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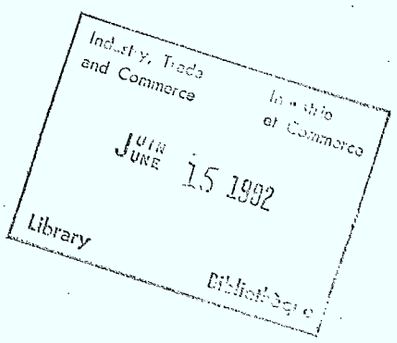

ON "GAPS" IN CAPITAL MARKETS [v.10]

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ON "GAPS" IN CAPITAL MARKETS

Attempts to justify government financing aid to small business have often taken the form of allegations that private financial markets contain distortions, usually called "gaps", which cause small business to receive less financing than is required for the most efficient allocation of the resources of the economy. The purpose of this paper is to outline the types of "gaps" that can occur, the conditions necessary for their existence, and the kinds of government intervention that can be justified by an appeal to "gaps". There is a large liturature on this subject, of which the review articles of Corcoran (1976) and Baltensperger (1978) provide useful summaries.

The imperfections that prevent the efficient allocation of capital generally fall into two categories.

1) The market does not clear: There are shortages or gluts at the prevailing price, and for one reason or another the price (in this case, the interest rate and security requirements) does not adjust to equate supply with demand, so that rationing by means other than price is necessary. This is the kind of gap most frequently mentioned in discussions of business credit. There is, it is asserted, a large amount of unsatisfied demand for loans, by borrowers willing to pay more than the prevailing rates, but who are prevented from doing so by institutional or other constraints.

2) The market clears, but at the wrong price: If the price is artificially held above or below the marginal cost, then social and private costs differ, and an inefficient allocation results. This situation might come about through a distorting tax, tariff, and subsidy system, monopoly control of the credit market, legal restrictions, or other causes.

We emphasize in this paper the first of these categories; the second has been extensively considered in the Economic Council of Canada report "Efficiency and Regulation", 1976.

By a "gap" is meant any situation in which potential borrowers willing to pay the opportunity cost of their loans are not allowed to do so, and do not receive loans. It is important to distinguish between arguments for the correction of "gaps" and arguments for subsidies to particular groups. Any argument that a borrower should be provided with capital at less than its opportunity cost is an argument for a subsidy. It is not difficult to show that, in all but one case, to be described below, a gap that can be corrected at all, can be corrected without subsidizing anyone; and it follows that pointing to a gap in the capital market is not, by itself, a sufficient justification for a subsidy program. A subsidy must always be justified separately. Many features of the capital market have been incorrectly identified as gaps requiring intervention; most of these arguments turn out, upon examination, to be calls for subsidies, based on a perceived inappropriateness in market outcomes. Appendix A lists some of the more frequently cited non-gaps.

Excess-Demand Gaps

We now consider in more detail the first type of gap mentioned above, in which the market fails to clear, leaving some potential borrowers willing to pay their opportunity cost but unable to find a willing lender. Most of the literature focuses on three questions:

1) Is the existence of such gaps consistent with "rational" economic behaviour?

2) Is there empirical evidence that such gaps in fact exist?

3) If such gaps exist, can government action improve resource allocation?

Of these three questions, the one in the least satisfactory state is the second: despite a few claims to the contrary, no investigator has yet devised a convincing empirical measure of non-price credit rationing, and subtler questions, such as the origin of such rationing as exists, are virtually unknown ground empirically. Arguments of the "I know a businessman who was refused credit" type are clearly of no use here. Attempts at statistical measurement of credit rationing have been made by, among others, Jaffee and Modigliani (1969), Harris (1974), Kane and Malkiel (1965), Laffont and Garcia, (1977), Rimbara and Santomero (1976), and Silber and Polakoff (1970). Unfortunately, the results of all this activity must be considered inconclusive.

The above-named are all econometric studies. A different approach taken by some researchers is to survey business establishments directly to determine how many have been refused credit. Although turn-down rates shed some light on the question, these studies are of limited usefulness in the study of "gaps" for two reasons: first, the information they provide on the extent of "shopping" done by the borrower, the borrower's ultimate success in finding a loan after rejection, the reason for the refusal, the nature of the project for which financing was refused and the bargaining that went on before the refusal, is generally less than is needed, especially the last three. Second, by surveying existing business one misses all refusals of financing for new enterprises.

The theoretical issues embodied in the first and third questions are a little clearer than the empirical problems, having been the subject of a great deal of work since the early fifties. The failure of the credit market to clear has been traced to four causes, of which the last two below are the most important for this paper, since only they offer any chance of providing a rationale for intervention:

1) Dynamic Rationing (Jaffee-Modigliani (1969)): Demand and supply conditions in any market change from time to time. Ideally, the price adjusts instantly to equate demand with supply, but in real markets there may be some time lag in adjustment due to communication difficulties, contractual obligations, uncertainties, information costs, and other

"frictional" forces. During this time lag, there can be temporary gluts or shortages, occasioning non-price rationing, until the market has fully adjusted. Prospects for intervention to improve the operation of the market appear poor, since such action would require a delicacy of timing for which government programs are not ordinarily noted, and a government agency would presumably be subject to at least the same frictional forces as a private lender. In any case, the problem is temporary.

2) "Implicit Contracts" (Fried and Howitt (1980)): A borrower who has a continuing relationship with a single lender and who wishes to be insulated from fluctuations in interest rates may enter into an arrangement whereby the lender, for a price, limits the variability of rates. Such an agreement can lead to occasional temporary rationing, but this is not a "gap": it is simply a way of organizing a market in response to a state of the world (variable interest rates), and is freely entered by both parties. It appears that such arrangements are rare in Canada, and variable-rate loans are the general rule. Baltensperger (1978) gives an extensive review of the literature on this subject.

3) Interest Rate Restrictions (Jaffee-Modigliani (1969), Smith (1972), Azzi-Cox (1976)): In one form or another, this is the most frequently cited mechanism of credit rationing. If lenders can not charge above a certain rate, then there may be unsatisfied demand at that rate, especially for higher-risk borrowers who, in effect, are more costly to lend to.

The source of such rate restrictions is less obvious. Legal constraints on lending rates have virtually disappeared in Canada; Jaffee and Modigliani attempt to derive rate ceilings from the degree of competition among lenders, but the reasoning is difficult to follow; others have argued, more plausibly, that the long tradition of hostility to lenders creates a situation in which banks have more to lose in public relations than they have to gain in revenue by lending to high-cost borrowers at high rates, and simply prefer not to trade in that type of loan, rather than try to answer charges of "gouging".

Whatever the sources of the restriction, some authors (among them Azzi and Cox (1976) and Baltensperger (1978)) have pointed out that it need not inevitably lead to rationing, since to a certain extent requirements for collateral can substitute for interest rates as part of the "price". Hence only if there are restrictions on collateral analogous to those on interest should we expect widespread rationing to follow.

If rationing is being practised, and if it results from rate restrictions (an important proviso, as will be seen below), and if it is impossible to remove the restrictions, and if collateral requirements can not substitute for interest rates, then a simple argument (see Appendix B) shows that

in principle, at least, a government lender can improve resource allocation by offering loans at the market-clearing rate that private lenders are unable to charge. Any lower rate is a subsidy, and may improve resource allocation or make it worse, but always improves it less than the market-clearing rate. Whether the improvement is achievable in practise depends on the extent to which the government is able to overcome the problems that led to the rationing. Having identified a failure of a "perfect market" model, we should not be tempted to uncritical acceptance of a "perfect government" alternative.

4) Information Asymmetry (Jaffee and Russell (1976), Rothschild and Stiglitz (1976), Stiglitz and Weiss (1981): Ordover and Weiss (1981)): The arguments above implicitly assumed that the bank knows, for each prospective borrower, the level of default risk (i.e. the probability of default) that the loan would carry. Now in fact lenders do put considerable effort into classifying borrowers by risk, but any evaluation system is imperfect, and there will always remain some uncertainty. If the uncertainty is shared equally by borrower and lender, then the conclusions under "Interest rate restrictions" above remain more or less unchanged, but if there are serious asymmetries in the information known to the participants, specifically if the borrower knows more about his own probability of default than the lender knows, then the market can be altered in surprising ways; among other effects, it can happen under certain circumstances that rationing occurs even if rates are completely free to move. These ideas are relatively new, and the implications are not yet fully worked out; we shall summarize the main arguments below, and develop them in more detail in Appendix C.

Assume that the bank does not know an individual borrower's probability of default, but that each borrower knows his own probability (If the bank has enough information to separate borrowers into broad risk-classes, then the same argument holds within each class). The only thing the bank knows is the distribution of risk levels in the population of borrowers. We emphasize that asymmetries of opinion are unimportant: the entrepreneur may have more faith in his business than the banker, but the question is whether he knows anything the banker does not know.

Faced with its inability to evaluate potential borrowers, but knowing that borrowers differ in their risk level, the bank pursues pricing and other policies designed to maximize its expected after-default return. As the bank raises its rates in order to cover its default losses, it can be shown that under some circumstances the "good" borrowers (from the bank's point of view) find the rate too high and drop out of the market, leaving the "bad" (i.e. high risk) borrowers as the only ones still willing to pay the higher rates. Hence raising the rates changes (for the worse) the composition of the clientele, a phenomenon known as adverse selection. Depending on the composition of the original borrower pool, it can happen that raising the rates raises the average risk level fast enough that the expected return to the bank per dollar lent actually decreases as the rate increases.

Under such circumstances the bank will not raise its rates beyond a certain level, the level that maximizes the expected return per dollar lent. If demand exceeds supply at that rate then some borrowers will be rationed: the rate will not be increased. The exact conditions under which rationing will occur are rather complicated, and not fully understood: in particular the role that collateral plays has been insufficiently investigated. Some things, however, can be said:

a) If rates and collateral requirements are both free to move, then it is only under very special circumstances that rationing will occur. We can distinguish two cases: in the first, the bank has no knowledge at all of individual borrowers; in the second, the bank has partial knowledge, sufficient to classify borrowers into groups, but not to differentiate between members of a group. In the first case, such rationing as occurs will be random, with no systematic differences between rejected and accepted borrowers. In the second case, it will usually, but not always, be the higher-risk groups that are rationed, and it is possible, in very special cases, that the expected social return on rationed groups exceeds that on the accepted groups, by an amount that is necessarily small.

b) If rationing does occur, then intervention can, in principle, in certain cases improve resource allocation by small amounts. If the intervention is in the form of a government lender, then the lender will necessarily lose money, and confer a subsidy. It will also raise the cost of funds to the private lenders (if it does not, then there will be no rationing in the first place), causing them to suffer losses (since they can not raise their rates to cover the increased cost). Faced with these losses, private intermediaries will curtail their lending to the point at which marginal costs equal marginal returns. This will be the same total of loans as obtained in the private market before the intervention, and hence there will be no less rationing than before. In order actually to increase total lending, the government will have to take over most of the business lending market. The only alternative is for the government lender to raise its funds outside the capital market, say by taxation, in such a way as not to increase the marginal cost of funds (assuming this is possible). A scheme of intervention along these lines proposed by Ordover and Weiss (1981) seems to be functionally equivalent to the bank's taking equity in the projects it finances, and indeed it appears that if lenders are free to take (partial) equity in their borrowers' projects, then the cases in which it is profitable for the lenders to ration financing shrink virtually to zero. It seems at this stage that to construct a case for intervention based on information asymmetry would be a very difficult task. Further research on this problem is needed.

SUMMARY AND CONCLUSIONS

If it can be assumed that both borrowers and lenders act in their own interests, and exchange is voluntary, then only such "gaps" will exist as are consistant with profit-maximizing behaviour. We have listed the most important of these. It is possible to form estimates of the loss of wealth caused by "gaps" in the credit market, but only if there is available some reliable empirical estimates of the extent of credit rationing from each source. We have not seen such estimates; as mentioned above, the empirical side of the "gaps" question is the one most in need of work.

We have indicated for which types of "gaps" a rationale for intervention can, in principle, be derived from consideration of economic efficiency; they are: rate restrictions, and information asymmetry. The two types of gaps warrant different kinds of intervention. In the first case, economic efficiency requires that the government lender simply charge the higher rates that private lenders are unable or unwilling to charge. In the information asymmetry case, a government lender can make no improvement at all unless it is prepared to monopolize the credit market, and to incur substantial losses. The gains available from such a major intervention are small, and there is no empirical evidence that they exist at all.

These are two cases in which a rationale for government intervention in the credit market can be grounded in the goal of maximizing the nation's wealth; there is essentially only one other such case: monopoly or cartel control of the credit market. Again we refer the reader to the Economic Council Report; we can, however make the following remarks:

1) Since lending is an activity in which anyone can engage, monopolization of credit markets is difficult to arrange.

2) It has often been alleged that some parts of the credit market, such as the chartered banks, are under cartel control, but the evidence is somewhat ambiguous. Since the federal government, through the Bank Act, exercises considerable control on the ease of entry into the banking system, any monopoly power the banks possess should be within the government's power to correct. The recent revisions to the Bank Act appear to have moved in this direction.

3) If it is the government's policy to restrict entry into some credit markets and then to offset the monopoly-inducing side effects by operating in the same market itself, the policy should be made clear, and its advantages stated.

If the source of the alleged "gap" is something other than these three, then a case for intervention must be built on other grounds than economic efficiency. These might include regional equalization or other goals of government policy. The rationale would take the form: "The community is willing to sacrifice a certain amount of its total potential wealth in order to achieve the following goal..." Debate can then focus on the central question: how much lost wealth is worth how much of the goal?

APPENDIX A: WHAT GAPS ARE NOT

1) High Default rates or "risk". Small business, it is frequently asserted, have a higher rate of default on loans than large business, and hence tend to be shunned by lenders, creating a "gap". If there are no restrictions on rates or security, and if the lender can reliably assess the risk of default, then loan default is an insurable risk, and each borrower can be charged a price (composed both of interest rate and security requirements) which, given a sufficiently diversified portfolio, fully covers the actuarial cost of the borrower's default risk, and the associated transaction costs. This means that higher risk borrowers (who may tend to be the smaller enterprises) will be charged a higher price than low-risk borrowers, but this is because their cost is higher. To argue that they should not have to pay a price that covers their cost is to argue for a subsidy, not for correcting a market imperfection.

   If the two conditions are not met, so that there are rate restrictions or information asymetries, then there may indeed be a gap, as discussed in the section "Excess-Demand Gaps". In the absence of these imperfections, there is no reason to expect high-risk borrowers to be any less well served by the credit market than anyone else. They will just have to pay more.

2) "Excessive" interest rates or security requirements. From the observation that small businesses, especially new ones, face higher rates and more stringent security requirements than large enterprise it is often inferred that small businesses are "gouged" and that this constitutes a gap requiring intervention. We can distinguish two possibilities. If the argument is that small firms should not have to pay a rate that covers the opportunity cost (including both risk elements and transactions cost) of a loan, then it is simply a call for a subsidy and can not be grounded in "gaps". On the other hand, if it is contended that small borrowers are being charged rates far in excess of their actual opportunity cost because of monopoly control of the credit market, then it is the monopoly that is the gap, and it is there to which attention should be directed and on which evidence should be presented. Merely pointing to different rates being charged borrowers of different risk is not an argument.

3) Transactions Cost. Some of the costs of processing a loan are independent of the size of the loan, and hence form a larger fraction of a smaller loan. In addition, a small borrower may require more careful screening for risk than a larger one, especially if it is a new firm. For these reasons the transactions cost of a small loan will generally be a considerably larger proportion of the loan than will that of a large loan, a situation sometimes cited as a market imperfection. By itself, however, it is no such thing. A market can include costs which differ among customers, and the contention that small borrowers should not have to pay their transactions cost is simply another argument for subsidies, having nothing to do with the filling of "gaps".

4) Information Costs: In the traditional "perfect" market, complete information is assumed to be available at no cost. In reality information always costs something, and this may affect the operation of the market. The information cost that is important here is the cost of screening a loan applicant to determine the likelihood of default; it has been argued that this is a "gap". But screening costs can be regarded as part of transactions costs, and the same argument as above applies. If the screening is imperfect, so as to leave serious asymmetries in the facts known to the two participants, then we have the situation discussed under "Information Asymmetries".

5) Retrospective vs. Prospective Risks: It is sometimes pointed out that most (80% seems an often-cited figure) firms considered by private lenders to be high-risk do not in fact default on their loans. The argument seems to be that since these firms have in retrospect proved their credit-worthiness, the fact that they may have been charged a high rate, or even been initially rejected by a lender, is evidence of market failure. Such an argument seems to misunderstand the theory of insurance. If it is known that, of a certain class of borrower, 20% will default and the other 80% will not, but it is unknowable which 20% will default, then all that can be done is to charge the entire class a premium sufficient to cover a 20% loss rate. (If there are restrictions on rates charged, then the class may be rationed out of the market, as described above, and this is a "gap", but again the source of the gap is the rate restriction, not the default risk. Again, if there are information asymmetries, the situation may change. To avoid repetition, we shall not continue to point this out.) To argue that the ones which do not default have been overcharged is to argue that everyone who owns a house that did not burn down last year should have his fire insurance premium refunded.

A related argument is that some borrowers will, because of the inevitability of errors, be misclassified and may pay a larger (or smaller) rate than their true likelihood of default warrants. This amounts to a transactions-cost argument: screening a loan applicant for default risk is a costly process, and finding the optimal screening effort involves balancing the costs of the screening against the gain from reducing classification errors. The optimal effort will still leave some possibility of error, but this is in the nature of the business, and is not a "gap": the market is operating as efficiently as it can, barring an improvement in the "technology" of screening. Government intervention will not improve resource allocation unless the government has access to more effective screening methods not available to private lenders. Subsidizing the cost of screening will not improve resource allocation, although if a decision has already been taken to subsidize the market, there may be an argument for directing the subsidy to screening costs.

6) Debt-Equity Ratios: Some studies have indicated that the debt-equity ratio rises with firm size, and concluded that small firms must be rationed in the acquisition of debt. That small firms are in fact less indebted than large firms is by no means clear from the available empirical evidence; indeed, some studies show just the opposite, but assuming provisionally that it is so, it does not follow that market imperfections are necessarily the reason. It would also have to be shown:

   a) that the desired debt-equity ratio in small firms is at least as large as that in large firms (offhand, we would expect the optimal value of the ratio to be lower in a small firm because of the importance of individuals and their decisions to the fortunes of the firm).

   b) that the actual debt-equity ratio is below its desired value in small firms and that this difference is due to rationing or discrimination, and is not simply a rational response by small businesses to relative costs of raising debt and equity that differ from those faced by large business.

7) Differing Costs Among Firms. In any industry firms differ in efficiency, in the sense that the average cost of production will be higher in one firm than in another. In a competitive market, inefficient firms will be forced by competition to become more efficient, or go out of business. It has been argued that preferential subsidies to inefficient firms have a beneficial economic effect. On the face of it, such a subsidy is a diversion of resources from a higher to a lower-valued use, and hence entails an economic loss. The rationale seems to be that firms are enabled to become more efficient, and so the end result is an economic gain. This is a difficult argument to follow: if a firm's costs are subsidized, it has no incentive to lower them, and so there is no particular reason to expect the firm to become more efficient unless the subsidy is explicitly tied to cost reduction. Even if there were, the expectation should be incorporated into the firm's earnings prospects; there is no obvious reason why the owners need to be encouraged to increase their own wealth. The same applies to "infant firms" arguments: subsidizing the acquisition by a new firm of equipment or expertise that improves its efficiency does not improve resource allocation; the earnings generated by the subsidized assets return to the firm and their expectation, together with an appropriate risk premium, should induce a private lender to finance the assets. If restrictions on rates prevent the paying of a risk premium, then the firm will be rationed out and we do then have a gap, but as above the market imperfection lies in the rate restriction; it has nothing to do with variability of efficiency.

8) Lenders are Too Conservative. Risk-aversion or risk-seeking are matters of individual preference, like the preference for peaches over strawberries. The risk-taking propensities of a lending institution presumable reflect the attitudes toward risk of the

institutions' owners, and if one wishes them to bear more risk than at present, one will have to compensate them for doing so, at an agreed-on rate. Resource allocation is not improved, but rather made worse, if the government imposes more risk on private lenders than their stockholders would choose to bear for the compensation they receive. If, on the other hand, a government lender accepts more risk than the private economy is willing to bear, then unless risks can be pooled or spread more effectively by the government, it is imposing on the Canadian public (its "stockholders") more risk than the public, in its role as economic agents, would freely choose to carry. The possibility that society, acting through government, can bear risk at a lower cost than it can acting through private markets has been widely discussed (see Arrow (1962) and Arrow and Lind (1970)). While this literature has illustrated the techniques by which risks may be pooled or spread by government it has yet to demonstrate why these same techniques are not available to market institutions. The "imperfections" which limit their use by private markets will also limit their use by government. There is nothing in this literature that implies that government has an advantage in risk pooling or spreading and therefore nothing to indicate that individuals will wish the government to act less conservatively than market institutions when it serves as their agent. In this case, when the government of a risk-averse population disregards risk, it does not correct a market misallocation, it creates one.

9) Bankers lack the skills to discern lending opportunities: The contention that there are profitable investment opportunities that private lenders are missing because of short-sightedness, prejudice, or lack of skill is difficult to take seriously, but even if true it raises the question of whether a government lender would be able to tap a better pool of talent, inaccessible to private lenders. The related complaint that small businesses must often deal with inexperienced loan officers is (because training loan officers is costly) simply a variant of the transactions-cost argument mentioned above in (3) and the discussion there applies.

10) Bankers are "profit hungry": Economic theory generally assumes that everyone acts in his own self-interest, in the sense of seeking to maximize utility subject to the constraints within which one must operate. The discipline imposed on this "greed" comes from market forces. If it is argued that the discipline is deficient, for example that competition has been eliminated and monopoly reigns, then the argument must be made in those terms, and evidence presented. The psychological or moral state of the participants is irrelevant.

11) Rural Borrowers: It has been argued that chartered bank branches are rather thinly spread in rural and remote areas, and hence small businesses in these locations are poorly served in their financing needs. The argument seems to have two components:

a) Rural borrowers, in effect, have higher transactions costs than borrowers in the cities. If the argument is that they should not have to pay the extra costs of their loans, then it is, again, a call for a subsidy, not for filling a "gap."

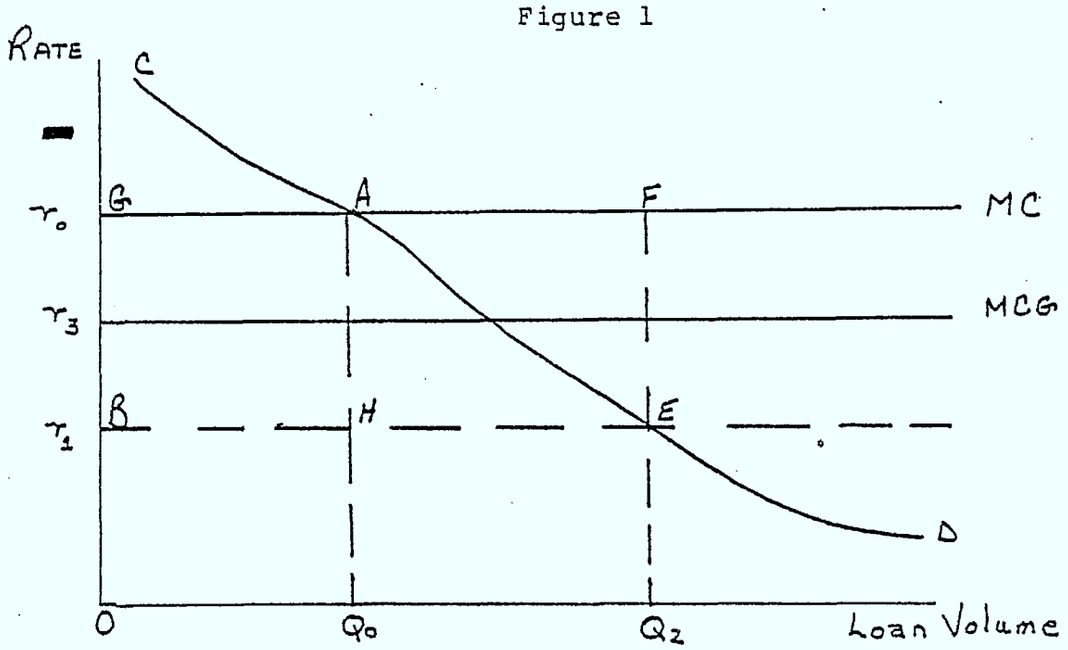
b) Rural markets are "thin", lacking sufficient numbers of both buyers and sellers for proper market operation. A potential borrower may have only one commercial lender within reach, leaving open the possibility that the lender will exploit this local monopoly power. If the argument were made carefully and backed by evidence, it could be considered as identifying a "gap", which might justify intervention in the form of a supplemental lender which fully recovered the transactions costs (and all other costs) of doing business in the remote area. (It is these costs, presumably, which lead private lenders to avoid the area in the first place.) Any failure fully to recover opportunity costs is a subsidy which must be justified separately. In any case, there already exists a large array of government programs sponsored by the departments of Agriculture and of Regional Economic Expansion, designed to compensate for the disadvantages of "ruralness".

12) Fixed Rate Loans are Hard to Get: There has been a general trend among commercial lenders toward "floating-rate" loans in which the rate charged varies with the prime rate over the term of the loan. A borrower who expects rates to go higher than do other market participants will naturally prefer a fixed-rate loan, and, it is said, these are difficult or impossible to arrange. Uncertainty about the future course of interest rates is a form of risk like any other, and whoever bears the risk will have to be compensated for doing so. A priori, there should be some (fixed) rate at which both borrowers and lenders are indifferent between fixed and floating-rate loans. If the argument is that there is some mechanism preventing the realization of this rate, then that is the source of the gap and its nature should be explained. If, on the other hand, it is argued that borrowers should receive fixed-rate loans at a lower rate than the "indifference" rate, then the argument is for a subsidy.

APPENDIX B: RATE RESTRICTIONS

A particular borrower has a certain probability of default, and will, in the absence of restrictions, be charged a rate reflecting both the pure rental (i.e. the charge for using the lender's money), plus the actuarial cost determined by the borrower's probability of default, plus transactions cost. Thus each class of borrowers of roughly similar expected loss will have a characteristic premium that must be paid (in the absence of restrictions) in addition to the prime rate. If there are restrictions on the rates that can be charged, then at least some members of the high-expected-loss classes will not receive loans at all. This situation is shown in Figure 1. The demand curve D is downward-sloping, and the marginal-cost-of-funds curve, labelled MC, is taken as horizontal, this being the simplest case. An upward-sloping marginal cost curve would not change any of the analysis below. The market-clearing rate r_o is determined by the intersection A of the two curves, and the corresponding volume is Q_o. It is emphasized that this diagram represents only a particular segment of the loan market consisting of a class of borrowers with roughly the same risk characteristics -- say, for definiteness that r_o for this class of borrowers is prime plus 3 percent. Other risk classes would have similar diagrams, with

Figure 1



r_o corresponding to other values. Suppose now that the market operates under the restriction, formal or informal, that no rate higher than r_1 can be charged, with r_1 less than r_o. Then no loans will be offered by suppliers, since any loan can only be offered at a loss, given the rate restriction (note that if the marginal cost curve has a positive slope, then some loans might be offered if the MC-curve intersects the horizontal line at r_1). The "gap" is the amount Q_2, this is the unsatisfied loan demand, and the market is at the point B.

It can charge essentially any rate it chooses; we assume first that it charges r_o, the original market-clearing rate. Then the market, with the aid of the government lender, moves to the point A, the original equilibrium. The gap is filled in the sense that there is no further unsatisifed demand. The total cost of the extra loans is the area $OGAQ_o$, and the total benefit to borrowers is the area $OCAQ_o$; the net benefit to the economy as a whole is therefore the area of the triangle GCA.

Now assume the government lender decides to charge a lower rate than r_o: say r_1 for simplicity (although any other value can be analysed similarly). Since loans are freely offered at the rate r_1, demand expands to the corresponding point E on the demand curve, determining a loan volume Q_2. If the government lender has no restrictions on the quantity offered then the point E is where the market will end up. The gap has been filled in the sense that the original unsatisfied demand has been satisfied. The cost of the additional loan volume is the area $OGFQ_2$, while the additional benefit to borrowers is given by the area $OCEQ_2$, so the net benefit to the economy is the difference between the areas GCA and AFE. This difference can be either positive or negative depending on r_1 and on the actual shapes of the demand and marginal cost curves, and hence we can not say <u>a priori</u> whether the economy benefits or loses from the intervention of the government lender. What can be said <u>a priori</u> is that the benefit, even if positive, will always be less than that obtained by charging r_o, i.e. by moving the market to the point A. Any movement beyond the volume Q_o is a negative contribution to the economy.

In addition to the welfare gain or loss, we can also consider the transfer of resources or subsidy implicit in the government lender's actions. A subsidy results if the lender fails to recover the cost of the transaction. The cost to the government lender of moving the market from B to A is $OGAQ_o$ and the cost in moving from B to E is $OGFQ_2$. The revenue generated for the government lender at A is $QGAQ_o$ and at E is $OBEQ_2$. Hence the subsidy in moving the market from B to A is zero. The subsidy involved in moving the market from B to E is BGFE, which is positive.

The principal conclusions emerging from the above are:

1) The maximum economic gain results from charging the market-clearing rate r_o, the rate that just covers the opportunity cost of the loan. This fills the gap and confers no subsidy.

2) Any lower rate results in a smaller economic gain than from charging r_o, and possibly a negative one; in addition it confers a subsidy.

3) As a consequence of (1) and (2) it follows that it is possible to fill a "gap" with maximal economic benefit <u>without</u> conferring a subsidy. Hence a subsidy must always be justified on its own merits -- it can not be justified by pointing to a "gap".

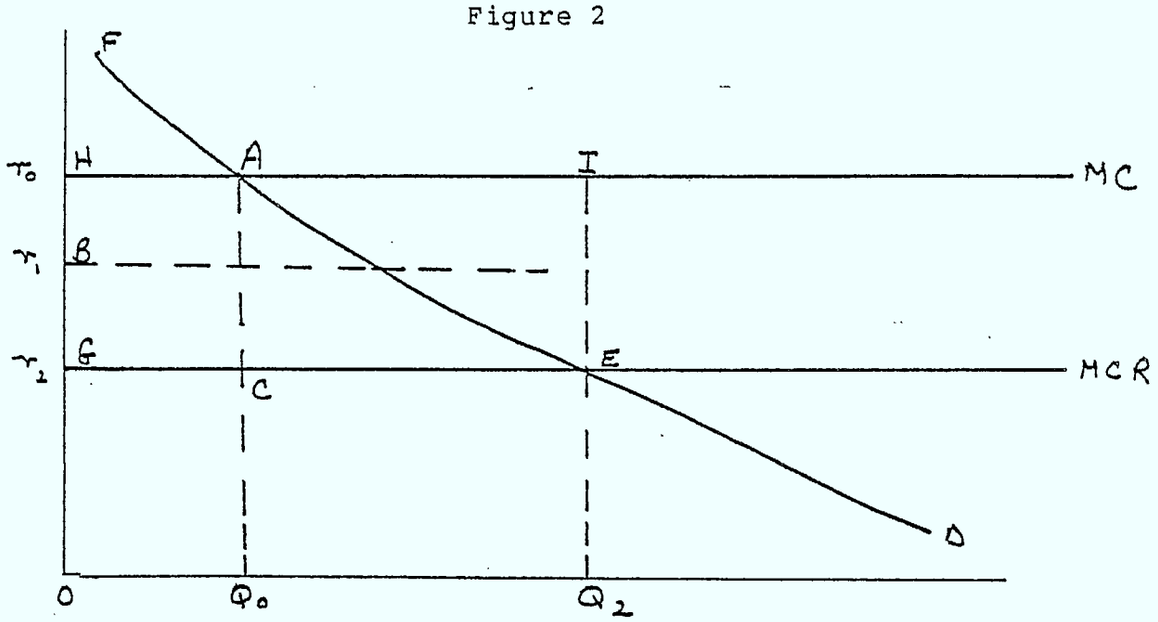
Now consider one more case: the government chooses to confer the rate subsidy as above by charging r_1, but

resolves to avoid the economic losses by limiting the quantity of loans made to the market-clearing volume Q_o. It is easy to see that the net economic benefit is GCA (the same as if r_o were charged), the maximum possible. The subsidy conferred is BGAH, which has presumably been justified separately. An efficient resource allocation has been obtained, and the subsidy is a pure rent enjoyed by the borrowers lucky enough to receive a loan -- "lucky" because there remains, at the price r_1, an unsatisfied demand Q_2-Q_o, which must be rationed out of the market by some non-price means. Thus the "gap" has not been filled, and it seems unlikely that the government could maintain its resolve not to expand loans to Q_2. There remains, in addition, the resource costs associated with reationing by queuing.

The government generally borrows at a favourable rate compared to private borrowers, and hence its "costs",may lie below the MC curve in Figure 1, say along the MCG curve. In that case the government lender's market-clearing rate is r_3, and it can be argued that passing this advantage along to the customers (i.e. charging r_3 instead of r_o) results in no resource misallocation or subsidy. The validity of this argument depends crucially on the source of the government's rate advantage: the government gets favourable rates because its default probability is extremely small. If it could be shown that the near-certainty of repayment is due to an efficiency advantage which the government has over private borrowers, then the argument would be valid. It appears, however, that the principal source of the government's low default probability is its power to command resources away from the private sector. The purchaser of a government bond knows that the government can always tax sufficiently to pay the bond off, and so requires no default premium. This is not an efficiency advantage: in effect, the government forces the taxpayers to provide it with free default insurance, the implicit premium for which is the rate advantage the government enjoys. Hence if this reasoning is correct the true cost of government borrowing is no less than that of the highest grade of private bonds; it appears less because part of the cost is hidden in an implicit insurance cost which is shifted to the taxpayers. For questions of resource allocation and subsidies, there is therefore no reason to use other than the same MC curve for both private and government lenders.

Credit Insurance: we give here a brief analysis of government credit insurance programs, such as the SBLA and EDP. Credit insurance involves separating the pure rental component of the interest rate from the implicit insurance premium; the insurance is provided by the government either free or at a nominal charge, and the borrower receives the loan at the pure rental rate. Figure 2 shows this: the MC curve represents the marginal cost of loans, including both the rental and risk components: this is what would be paid in the absence of the government program. The curve below it labelled MCR represents the marginal cost of loans with the government program. The vertical distance between the curves is thus the implicit insurance premium. A fee charged by the government would lower the demand curve by a corresponding amount.

Figure 2



In the absence of the program and of rate restrictions, the market is at A. If rates are restricted to r_1, the market will be at B. Suppose now the program is instituted: it will have no effect unless r_2 is less than r_1, so we assume this. As before, there are two possibilities: first, that loan insurance is freely available, in which case the market moves to E; second, loan insurance is restricted in its availability, to no greater volume than Q_0; in this case the market moves to C.

These cases can be analyzed along lines similar to the previous sections: the cost to private lenders of moving from B to E is $OGEQ_2$; the cost to the government is GHIE, and the total cost is $OHIQ_2$. The benefit to borrowers is $OFEQ_2$, and the net gain is therefore HFA minus AIE, which can be positive or negative. If the market were at A before, then moving to E would occasion a net loss of AIE. The subsidy is GHIE. Suppose now that a restriction to Q_0 is in force. Then the market moves to C; the resource allocation is the same as at A, which is optimal, and the gain in moving to C from B is HFA, which is positive. The program has no allocative effects and is a pure subsidy. The total subsidy is GHAC.

APPENDIX C: INFORMATION ASYMMETRY

In this appendix we shall consider only adverse selection. We intend to treat adverse incentives in another paper. Suppose that all investment projects are scaled to the same size loan B, and have only two possible outcomes: a return of S (the "salvage" value) and a return of R, with $R<S$. The probability of R is denoted by p. We assume that S is fixed, but that different projects can have different values of R and of p. The expected return to a project is $E = (1-p)\,S + pR$, and $p = (E-S)/(R-S)$.

We can parameterize projects by E and R, or by p and R, and will have occasion to do both. We assume that $S < B$, and that in the event of project failure the bank has a claim to the remaining assets of the firm (i.e. S) plus whatever additional collateral Q was agreed upon; let $C = S + Q$, the bank's total security.

At this stage, we ignore the possibility that entrepreneurs differ in wealth, and some may finance an investment project from their own resources. At interest rate r, the borrower's return from a project defined by the values (E,R) is:

$$\begin{array}{ll} -Q = S - C & \text{if the project fails} \\ R - (1+r)B & \text{if the project succeeds} \end{array}$$

(We are obviously assuming $R > (1+r)B$, since otherwise no loan will be sought).

The expected value of this is $(1-p)(S-Q) + p\,(R-(1+r)B) = (1-p)(S-C) - p(1+r)B + pR = (1-p)(S-C) - pL + pR = V(L,E,R)$

where $L=(1+r)B$ is the payback to the bank.
The bank's return from the same project is:

$$\begin{array}{ll} C & \text{if failure} \\ L & \text{if success} \end{array}$$

So the bank's expected return is $(1-p)C+pL=W^*(L,E,R)$

Note that $W^*(L,E,R) + V(L,E,R) = E$, the total expected value of the project. Now <u>assume</u> for the remainder of this section, that the banks and the borrowers are both risk-neutral. Assume also that there is no shortage of entrepreneurs -- specifically, that any project with a positive expected return will have an entrepreneur seeking a loan to undertake it. This requires that $V(L,E,R) \geq 0$, or

$$\begin{array}{l} (1-p)(S-C) + p(R-L) \geq 0, \text{ or} \\ p\,(R-S - L+C) \geq C-S, \text{ or} \end{array}$$

$$(1) \qquad E-S \geq (R-S)\,(C-S) \,/\, (R-S - L+C)$$

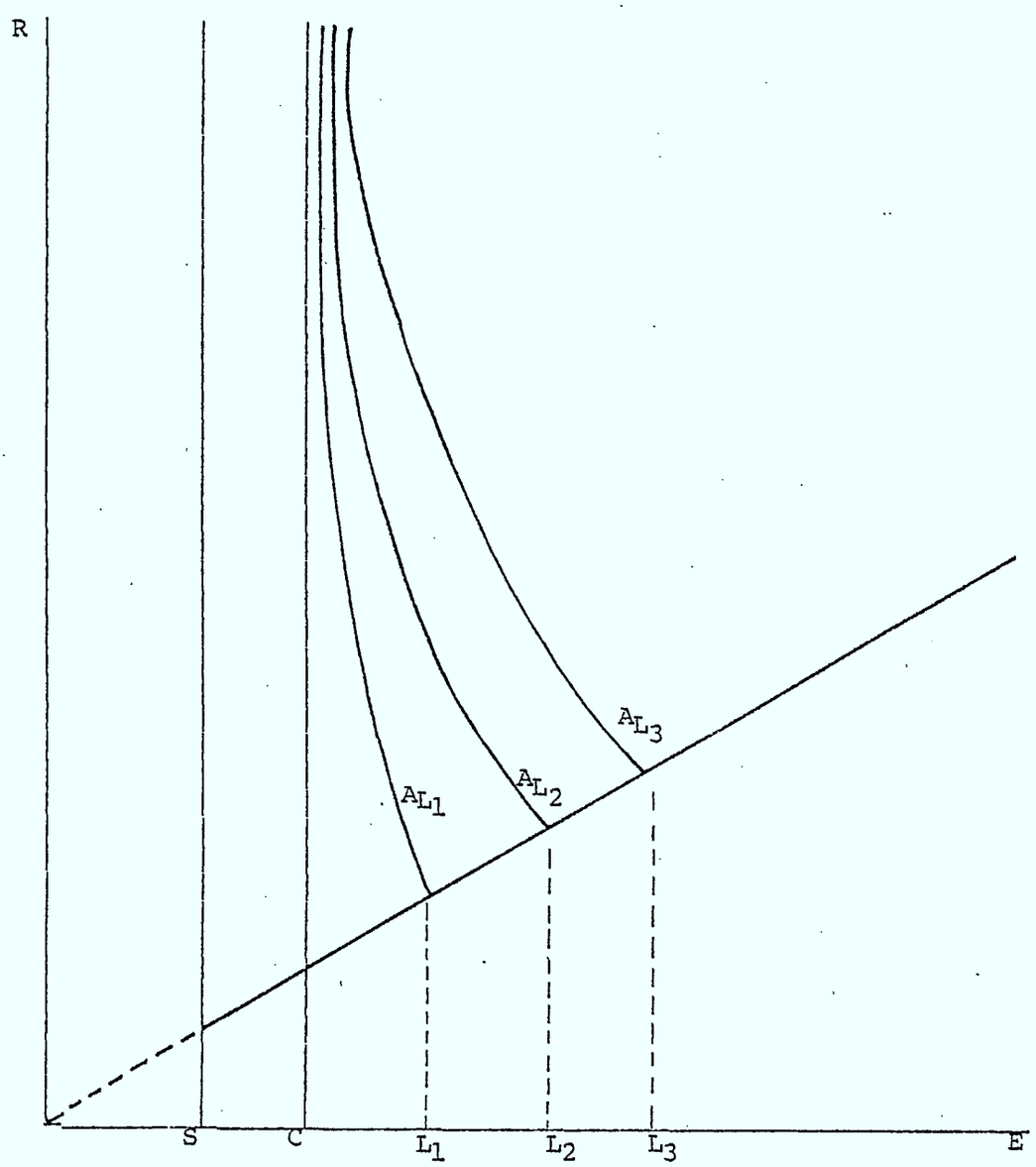
This is the condition a project must satisfy, at a given interest rate, in order to offer a profit to the entrepreneur, and only such projects as satisfy this condition will be undertaken.

We can reformulate this condition geometrically as follows: the projects can be characterized as points in the (E,R) plane, lying to the right of the vertical line E=S, and above the diagonal line E=R (Figure 1). The projects satisfying the condition (1) correspond to the points lying above the curve:

$$E = S + (R-S)(C-S) \,/\, (R-S-L+C),$$

some examples of which are shown, for different values of L, in Figure 1.

FIGURE 1



The curves A_L have the following properties:

a) A_L intersects the line R=E at the point R=E=L.

b) As R increases to infinity, the curve A_L is asymptotic to the vertical line E=C.

c) The curves are convex, with negative slope throughout.

d) If $L_1 < L_2$, then A_{L2} lies entirely above A_{L_1}.

In summary, at interest rate r, the region lying above the line E=R and above the curve A_L (where L=(1+r)B) includes all projects for which the bank will receive loan applications.

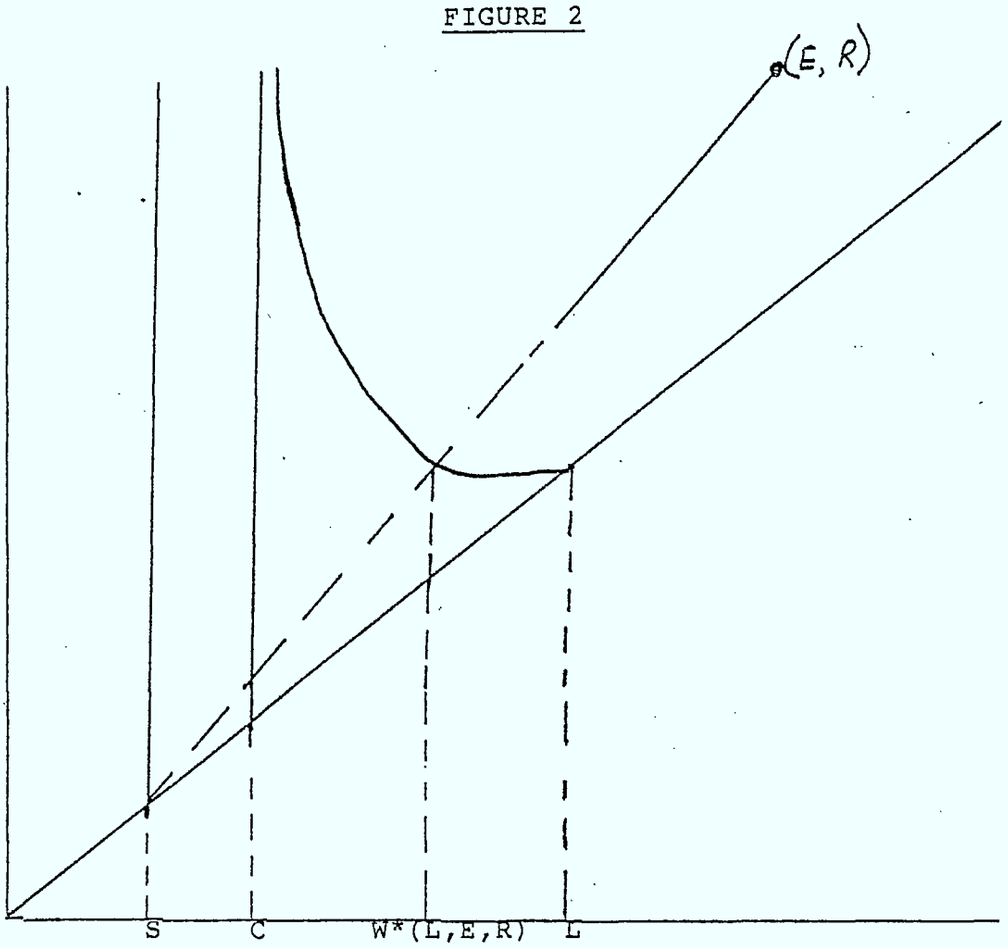
Now we formulate the information-asymmetry hypothesis, in (for convenience) its most extreme form: we assume that the borrower knows the project he intends to undertake (i.e. knows E and R), but the bank does not: the bank knows only the overall distribution of projects available in the economy. In this extreme case, the bank will have to charge every borrower the same rate, and exact the same security requirements, because it can not tell borrowers apart. Later we shall weaken this assumption to allow partial knowledge on the bank's part. As the rate is increased, the curve A_L moves upward and to the right, rendering a greater portion of projects unprofitable. The bank is interested in its average return on the remaining projects.

We can formulate the bank's knowledge more precisely by supposing that there is a bivariate probability distribution defined on the region $\{S \leq E \leq R\}$, and known to the bank. Let the probability of a subset F of the region be denoted by G (F). This distribution gives the relative abundance of projects of different values of E and R. The absolute number we can assume is given by a constant, say K, times G. In other words KG(F) is the number of projects whose (E,R) values lie in the region F. Denote by F_L the region above the curve A_L. Then the total demand for loans at the rate corresponding to L is K B $G(F_L)$. The bank's expected return at L is the condition expectation of W, conditioned on the event (E,R) F_L. This is given by:

$$W(L) = {}^{1}/_{G(F_L)} \iint_{F_L} W^*(L,E,R)G(dRdE)$$

As L increases, the behaviour of the function W(L) will depend on the way in which the conditional distribution, conditional on F_L, varies with L, and also on the function W*. Now $W^*(L,E,R) = (1-p)C + pL = C+(E-S)(L-C)/(R-S)$, and for fixed C and L, this is dependent only on p, so is constant on the lines p= constant, which means, since $p=(E-S)/(R-S)$, that W is constant along any straight line through the point (E=S, R=S). So geometrically, for a given C and L, W*(L,E,R) can be obtained for any point (E,R) by projecting along the line through (S,S); at the intersection with the curve A_L, V=0, so W*(L,E,R) is the horizontal coordinate. Figure 2 illustrates this.

FIGURE 2



Note that W(L) is the bank's expected payback per loan. We can convert this to a rate of return by:

$$q = W(L)/B - 1$$

This rate q is the highest that the bank can afford to pay for funds, and because of defaults it will in general be less than r. As Stiglitz and Weiss argue, rationing will occur only if W(L) decreases on some interval. This is a property of the measure G, and so to study its occurrence we will begin by considering some simple examples of distributions.

1) We first consider the trivial case of a degenerate distribution, concentrated at a single point (E_o,R_o). This means that all projects are identical, and W(L) reduces to

   $W(L)=W^*(L,E_o,R_o)= (1-p)C+pL$, where

   $p=(E_o-S)/(R_o-S)$.

   The bank will charge a rate corresponding to the curve A_{L_2} that passes through the point (E_o,R_o), as in Figure 3a, and W(L) will have the graph shown in Figure 3b. Since W(L) increases up to the point at which all borrowers drop out of the market, there will be no rationing. Note that at the rate corresponding to L_2 the bank (or more precisely the bank's depositors) capture the entire expected value of the project, E_o.

2) Consider now a distribution concentrated on two points $P=(E_o,R_o)$, and $Q=(E_1,R_1)$, where we suppose $E_o \leq E_1$. If the bank can distinguish between the borrowers who intend to undertake projects of type P from those who intend Q, then we are back to the previous case, treating P and Q separately, and charging each the appropriate rate as discussed in (3) below. However, if the bank can not tell borrowers apart, then it must charge all the same rate. First suppose that the slope of the line joining P and Q is positive, as in Figure 4. The bank has only two choices of interest rate to charge, corresponding to L_o and L_1, determined by the curves that pass through P and Q respectively; it is easy to see that no other rate can be optimal. If L_o is chosen, then $W(L_o)$ is a weighted average of E_o and $W^*(L_o,E_1,R_1)$, both of which are strictly less than E_1. On the other hand, if L_1 is chosen, then $W(L_1)=E_1$. So the optimal choice is L_1, the projects of type P are rationed out <u>by price</u>, and there is no non-price rationing. Note also that the "social" return, which here is the total of all private returns, is, at L_o, a weighted average of E_o and E_1, and at L_1 is equal to E_1. So the choice of L_1 also maximizes the social returns. Any redirection of funds to type P projects decreases overall wealth.

Now suppose that the line joining P and Q has negative slope. There are two subcases: as L increases, the curve A_L sweeps across from left to right, and encounters either P (figure 5a) or Q Figure 5b) first. It is easy to see that the first of these is essentially the same as the positive-slope case already described. The second subcase we shall treat in some detail, as it is the simplest situation in which non-price rationing can occur.

FIGURE 3a

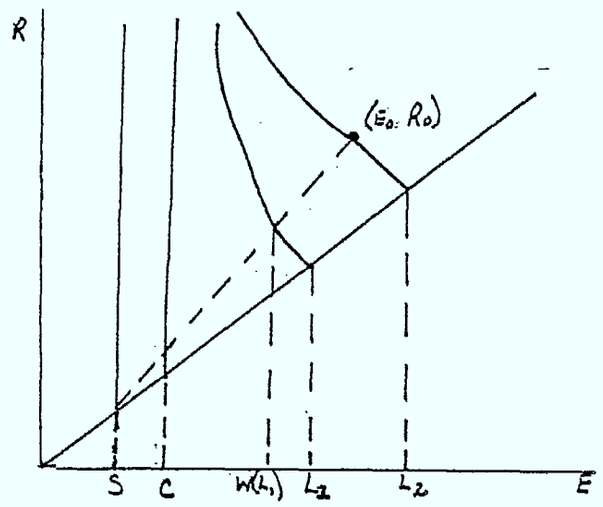


FIGURE 3b

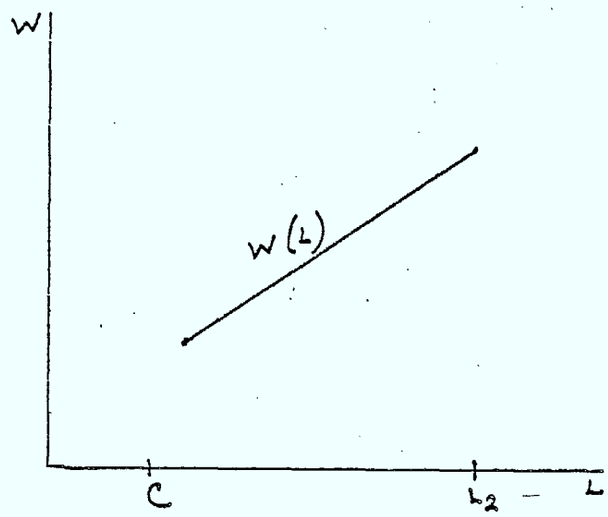


FIGURE 4

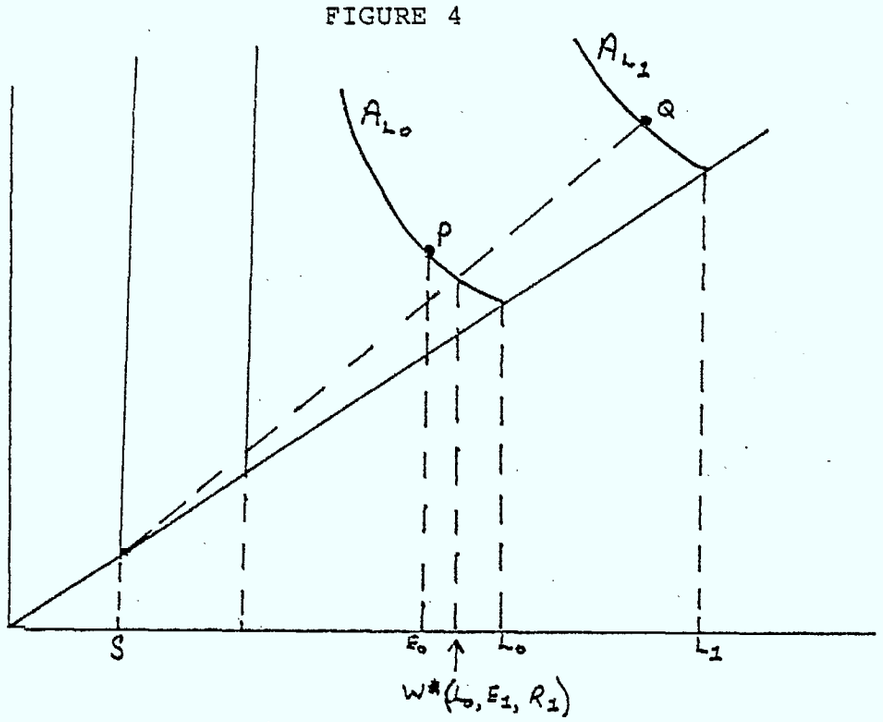


FIGURE 5a

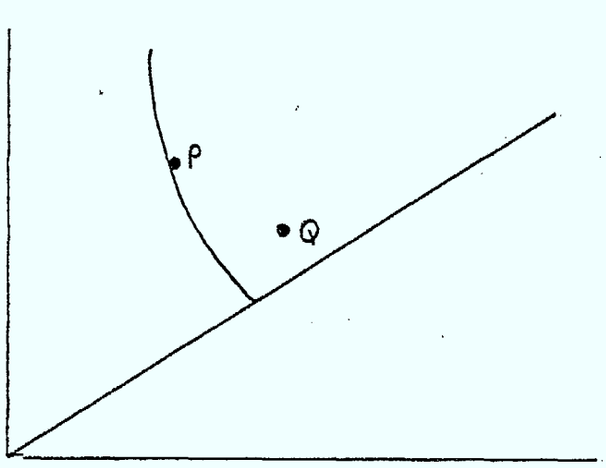


FIGURE 5b

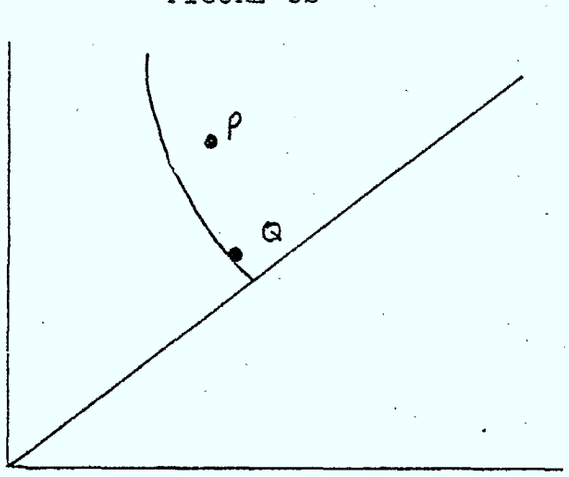


Figure 6 is Figure 5b drawn in more detail.

Again it is easy to see that the only candidates for the optimal rate correspond to L_o and L_1. At L_o, the bank's expected return is E_0. At L_1, $W(L_1)$ is a weighted average of E_1 and $W^*(L_1,E_o,R_o)$,and can be either greater or less than E_o. If it is greater (this corresponds to a high weight on Q and a low one on P) then the optimal choice for the bank is L_1. The bank will not go above L_1 regardless of the demand: if the supply of funds is sufficiently elastic that all demand can be satisfied while paying the depositors the maximum that the bank can afford to pay while charging L_1, then there will be no rationing. On the other hand, if the supply curve is such that satisfying the demand requires paying more than $W(L_1)/B-1$, then the bank must ration: it can not raise its rates. In the total-ignorance case we are considering here, the bank can not tell its borrowers apart, and so will ration randomly. The bank's return $W(L_1)$, in this case, as stated above, is a weighted average of E_1 and $W^*(L_1,E_o,R_o)$. The total return is a weighted average E^* (with the same weights) of E_1 and E_o, which is greater than the bank's return. If there is rationing, then the marginal cost of funds will be $W(L_1)/B-1$, and this is less than $E^*/B-1$, which is the marginal social gain from giving loans to the rationed borrowers (this, of course, depends heavily on the assumption that rationing is random. If it is not, then the weights change). Hence there are allocative gains available in increasing the supply of loans above what the private market will provide on its own.

Now suppose that $W(L_1)$ is less than E_o. In this case the optimal choice for the bank is L_o, and type Q projects drop out of the market. The bank's return (and the social return) is E_o, which is necessarily less than E^*, the social return if L_1 is charged. In this case there are allocative gains in redirecting loans to type Q projects. This is a somewhat curious case in that there is no non-price rationing: the perverse allocative effects arise from rationing by price.

These results provide little unequivocal support for intervention; even if the considerations to be outlined in the next few paragraphs do not apply, there are two points to be kept in mind. The first is that efficiency considerations justify intervention only up to the point at which the marginal cost of funds equals $E^*/B-1$. Depending on the elasticity of supply, this may still fall short of satisfying demand. Hence there is no automatic justification for eliminating all rationing. The second point is that a government lender that raises the total volume loaned must raise the cost of funds (if it does not, then the supply is infinitely elastic and there will be no rationing in the first place), but can not increase the loan rate. It must therefore make a loss, and the same holds for all private lenders: if they were earning no rents before the intervention, they will be making losses after. If the extra funds are raised not through the capital market but by a proportional tax on the earnings of the succesful borrowers, this is equivalent to the lenders (public or private) taking partial equity in the projects they finance, something that, in principle, is available to the private market without the help of a government lender.

The presence of unrealized gains from trade should lead us to ask if there are any devices the private market may have evolved in order to make the gains realizable. In the present situation there is an obvious one: the collateral requirement. Up to now we have assumed that C is fixed. Supose on the contrary that, faced with the choice outlined above, the bank raises its collateral requirement to C^1, and lowers the rate to L_3. The situation is as shown by the dotted curve $A^1{}_{L_3}$ in Figure 6. Raising the collateral requirement steepens the curves AL^1, so that, as L increases, the first point crossed is now P rather than Q. This puts us back into the first subcase: the optimal L is the one for which the curve $A^1{}_L$ passes through Q. The bank's return and the social return are both E_1, the highest possible; projects of type P are rationed out by price, and there is no non-price rationing, nor are there any unrealized gains from trade. It follows that in order for this simple model to exhibit rationing, it is necessary that there be limits on the bank's ability to set collateral requirements. What such limits might be, and where they might come from, we shall explore further on.

FIGURE 6

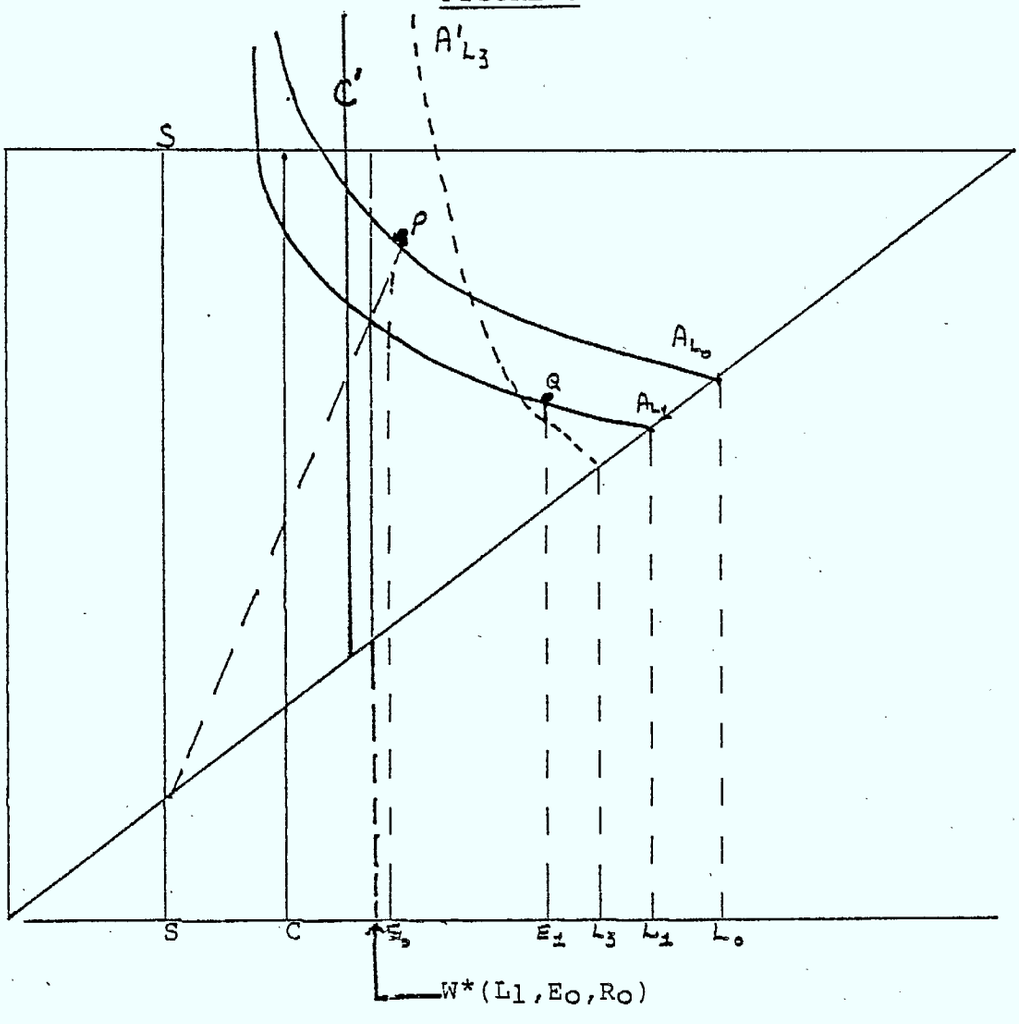


FIGURE 7a

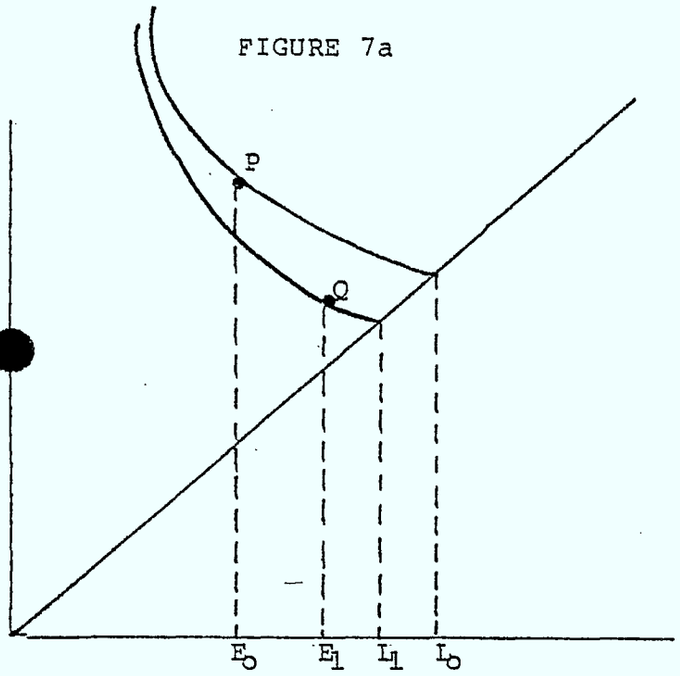
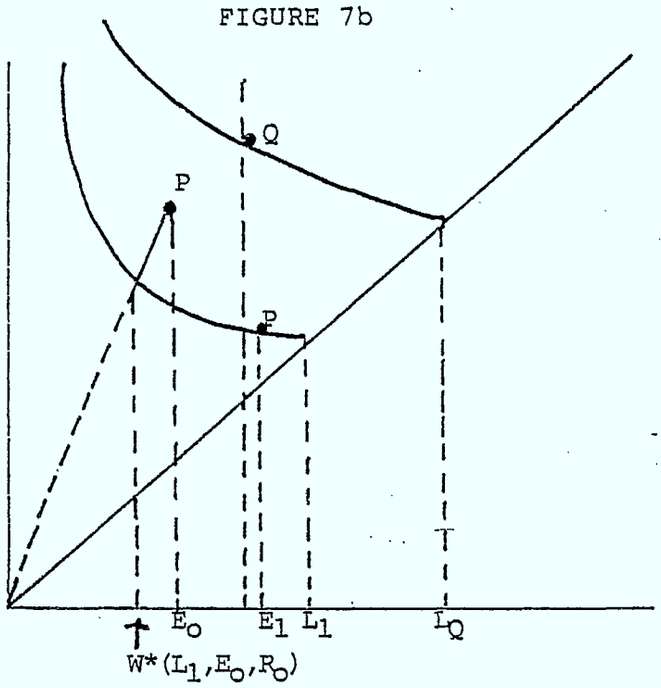


FIGURE 7b



Another device the lender might use to steepen the A_L curves is to take partial equity in the project: that is, a proportion Z of the total financing package would be a loan, and the rest would be equity. Chartered banks are currently prohibited from doing this, but other types of lender such as business finance companies can and sometimes do offer such packages. In this case the curve A_L takes the form $E=S+(C-S)(R-S)/(Z(R-L)-S+C)$, which has similar properties to the A_L curves in the previous case (which was defined by: $Z=1$); in particular, the curves are convex and cross the line $E=R$ at $E=R=L$; but the vertical asymptote is no longer at $E=C$, but rather at $S+(C-S)/Z$. So as the equity portion of the package increases, the vertical asymptote moves to the right, thus steepening the curves. Hence taking equity has an effect similar to that of raising collateral requirements.

Still another device available to the lender is screening of borrowers. We have up to now assumed the bank is totally ignorant of the projects intended by individual borrowers. Suppose, however, that the bank applies a test which separates the borrowers into two groups called I and II, such that the probability of a type P borrower being assigned to group I is y, and to group II is 1-y. Similarly the probability of a type Q borrower being assigned to group II is y. We can assume (we hope!) that $y > .5$, the coin tossing value. Assume that the weights on type P projects is t, and on the type Q, 1-t. The bank can charge group I the rate corresponding to L_o, and group II, the rate corresponding to L_1. Then all the type Q borrowers assigned to group I drop out, leaving the type P borrowers in group I, and both types in group II: The returns are:

Group I: $yt\ E_o$

Group II: $(1-y)t\ W^*(L_1,E_o,R_o)+y(1-t)E_1$

Now if the cost of funds is less than $E_o/B-1$, then the overall return is

$$(yt\ E_o + (1-y)t\ W^*(L_1,E_o,R_o) + y\ (1-t)E_1)/(t+y(1-t)).$$

If the cost of funds is above $E_o/B-1$, then the group I borrowers are eliminated (by price) and the return is:

$$((1-y)t\ W^*(L_1,E_o,R_o)+y(1-t)E_1)/((1-y)t+y(1-t))$$

As y approaches 1, the return in either case approaches the maximum possible. Screening is not costless, of course, and the bank would equate the marginal cost of increasing y with the marginal increase in return. If at this point the bank's return is higher than $tW^*(L_1,E_o,R_o) + (1-t)E_1$, then this will be the preferred solution, and it involves no rationing. This solution will also yield a higher social return then will the intervention, described above, to direct loans to rationed borrowers.

3) We can extend this last situation to its logical extreme and consider the case in which the borrowers fall into two (or more) groups which the bank can identify, but whose members are indistinguishable from each other. The simplest example is shown in Figure 7a, in which the points P and Q are the same as in Figure 6, but the assumption is now that the bank can tell type P borrowers from type Q. The obvious procedure is to charge type Q borrowers the rate $L_1/B-1$, and type P borrowers the rate $L_o/B-1$, provided the marginal cost of funds is below E_o; if it is above E_o, then no loans can be made to type P borrowers except at a (private and social) loss, and they will not receive funds. There will be no non-price rationing, and the (private and social) return will be $tE_o + (1-t)E_1$ in the former case, and E_1 in the latter: both the highest possible.

Now we look at a more complicated situation, shown in Figure 7b, where the group P consists of two points, both labeled P, and group Q is a single point. Assume that the weights on the two points of P are t and 1-t, and, for convenience, that S=0. As shown, the bank's return from group P, while charging L_1, is a weighted average of the two types, given by $tW^*(L_1,E_o,R_o)+(1-t)E_1$. The social return is $tE_o+(1-t)E_1$, which is greater than the bank's return. Suppose now that the E-coordinate E_Q of Q lies strictly between these values:

$$tW^*(L_1,E_o,R_o)+(1-t)E_1<E_Q<tE_o+tE_1.$$

Since the bank, by charging L_Q, can realize the return E_Q on type Q loans, the bank will prefer them to type P loans (on which there may or may not be rationing). If the marginal cost of funds lies between $tW^*(L_1,E_o,R_o)+ (1-t)E_1$ and E_Q, then no loans will be made to type P borrowers, even though their social return is higher than that of group Q, and above the marginal cost of funds. Again we have a perverse allocation effect arising from price rationing, and the same considerations apply as discussed in (2): in particular, the bank can, by raising its collateral requirements to group P, steepen the curves A_L to the point at which the "northwest" component of group P becomes unprofitable before the "southeast" component, as L increases. The bank's (and the social) return from the remainder of group P is E_1, the best possible; raising C has increased both the bank's and the social return, and eliminated any rationing that may have been occuring.

4) The examples we have considered above are of course very simple: the more general model would treat a continuum of projects, with an appropriate probability measures. The mathematical machinery becomes considerably more elaborate, however, and we shall save it for a subsequent paper. Although the investigations are not complete, we can say with fair assurance that the simple situations described above are canonical, in the sense

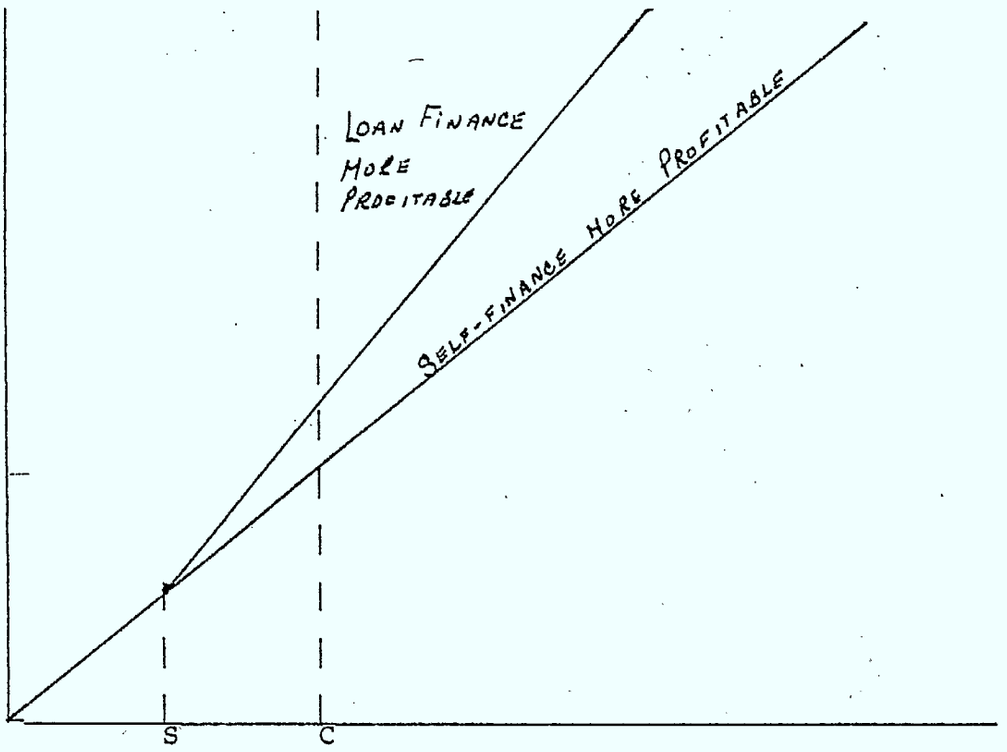
that all the cases we have found which exhibit credit rationing boil down to something very similar to what is going on in the examples discussed in (2) and (3) above. Hence the conclusions drawn from them can be expected to hold in more general situations.

Up to now we have been assuming that both lenders and borrowers are risk-neutral. It is not difficult to extend the model to cases of risk aversion of risk seeking; and the results, which we merely summarize here, are not very different from the risk-neutral case. In particular if borrowers are risk averse it makes rationing less likely to occur; if risk-seeking , credit rationing is more likely. Risk-aversion by banks increases the likelihood of rationing; in all cases the effects are small unless the risk-preferences are extreme, and the mechanisms are qualitatively similar to the risk-neutral case. If the borrowers differ in risk-preference, then the results are the same as if it is assumed that all borrowers are identical to the most risk-seeking (or least risk-averse) borrowers in the population (this last statement is true because the model presented here deals only with adverse selection. If we expand the model to treat incentive effects, then it no longer holds).

As stated in the beginning, the focus of this Appendix is on adverse selection. Adverse incentive effects do not appear in this model, because we assumed, in effect, that each project can be carried out in only one way -- that is, each projects has a unique value of E and R associated with it. In order to allow for incentive effects it is necessary to suppose that each project has a certain range of combinations of E and R, and that the more favourable combinations require a larger input (called "effort", somewhat arbitrarily). The actual values of E and R that result then depend on the entrepreneur's utility function, the possibilities the project offers, and the conditions of the loan. Stiglitz and Weiss argue that adverse incentive effects may limit the ability of the bank to raise collateral requirements, thereby making them ineffective as a device for avoiding rationing. Our preliminary investigations suggest that, while such effects can certainly occur, the conditions necessary for their occurrence are somewhat special, and the incentive effects of changes in security requirements are at least as likely to be beneficial as adverse. As mentioned before, we intend to consider these questions in some detail in a later paper.

Another possible limitation on the bank's ability to charge security requirements is the ability of at least some entrepreneurs to finance projects out of their own resources. It is easy to work out the conditions under which self-finance of a project at (E,R) is more profitable than loan finance. The condition is: self finance is more profitable if $p \leq ((1+i)(B-C)/((1+r)B-C))$, where i is the social opportunity cost (Figure 8). The right side of this inequality is decreasing in both R and C so that as either of these variables increase, the set of projects profitable to self-finance becomes larger. Whether this is an important limitation on the bank's action depends on the distribution of savings within the economy. If the number of entrepreneurs able to self-finance is relatively few, then it can be assumed under normal conditions that all those able to self finance are already doing so, and an increse in C or L does not produce any additional self-financing, and hence

Figure 8



the bank will not lose any projects it would otherwise have financed. On the other hand, if a large portion of the funds available for investment is in blocks sufficiently large for self-financing then every move by the bank that increases the proportion of projects which can be profitably self-financed loses business for the bank. Of course, since the purpose of financial intermediation is to assemble small blocks of funds into blocks of suitable size for investment, if a large part of the economy's savings is already in such blocks, there is little need for financial intermediaries in the first place, and we would expect to see a small and relatively unimportant banking system.

Discussion

The Stiglitz-Weiss paper is important because it provides the first plausible model that predicts the occurrence of such seeming anomalies as credit rationing without invoking extraneous (and very hard to pin down empirically) limiations such as interest rate restrictions. They present credit rationing as one possible feature of the credit market, that can occur under certain conditions, but pay to little attention to the question of how widespread such rationing is likely to be, or equivalently, how restrictive are the assumptions on needs tomake in order that the model predict credit rationing. This is the first subsidiary question that must be answered in attempting to deal with the main question: to what extent can an argument for government intervention be grounded in mechanisms of the sort discussed by Stiglitz and Weiss?

The investigations briefly described in this Appendix have as their intitial goal answering the subsidiary question. In order to discuss the restrictiveness of assumptions, it is necessary first to make the assumptions explicit, and this requires formalization of the model. Though the investigations are incomplete, we can give some preliminary assessment at this stage. In order for the private market to generage credit rationing through an information-asymetry mechanism, the following conditions must hold.

1) The first requirement, of course, is that the information asymmetry actually exist. Just how much better an estimate of his E and R values a small businessman can make than his loan officer (Ignoring, of course, the possibility of fraud) is an empirical question whose answer is by no means obvious. Part of the estimate depends on "public" information such as the state of the economy, and of the market in which the business operates. The component determined by private information about the business itself to which bank has no access (much of the firm's private information is, of course, available to the bank) may conceivably be important or even dominant; there is no way of telling <u>à priori</u>. This might be a rewarding topic of investigation for a researcher in management science.

2) The distribution of available projects must be of a particular type: specifically, the correlation between E and R must be sufficiently strongly negative.

3) There must be relatively severe limits on the lender's ability to increase collateral requirements in a given situation. These limits might arise from regulation, from adverse incentive effects, from self-financing considerations, or the like, but they must be shown to arise from somewhere.

4) There must be severe limits on the lender's ability to take partial equity. Chartered banks are prohibited from doing so, but other lenders sometimes package loans and equity together. Chartered banks remain the dominant source of small business lending, so the disability imposed by the equity prohibition appears not to be decisive, suggesting either that the gains from trade available through equity participation are slight (and hence that the information asymmetry that produces the gains is not very important), or that adverse incentive effects render the gains difficult to realize. The latter alternative would similarly disadvantage an Ordover-Weiss type of intervention scheme.

5) There must be little scope (due either to high costs or low effectiveness) for reducing the information asymmetry through screening and classification procedures.

6) The marginal cost of loanable funds must be increasing at a sufficiently high rate.

7) Demand must be at the right level: in some cases of rationing, this means that demand must be sufficiently high. In other examples, demand must be neither too low nor too high; otherwise rationing will not occur.

Assuming all the above conditions are met, there may be some gains, at least theoretically, from intervention in the credit market. The case for intervention is not automatic, however; laying aside the practical question of whether fallible human institutions can achieve the gains which theory says are there, there are at least two considerations that argue for caution:

First, the optimal form of intervention raises the cost of funds to all lenders, because rationing will only occur if the marginal cost of funds is increasing. Since the marginal cost of funds can be presumed equal to the marginal revenue before the intervention, the increase in the cost of funds will put private lenders into a loss position (if there is rationing, this will be true whether or not the private lenders are competitive, since rationing will not occur until loans have expanded to the point at which no further rents are obtainable). They will therefore curtail their own lending (remember, they cannot raise their rates) until marginal cost again equals marginal revenue. At this point, total loan volume is exactly what it was before the entry of the government lender, and so the volume of rationing must be the same. The government lender has simply displaced an equal amount of private lending. If the government prefers to keep its lender at a certain size, then no change results: the government lender is just another firm in the industry, and the rationing is unaffected. If, on the other hand, the government lender expands its operations as long as there is rationing, then it will expand until it has displaced all private lending, and only then can it increase total loans and reduce rationing. This is a rather substantial intervention; but no lesser one can be supported by an argument based on information asymmetry.

Second, if the govrnment chooses to intervene in this way, then the optimal course is to expand loans up to the point at which the marginal cost is equal to the marginal social benefit of the projects financed (determining this latter figure is itself a difficult econometric problem). This may or may not satisfy all the demand for loans; if the marginal cost of funds rises steeply, then the optimal level of loans may still involve some rationing. In this case there is no reason <u>à priori</u> to assume that satisfying <u>all</u> the demand would allocate resources any more efficiently than would the private market alone. But it is in that direction that the political process could be expected to press any intervention.

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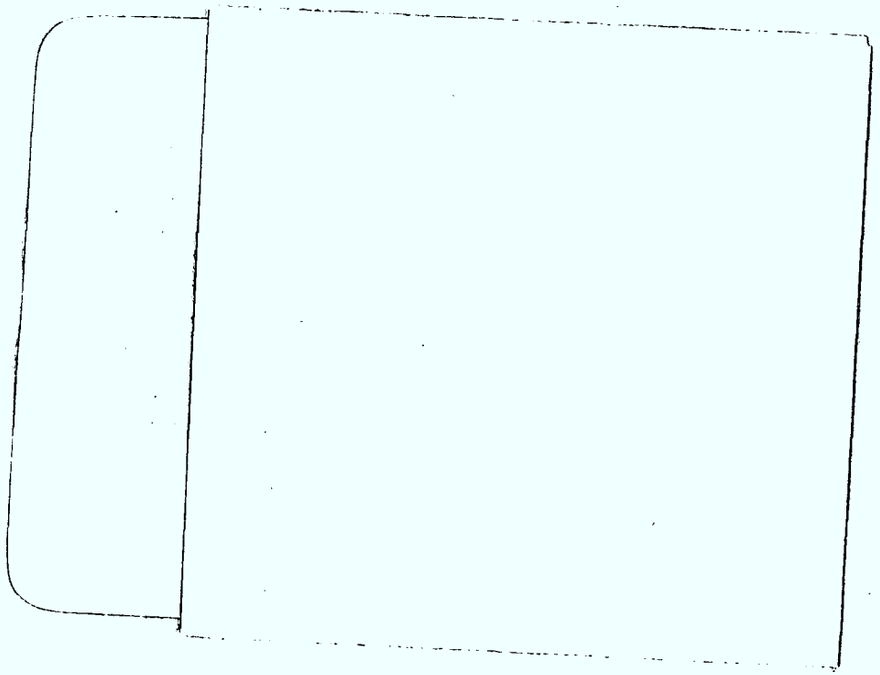

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