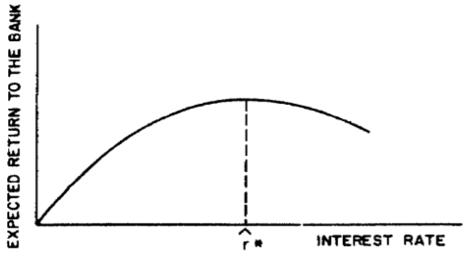
EQUILIBRIUM CREDIT RATIONING

(Stiglitz and Weiss, AER, 1981)

A basic assumption of economics is that if prices react to excess demand, there should be no rationing. However, rationing of credit and unemployment exists in practice. They imply in excess demand for loans and oversupply of workers, respectively. One way of explaining these phenomena is by the existence of price stickness for capital and labor, in which case the rationing of credit and labor market vacancies would be observed only in the transition between long-run equilibrium positions. Complementarily, structural unemployment (i.e., above any natural rate of unemployment) or credit rationing could be explained by restrictions imposed by the government, such as minimum wage policy or the usury law. This text proposes an equilibrium (i.e., non *ad-hoc*) explanation for persistent excess demand in the credit market based on problems of information asymmetry between lenders and borrowers (similarly, the argument could be used to explain persistent excess supply in the labor market).

Key-Points: After a certain point, increasing the contractual interest rate decreases the lender's return.



Case 1: Adverse Selection (two types of borrowers)

X = return if well succeeded; 0 = return if not succeeded (failure); p = probability of success

Borrowers withou risk ---> (p^a, X^a) ; λ = Fraction of the population
Risky Borrowers ---> (p^b, X^b) ; 1- λ = Fraction of the population

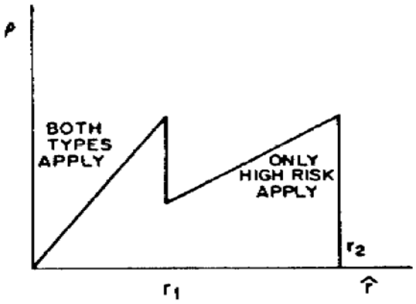
$$p^a > p^b \; ; \; X^a < X^b \; ; \; p^a \, . \, X^a > p^b \, . \, X^b$$

Size of the loan = 1; R = gross rate of return

Calculating Expected Return; E = Expected Return
(a) R =< X^a ---> both types of agents take loans ---> E = R . $\mathbb{p}^{me}$ where: $\mathbb{p}^{me} = \lambda \, . \, p^a + (1-\lambda) \, . \, p^b$

(b) $X^a <$ R =< X^b ---> Only risky borrowers take loans ---> E = R . $\mathbb{p}^b$

Lesson: Fixed equilibrium interest rate with excess demand for loans



Case 2: Moral Hazard - two types of actions but one type of borrower)

Two techniques: $p^a > p^b$; $X^a < X^b$; $p^a \cdot X^a > p^b \cdot X^b$

Exists R^* subject to
| $R \leq R^*$ ---> without risk ---> $E = R \cdot p^a$
| $R > R^*$ ---> with risk ---> $E = R \cdot p^b$

R^* satisfies $p^a \cdot (X^a - R^*) = p^b \cdot (X^b - R^*)$

Incentive Compatibility Restriction ---> $R^* = (p^a \cdot X^a - p^b \cdot X^b) / (p^a - p^b)$

ABSTRACT: The adverse selection aspect of interest rate is a consequence of different borrowers having different probabilities of repaying their debt. The expected return to the bank obviously depends on the probability of repayment, so the bank would like to be able to identify "good borrowers" who are more likely to pay. It is difficult to identify "good borrowers" and to do so requires the bank to use a variety of **screening devices**. The interest rate that an individual is willing to pay may act as one such screening device: those who are willing to pay high interest rates may, on average, be worse risks; they are willing to borrow at high interest rates because they perceive their probability of repaying the loan to be low. As the interest rate rises, the average "riskiness" of those who borrrow increases, possibly lowering the bank's profits. Similarly, as the interest rate and other terms of the contract change, the behavior of the borrower is likely to change. For instance, raising interest rates decreases the return on projects that succeed. Higher interest rates induce firms to undertake projects with lower probabilities of success but higher payoffs when successful.

In a world with perfect and costless information, the bank would precisely stipulate all the actions that the borrower could undertake that might affect the return to the loan. However, **the bank is not able to directly control all the actions of the borrower.** Therefore, it will formulate the terms of the loan contract in a manner designed to induce the borrower to take actions that are in the interest of the bank as well as to attract low-risk borrowers. For both these reasons, the expected return by the bank may increase less rapidly than the interest rate and beyond a point may actually decrease, as depicted in figure 1. The interest rate at which the expected return to the bank is maximized, we refer to as the "bank-optimal" rate. Both the demand for loans and the supply of funds are functions of the interest rate (the latter being determined by the expected return at the "bank-optimal" rate), Clearly, it is conceivable that at the demand for funds exceeds the supply of funds. Traditional analysis would argue that in the presence of an excess demand for loans, unsatisfied borrowers would offer to pay a higher interest rate to the bank, bidding up the interest rate until demand equals supply. **But although supply does not equal demand at the "bank-optimal" rate, it is the equilibrium interest rate!** The bank would not lend to an individual who offered to pay more than a certain interest rate. In the bank's judgment, such a loan is likely to be a worse risk than the average loan at this certain interest rate level and the expected return to a loan at an interest rate above th is actually lower than the expected return to the loans the bank is presently making. Hence, there are no competitive forces leading supply to equal demand, and credit is rationed.

It is not the argument that credit rationing will always characterize capital markets but rather that it may occur under not implausible assumptions concerning borrower and lender behavior. This paper thus provides the first theoretical justification of true credit- rationing. Previous studies have sought to explain why each individual faces an upward-sloping interest-rate schedule. The explanations offered are (a) the probability or default for any particular borrower increases as the amount borrowed increases, or (b) the mix of borrowers changes adversely. In these circumstances we would not expect loans of different size to pay the same interest rate any more than we would expect two borrowers, one of whom has a reputation for prudence and the other a reputation as a bad credit risk, to be able to borrow at the same interest rate.

The term credit rationing is reserved here for situations in which either (a) among identical loan applicants, some receive a loan and others do not, and the rejected applicants would not receive a loan even if they offered to pay a higher interest rate, or (b) there are identifiable groups of individuals in the population who, with a given supply of credit are unable to obtain loans at any interest rate, even though with a larger supply of credit, they would.

In this equilibrium model with credit rationing, both borrowers and banks seek to maximize profits, the former through their choice of a project, the latter through the interest rate they charge borrowers the interest rate received by depositers is determined by the zero-profit condition. Obviously, we are not discussing a "price-taking" equilibrium. Our equilibrium notion is competitive in that banks compete. One means by which they compete is by their choice of a price (interest rate) that maximizes their profits. The reader should notice that in this model, there are interest rates at which the demand for loanable funds equals the supply of loanable funds. However, these are not in general equilibrium interest rates. If, at those interest rates, banks could increase their profits by lowering the interest rate charged borrowers, they would do so. Although these results are presented in the context of credit markets, they are applicable to a wide class of principal-agent problems (including employer-employee relationship).