

## Credit Rationing: a debate in macroeconomics

Sebastián Barea Lugo

Profesor – Departamento de Administración de Empresas

UPR-Ponce

### Resumen

Se pudiera pensar que en la práctica de dar crédito, mientras más créditos concedieran los bancos, más ganancia obtendrían. Pero cuando el crédito es racionado, sólo se conceden los créditos que tienen una expectativa mayor de ser repagados, y por lo tanto, los bancos reciben lo que esperan. Si en vez de racionar el crédito, los bancos optaran por la política de alzar la prima del préstamo, se podría probar que el efecto neto sería que la cartera de préstamos del banco se compondría entonces de un mayor porcentaje de acreedores que no podrían repagar, y la ganancia sería menor. Así pues, con la práctica de racionar el crédito los bancos obtienen mayor ganancia que cargando mayores primas. Stiglitz obtuvo el premio Nobel en Economía 1981 al proveer la explicación racional de la práctica de racionar el crédito.

Palabras claves: crédito – ganancias – acreedores – Stiglitz – racionar el crédito

### Abstract

Some people could assume that, in giving credit, the more credit the banks would give, the more profit they could make. But when credit is rationed, only the loans with the surest payment return expectancy are accorded, and banks collect what they expect. If instead of rationing credit, banks just asked higher rates for it, the actual effect in the loan portfolio could be proved to be that a higher percentage of loan petitioners would fail to pay, so the loan portfolio would be composed of a higher percentage of unsafe loans and consequently profit would be less. Thus, by rationing credit, banks maximize profit better than by raising interest rates. Stiglitz won the Nobel prize in Economics by providing the rationale for the banks' behavior in credit rationing (1981)

Key words: credit - profit – petitioners - Stiglitz - credit rationing

The credit issue became relevant in the debate on macroeconomics when dealing with monetary policy. Credit rationing, can be seen as an excess demand for credit in which an increase in the interest rate will not be able to clear the market. In other words, if the borrower is unable to borrow the funds at the prevailing interest rate, then credit

rationing occurs. After WW II many economists questioned the efficacy of monetary policy because the demand for credit tends to be interest inelastic. In the 1950's in order to cope with that criticism, the "availability doctrine" was developed [see for example Scott (1957), Kareken (1957), Hodgman (1959)]. The new approach shifted the attention from

the role of the borrower to that of the lender. Emphasis was on the availability of credit rather than on the cost of borrowing; the focus was on the supply side, not on demand. According to this new approach, monetary policy does not depend only on changes on the interest rates but also on changes in the availability of credit. The contention of those who share the availability doctrine was that small changes in interest rates would be able to limit the credit expansion.

The availability doctrine consists basically of three arguments. First, monetary policy can change the liquidity of the bank portfolio. Second, the "lock-in" effect can take place. Third, the interest rate may become inflexible.

The liquidity, or safety margin, consists of the bank government bond holdings in the role of secondary reserves as a precaution for liquidity. The reasoning is that monetary policy through an open market operation by the Fed will increase the interest rates and result in a reduction of the value of the portfolio of government bonds. Eventually this will make the secondary reserves inadequate. In order to restore the liquidity or safety margin the bank will find it necessary to acquire more government bonds. As a consequence there will be less credit available.

Second is the so called "lock-in" effect. Again, an open market sale of bonds by the Federal Reserve Board (Fed) will increase the interest rate, allowing for government holdings of securities to decline in value. The banks will be unwilling to sell their securities, if they do not want to accept a capital loss. One possible reason for not selling the government securities might be that banks are legally required to publish their financial statements. This

unwillingness of the lenders will reduce funds to the private sector limiting the credit available on the market.

Third, there also the contention that the interest rate is established on an imperfectly competitive market and becomes inflexible or rigid. This will result in credit rationing. As said before, credit rationing occurs when the borrower is unable to borrow the funds he wants at the prevailing interest rate. The idea at the time was that credit rationing would enhance tight monetary policy, diminishing aggregate demand by reducing the availability of funds or credit.

In the previous scenario, credit rationing was almost a side effect of the monetary policy. Despite the fact that many economists acknowledged the shortage of credit at the time, credit rationing was not yet established as a main theme in economics. The main reason for this was that no one was able to establish a theory in which credit rationing was a rational behavior within the economic theory. In other words, it was not clear how it explained or justified that a bank would not increase the interest rate to increase profits instead of reducing its lending. One explanation that has been offered at this time on why interest rates will not adjust to clear the market has been the usury law.

Credit rationing does not affect every firm in the same way. Larger firms have access to different forms of financing, such as bonds or the equity market, while small firms depend more on bank loans.

Guttentag (1960) offers a different view for rationing. In his view he thinks it more realistic and useful to see credit rationing through non-price terms. Then, rationing can be seen as

the application of different non-price lending terms and, according to Guttentag, this constitutes the core of the rationing process. The loan terms specify not only the interest rates but also compensating balances, collateral, equity, etc. This allows banks to offer different terms to different firms and to exercise some form of rationing.

Hodgman (1960) established one of the first theories to explain credit rationing. For Hodgman this was a rational behavior in the presence of default risk. In his model the risk was measured by the ratio of expected payment to expected loss. From Hodgman's point of view, as the probability of non-payment increased, the supply curve became vertical at some point, and at this point the borrower could offer a higher interest rate but would not be able to secure a loan. As the risk of not repaying the loan increased, the offer curves might even become backward bending. In this framework, reducing the availability of funds becomes a rational behavior for a profit maximizer according to economic theory.

Kane and Malkiel (1965) conclude that even though they admit the possibility of credit rationing it will be rather small in magnitude compared with the advocates of the availability doctrine. They postulate that there is a certain class of customers that the bank will accommodate because of the bank-customer relationship. The main idea is that a customer also brings his deposits to the bank and therefore a refusal to grant a loan might encourage the customer to take his deposits elsewhere. Losing deposits can increase the risk in the sense that deposits become more volatile and the bank is left with less funds. Also, the long run expected

profits might also decrease. Therefore, denying the loan is not an easy task to accomplish if there is a long term customer relationship.

Freimer and Gordon (1965) considered two cases, one in which the entrepreneur had a fixed investment opportunity and another in which the entrepreneur had an open-end investment. They concluded that, as a banker maximized expected profit in the case of a fixed investment opportunity, a point was reached in which increasing the interest rate would not increase the amount of the loan. Therefore, credit rationing would arise. They made the observation, with some numerical examples, that as the interest rate increased the amount of the loan would increase but at a decreasing rate. On the open-end investment case, their model was not clear cut. As the interest rate increased so did the amount of the loan. Then, they made the qualification that real bankers are not indifferent to risk. So, as the amount of the loan increased within the portfolio, diversification decreased and risk increased, implying that the loan amount at some point would cease to increase. Therefore, credit rationing is in accord with profit maximizing behavior, particularly in the case of a fixed investment opportunity.

Jaffee and Modigliani (1969) criticized previous studies by stating that they did not incorporate demand in their models, concentrating only on supply. If credit rationing is defined as excess demand, then, models should include it. In their model they also came out with a backward bending supply curve as in previous studies, although, they did include the demand in their analysis. According to them, credit rationing should be measured as the difference between demand and supply in the

market. Because credit rationing is not observable, they used a proxy variable approach. They proposed that the loan to risk free customers proportion of the total asset portfolio should be used as the proxy. The way they approximated it was by using the loans granted at the prime rate. Jaffee and Modigliani showed that whenever there is uncertainty in loan repayment and banks are unable to discriminate perfectly among customers, credit rationing will be a rational profit maximizing behavior. On the other hand, if banks can perfectly discriminate among borrowers there will be no rationing. Because of the social mores and legal restrictions, it will be almost impossible to charge widely different rates to different customers; therefore, the banks could not discriminate perfectly. They even assert that it could be the case that in order to reduce the overall risk of the loan portfolio it would be appropriate to reduce the size of the loan to the customer.

Jaffee and Russell (1976) later suggested that banks could not distinguish ex-ante between honest and dishonest borrowers. Honest borrowers take loans that they expect to pay. On the other hand, dishonest borrowers will default whenever the cost of default is less than the contracted repayment amount. The model developed by them is based on imperfect information and uncertainty, mainly because borrowers have more information about the likelihood of default than the lenders. So credit rationing could be explained as a response to the adverse selection and moral hazard problem.

In competitive conditions the outcome of the Jaffee and Russell model for the lender is no rationing, because equilibrium is set at the intersection of

the demand and supply. One interesting property under this condition is that the honest borrower ends up paying a premium which will support the dishonest borrowers. On the other hand if the amount of the loan is reduced and the quantity of the loan lies on the supply, not on the demand curve, credit rationing will emerge. According to Jaffee and Russell, borrowers that do not default prefer rationing because there will be some savings due to a lower interest rate. In their analysis for the pure monopolistic case, they concluded that rationing will not be profitable for the lender.

In the end, they realized that their model did not resemble the actual loans market, but in a market structure with some monopoly power, credit rationing could arise. They did not consider the non-price terms into their model, like collateral, maturity, etc.

Credit rationing is usually defined as an excess demand in the loan market. But in a typical case rationing does not necessarily imply a complete denial of a loan. A bank does not want to jeopardize a long term relationship with its customers. There are different ways to ration credit; for example, requiring a larger compensating balance, establishing shorter maturity, reducing the size of the loan, or requiring more collateral, or a combination of all of the above. This form of rationing is known as non-price rationing. In a period of credit tightening, banks will employ these non-price techniques rather than increase the interest rate.

Fried and Howitt (1980) look upon non-price rationing. They assume some form of implicit contract to obtain the credit rationing result. They obtain it by making an analogy between the labor market and the credit market. It consists

of two similar questions. First, why do firms lay workers off instead of adjusting wages? Second, why lenders ration credit instead of changing the interest rate?

According to them if the borrower always negotiated in the spot market then they will be exposed to the risk of fluctuating interest rates. So they argued that there will be an implicit contract between the lender and the borrower in which the lender maintains a more stable interest rate in exchange for a higher return on the loans from the borrower. On the other hand if the bank reaches an implicit contract about interest rates with the borrower, then, when the bank wants to deny a loan it will do it through non-price terms.

Fried and Howitt point out that their theory explains why interest rates do not change much without assuming or imposing determinants from outside the model, for example usury laws. They also stress the importance of the customer relationship, which will explain why long term customers tend to be less rationed than new ones. According to them the likelihood of rationing increases as the cost of funds or making loans increases.

Stiglitz and Weiss (1981) demonstrated that credit rationing is a profit maximizing behavior because of the adverse selection problem. Banks cannot discriminate in the market because the riskiness of the borrowers' projects is not observable. Changing the interest rate also changes the mix of the borrowers. As the interest rate increases, the riskiness of the pool of loans also increases and therefore the rate of return of the loan portfolio drops. Borrowers with less risky investment projects will leave the market, because to be able to pay higher interest rates, their projects

will require a higher yield. But the only way to obtain a higher yield is by investing on riskier projects. Therefore, the bank ends up with fewer applicants of lower credit quality. Increasing the interest rate increases the probability of default, lowering the expected bank profits. So it will be rational for the bank not to adjust the interest rate fully to clear the market. Despite the fact that some borrowers will be willing to offer a higher interest rate they will not be able to secure a loan. Therefore, banks will allow some excess demand in the loans market. This is still considered a rational behavior within economic theory.

Williamson (1987) develops a model in which a debt contract is an optimal arrangement between the borrower and the lender. In this model there is no adverse selection or moral hazard, but there are asymmetric information and monitoring costs. The asymmetry consists in that the borrower can observe the returns of the investment project costlessly but the lender cannot. The equilibrium could be characterized either by credit rationing or not.

Credit rationing in this model is the result of costly monitoring, which in essence is the cost of bankruptcy. Therefore, increasing the interest rate increases the cost of monitoring and the probability of bankruptcy. So the interest rate set by the lender will not necessarily clear the market. Without adverse selection or moral hazard it is possible then to obtain credit rationing as the result.

Riley (1987) postulates that if borrowers could be classified in different categories according to risk then only a single marginal class would be rationed. He also argues that credit rationing is not an important phenomena from an

empirical point of view. On the other hand he concedes that if the bank finds it difficult to classify the borrowers then rationing will follow.

Stiglitz and Weiss (1987a) reply that most of the time the bank does not have perfect information of the borrowers and can hardly be able to monitor the borrowers' actions perfectly. Therefore, under this scenario, credit rationing will be the outcome despite the different number of Riley categories.

Another way to ration credit would be by reducing the size of the loan. Schreft and Villamil (1992) showed, in a theoretical model characterized by imperfect information, that a profit maximizing lender may ration credit by restricting the size of the loan. In their model small borrowers were more constrained than larger ones, so that small firms ended up receiving a smaller loan than desired.

### **EVIDENCE ON CREDIT RATIONING**

Among the first to make an empirical inquiry into the credit rationing and investment issue was John Hand (1968). His research concentrated on plant and equipment and inventories in the manufacturing sector. He developed and used a total of 24 variables to construct an index that could be used as a proxy to measure credit rationing. The manufacturing sector was divided into two samples. Large firms were those with \$10 million or more of assets, and the small firm sample consists of those with less than \$10 million. In order to assess the effects of credit rationing the factor analysis technique was employed in conjunction with the principal component.

With regard to plant and

equipment investment, he found out that credit rationing was a binding constraint for small firms but not for large ones. This could be explained by the fact that, when the market becomes tight, banks will draw on the secondary reserves up to a safe limit. When banks reach this position, it is more likely that they start to reduce loans to the small business sector. Basically the idea is that the small business sector does not have many alternatives to bank credit: therefore, it is believed that the customer relationship is not jeopardized. Hand also notices that, according to his research, small firms are not affected by changes in the interest rates while large firms are.

On the inventory issue he concluded that large firms are not influenced by credit rationing. For the small firms it is suggested that more extensive data are needed in order to reach definite conclusions.

From an empirical point of view, Jaffee and Modigliani (1969) define credit rationing as dynamic rationing, which in turn is defined as the difference between the actual rate charge and the long run equilibrium rate. This can be measured by the spread between the long run interest and the rate that is prevailing. Their estimates confirm their conjecture; so, they concluded that credit rationing did exist and was significant. On the other hand they could not quantify the effect of credit rationing on real investment expenditures, if any.

Bischoff (1970) did an empirical inquiry on the effects of credit rationing on investment in nonresidential construction. He used the index of credit rationing developed by Hand and Jaffee on an unconstrained third degree polynomial in ten different formulations. He found out that the proxy of credit

rationing entered with the right sign but the coefficients were small and insignificant. Therefore, he concluded that there was no clear evidence of credit rationing on nonresidential construction.

In an empirical assessment of credit rationing, Harris (1974) concluded it did exist. However his definition of it consisted of the non-price terms of the loan, like collateral or maturity. The Quarterly Survey of Interest Rates on Business Loans was used to construct a variable called balance. This variable goes from one to minus one, in accordance with tighter or easier credit terms. He also found out that borrowers are not treated equally. On tighter periods, rationing was stronger on new customers versus established ones. Also, banks were easier on local customers relative to non-local ones. He concluded that the loan terms moved in the same direction as the interest rates. Also credit rationing, according to him, was not temporary. On the other hand, he was not able to quantify the magnitude of the effects of credit rationing.

Sealey's (1979) research showed that in the U.S. the commercial and industrial loans were supply-determined most of the time. Also he found that the loan rate responded slowly to excess demand. In tight monetary periods, credit rationing accelerated monetary policy relative to periods of monetary expansion.

King (1986) finds mixed support for the credit rationing hypothesis. From his estimates he concludes that most of the time there is excess demand, which he interprets as consistent with credit rationing. On the other hand from his supply equation he concludes that because it responds to the loan rate this should be interpreted as inconsistent

with the rationing hypothesis. Also in his test he found out that bank asset aggregates did not contain any information that could aid in the prediction of output. Therefore, he also concludes that credit rationing does not play any significant role at the macroeconomic level.

Fazzari, Hubbard and Petersen (1988) provided strong evidence of financial constraints on investment. The authors divided the firms into three groups, according to their retention ratio. Retention ratio is the proportion of retained earnings by the firm. It went from almost 80% for the smallest firm up to 50% for firms with assets of more than \$1 billion. They found that internal and external finance are not perfect substitutes. Because of asymmetric information, the cost of capital of retained earnings was lower than external finance. They showed that cash flow in fact had a direct link with investment, specifically for the small firm. Some of the firms were dependent on bank loans. What needs to be proved is that this sector is binding to the whole economy.

Berger and Udell (1992) carry out an empirical study in which they found evidence that the interest rate is sticky, but according to them this does not imply credit rationing. Their main source of data was the Federal Reserve's Survey of Terms of Bank Lending. They came out with a test they believe will differentiate between the stickiness of the interest rate and credit rationing. Their tests focus on the proportion of new loans that are issued under commitment, because under commitment the lender cannot deny credit to the borrower. Their conjecture is that in the credit rationing case this proportion should increase.

Among their findings the stickiness between commitment and non commitment loans are nearly the same. They suggest that the stickiness of the loan rate does not imply credit rationing as most empirical literatures suggest. According to them the proportion of new loans issued under commitment does not increase when the interest rate rises. Therefore, they concluded that most of the interest rate stickiness does not reflect credit rationing, and that credit rationing is not a significant macroeconomic phenomenon.

Pérez (1998) realized another test, to verify the existence of credit rationing. He criticizes the previous studies because they consisted of examining the response of loan rates to other market interest rates. For the test he uses firm data and points out that aggregate data averages out the data. It is suggested that with aggregate data it is possible that some firms are rationed but the average firm is not.

He builds three equations, one for demand, one for supply and one for the interest rate. These were estimated by the maximum likelihood method. The data was divided into three samples according to assets size.

In all three samples there were both rationed and non-rationed firms. He concludes that credit rationing does exist from an empirical point of view.

Today current rationale for credit rationing comes from Stiglitz and Weiss (1981). They establish in economic theory that credit rationing is the result of asymmetric information in the form of adverse selection and/or moral hazard.

Wojnilower (1980) analyzed the credit rationing or credit crunches from the 1950's up to the 1980's. Among his conclusions is that credit is fundamentally supply-determined and

that demand for credit is essentially insensitive to interest rates.

For Wojnilower rate ceilings were responsible for much of the credit rationing. In his view rationing is a side effect of disintermediation. When the rate ceiling on deposits becomes binding some depositors will reduce their deposits at the bank and will seek higher interest on other financial instruments. With fewer funds, the bank will reduce its lending to the firms. Those who can go directly to the financial market will obtain funds, but others will not be able to and will be rationed.

Wojnilower concluded that interest rates were not a binding constraint but the availability of credit was binding. He proposed that credit crunches play a constructive role in the economy because, without them, the financial crisis would have been much worse.

## **THE FINANCIAL SYSTEM**

One reason research did not previously consider financial factors were presented in a paper by Modigliani and Miller (1958). They showed that in a world without taxes, with complete markets and perfect information the firms' capital structure does not matter. In other words, the real variables of the economy are not determined or influenced by financial variables. Therefore, financial issues become irrelevant.

Friedman and Schwartz (1963) focused on money supply. In their study of the monetary history of the United States, one of their main points was that during the Great Depression there was a clear relationship between money and output. After the Great Depression if any financial variable needed to be



studied, that variable was money. In other words money contains all the financial information of the economy. Within this context credit did not bring any additional information and was unimportant in order to understand the economy.

Fama (1980) went even further and said that in an unregulated banking system money did not have a role other than being a numeraire. Also, banks are not necessary for the determination of prices or real economic activity. Therefore, the irrelevance to Modigliani and Miller of financing was extended to the entire financial system. Credit was not in the mainstream of economics.

Another possible reason why money has received more attention in the literature is that despite both money and credit being used as a medium of exchange, money is an asset and credit is a liability. Therefore, money being an asset, as more of it is accumulated, wealth increases. Credit on the other hand is a liability, the more of it the less wealth now and in the future. From a macroeconomic perspective, building an economic model is easier around money than credit. There is also another crucial difference. When money is used no further information is required. But when credit is used usually more information follows.

Bernanke (1983a) in a well quoted paper brings the issue of credit to the forefront. He proposes that besides the supply of money as an explanation of the Great Depression there are other financial factors that complemented it. He came to the conclusion that money by itself is not able to explain the duration and profundity of the Great Depression. Empirically he fitted four equations of output. In the first two only monetary variables were used. In the

next two he added proxies for financial variables. The first two only capture about half of the decline in output. The addition of financial variables improved the performance of the equations.

For Bernanke not just the liability side but also the asset side of the balance sheet of the bank offers a better explanation of the episode. Basically the main argument is that during the great Depression the cost of credit intermediation increased. This in turn reduced the flow of credit or funds to certain sectors of the economy like small business, reducing output. Therefore, credit also matters, not just money.

Credit enhances the economy because it allows bigger markets and easier transactions in the industrial sector. Most of the machinery and equipment used by industrial firms is tailor made. Credit makes the transactions easier for the firm that buys capital goods. The credit process actually goes both ways. For the firm that buys the equipment the credit avoids a disruption in its production and financial situation. For the firm that produces and sells capital goods credit makes possible the enhancement of their business by selling more equipment. It also enhances the economy because the more capital goods that are produced and sold, the larger is the capacity of the economy overall.

The financial system indeed enhances our economic welfare by increasing the ability of the economy to produce goods and services. This is accomplished by matching lenders and borrowers in the market. When an economic agent has an investment opportunity but does not have the necessary funds, the financial system is able to fund the agent. Intermediaries, especially banks are able to pool funds

among many small savers to lend them out in particular to small business.

One major obstacle in financial markets is transaction and information cost. As these two costs increase the cost of funds for the borrower increases and the return for the lender is reduced. Outsider lenders do not have all the information about the firm. They will require a higher interest rate to be compensated for the higher risk. This in turn will make external funds more expensive than internal funds.

In general it is widely assumed that different sources of financing are substitutes. Because of asymmetric information, different alternatives of finance are imperfect substitutes. Asymmetric information occurs when the borrower and the lender do not share the same information.

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