the bank and the firm, inasmuch as the banks do not lend resources which have previously been saved by other agents, but rather they give the entrepreneur new purchasing power. Schumpeter (1934, p. 73-4) highlights the role of banks in financing the innovating entrepreneur by means of the creation of new purchasing power; he stresses that the typical form of financing innovations:

“...is the creation of purchasing power by banks. The form it takes is immaterial. ... It is always a question, not of transforming purchasing power which already exists in someone's possession, but of the creation of new purchasing power out of nothing... The banker, therefore, is not so much primarily a middleman in the commodity 'purchasing power' as a *producer* of this commodity... He makes possible to carrying out of new combinations, authorises people, in the name of society as it were, to form them.”

²⁴ Wicksell 1898, p. 190.

Keynes (1939, p. 572) asserts that investments are financed by credit and not by saving:

“Increased investment will always be accompanied by increased saving, but it can never be preceded by it. Disharding and credit expansion provides not an *alternative* to increased saving, but a necessary preparation for it. It is the parent, not the twin, of increased saving.”

Even the NKs, when they describe the characteristics of the monetary policy transmission mechanism in a world characterized by the presence of asymmetric information, acknowledge that the credit supply depends on the decisions of the banks and the monetary authorities and not on saving decisions.²⁵ This acknowledgement gives rise to a problem: it is not clear why the nature of credit must change depending on whether or not there is asymmetric information. According to the NKs, in the presence of perfect information the object of the credit is the resources set aside by savers, while in the presence of asymmetric information the object of the credit is bank liabilities.

The second limitation of the NKs approach is the introduction of the hypothesis that the banks are able to only partially screen firms. As we have seen, this assumption is necessary because if the banks were able to perfectly screen firms, the consequences of asymmetric information would be cancelled and the neoclassical theory of income and interest rate would, according to the NKs, become valid once more. Even if the role this hypothesis plays in the NKs' approach is clear, it is by no means clear what prevents the banks from obtaining all the information necessary about the firms' investment projects. Why is it that the banks, which were created with the aim of gathering information, are not able to obtain the necessary data to eliminate the asymmetric information between firms and savers? The doubts about the soundness of the assumption introduced by the NKs are accentuated by the fact that the NKs maintain that information exists which enables the future results of investments to be specified by a probability distribution. If we assume that it is possible to represent the future income of investment projects by a probability distribution, then the assumption that the banks know only the expected yield and not the degree of risk of each project becomes arbitrary. The soundness of the hypothesis introduced by the NKs is challenged by Allen and Santomero (1998), who observed that the spread of the information technology revolution produced a significant reduction in information costs and therefore they conclude that these costs do not constitute a convincing explanation for the presence of financial intermediaries.²⁶

²⁵ “Credit is not like an ordinary good. It is not only that credit is not allocated by the price system. It is possible to create credit seemingly out of thin air. And by the same token, credit can disappear: a confidence crisis can suddenly lead to the shrinking of credit. Thus the magnitude of credit outstanding may not be easily predictable...” (Stiglitz and Weiss 1990, p. 105)

²⁶ “... the advent of the technological revolution has substantially reduced the cost of information and reduced information asymmetry. Yet it did not reduce the need for intermediary services and encourage direct lending by households. In fact, the data suggest the opposite. In short, the decline in frictions which were allegedly the market imperfections that led to a need for intermediation services has not reduced the demand for them. Intermediation is growing and prospering even as the frictions decline.” Allen and Santomero 1998, p. 1465; see also: Scholtens and Van Wensveen 2000.

The third limitation of the NKs' approach concerns the way in which the future returns of investment projects the firms plan to carry out are represented. The NKs assume that the future investment projects returns can be represented by a probability distribution characterised by an expected return and a degree of risk. It is singular that such an assumption is put forward by those who aim to highlight the more innovative aspects of Keynes's thought that had been overlooked by the neoclassical synthesis. As is well known, Keynes stresses that the fundamental difference between his own theory and the classical one regards the assumptions about the way in which expectations regarding future results of economic decisions are formulated. The classical theory assumes that it is possible to define the future results of economic decisions through objective criteria defined by the probability theory and by actuarial mathematics. Keynes, however, deemed that criteria inappropriate, and maintained that economic decisions are taken in conditions of uncertainty.²⁷ Keynes held that there are no objective methods for representing the future results of an investment project; the presence of uncertainty is linked to the continuous structural change in the economic system which prevents the use of the past and the present as a reliable guide for forecasting the future consequences of economic decisions.²⁸

The final weakness of the NKs' theory is the lack of a single theoretical model able to explain simultaneously: i) the higher costs connected with the financing by means of equity rather than debt; ii) the presence of the banks and the credit rationing. The NKs explain these two points by using different models that do not seem to be compatible. Let us recall that the NKs' approach is based on the assumption that it is possible to attribute values representing the expected yield and the degree of risk to the future yield of each investment project; the asymmetric information between debtor and creditor can relate to one or both of these values. The first result obtained by the NKs, that it is more costly to finance projects through shares than through borrowing, is based on the presence of asymmetric information regarding the yield.²⁹ The second result is obtained using models in which it is assumed that the banks are able to identify the expected return but not the degree of risk of the investment projects.³⁰ The demonstration that a rationing equilibrium in the credit market might occur is conditioned by an important limitation: it has been shown that in the presence of asymmetric information concerning solely the degree of risk, the form of optimal financing becomes the issue of equity and not bank borrowing. The reason for this result is intuitive: if the banks are not able to know the risk involved in each individual project, they will finance all the firms at the same interest rate. This situation penalises

²⁷“By ‘uncertain’ knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject, in this sense, to uncertainty; nor is the prospect of a Victory bond being drawn. Or, again, the expectation of life is only slightly uncertain. Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know.” Keynes, 1937a (CW, XIV, p.113)

²⁸ Keynes 1937, p. 114. The difference between the NKs and Keynes in relation to the concept of time and the definition of the future investment results is forcefully underlined by the post-Keynesians; see for instance: Davidson 1991, Wolfson 1996; Dow 1998; Isemberg 1998.

²⁹ See: Myers and Majluf 1984; Greenwald, Stiglitz and Wiess (1984).

³⁰ “We initially assume that the bank is able to distinguish projects with different mean returns, so we will at first confine ourselves to the decision problem of a bank facing projects having the same mean return. However, the bank cannot ascertain the riskiness of a project.” Stiglitz and Wiess 1981, p. 395.

the less-risky firms, who will find it more convenient to issue equities since, if the expected return on the firms' investment projects is the same, the issue of equities will not penalise the best firms and it will eliminate the possibility of rationing taking place.³¹ To overcome this criticism Hellmann and Stiglitz (2000) presented a model in which there is asymmetric information both about the expected return and the degree of risk. They assume that there are two types of financiers specialising in the provision of two types of financing instruments: the banks which give credit and the private equity funds which subscribe equities; they assume that the two intermediaries do not know either the expected profit or the riskiness of the investment projects and they show that, in these circumstances, rationing can again occur.³²

Hellman and Stiglitz's analysis seems to suffer from one limitation: if it is assumed that banks do not know either the expected yield or the risk, then it can no longer be said that their role is to collect information. To save the credit rationing result, Hellman and Stiglitz do not bother to explain the reasons for the banks' existence and consider their presence as given.³³ This is an important limitation if the NKs' approach is considered because, if the banks do not collect information, it is difficult to see why the creditors do not directly finance the debtors, thereby avoiding to pay the intermediation costs.

I believe that to overcome these limitations it is necessary to elaborate a credit theory that has the following characteristics: i) a theory that can justify the existence of banks independently of the presence of asymmetric information; ii) a theory that does not identify the credit supply with the saving decisions and that does not contend that in the absence of asymmetric information the neoclassical theory of credit and interest is valid. In other words, a theory must be formulated that puts the relation between bank and firms at the centre of the analysis and stresses that the credit supply reflects the decisions of the banks and not those of the savers; iii) a theory that is coherent with the Keynesian conception of uncertainty. In the next section a theory of credit that possesses these characteristics is presented; this theory has been elaborated using the elements employed by Keynes to define the characteristics of a *monetary economy*.

3. A Keynesian theory of credit

As is well known, Keynes distinguishes between a *real exchange economy* and a *monetary economy*. Keynes uses the former term to refer to an economy in which money is merely a tool to reduce the cost of exchanges and whose presence does not alter the structure of the economic system, which remains substantially a barter economy. *Monetary economy* instead refers to an economic system in which the presence of fiat money radically changes the nature of the exchanges and the characteristics of the production process. The presence of money transform an

³¹ See: Cho 1986; De Meza and Webb 1987; Hillier 1997.

³²“If there is asymmetric information about both (expected return) and (risk), and if there are two types of investors specializing in debt and equity respectively, then it is possible that there is credit rationing, equity rationing or both.” Hellman and Stiglitz 2000, p. 295.

³³ Bhattacharya and Takor (1993, p. 19) assert that: “... rationing models fails to address the role of the bank itself: the bank is merely a conduit for moving resources from savers to borrowers without any further justification”

exchange economy where the resources available to each agent are given, into a production economy where the level of production is subject to fluctuation. To highlight the consequences of the employment of money, Keynes distinguishes a 'co-operative economy' from a 'neutral entrepreneur economy' and an 'entrepreneur economy'. The former is essentially a barter economy, the latter an economy in which money is used and in which there is a mechanism which insures that all the monetary income is spent, directly or indirectly, to buy the goods produced by firms; in other words, it is an economy in which Say's law applies. Finally, in an 'entrepreneur economy' Say's law does not apply, and the income level is subject to fluctuations that depend on the oscillations in the aggregate demand.³⁴

Keynes notes that the classical economists formulated an explanation of how the *real-exchange economy* works, convinced that this explanation could be easily applied to a *monetary economy*. He believed that this conviction was unfounded and stressed the need to elaborate a “.. monetary theory of production, to supplement the real-exchange theories which we already possess.”³⁵ Keynes stresses that the passage from a *real exchange economy* to a *monetary economy* is linked to the spread of fiat money; he observes that the employment of commodity money guarantees full employment whereas, when fiat money is used, the levels of income and employment are influenced by fluctuations in the aggregate demand.

The most important feature of a world in which commodity money is used is that all individuals can produce money in the same way that can produce any other commodity. Keynes observes that in a gold standard system, there is no such thing as unemployment as, in the event of a fall in aggregate demand, the unemployed workers will turn to gold mining;³⁶ on the other hand, if fiat money is used, the fluctuations of the aggregate demand will cause income and employment levels to vary.³⁷ Fiat money, which is not a commodity, cannot be produced by the unemployed workers. The production of fiat money is a prerogative of special subjects; a typical example examined by Keynes, is constituted by the money created by the banking system.

The subjects that are able to create money, can buy commodities even if they do not possess goods. In reality, banks do not buy commodities, but they finance operators against the promise to repay the amount received at a given future date. In

³⁴ See: Keynes 1933a, 1933b.

³⁵ Keynes 1933a, p. 411.

³⁶ “In actual fact under a gold standard gold can be produced, and in a slump there will be some diversion of employment towards gold mining. If, indeed, it were easily practicable to divert output towards gold on a sufficient scale for the value of the increased current output of gold to make good the deficiency in expenditure in other forms of current output, unemployment could never occur; except in the transitional period before the turn-over to increased gold-production could be completed.” (J.M.Keynes, 1933b, pp. 85-86)

³⁷ Keynes maintains that there are reasons to believe that income fluctuations caused by a lack of effective demand are more frequent: “I fancy... that there is a further feature of our actual monetary system which makes a deficiency of effective demand a more frequent danger than the opposite; namely the fact that the money in terms of which the factors of production are remunerated will ‘keep’ more readily than the output which they are being remunerated to produce, so that the need of entrepreneurs to sell, if they are to avoid a running loss, is more pressing than the need of the recipients of income to spend. This is the case because it is a characteristic of finished goods, which are neither consumed nor used but carried in stock, that they incur substantial carrying charges for storage, risk and deterioration, so that they are yielding a negative return for so long as they are held; whereas such expenses are reduced to a minimum approaching zero in the case of money.” (J.M.Keynes 1933b, p. 86); see: Rotheim 1981, 1991; Sardonì 1991.

both cases, the employment of fiat money alters the nature of exchanges as the necessary condition in order to buy goods is not the disposability of goods, but the disposability of money. When bank money is used it is not necessary to possess goods in order to buy money, but it is necessary to fulfil the criteria used by banks to select the demands for credit. In a world in which a fiat money is used we can highlight the means of payment function of money. By this term is meant a different function from that of means of exchange: this term is used to observe that the disposability of money is necessary in order to buy goods, but the disposability of goods is not necessary in order to buy money.

We can emphasize that Keynes's thesis in according to which the presence of fiat money alters the nature of exchanges as compared with what happens in a barter economy is in contrast with the mainstream view which is focused on the role of money as a medium of exchange and envisages money as a spontaneous response to the inefficiencies of barter. The mainstream view asserts that the passage from commodity money to fiat money does not alter the nature of exchanges; the use of fiat money simply reduces the cost of exchanges as it leads to reduced costs of production of the medium of exchange.³⁸

When a bank money is used it is important to define the criteria which are used by the banks in order to create new money; in particular it is important to specify the subjects that receive credit and the operations that are financed. The Keynesian theory of income and the inversion of the causal relation between savings and investments allow us to elaborate a first answer. If we observe that the diffusion of bank money proceeds with the emergence of agents who use the purchasing power obtained to carry out new production projects, we can hold that investments are the principal component of the aggregate demand financed by the banking system.³⁹ The Keynesians have generally neglected the relation between the presence of bank money and the theory of income. In the *General Theory* it is implicitly assumed that firms have the necessary liquidity to carry out their planned investments at the interest rate determined on the money market. Keynes tackled the problem of the financing of spending decisions in some works published between 1937 and 1939 to respond to the criticisms of the *General Theory*, and, in particular, to Ohlin's criticisms of the interest rate theory. Ohlin contrasts Keynes's theory with a new version of the *loanable funds theory*, which holds that the interest rate is determined by the credit demand flow which depends on *ex-ante investment*, and by credit supply flow which depends on *ex-ante saving*. Keynes considers the concept of *ex-ante investment* important because it makes it possible to show that firms that intend to carry out a certain investment project must find the necessary funds.⁴⁰ While, on the one hand, Ohlin's criticisms do lead Keynes to give more importance to the issue of investment decision financing, he rejects the thesis that *ex-ante investment* is financed by *ex-ante saving*. Keynes criticises Ohlin by pointing out that the firms' demand for liquidity must be met by a supply of liquidity

³⁸ This view can be traced out to Smith (1776) and in Ricardo (1817). The modern version of this thesis was elaborated by Menger (1892), and it has been taken up again in different works; see for instance: Brunner and Meltzer 1971, Jones 1976; Kyotaki and Wright 1989; Gravelle 1996.

³⁹ See: Chick 1986.

⁴⁰ “.ex-ante investment is an important, genuine phenomenon, inasmuch as decisions have to be taken and credit or ‘finance’ provided well in advance of the actual process of investment...” (J.M.Keynes 1937c, p. 663).

which can not arise from ex-ante saving.⁴¹ The firms' demand for liquidity is met by the banks which create new money or by the public which gives the existing money to firms:

“... the transition from a lower to a higher scale of activity involves an increased demand for liquid resources which cannot be met without a rise in the rate of interest, unless the banks are ready to lend more cash or the rest of the public to release more cash at the existing rate of interest. If there is no change in the liquidity position, the public can save ex ante and ex post and ex anything else until they are blue in the face, without alleviating the problem in the least... This means that, in general, the banks hold the key position in the transition from a lower to a higher scale of activity. If they refuse to relax, the growing congestion of the short-term loan market or of the new issue market, as the case may be, will inhibit the improvement, no matter how thrifty the public purpose to be out of their future incomes. On the other hand, there will always be *exactly* enough ex post saving to take up the ex post investment and so release the finance which the latter had been previously employing. The investment market can become congested through shortage of cash. It can never become congested through shortage of saving. This is the most fundamental of my conclusions within this field.”⁴²

Saving cannot be the source of investment financing inasmuch as it is the result of the investment process. Notwithstanding these arguments, Keynes does not specify a credit market that is distinct from the money market; as is well known, Keynes considers firms' demand for liquidity as an additional component of the demand for money, which he calls 'finance motive'. In this way, Keynes can tackle the issue of investment financing or, in other words, he can describe the process of capital formation without substantially altering the theoretical framework of the *General Theory*.⁴³

I think that it is not possible to give relevance to investment decision financing by considering only the money market. In a world in which bank money is used, money does not fall from the sky, but banks create money through a debt contract by which they finance spending decisions of agents who do not have purchasing power. It is therefore necessary to provide a fully fledged specification of the credit market, in order to analyse how spending decisions are financed. I think that the specification of the credit market provides valid support for Keynes's thesis that the presence of fiat money substantially alters the structure of the economic system.

I believe that Keynes's arguments can have greater relevance if a credit market is specified. In order to specify a credit market separate from the money market it is convenient to use the distinction between capital account and income account introduced by Tobin (1961,1969,1982). The capital account describes all the assets and the liabilities of the institutional sectors (families, firms, public sector, financial intermediaries) and a capital account theory analyses the factors which determine the supply and demand of the various assets. It is therefore composed of stock variables; the money market is a component of the capital account. The income account, on the other hand, describes the income flow and a theory of income account analyses the

⁴¹ “... The ex-ante saver has no cash, but it is cash which the ex-ante investor requires. ... Surely nothing is more certain than that the credit or 'finance' required by ex-ante investment is not mainly supplied by ex-ante saving .” (J.M.Keynes 1937c, p. 664-5).

⁴² J.M.Keynes 1937c, p.668.

⁴³ See: Chick 1997, 2000.

factors which determine its level and use. The credit market must be associated with the income account.⁴⁴

A theory of credit must specify a credit demand function and a supply function and it must explain what factors influence the interest rate on credit. On the basis of Keynes's comments on the role of the banks in the investment financing process, we can assume that the demand for credit depends on the investment decisions of firms. Investment decisions therefore assume particular importance, not just because, owing to their instability, they are the principal factor in explaining fluctuations in the levels of income, but also because of the way they are financed. It is assumed that investments are financed by bank credit, while consumption decisions are financed by the distributed income.⁴⁵ The firms which intend to carry out investment projects need to obtain liquidity; this demand for liquidity can be considered as a demand for credit since it is expressed by actors that: a) do not have liquidity, b) when they obtain the cash, they undertake to pay it back at a fixed future date. By specifying the credit demand function, the firms' demand for liquidity aimed at financing investment decisions is distinguished from the demand for money which instead reflects the decisions of wealth-owners.

Keynes's considerations about the role of the banks enable us to describe the characteristics of the credit supply function. This flow depends on the banks' decisions, and is not influenced by saving decisions. In a world in which bank liabilities are used as a means of payment, banks do not increase the creation of money by throwing banknotes from helicopters, but rather by financing operators who undertake to repay the same amount of money, plus a premium represented by the interest.

Distinguishing the credit market from the money market, the process of production and income determination is described by specifying two phases.⁴⁶ In the first phase, firms carry out their investment projects thanks to the financing obtained from the banks; we assume that the liquidity created by the banks permits the realization of the income level predicted by the multiplier theory and a savings flow equal to that of investments. The flow of savings so generated causes a change in the stock of wealth; in the second phase the problem arises of the choice of the composition of wealth. We can consider two opposing situations. Let us suppose that, in the first case, savings are made by firms; in this case firms will be able to pay back the loans received from the banks and the increase in wealth coincides with the accumulation of new capital goods. In the opposite situation, let us assume that the actors that save are households; in this case, the increase in household wealth is translated into an increase in the demand for financial assets and, hence, also into an increase in the demand for money. This demand for money finds as a counterpart the supply of money, which is composed of the banks' liabilities. In this way the decision of the banks influence the supply of credit and cash; these two variables do not coincide as they do not constitute the only components of bank assets and liabilities.⁴⁷

From this analysis it emerges that the credit market in an economy where bank money is used has very different features from the credit market of a barter economy. In a barter economy the object of the credit is the resources which are not consumed by

⁴⁴ In support of the view that credit and money should be distinguished see: Rochon (1997); (1999).

⁴⁵ This point is stressed by Minsky (1980, p. 27).

⁴⁶ See: De Carvalho (1997).

⁴⁷ See: Arestis and Howells (1996), Dow (1996; 1998), Bertocco (2001).

savers and the interest rate is the variable that balances savings and investment decisions. In a monetary economy the credit supply depends on the banks decisions and the interest rate on loans is independent of savings decisions. While the neo-classical theory of credit considers the presence of savers as a necessary pre-condition for the existence of a credit market, a Keynesian theory of credit stresses that in an economy in which bank money is used the credit market is founded on the relation between the bank and the firm, inasmuch as the banks do not lend resources which have previously been saved by other agents, but rather they give the entrepreneur new purchasing power.

This description of the credit market provides valid support for Keynes's thesis that the presence of fiat money substantially alters the structure of the economic system. The spread of the use of bank money proceeds simultaneously with the emergence of a group of agents willing to obtain money today against the promise to repay the amount received at a given future date. It would be unrealistic to think that these agents are simply individuals who prefer to expand present consumption and forgo future consumption; those who take out loans are, instead, agents who are convinced that they can use the purchasing power obtained in productive activities which will enable them to obtain sufficient returns to repay the debt. The specification of a credit market connected with the creation of bank money underlines a fundamental change in the structure of the economic system; in particular, it marks the passage from an exchange economy, made up of operators with given resources whose only concern is to find an effective system of exchanges, to a production economy in which the level, composition and distribution of income depend on the decisions of the entrepreneurs who plan to carry out new investment projects and the banks that select which entrepreneurs to finance.

This credit theory enables us to highlight Keynes's views on uncertainty. The spread of bank money contributes to the creation of an economic system in which uncertainty takes on a decisive role. Even in an exchange economy the use of money is associated with the presence of uncertainty. Hahn (1982) observed that in a Walrasian economy in which it is possible to make contingent contracts, there is no need to use money as all the exchanges take place at the one time. The use of money is justified in a sequential economy in which exchanges take place in successive moments. The possibility of successive exchanges means that it is necessary to introduce expectations and thus uncertainty into the analysis.

The dimensions of expectations and uncertainty take on an even greater relevance than that defined by Hahn if we abandon the logic of exchange and consider the characteristics of a 'monetary economy'. In a world in which bank money is used, the process of the creation of money is linked to the expansion of credit and therefore to the increase in the number of entrepreneurs who gamble on their ability to make enough productive activity to generate sufficient revenues to meet their loan repayment commitments. In a world in which the spending for investments becomes a significant quota of the effective demand, uncertainty acquires a different importance than it would in a 'real-exchange economy'. Keynes is well aware of this:

“..the whole object of the accumulation of wealth is to produce results, or potential results, at a comparatively distant, and sometimes at an *indefinitely* distant, date. Thus the fact that our knowledge of the future is fluctuating, vague and uncertain, renders wealth a peculiarly unsuitable subject for the methods of the classical economic theory. This theory might work very well in a world in which economic goods were necessarily consumed

within a short interval of their being produced. But it requires, I suggest, considerable amendment if it is to be applied to a world in which the accumulation of wealth for an indefinitely postponed future is an important factor; and the greater the proportionate part played by such wealth accumulation the more essential does such amendment become.”⁴⁸

Thus, we can observe that the diffusion of bank money is accompanied by a transformation of the economic system which makes it impossible to compare with a barter economy; a monetary economy is characterized by an extensive credit market and by a high level of investments and this makes the extent of the uncertainty fundamental.

There are two aspects of the banks' action in the presence of uncertainty which are worth highlighting. To introduce the first one we observe, using Keynes's approach, that in condition of uncertainty not even the banks possess objective criteria that allow them to know the 'true' probability distribution of future investments returns. In the real world, characterized by the presence of uncertainty, the banks take their decisions on the basis of conventional criteria, making their decision highly discretionary; therefore the banks share with the entrepreneurs the responsibility of deciding which investments are carried out; by their decisions they influence the development of the economic system. Keynes believed that the conventional judgements necessary to take decisions in conditions of uncertainty are subject to sudden changes.⁴⁹ It can thus be assumed that also the evaluation criteria applied by the banks can change rapidly, provoking deep instability in the economic system. Minsky is the Keynesian economist who has most studied the instability of capitalist economies. The financial relations connected with the investment decisions of firms define the temporal dimension of the economic process since they make it possible to distinguish a past, present and a future. The ability of firms today to repay the loans contracted in the past depends on the current profits and therefore on the income level, which in turn depends on the investments which the firms intend to realize on the basis of their expectation of future profit; this, Minsky observes, makes a capitalistic economy very unstable.⁵⁰ Minsky explains that the alternation of phases of boom and bust is due to changes in the banks' criteria in appraising firms' investment projects. The application of permissive criteria drives the boom phases, encouraging firms to increase their borrowing and, consequently, their debt repayment commitments; this creates the conditions for a crisis caused by events that prevent firms from honoring their repayment obligations. Minsky emphasizes that there is an endogenous tendency towards instability as, in the quiet periods, the ability of firms to repay their loans constitutes a confirmation of the validity of their projections, and induces the banks to believe that they have applied excessively stringent criteria in assessing the firms' requests for finance. This leads, on the one hand, the firms to plan more risky

⁴⁸ Keynes 1937a, CW, XIV p.113

⁴⁹“Now a practical theory of the future ... has certain marked characteristics. In particular ... it is subject to sudden and violent changes. The practice of calmness and immobility, of certainty and security, suddenly breaks down. New fears and hopes will, without warning, take charge of human conduct. The forces of disillusion may suddenly impose a new conventional basis of valuation .” Keynes, 1937a, pp. 114-5.

⁵⁰ Minsky 1982, p. 65; see also: Minsky (1975), (1980).

investment projects, and, on the other, the banks to apply less rigid assessment criteria; this behaviour will transform: "... doing well in a speculative investment boom"⁵¹

The second aspect worth noting is that, in the presence of uncertainty, banks can choose to ration credit despite the fact that they are able to create credit endogenously.⁵² Reasoning within the NKs' approach, the two concepts of credit rationing and credit supply endogeneity appear to be contradictory. Indeed, we must remember that, according to Stiglitz, the rationing equilibrium depends not only on the presence of asymmetric information, but also on the characteristics of the credit supply function. We must assume that the credit supply is constrained by the availability of monetary base, or else that it is an increasing function of the banks' expected rate of return. If the credit supply function was perfectly elastic at the interest rate that maximises the banks' expected profits, there would be no rationing equilibrium. In the presence of uncertainty the situation is different; it would be possible to have credit rationing even if the banks were able to satisfy all the credit demand corresponding to any interest rate level. Let us assume that banks set the interest rate by applying a mark-up at a benchmark rate which could be the bond rate or an interest rate controlled directly by the monetary authorities; in this case, rationing can occur even when banks have the same information as firms. In conditions of uncertainty, credit rationing arises due to the fact that firms and banks may formulate different expectations regarding the future results of the same investment project even when the same information is available to them; the bank might be less optimistic about the project's future returns, or it could be more risk averse. As Tobin (1980, p.10) states:

"Typically (debtors) indebtedness is rationed by lenders, not just because of market imperfection but because the borrower has greater optimism about his own prospects and the value of his collateral, or greater willingness to assume risk and to die insolvent, than the lender regards as objectively and prudently justified."

This rationing phenomenon has different characteristics from the one described by the NKs; Stiglitz, in fact, points out that, at the rationing equilibrium, the demand for credit from firms which are - from the banks' standpoint - identical to firms which do obtain financing, is not satisfied. However, in the presence of uncertainty, the banks refuse to finance firms which they consider different from the others, in other words, firms which they do not deem to be credit worthy.⁵³

Thus, we can say that, in a Keynesian framework, the role of the banks is defined by the combination of two functions: in the first place, the banks grant credit by creating new money; secondly, banks are institutions which, in conditions of uncertainty, assume the responsibility of choosing the investments which should be made. The NKs do not highlight the monetary role of banks, that is, their ability to offer credit by creating new money; as a matter of fact, they claim that the unique feature of banks is the nature of their assets rather than their liabilities. Such lack of interest in the monetary function of banks is probably due to the conviction that, in the last analysis, the credit supply depends on savings decisions. In contrast, the significance attributed to the monetary function highlights the fact that the credit

⁵¹ Minsky 1982, p. 67.

⁵² See: Lavoie 1992; Wolfson 1996.

⁵³ See: Wolfson 1996.

supply need not imply a saving decision, and that the presence of savers is not a prerequisite for the existence of a credit relation; this relation regards first and foremost banks and debtors. It is important to emphasize that the monetary function of banks is independent of the presence or absence of asymmetric information; this function is important also in the case in which it is assumed that the banks have the same information at their disposal as the firms do.

Finally, we can note that the theory put forward in this section underlines that the credit market is substantially different from Akerlof's used car market. In the case of the used car market we can assume that the quantity and the quality of the cars is independent of the choices of the intermediaries who specialize in evaluating the quality of cars (the merchants). However, in the credit market, the amount of the credit depends on the decisions of the financial institutions. Furthermore, in the credit market intermediaries also influence the quality of the credit, as in presence of uncertainty the banks evacuate loan applications by adopting subjective criteria. Therefore, by their choices, they attribute to the investment projects a certain level of quality.

4. A macroeconomic model

In this paragraph, a macroeconomic model illustrating the most important elements of the credit theory outlined in the preceding pages is presented. In particular, this model: a) highlights the monetary role of the banks, that is their ability to offer credit by creating new money. This model is consistent with the Keynes's thesis in according to which the presence of fiat money alters the nature of the exchanges as compared with what happens in a barter economy; b) provides an example of how it is possible to specify functions of credit demand and supply which are distinct from the functions of money supply and demand; c) shows that the specification of the credit demand and supply does not imply acceptance of the loanable funds theory and of the concept of the natural interest rate; d) shows that the importance of the credit market is independent of the presence or absence of asymmetric information; e) finally, this model illustrates the characteristics of a theory of credit rationing which does not depend on the presence of asymmetric information.

Let us consider a system composed of five markets: money in the form of bank deposits, monetary base, bank credit, public bonds and goods. Let us suppose that the banks' balance sheet can be represented as follows (the variables are flows):

$$a) \quad \Delta D + \Delta CD = \Delta ROB + \Delta L$$

The banks issue two types of liabilities: deposits (ΔD) which have a return equal to zero and certificates of deposit (ΔCD); we assume that the CDs are considered by the wealth owners to be perfect substitutes of the public bonds and so the banks pay an interest rate equal to the bond rate r_b on these liabilities.⁵⁴ The banks' assets comprise the loans (ΔL) and the required reserves (ΔROB) which are proportional to the deposits according to the equation:

$$b) \quad \Delta ROB = q_k \Delta D \quad 0 < q_k < 1$$

We can describe the money market using the following equations:

⁵⁴ See: Romer and Romer 1990.

- 1) $D = (1/q_k)MB$
- 2) $D = D(Y; r_b; W)$
- 3) $W = W_{t-1} + S(Y)$

In this model, the money stock coincides with the deposits (D). Let us suppose in a first approximation that the monetary authorities control the monetary base stock (MB) and, hence, the money supply (eq. 1); equation 2) determines the money stock demanded by the operators as a function of income, the bond rate (r_b), and of wealth (W). The wealth available at any time is equal to the level of wealth in the preceding period (W_{t-1}) increased by the saving flow (S) which depends on the current income (Y). The credit market is described by the following equations:

- 4) $?L = I(r_l^*)$
- 5) $\rho^* = (1 + q)r_b$
- 6) $r_l^* = \rho^*/p$
- 7) $?D = D - D_{t-1}$
- 8) $?CD = ?L + ?MB - ?D$

The credit demand flow ($?L$) is equal to the flow of investments desired by firms (I) which depends on the interest rate applied by the banks (r_l^*) as specified by equation 4). In order to define this interest rate, we introduce some assumptions about the banks' behaviour. Let us suppose that the banks provide financing by means of a standard debt contract which provides that the firms, if successful, repay the loans plus the interest; if unsuccessful, the banks shall obtain the whole result of the investment. Let us assume that the banks behave in an oligopolistic manner; their objective is to obtain an expected profit rate ρ^* , applying a mark-up $(1 + q)$ at the rate r_b , according to the equation 5). To achieve this objective the banks will have to apply an adequate interest rate value (r_l) to the loans given to firms. In order to determine this value we have to make some assumptions about the characteristics of firms and the information available to banks. Let us introduce, as a first approximation, analogous assumptions to those used by the NKs. In other words, we suppose that it is possible to represent the future income of investment projects in probability terms. This approach allows us to show how the non-neutrality of the monetary variables is independent of the presence or absence of asymmetric information. Let us suppose, as a preliminary approximation, that the firms which ask for credit are perfectly homogenous: every firm intends to realise an investment project whose cost is equal to K, and asks for an amount of credit equal to K. All the projects have the same characteristics: if successful, they enable a result equal to $R > K$ to be obtained with probability equal to (p), and, if unsuccessful, a result equal to K with probability equal to $(1 - p)$.⁵⁵ If we suppose that firms are indifferent to risk, they will decide to ask for a loan if their expected return $E(\Pi)$ is higher than zero; since the banks give loans at the rate (r_l), we get:

c) $E(\Pi) = [R - (1 + r_l)K]p$

The maximum interest rate which firms are willing to pay will therefore be:

d) $r_l = R/K - 1$

The gross return expected by the banks $E_b(GR)$ will be equal to:

e) $E_b(GR) = p(1 + r_l)K + K(1 - p)$

The profit expected by the banks will be equal to:

f) $E_b(?) = E_b(GR) - K$

from which we get the expression of the expected rate of return:

⁵⁵This assumption simplifies the model as it eliminates the possibility of bankruptcy; see Hillier 1997.

$$g) \rho = (E_b(GR) - K)/K = r_l p$$

To obtain an expected rate of profit of ρ^* , the banks will have to apply an interest rate of $r_l^* = \rho^*/p$ on the loans (eq. 6); the banks will be able to set this rate if: $r_l^* = r_l$.

Equation 7) determines the money flow (ΔD), while equation 8) determines the flow of DCs which must be created by the banks in order to adjust the supply of credit to the demand. As the reserve requirement regards only that component of liabilities which is composed of deposits, D, the banks can expand the credit independently of the amount of the monetary base, creating CDs.⁵⁶ Equation 9) describes the income level as a function of the autonomous demand formed by the investment flows and public spending G.

$$9) Y = Y(I(r_l^*), G)$$

This model is composed of nine equations and nine unknowns : D, Y, W, r_b , ρ^* , r_l^* , ΔL , ΔCD , ΔD . The credit supply is not influenced by saving decisions, the savings flow is a consequence of investment decisions. Credit is an endogenous variable; we can note that the banks through the creation of CDs are able to satisfy the firms' demand for credit.⁵⁷

In this model, the presence of asymmetric information does not change the characteristics of the credit markets and in particular of the credit supply function, it simply influences the value of the interest rate applied on loans by the banks. Let us, in fact, suppose that firms can be divided into two groups depending on the

⁵⁶ In this model credit is endogenous. As credit and money are separate variables, the endogeneity of the credit does not necessarily imply the endogeneity of money. In fact, in the model it is assumed that money supply depends on the monetary base. The money supply could also be considered endogenous if it is assumed that the monetary authorities set the bond rate and adjust the creation of monetary base to demand arising from banks; see for example Godley 1999.

⁵⁷ We can show that the flow of CDs created by the banks is consistent with the households' demand for CDs. It is possible to define the demand for CDs starting from the households' balance sheet:

$$a) W = D + CD + B_H$$

D = money stock; B_H = Households' bonds

If we use flow variables, we have:

$$b) S = \Delta D + \Delta CD + \Delta B_H$$

The wealth owners will buy all the government bonds not purchased by the central bank:

$$c) \Delta B_H = \Delta B - \Delta B_{CB}$$

The flow of bonds purchased by the central bank (ΔB_{CB}) coincides with the flow of monetary base which is used by the banks in order to found the reserve fund:

$$d) \Delta B_{CB} = \Delta BM = \Delta ROB$$

On the ground of these relations, it is possible to obtain the demand for CDs:

$$e) \Delta CD = S - \Delta D - \Delta B_H = S - \Delta D - \Delta B + \Delta B_{CB}$$

If we observe that:

$$f) S = I + G - T$$

and:

$$g) I = \Delta L$$

and :

$$h) G - T = \Delta B$$

we obtain:

$$i) S = \Delta L + \Delta B$$

Therefore:

$$l) \Delta CD = \Delta L + \Delta B - \Delta B - \Delta D + \Delta MB$$

At least we have:

$$m) \Delta CD = \Delta L - \Delta D + \Delta MB$$

Equation -m- coincides with equation 8). This model does not specify the interest flows; for a more detailed model see: Godley 1999.

characteristics of the investment projects which they intend to realise.⁵⁸ Let us also suppose that the projects of the firms which belong to group (i) obtain, if they are successful, a value equal to R_i with probability (p_i) and, if they are not successful, a value equal to K with probability ($1 - p_i$). On the other hand, the projects of the firms which belong to the group (j) shall obtain, in the event that they are successful, a result equal to R_j with probability (p_j) and in the event that are not successful, a value equal to K with probability ($1 - p_j$). Let us further suppose that the expected value of the two investment projects is the same; hence we get:

$$h) E(R)_i = R_i p_i - K(1 - p_i) = E(R)_j = R_j p_j - K(1 - p_j)$$

As the expected return of the two projects is the same, the less risky project is also the project that, if successful, will produce the lower result. If, for example, it is the case that: $p_i > p_j$, then we will also get: $R_i < R_j$. This implies that the maximum interest rate that the firms of group (i) will be willing to pay shall be inferior to the one that the firms of group -j- are willing to pay. On the basis of equation d) we can state that the maximum rate that firms of group (i) are willing to pay will be equal to: $r_i' = R_i/K - 1$, while the maximum rate that the firms of group (j) are willing to pay will be equal to: $r_j' = R_j/K - 1$.

The banks' problem is to stabilise the interest rate to apply to firms in order to obtain an expected rate of return equal to ρ^* . The solution to this problem will depend on whether or not there is asymmetric information. If the banks were perfectly able to recognise to which group each firm belongs, they would apply two different interest rates. On the basis of equation e) we can observe that the expected gross return flow deriving from the loans to firms of group (i) will be equal to:

$$i) E_b(GR_i) = p_i(1 + r_i)K + K(1 - p_i)$$

from which we get:

$$l) \rho_i = (E_b(GR_i) - K)/K = r_i p_i$$

So, in order to obtain an expected rate of return of ρ^* on the loans granted to the companies of group (i), the banks will have to apply to them a rate equal to: $r_i^* = \rho^*/p_i$. In the same way, in order to obtain an expected rate of return of ρ^* on the loans granted to firms of the group (j), the banks will have to apply to them a rate of: $r_j^* = \rho^*/p_j$.

In the case in which the banks are not able to distinguish between the firms belonging to the two groups, they will apply just one rate of interest. As r_i' is the maximum value of the interest rate which the companies of group (i) are willing to pay, for values of $r_l = r_i'$, both groups of firms shall ask for credit; therefore the expression of the expected rate of return of the banks shall be:

$$m) \rho_{ij} = r_l p_i n_i + r_l p_j n_j = r_l (p_i n_i + p_j n_j)$$

where n_i and n_j represent the proportion of group (i) and group (j) firms out of the total. In this case, in order to obtain an expected rate of return of ρ^* the banks will have to apply an interest rate of:

$$n) r_l^* = \rho^*/(p_i n_i + p_j n_j)$$

This value will be between r_i^* e r_j^* ; in the presence of asymmetric information, therefore, the firms of group (i) pay a higher rate than they would in the case of perfect information. We can illustrate these different situations of equilibrium using figure 1,

⁵⁸ The assumptions introduced are the same as those used by the NKs to illustrate the possibility of a rationing equilibrium.

which plots the expected rate of return of the banks on the ordinates, and the interest rate applied on loans on the abscissae.⁵⁹

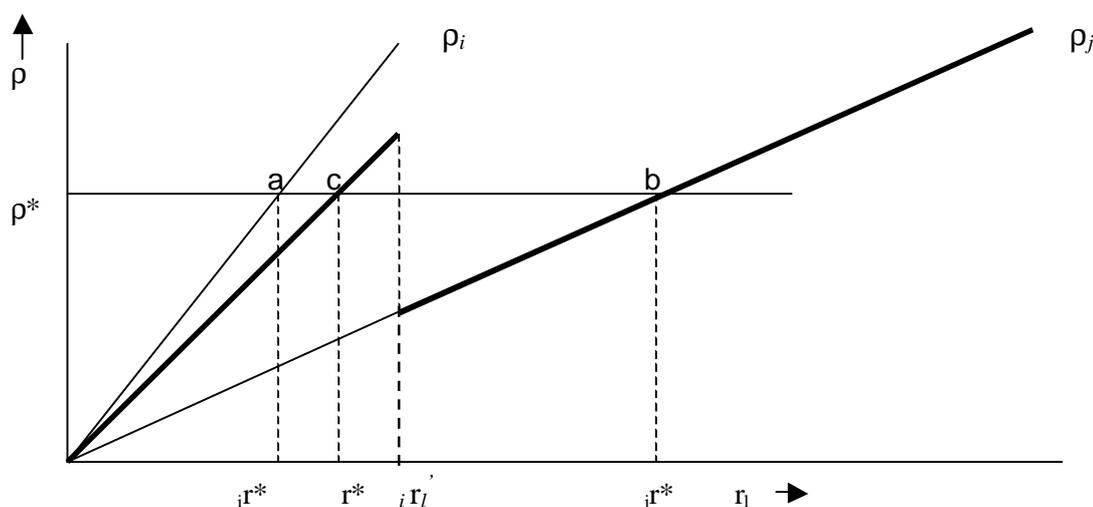


Figure 1

In the case of perfect information we get two different relations: the steeper line, with slope equal to p_i , represents the relationship between the profit rate expected by the banks (ρ_i) and the interest rate applied on the loans granted to the firms of group (i); the less steep line, with a coefficient of p_j , represents the relation which corresponds to the loans provided to the firms of group (j). The broken curve represents the relation between the interest rate applied and the expected rate of return in the case of asymmetric information. This curve is discontinuous at the point where the interest rate is $i r_l'$. Given the target value of the expected rate of return ρ^* , the values of the interest rate which should be applied by the banks can be read on the plotted curves. In the case of perfect information, the banks will apply two different rates: the rate which corresponds to point (a) will be applied to the group (i) firms, and that which corresponds to point (b) to group (j) firms. In the presence of asymmetric information, on the other hand, the banks apply the rate which corresponds to point (c) to all the firms.

We can point out some elements that characterise this model. Firstly, we can note that money and credit are independent variables. Monetary authorities control money supply (eq. 1), while the amount of credit depends on the investment decisions that firms intend to carry out and on the quantity of credit that banks are willing to provide. Secondly, we can note that the model is consistent with the thesis according to which the credit supply is completely independent of saving decisions. Thirdly, the model shows that the presence of asymmetric information does not alter the characteristics of the credit market: in both the case of perfect information and asymmetric information, the amount of credit granted is in no way influenced by the savings decisions. The existence of banks is not justified by the presence of information asymmetries, but by the diffusion of bank money; hence the importance of the credit market is not linked to the presence of information asymmetries.

⁵⁹ This figure is taken from Hillier 1997.

In the third section we have argued that the diffusion of bank money and the presence of an important credit market are the elements that allow us to give prominence to a fundamental dimension of Keynesian theory, i.e. uncertainty. We have underlined two important aspects of the banks' action in the presence of uncertainty: a) the fact that in condition of uncertainty not even the banks possess objective criteria that allow them to know the 'true' probability distribution of future investments returns; b) we have noted that in presence of uncertainty banks can choose to ration credit despite the fact that they are able to create credit endogenously.

In order to show an example of a rationing phenomenon induced by the presence of uncertainty and not by the presence of information asymmetries, let us consider a different version of the model. In this case we assume that also the money supply is an endogenous variable; in particular we assume that the monetary authorities set an objective value of the interest rate on bonds (r_b^*) and create the monetary base necessary to meet the money demand expressed by the operators.⁶⁰ We can describe the credit market using the following equations:

- 9) $r_1 = (1 + q)r_b^*$
- 10) $I_d = I(EI; r_1)$
- 11) $?L_d = I_d$
- 12) $?L = L(EB; L_d) \quad ?L < ?L_d$
- 13) $I = ?L$
- 14) $Y = Y(I; G)$

The banks fix (r_1) by applying a mark up to the reference rate established by the central bank (eq. 9); the firms define the investment level desired (I_d) as a function of their expectations (EI) and the interest rate applied by the banks (eq. 10). Firms express a demand for credit ($?L_d$) which is equal to the desired investments (eq. 11). The quantity of credit ($?L$) is fixed by banks as a function of their expectations (EB) and the demand for credit expressed by firms (eq.12). The quantity of credit created by banks will be less than that demanded by firms; as we have recalled in the third section, in condition of uncertainty rationing can occur even when banks have the same information as firms. In condition of uncertainty credit rationing arises due to the fact that firms and banks may formulate different expectations regarding the future results of the same investment projects; moreover it is difficult to imagine a situation in which the banks apply evaluation criteria of investment projects under which all the applications for funding are accepted. If that were the case, the banks' behaviour would spur requests from adventurers and dreamers, and the stability of the banking system would be compromised. The flow of credit determined by the banks defines the amount of investments (eq. 13), while the income level is determined as a function of autonomous demand (eq. 14). This first block of equations determines the 6) unknowns $r_1, I_d, ?L_d, ?L, I, Y$.

The money market can be described by the following equations:

- 15) $D = D(Y, r_b, W)$
- 16) $W = W_{t-1} + S(Y)$
- 17) $?D = D - D_{t-1}$
- 18) $?D = 1/qk?MB$

⁶⁰ This hypothesis seems consistent with the behaviour of developed countries monetary authorities in recent years, which have abandoned the control of monetary aggregates and have chosen an interest rate as an intermediate target. See: Leiderman and Svensson (1995), Mishkin (1999), Bank of England (1999); Romer (2000); Meltzer (2001).

$$19) \Delta CD = \Delta L + \Delta MB - \Delta D$$

Equation 15) determines the money stock demanded by the operators as a function of income, the interest rate set by the central bank and wealth (W). The wealth available in any given period is equal to the value of the wealth of the previous period (W_{t-1}) plus the saving flow (S) which depends on the current income (eq. 16). Equation 17) defines the flow of deposits (ΔD), and equation 18) specifies the value of the monetary base flow which should be created by the central bank to meet the demand for money from the public. Finally, equation 19) determines the flow of CD which allows the banks to meet their budget constraint. This second block of five equations determines the five unknowns: D, W, ΔD , ΔMB , ΔCD .

Conclusions

The basic merit of the NKs' approach is the importance it gives to the credit market and the issue of the financing of spending decisions. In the second section of this paper, some elements of weakness in the NKs' approach have been identified. On the basis of this critical analysis of the NKs' approach, the elements which should distinguish a Keynesian theory of credit and financial institutions have been identified in sections three and four. These elements are based on comments made by Keynes to define the characteristics of a *monetary economy* and on the arguments contained in the response to Ohlin's criticisms:

a) Keynes conceives of this market as a place in which purchasing power is put at the disposal of firms in order to carry out investments. In this market are not transferred the resources which are generated by savings decisions, but rather newly created or already existing means of payment; Keynes attributes a fundamental role to the banks, which finance the firms by creating new means of payment. In a Keynesian framework, the credit supply is determined by the financial institutions and is independent of the savings decisions; the credit relationship regards the banks and the debtors, and not savers and firms;

b) the second element which should feature in a Keynesian theory of credit is a certain emphasis on the presence of uncertainty which allows important aspects of bank action to be demonstrated. In a world without objective criteria to represent the future results of economic decision, the banks are the institution given the responsibility to decide which investment projects can be made by firms. Banks do not necessarily act in conditions of less information than the debtors, but they screen the loan applications by adopting subjective evaluation criteria which are accepted by society at large. Two important aspects of the banks' action have been highlighted. Firstly, it has been observed that the banks' decisions condition the development of the economic system. In other words, they influence the structural changes which characterise a world with uncertainty, in which investment decisions are unique decisions, and the past and present do not constitute a reliable guide to project the future results of economic decisions. The second significant aspect of bank action in conditions of uncertainty is the possibility of a credit rationing equilibrium occurring. This result is not due to the presence of asymmetric information but rather to the discrepancy between the evaluation criteria employed by the banks and that used by firms.

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