DEVELOPING A THEORY OF FINANCIAL INTERMEDIATION IN TRANSITION

Erjon Luçi[1]

Abstract

We propose an alternative theory to the traditional theory of financial intermediation derived from the credit rationing literature, which is more consistent with the case of financial intermediation in transition economies. One of the key insights gained from our theoretical analysis is that the synchronisation of different reforms, especially institutional reforms, is critical for a faster development of financial intermediation in transition economies.

1. Introduction

The transition towards the market economy in Central and East European (CEE) and Former Soviet Union (FSU) countries has proved to be neither a quick nor a simple process. Despite the implementation of major reforms that irreversibly distanced most transition economies from the centrally planned socialist system, the conditions under which the new markets and institutions operate still remain substantially different from those in mature market economies. These different environmental settings mean that orthodox (Western) theories may not be able to provide a comprehensive

[1] The views expressed here are those of the author and do not necessarily represent the views of the Bank of Albania. This paper is part of the PhD programme completed by the author during the period 1999-2002 at Staffordshire University. I would like to thank Prof. Nick Adnett and Dr. Iraj Hashi for their invaluable help in completing this paper. Any comments and suggestions are most welcome.

explanation for problems facing these countries at this stage of transition. In the particular area of the development of the financial sector, orthodox theories may lead to inappropriate or even misleading policies and guidelines.

One of the main elements of the systemic change in CEE and FSU countries was the replacement of the old state sector with a private sector that could allocate resources more efficiently. This process involved the privatisation of some of the state owned enterprises (SOE) and the entry of new private firms. This replacement has progressed rapidly in many transition countries. This means that individual investors are now faced with a different set of largely unknown new firms and projects. These new firms usually lack reputation and credibility, and the transparency of their activities is quite low, partly because of their unfamiliarity with the new accounting practices and partly because of their desire to evade taxes or simply for fraudulent reasons. Under these circumstances the transaction costs of gathering and processing information on new projects are quite high for inexperienced investors and the asymmetric information between lenders and borrowers severe. According to the orthodox theory of FI, which relies mainly on transaction costs and asymmetric information to explain the existence of FIs, because of the particular significance of these problems in transition countries, there is a large scope for the expansion of FIs to mitigate these problems and consequently to play a crucial role in promoting growth. Several reforms were needed before FIs could start performing this basic function efficiently. These reforms included: the break-up of the monobank and the establishment of a two-tier system, the privatisation of state owned banks, and opening the doors to the entry of foreign banks. However, even in those countries where these banking reforms were completed, the depth of FI has not changed dramatically, an outcome that conflicts with the predictions of the orthodox FI theory.

This discrepancy between the reality and the prediction of the orthodox FI theory could be partly explained by Allen and Santomero's (1997) argument, that the role of FIs in developed countries may have changed. Therefore, transaction costs and asymmetric information may not be the only factors explaining the differences between FI in transition and developed countries. On the other hand the failure of the FI theory to predict the inadequate level of FI development in transition countries, despite the large scope for reducing transaction costs and asymmetric information

problems, could also be related to other assumptions of this theory that do not apply to transition economies or need to be modified in the case of these countries.

The slow development of FI in transition economies has led some analysts and politicians to criticise the strategy of relying on foreign banks' participation and the privatisation of state owned banks to foreign investors. It has also been argued that transition countries should tolerate more bank instability in order to achieve higher levels of the development of FI.

However, these suggestions may be misguided since they are based on the orthodox theory's prediction which overstates the benefits to transition countries from reforming their banking sectors, at least at this stage of transition. The success of a banking reform programme in transition countries depends not only on the level of efficiency of FIs but also on other factors outside the banking system. The orthodox FI literature generally concentrates on factors within the banking system, ignoring broad environmental and institutional factors like macroeconomic and legal conditions, culture and attitude towards markets, which make the transition environment so different from that upon which this literature is based. Therefore alternative theories, which take into account other factors besides banking reforms, are needed to fill this gap and to facilitate a better understanding of the development of FI in transition economies.

In this paper we address this issue. We try to construct such a theoretical framework that takes into account these limitations of orthodox theory of FI and reflects more accurately the situation in transition countries. To this end, we rely and extend further the credit rationing approach in the case of transition countries. Based on this alternative theory we show that the relationship between informational problems and transaction costs, and the development of FI may not be as simple as orthodox theory of FI suggests. In particular, we argue that severe asymmetric information problems could be an obstacle to, rather than a motive for, the development of FI. We also show that factors such as macroeconomic instability, weaknesses in the legal framework and poor information flows increase the uncertainties faced by banks in evaluating credit risks and the moral hazard behaviour of borrowers. Together these could lead to a 'bad' equilibrium of low FI that could persist even after the efficiency of FIs improves.

This paper proceeds as follows. In Section 2, we set out the New Keynesian theory of credit rationing that explains the situation of a

persistent excess demand in credit markets via adverse selection and moral hazard. We also briefly refer to the Post Keynesian version, which provides some useful insights for our discussion of transition countries. We develop credit rationing theory in the case of the later in Section 3. In Section 4 we review some critiques of credit rationing theory. Finally, Section 5 concludes.

2 The theory of credit rationing

The concept of credit rationing has been the focus of a large body of literature, particularly after the seminal papers of Jaffee and Russell (1976) and Stiglitz and Weiss (1981) that explained credit rationing on the basis of asymmetric information. One of the reasons for this considerable attention is the implication that credit rationing has for the transmission mechanism of monetary policy. However, we are here more interested in the implications of credit rationing for the supply of credit.

Before analysing in more detail the theory of credit rationing it is first important to define the concept of credit rationing. Jaffee and Modigliani (1969) define credit rationing as a situation in which there is an excess demand for commercial loans at the prevailing commercial loan rate. More specifically Keeton (1979), Stiglitz and Weiss (1981) and Jaffe and Stiglitz (1990) define two types of credit rationing:

> Type 1. *Pure credit rationing* occurs when some individuals obtain loans, while apparently identical individuals, who are willing to borrow on precisely the same price and non-price terms, do not.
>
> Type 2. *Redlining* occurs when 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, whereas with a larger supply of credit they would.

How do the models of credit rationing explain the persistent excess demand in credit markets? Let us concentrate first on pure credit rationing. In order to keep the arguments as straightforward as possible we build our discussion upon the simplified model of credit rationing developed by Waller and Lewarne (1994), adding a few modifications to bring it closer to the original Stiglitz and Weiss (1981) model. Consider a risk neutral bank that faces a competitive market for loans and deposits. The bank tries to

maximise its profit by deciding on the amount of loans to extend[2] at the prevailing interest rates r^*_L, r^*_D for loans and deposits respectively. Let us also assume that the probability that the borrower will return the loan is p. In Stiglitz and Weiss's (1981) model it is assumed that all borrowers are required to provide the same amount of collateral C.

The problem that the bank wants to solve is:

$$\begin{aligned} &\max \Pi = [pr_L L + (1-p)C] - r_D D - (\frac{q}{2})L^2 \\ &\textit{with respect to } L \\ &\text{s.t. } D = bL, \quad b \geq 1 \end{aligned} \tag{1}$$

where: $r_L = (1 + r^*_L)$, $r_D = (1 + r^*_D)$, r^*_L and r^*_D are the loan and deposit interest rates respectively, L represents the total loans, D the total deposits and $(q/2)L^2$ captures bank's operating costs. Loans' unit cost, qL, (the first derivative of $(q/2)L^2$) is assumed to be an increasing function of loans (q>0) because it is assumed the bank eventually has to employ proportionally more credit officers as the number of applications and customers rises. Since banks are constrained to rely more on labour intensive processes, the unit costs of deposits (not included here) and loans eventually rise as their volume increases beyond a certain level. We should expect q, which broadly speaking captures bank's efficiency, to decline (and/or even the bank's operating costs functional form to change) as the quality of banking management, the technology, the employees' skills and other factors hampering it (not just within the bank) improve. The first order condition that satisfies the above maximisation problem is:

$$\frac{\partial \Pi}{\partial L} = pr_L - br_D - qL = 0 \tag{2}$$

[2] Different models use either the number or the size of loans. As we will later see some authors argue that the results are sensitive to whether you refer to the number or to the loan size.

Solving the above equation with respect to L gives us the bank loan supply function:

$$L^S = \frac{(pr_L - br_D)}{q} \tag{3}$$

Differentiating with respect to r_L we get the inverse slope of the supply curve (Eq. 4) which, from our previous assumption, has a positive sign as orthodox theory predicts.

$$\frac{\partial L^S}{\partial r_L} = \frac{p}{q} > 0 \tag{4}$$

A crucial assumption needed for the above model to generate credit rationing is that $\partial p/\partial r_L$<0, in other words, the probability of default increases with the increase in the loan interest rate. Another important assumption is that up to a certain level of interest rate the probability of default increases less than proportionally with the increase in interest rate. Beyond that particular level the probability of default increases more than proportionally as interest rate increases. Graphically this relation is illustrated in Fig. 2,

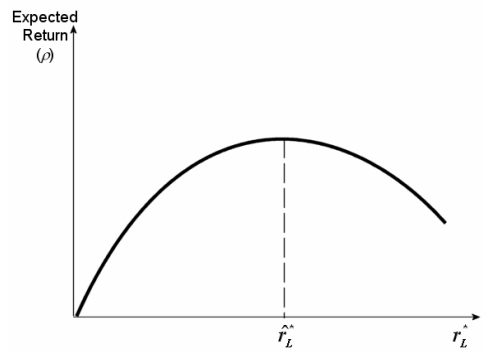

Fig. 2: Expected return with respect to interest rate

which plots expected returns of the bank against interest rates. It is clear that the expected return of the bank is not a monotonic function of interest rate and at a certain point ($\hat{r}_L^*$) the expected return to the bank starts to decrease with the increase in interest rate. Stiglitz and Weiss (1981) call the interest rate where the expected return reaches its maximum point ($\hat{r}_L^*$), the interior bank optimal interest rate.

If we take into account the negative relationship between the probability of repayment and the interest rate the slope of the supply function ($L^S = \frac{(p(r_L)r_L - br_D)}{q}$) becomes:

$$\frac{\partial L^S}{\partial r_L} = \frac{\frac{\partial p(r_L)}{\partial r_L} r_L + p(r_L)}{q} \tag{5}$$

Multiplying both numerator and denominator by 1/*p* and rearranging we get:

$$\frac{\partial L^S}{\partial r_L} = \frac{\frac{\partial p}{\partial r_L} \cdot \frac{r_L}{p} + p/p}{q/p} = \frac{e_L + 1}{q/p} \tag{6}$$

where: $e_L = \frac{\partial p}{\partial r_L} \cdot \frac{r_L}{p}$ is the elasticity of probability of repayment with respect to the interest rate of the loan. As we can see from Eq. 6 now the slope of the supply function may not necessarily be positive since $e_L<0$. From Fig. 2 it is easy to show that when expected returns are increasing with respect to interest rate then:

$$\frac{\partial \rho}{\partial r_L} = r_L \frac{\partial p}{\partial r_L} + p > 0 \tag{7}$$

Rearranging we have:

$$e_L = \frac{\partial p}{\partial r_L} \cdot \frac{r_L}{p} > -1 \tag{8}$$

Similarly when expected return starts decreasing we have:

$$e_L = \frac{\partial p}{\partial r_L} \cdot \frac{r_L}{p} < -1 \tag{9}$$

Thus the supply curve has a positive slope as expected returns increase with the increase of interest rates but the slope turns negative when the expected returns start decreasing. So, we get a backward bending supply curve as in Fig. 3. If the demand D and the supply for loans S intersect at or below the bending point of the supply curve we get a normal equilibrium where demand equals supply. If supply shifts to S' and the intersection occurs at a point above the bending point the bank may not have incentive to achieve this new equilibrium because beyond the bending point its expected returns

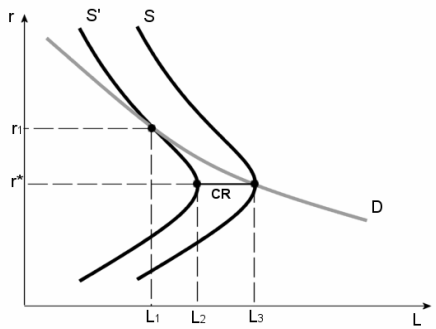

Fig. 3: Type 1 Credit Rationing

decrease.[3] Therefore the bank decides to stay at r* even if an excess demand (CR) exist.

2.1 Explanations for the dependence of loan quality on price

The dependence of the probability of repayment on the loan interest rate, which give rise to the non-monotonic relation between the expected return of the bank and interest rate, is crucial in explaining the existence of credit rationing. Let us concentrate now on some of the reasons put forward to explain such dependence.

Before Jaffee and Russell (1976) and Stiglitz and Weiss (1981), models of credit rationing did not make explicit use of the presence of asymmetric information between the borrower and the lender in explaining the relationship between risk and the interest rate. They would usually argue that an increase in interest rates would make it more difficult for the borrower to repay because the cost of borrowing would be higher for a given return on the investment project (Hodgman, 1960). In their 1981 article "Credit Rationing in Markets with Imperfect Information", Stiglitz and Weiss put forward an innovative approach as to why excess demand or supply can persist in equilibrium in markets with asymmetric information. They concentrate on credit rationing in financial markets but their idea has also been extended to other markets with persistent disequilibria like labour markets (Shapiro and Stiglitz, 1984).

According to Stiglitz and Weiss (S-W) there are two reasons behind the non-monotonic relationship between expected returns and interest rate: adverse selection effects and adverse incentive (or moral hazard) effects.

The adverse selection effect stems from the failure of interest rates to act as a screening device. S-W argue that the group of borrowers who choose relatively safer projects have a lower threshold of interest rate, beyond which they do not apply for a loan, than the group of borrowers who choose riskier projects, given the expected rate of return. As interest rates rise, eventually the borrowers with safer projects will drop out of the market and only the borrowers with risky projects will remain, which is a case of

[3] Beyond the bending point e_L is greater than 1 in absolute terms, which means that p decreases more than the r_L increase. The product pr_L in Eq. 1 will therefore decrease so the profit of the bank will decrease as well. Note that pr_L is the bank's expected return (ρ).

adverse selection. At this point the applicants who are willing to pay higher interest rates to obtain the loan are considered riskier;[4] the expected value of the loan from the bank's point of view is lowered.

Let us consider that all borrowers are risk neutral with projects of the same size, L. Certain projects are riskier in the 'mean preserving spreads' sense (Rothschild and Stiglitz, 1970). That is, they have the same expected return as the other projects but higher probability of failure, hence, higher returns. The bank may observe the expected return of a project but not its risk. Therefore the bank cannot distinguish borrowers with safe projects from those with risky ones. The bank knows only the proportion (or the distribution) of each group of borrowers (or borrowers population). For simplicity, let us now assume that the bank's cost of loans is zero and for each loan there is a collateral C. The return to the bank is:

$$\Pi = \min(r_L L, X + C) \tag{10}$$

where X is the actual return of the project or the value of investment.[5] The bank will receive a full loan repayment ($r_L L$) if $(X + C) \geqq r_L L$ otherwise it receives only $(X + C)$.[6] On the other hand, assuming that there are no bankruptcy costs, the borrower's profit (π) is:

$$\pi = \max(X - r_L L, -C) \tag{11}$$

which is, the borrower will make a profit (or a loss) of $(X - r_L L)$ if she can pay the loan back, $(X + C) > r_L L$, or a loss of $(-C)$ if she cannot.[7] The borrower will apply for a loan only if expected profit is positive.

[4] In terms of their projects not their attitude toward the risk.

[5] In the previous model (Eq. 1) for simplicity it was assumed that the actual return of a failed project was 0.

[6] This could also be written as:

$$\Pi = \begin{cases} r_L L & if \quad (X + C) \geq r_L L \\ (X + C) & if \quad (X + C) < r_L L \end{cases}$$

[7] This could also be written as:

$$E(\pi) = p(X - r_L L) + (1-p)(-C) > 0 \tag{12}$$

Differentiating with respect to interest rate we get:

$$\frac{\partial E(\pi)}{\partial r_L} = -pL < 0 \tag{13}$$

From Eq. 13 we can see that an increase in interest rate will lower the expected profit for all the borrowers. However, because p (the probability of

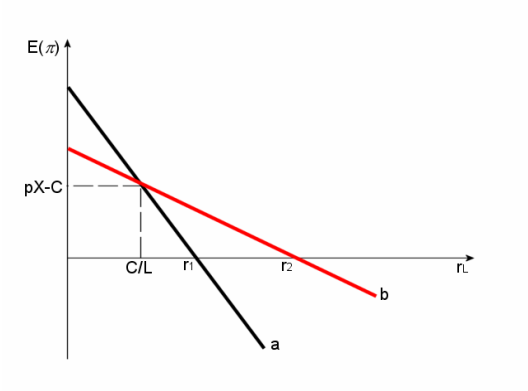

Fig. 5: Expected profit for risky and safer borrowers[8]

$$\pi = \begin{cases} X - r_L L & if \quad (X+C) > r_L L \\ -C & if \quad (X+C) \le r_L L \end{cases}$$

Before taking the loan, the borrower wealth is C. If she can pay back the loan its wealth will be $[(X+C)-r_L L]$. Therefore its profit will be $[(X+C)-r_L L]-C=X-r_L L$.

[8] The intersection between the two expected profit lines is at (pX-C; C/B), under the assumption of mean preserving spreads, $p_a X_a = p_b X_b$ and the assumption that expected return of projects is greater than collateral pX-C>0, otherwise a bank would not face any risk at all.

repaying the loan) is greater for safer borrowers,[9] their expected profit will reduce faster as r increases. If we assume that λ percent of the borrowers are of type a and $(1-\lambda)$ type b, with $p_a > p_b$, then the expected profit of the safe borrowers, a, decreases faster than the expected profit of the risky borrowers, b, as interest rate rises (Fig. 5). Hence the expected profit of the safe borrowers becomes negative before that of the risky borrowers, and at r_1 they drop out of the market.

Thus, as interest rate increases the market composition shifts toward riskier borrowers. The positive effect of the increase in interest rate on bank's expected return can be outweighed by the adverse selection effect (Jaffe and Stiglitz, 1990). At r_1, before the type a borrowers drop out, the expected profit of the bank is:

$$\begin{aligned} \rho &= \lambda[p_a r_1 L + (1-p_a)(X+C)] + (1-\lambda)[p_b r_1 L + (1-p_b)(X+C)] \\ &= \lambda[p_a r_1 L + (1-p_a)(X+C) - p_b r_1 L - (1-p_b)(X+C)] + [p_b r_1 L + (1-p_b)(X+C)] \\ &= \lambda[(p_a - p_b) r_1 L - (p_a - p_b)(X+C)] + [p_b r_1 L + (1-p_b)(X+C)] \\ &= \lambda(p_a - p_b)[r_1 L - (X+C)] + [p_b r_1 L + (1-p_b)(X+C)] \end{aligned} \tag{14}$$

After the safe borrowers drop out the expected return becomes:

$$\rho = p_b r_1 L + (1-p_b)(X+C) \tag{15}$$

which is clearly lower than before since the extra component in 14 (last row, the first component on the left) from the previous assumptions is positive.[10]

The adverse incentive (moral hazard) effect is related to the incentive role of interest rates. S-W argue that an increase in interest rates shifts the choice of borrowers (existing and new ones) toward riskier projects, which again reduces a bank's expected return. To make this point clearer we can use the previous framework, only in this case instead of two types of borrowers we have one borrower with two alternative projects a and b. From

[9] Borrowers that have safer projects in terms of mean preserving spreads.

[10] For the bank $r_L L$ is always greater than $(X+C)$.

Fig. 5 it can be seen that at low levels of interest rate the expected return from the safe project *a* is higher than that of risky project *b*. However, as soon as interest rate exceeds C/L firms have greater incentives to switch to project *b* because of its higher expected returns. When the interest rate reaches r_1 project *b* remains the only option with positive expected returns. So, for the same reasons as in the adverse selection case, as interest rates increase at a certain point the bank finds itself with a riskier pool of projects and eventually its expected return will start falling.

Prior to S-W's work, Jaffe and Russell (1976) also relied on borrowers' moral hazard behaviour to explain the dependence of the probability of repayment on the loan rate. But their approach was based on a different type of moral hazard behaviour, one that could be common in the transition countries. In the Jaffe and Russell's model, the loan contract between the bank and the borrower cannot be enforced. Hence there is an open opportunity for borrowers not to return the loan even if the project succeeds and they are capable of repaying it. Jaffe and Russell assume that there are two types of borrowers, honest and dishonest borrowers. The honest borrowers will never take the opportunity of not repaying the loan if their project succeeds.[11] The dishonest owners, on the other hand, will take the chance of not returning the loan if the nonpecuniary costs (Z) of doing so are lower than the loan repayment ($r_L L$). These nonpecuniary costs in the context of our discussion could be the legal action the bank can take against the borrower[12] and/or the borrower's loss of reputation for future bank funding. Under this interpretation, a borrower should not suffer these costs if the project fails for 'natural' reasons.

Based on these assumptions and also assuming, for the time being, that there is no collateral, the profits of honest and dishonest borrowers are:

Honest borrowers: $$\pi = \max(X - r_L L, 0) \tag{16}$$

[11] In fact Jaffe and Russell go further by assuming that the honest borrowers will never take a loan if they are not completely sure that they will return it. Nevertheless to keep this model comparable to that of S-W, we keep the assumption that there is always a probability (1-*p*) that the project fails.

[12] This is the case when the bank has the evidence that the borrower has broken the contract on purpose when she had the chance to meet it.

Dishonest borrowers: $$\pi = \max(X - r_L L, X - Z, 0) \tag{17}$$

As we can see from Eq. 16 and 17, the dishonest borrowers consider an extra possibility compared to the honest ones. They may not return the loan if $X - r_L L < X - Z$ or similarly if $r_L L > Z$, provided $X - r_L L > 0$. This means that if the loan repayment exceeds the nonpecuniary costs then the dishonest borrowers will choose an intentional default even if they are able to pay the loan back. It follows that the expected profits for each group of borrowers are:

Honest borrowers: $$E(\pi) = p(X - r_L L) \tag{18}$$

Dishonest borrowers: $$E(\pi) = \begin{cases} p(X - r_L L) & if \quad r_L L < Z \\ p(X - Z) & if \quad r_L L > Z \end{cases} \tag{19}$$

The expected profits of honest and dishonest borrowers with respect to the loan interest rate are shown in Fig. 6. The expected profit is the same for both groups of borrowers as far as $r_L L < Z$. Hence the group of borrowers is homogenous from the bank's point of view and its expected profit is: $\rho = p r_L L$. As the interest rate increases eventually $r_L L$ becomes greater than Z and the group of dishonest borrowers deliberately choose not to return the loan. The expected profit of dishonest borrowers becomes independent of the interest rate as far as they do not pay any interest rate at all. If we assume that the proportion of the honest group is λ the expected return of the bank becomes: $\rho = \lambda p r_L L$, which is clearly only a fraction of the bank expected return before the interest rate exceeded r_1. If the interest rate increases beyond r_2 the group of honest borrower drops out of the market completely and the bank's expected return goes to zero. Jaffee and Russell extend the model to the case when the penalty Z is different for different dishonest borrowers. In this case we should expect the dishonest borrowers to start breaking the contract at different interest rates rather than

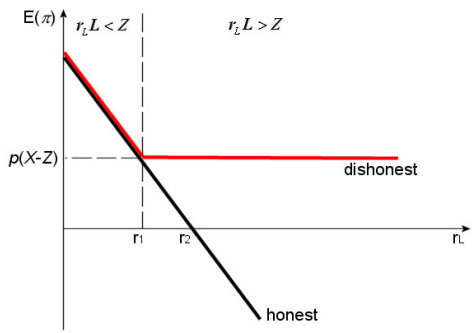

Fig. 6: Expected profits for honest and dishonest borrowers

at one point as a group, which means that the expected return of the bank will decline more gradually. In any case, the results are very similar to those of S-W model although a different type of moral hazard has been analysed.

So far it was assumed that there is no difference between borrowers' attitude toward risk. To some extent the borrowers' choice between the safe and risky project is arbitrary. If we assume that there are two types of borrowers, risk averse and risk neutral, and two possible projects, *a* and *b* as before, then we should expect the risk averse borrowers to systematically choose the safest project which is *a*. When this project is not feasible anymore, beyond the interest rate r_1 (Fig. 5), they will drop out of the market so the adverse selection occurs. As S-W have argued, if the proportion of risk averse borrowers (λ) is sufficiently large[13] and/or the risk of project *b* is high, there is the possibility that the expected return curve of a bank is non-linear with respect to interest rate, as in Fig. 2. The same rationale could also apply in the case of the Jaffee and Russell's model if we assume that the honest borrowers are risk averse and, consequently, they choose safer projects than dishonest borrowers since they are more concerned to return the loan.

[13] But not equal to 1, the whole population of borrowers.

2.2 Credit rationing between different groups (Redlining)

In the above models it was assumed that there was a single pool of loan applicants and the bank could not distinguish between them. That is, the bank was unable to discriminate between borrowers who choose relatively safer projects and those with riskier projects or between honest borrowers and the dishonest ones. Let us assume now that there are two distinguishable groups of applicants, *1* and *2*, as shown in Fig. 7. The expected gross return from group *i* at interest rate *r* is given by the function $\rho_i(r)$. The two groups can be distinguished by the fact that $\rho_1(r^*)<\rho_2(r^{**})$, where r^* and r^{**} are the respective bank interior interest rates for each group. This could be because the applicants of the first group have access only to riskier projects or are less "honest"[14] compared to the applicants of the second group. If the bank's cost of extending a loan is δ_2, which includes the interest rate of deposits and operating costs,[15] then the second group of applicants will receive all the loans they need (provided the bank has sufficient funds to meet their demand) at interest rate of r_2 while the applicant of group one will not receive any loans at all at any interest rate. This is the reason S-W call it the 'redline' group. If the cost of loanable funds falls to δ_1 the second group will have access to credit although it may still be credit rationed or not receive credit at all if there is a shortage of funds.

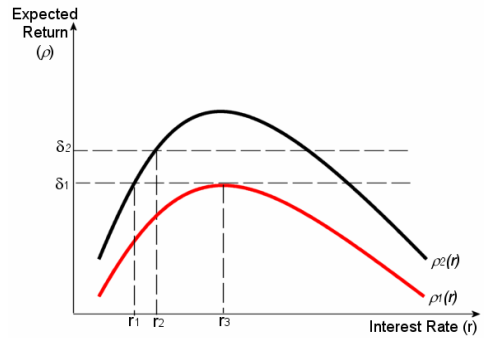

Fig. 7: Bank's expected returns for two different groups of borrowers

[14] According to Jaffee and Russell's (1976) model.
[15] Because of the competition banks' profit is assumed to be zero.

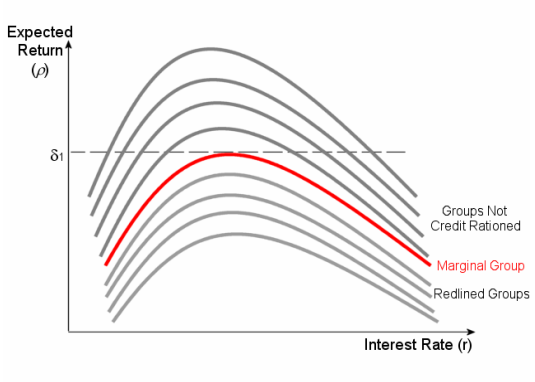

Fig. 9: Many Distinguishable Groups of Borrowers

If the number of distinguishable groups is larger, the number of applicants in each group will be smaller (Fig. 9). Therefore type 1 credit rationing occurs only in a single marginal group, the group whose maximum expected return equals the bank's costs of loans (δ_1), and this will therefore have a smaller overall impact than in our previous example with only two groups. For this reason Riley (1987) has argued that as the number of distinguishable groups increases, type 1 credit rationing is likely to become less significant. However, Stiglitz and Weiss (1987) maintain that if the number of groups increases it becomes difficult to distinguish between redlining and pure credit rationing because the groups just above or just below the marginal group have apparently similar characteristics but the former receive credit while the latter do not, which is a case of type 1 credit rationing.

2.3 Collateral

It is usually argued that banks use other non-price measures, such as collateral, in addition to the interest rate to sort borrowers. A higher collateral for a given interest rate, from Eq. 12, would reduce the expected profit of borrowers with risky projects more than those with safer ones, assuming enforceable contracts. Hence, increasing the collateral could improve the pool of bank's applicants by forcing the risky borrowers to drop out of the market or move toward choosing safer projects. In terms of our

simple model (Eq. 1), if we allow the bank to also change the amount of collateral C, the situation of credit rationing does not occur anymore. Assume that the bank maximises its profits in terms of both the amount of loans L and the collateral C, and the probability of default increases with the interest rate, $\partial p/\partial r_L<0$. The bank profit maximisation problem in this case is:

$$\begin{aligned} &\max_{L,C} \Pi = [p(r_L)r_L L + (1-p(r_L))C] - r_D D - (\frac{q}{2})L^2 \\ &\text{s.t.} \quad D = bL, \quad b \geq 1 \end{aligned} \tag{20}$$

The first order conditions that satisfy the above maximisation problem are:

$$\begin{cases} \dfrac{\partial \Pi}{\partial L} = p(r_L)r_L - br_D - qL = 0 \\ \\ \dfrac{\partial \Pi}{\partial C} = 1 - p(r_L) = 0 \end{cases} \tag{21}$$

Solving the above system of equations with respect to L we get:

$$L^S = \frac{r_L - br_d}{q} \tag{22}$$

The slope of the supply curve is now:

$$\frac{\partial L^S}{\partial r_L} = \frac{1}{q} > 0 \tag{23}$$

which is unambiguously positive, unlike the previous case (Eq. 6) where the collateral was fixed. In other words, the supply for loans is not backward

bending even if $\partial p/\partial r_L<0$. Therefore, allowing the bank to decide the collateral can eliminate the possibility of the credit rationing in equilibrium. The system of equations (21, second equation) shows that the bank sets the collateral, at any interest rate, high enough to induce borrowers to choose projects which are completely safe, $p(r_L)=1$.

However, according to S-W, collateral just like the interest rate, may fail as a sorting and incentive device. An increase in collateral may shift the composition of borrowers toward those with riskier projects or encourage borrowers to choose riskier projects.[16] One reason put forward by S-W for this outcome is that a higher collateral reduces borrower's equity that could be invested in a project. This could force them to select smaller projects. If it is the case that smaller projects have a higher probability of failure, then according to S-W an increase in collateral could lead to a riskier a pool of borrowers with riskier projects.

Another reason why the increase of collateral could lead to adverse selection, according to S-W, is related to what they call "decreasing absolute risk aversion". S-W argue that the aversion toward risk of individuals could decrease as they become wealthier. Increasing the collateral will increase the relative proportion of wealthier but 'riskier' borrowers, compared to less wealthy but more risk averse ones who cannot afford higher collateral and drop out of the market. Again an increase in collateral could lead to a riskier pool of borrowers. These adverse selection effects could be sufficiently strong to cancel out the positive effect that the increase of collateral could have on the bank's expected profit.

It should be pointed out that S-W's arguments against collateral as a sorting device are based on very restrictive assumptions. Both the arguments of smaller projects being more risky and of decreasing absolute risk aversion lack empirical justification. Also, Bester (1985) has argued that if the rate of interest and collateral are chosen simultaneously, rather than separately, it is possible to use different contracts as a self-selection mechanism so no credit rationing will occur in equilibrium. Bester's model shows that even without perfectly secured loan solutions, as in the case of our model,[17] the bank can sort the risky borrowers from the safe ones by offering contracts with different combinations of interest rate and collateral. The borrowers with a

[16] In terms of our model this translates into $\partial p/\partial C<0$.
[17] Bester avoids these solutions by making the provision of collateral costly for the borrower.

low probability of bankruptcy are more inclined to accept an increase in collateral requirements, for a certain reduction in the rate of interest, than those with a high probability of failure. In Bester's model, as in ours, borrowers can afford any amount of collateral required by the bank. However, borrowers' lack of collateral could be an important reason why it fails as a sorting device in transition countries. This is not because banks end up with riskier applicants, as S-W would argue, but because among the rejected applicants could be many safe borrowers who simply cannot afford the collateral and therefore are unable to signal their creditworthiness.

~~According to Devinney (1986), sorting and screening (or monitoring) are substitute techniques. The inability of collateral to act as a feasible sorting instrument leads Buch (1996) to suggest that increasing investment in information (ex-post monitoring) can substitute for this drawback. But the costs of ex-post monitoring in transition could also be high as the level of credit increases. Williamson (1987) developed a model of asymmetric information which generates equilibrium credit rationing based on the costly monitoring rather than the adverse selection and moral hazard of S-W. Thus, screening (or monitoring) and sorting may be substitutes but this is trivial in transition economies since neither of them can solve the problem of credit rationing.~~

2.4 Multiperiod credit rationing models (Dynamic incentives)

An important and realistic extension made to the credit rationing theory is the introduction of a multi-period relationship between the bank and borrower. Stiglitz and Weiss (1983), in a multi-period model, have shown that if the borrower defaults, the bank might still have incentives to renew the credit to allow her to restructure and repay the loan later. This could lead to moral hazard behaviour amongst borrowers, who know that the bank will rescue them in case of default. They now have greater incentives to choose a riskier project, which in turn might lead to a decline in bank's expected profit.

To avoid this moral hazard problem, S-W (1983) argue that sometimes a bank might not renew credit and force the borrower to bankruptcy, even if the expected return from all terminated borrowers is higher than the expected return from the new borrower set. This threat could be effective only if the terminated borrowers are rejected by other banks as well. Other banks would do so, since it is in their interest to make the threat of

bankruptcy credible for their borrowers. So, in the case of multi-period models, credit rationing serves as a dynamic incentive device to influence borrowers to choose less risky projects.

2.5 A Post Keynesian view of credit rationing

According to Post Keynesian economists, the New Keynesian models reviewed so far concentrate only on a very narrow interpretation of asymmetric information to explain credit rationing. According to Wolfson (1996), moral hazard behaviour, which stems from borrowers having more information than the bank, is only one of many risks involved in the lending and borrowing process. Furthermore, these risks cannot be categorised into precise probabilities as the New Keynesian models do, since they are mainly related to the fundamental uncertainties faced by lenders and borrowers about the future.[18] Wolfson argues that this fundamental uncertainty about the future could lead borrowers and lenders to different predictions and perceptions of risk (asymmetric expectations), which in turn could result in credit rationing. Assume that both lender and borrower are risk averse, but because they predict the future differently they have different perceptions of the risk of various projects. Thus, the same project could be considered risky by the borrower but not by the bank and vice versa. As we can see from the diagram above, those projects that the borrower perceives as risky are not undertaken at all, and the bank never gets to see them. On the other hand, among those projects perceived as safe by the borrower only those perceived as safe by the bank are undertaken, while the rest are credit rationed.

		The Bank	
		Safe	Risky
The Borrower	Safe	Accepted	Rejected (CR)
	Risky	–	–

In contrast to the S-W model, the bank and the borrower in this case do not know the precise probability of loan repayment of projects because of uncertainty. Instead, according to Wolfson, they form some opinions about the likelihood of a project's repayment, which are held with different degrees of confidence. In terms of the S-W model, this could mean that the probabilities of repayment of different projects are estimated with different

[18] The idea behind the radical uncertainty hypothesis, first proposed by Keynes (1937), is that there are many future events which are unpredictable.

error margins.[19] The level of confidence (or the error margin) with which a bank forecasts (or estimates) the creditworthiness of borrowers is influenced by several factors. A project considered safe under certain conditions and accepted might not be considered safe under different ones and hence can be credit rationed. This means that the occurrence and the magnitude of credit rationing could be explained by those factors that may alter the confidence of banks in estimating the risk of projects.

The Post Keynesian approach to credit rationing, is particularly useful in the context of transition economies, since it allows us to make a clearer distinction between that part of credit rationing caused by the inability of banks to minimise the error of estimating (forecasting) the likelihood of loan repayment, and that part of credit rationing caused by the fundamental uncertainties of the environment outside banks, which we analyse in more detail in the following section.

3 Credit rationing theory and transition countries

There are several factors that may hold back the expansion of FI in transition countries. The most important among these factors could be: the inefficiencies of FIs, macroeconomic uncertainties, the weaknesses of property rights and of the legal framework, and other microeconomic problems such as the underdeveloped business culture, the low transparency of businesses and inadequate flows of information, the inefficiencies relating the use of collateral, etc. Let us now analyse how these factors can contribute to the low level of FI in these countries based on the credit rationing theoretical framework developed above.

The quality of FIs

According to the theoretical framework developed in this paper, the relatively low quality of FIs in transition economies could adversely affect the supply of loans in two ways. First, regardless of the dependence of the probability of repayment on the loan rate, the low efficiency of banks (in particular of SOBs) captured by high q values in Eq. 3, will push the loan supply curve leftwards.

[19] This comparison should be treated with caution since the New and Post Keynesian models of credit rationing are sometimes considered as incompatible (Piegay, 1999), because of their differing probabilistic and non-probabilistic assumptions.

Second, many banks in transition countries, including foreign banks,[20] may need some time before the skills of their staff in credit analysis and evaluation improve to a level comparable to that in developed countries. In the meantime, the accuracy of evaluating the likelihood of loans repayment will suffer. In terms of the Post Keynesian approach this means that the confidence of bank's opinion about the safeness of many projects, or the creditworthiness of borrowers, will be relatively low. Therefore, many good projects could be considered as risky and credit rationed because of the lack of confidence in the credit analysis and evaluation process.

The improvement in banking quality could have only a marginal effect on the depth of FI in transition countries. There are several other factors external to banks that may shake their confidence in extending new loans regardless of the level of their efficiency, as we discuss further below.

Macroeconomic uncertainties

Although many transition economies have reached a certain level of macroeconomic stability in terms of economic growth and low inflation rates, the pyramid schemes events in Albania and the collapse of T-bills market in Russia have shown the fragility of the macroeconomic situation in these countries. The uncertainty about the future economic situation would negatively affect the likelihood of repayment (p in our model) of both safe and risky projects.

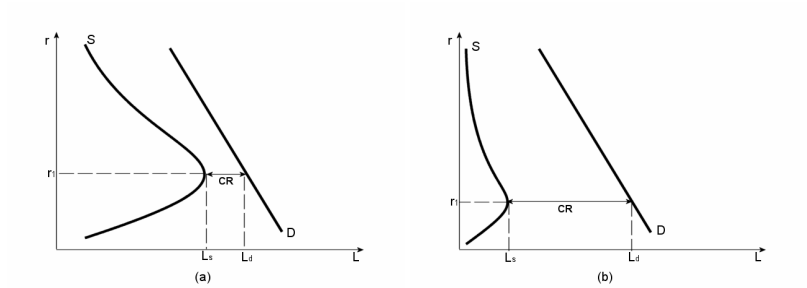

Fig. 10: Credit rationing in (a) a developed country and (b) a transition economy

[20] Foreign in terms of ownership not of staff.

If we were to compare a transition economy with a developed country, we should expect banks in the transition country to perceive a smaller probability of repayment p for a similar set of projects compared to banks in the developed country. This is because banks in transition would have to face higher asymmetric information problems and higher macroeconomic uncertainty. From Eq. 3 we can see that a smaller p means that banks' supply of funds will be lower at every interest rate, and it also becomes more inelastic (Eq. 4 and 6). This is illustrated in Fig. 10, where the supply curve of a transition country is located closer to the vertical axis compared to that of the developed country, ceteris paribus. Assuming the possibility of credit rationing in both countries and that the demands for loans are comparable, the magnitude of credit rationing in the transition country should be higher than in the developed country. If however we assume that the demand for credit in the transition country is likely to be lower than in the developed country, then the difference in credit rationing between the two countries would be smaller. However, it is not so much the actual magnitude of credit rationing in itself that is of concern to transition economies as much as the low level of lending which could persist even after demand eventually increases. Therefore, unless transition countries find a solution to the credit rationing problem, the development of FI may be severely constrained.

Weaknesses of property rights and of the legal framework

One of the most important institutional factors that may affect FI in transition economies is the legal framework. Both the quality of laws that protect investors' rights and the enforcement of these laws could be important in explaining the differences in FI development between transition and developed countries. Let us now analyse how the theoretical framework of this paper supports this view.

From the various models reviewed in this paper, the Jaffee and Russell model is the most appropriate one to analyse how the legal weaknesses influence banks' decisions on extending new loans. In this model the nonpecuniary costs (Z) could be interpreted as the degree of legal protection that banks have for their investments (loans). The bank enjoys a full legal protection if $r_2L<Z$ (Fig. 6 above). In this case there is no interest rate at which the dishonest borrowers could maximise their expected profit by choosing an intentional default. Hence, the pool of borrowers becomes

homogenous since the expected profits of honest and dishonest borrowers are now identical at any interest rate. Under such conditions, no credit rationing occurs since the bank's expected return does not decline with an increase of interest rate.

If at the other extreme banks do not have any legal protection at all (Z=0) then $r_L L > Z(=0)$ for every r_L, which means that the expected profit of dishonest borrowers is maximised only if they do not return the loan.[21] Therefore, they will choose a strategic default at any interest rate and their expected profit will be constant[22] at pX (Fig. 11). In this case, since the dishonest borrowers will always default, the expected return of the bank

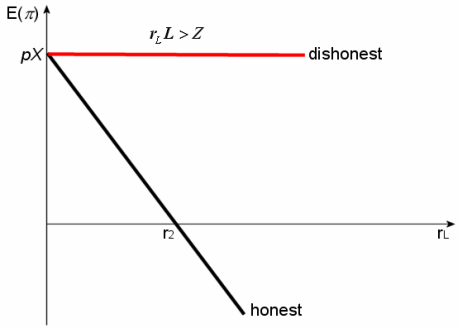

Fig. 11: Expected profits for honest and dishonest borrowers when Z=0

until the honest borrowers drop out of the market at the interest rate of r_2 is $\rho = \lambda p r_L L$.[23] This is lower than the expected return of the bank when there is some legal protection ($0<Z<r_2L$)[24] $\rho = p r_L L$ up to r_1, while it is the same thereafter. This means that the supply of loans for interest rates below r_1 will be lower when there is no legal protection compared to the

[21] See also Eq. 19, Fig. 6, and the relevant discussion.
[22] With respect to changes in interest rates.
[23] Where λ denotes the proportion of honest borrowers in the population.
[24] See also Fig. 6.

supply of loans when there is protection, while it is the same beyond r_1 as illustrated in Fig. 12(a). Since bank's expected profit is maximised at r_1 when there is legal protection and at r_2 when there is not, the equilibrium supply of loans in the latter case would be considerably lower and credit rationing more severe.

However, this result depends critically on the relative size of the group of dishonest borrowers. If the group of dishonest borrowers is small (λ is high) then the difference in the bank's expected return before and after the dishonest borrowers intentional default, will be small. Therefore the supply curves in the case of no legal protection and with legal protection will differ little. If the group of dishonest borrowers is sufficiently small it could also be the case that the supply of loans in equilibrium with or without legal protection could be the same as in Fig. 12(b). Thus, legal protection is particularly important for the supply of loans when the group of dishonest borrowers is significantly large as in case (a) in Fig. 12.

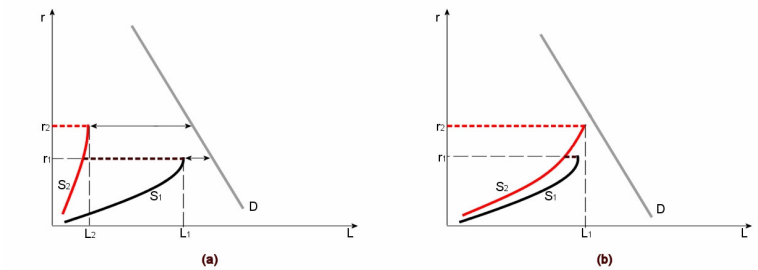

Fig. 12: The supply of loans when there is legal protection ($0<Z<r_2L$) - $\mathbf{S_1}$, and when there is no legal protection (Z=0) - $\mathbf{S_2}$, for different $\lambda - \lambda_{(a)} < \lambda_{(b)}$

It is a difficult task to make a straightforward realistic assumption about differences in the distribution of 'honest' and 'dishonest' (or safe and risky) borrowers in transition economies compared to that in the other countries. However, we can analyse how the differences in the institutional settings could alter the relative size of these two groups of borrowers. For instance, it could be argued that a weak legal framework would encourage more widespread moral hazard behaviour by borrowers not to return the loan. If we make a more realistic assumption that the nonpecuniary cost of default Z is different for each borrower, meaning that the cost of the same legal action

could be perceived differently by different borrowers, we should expect that as Z declines more and more borrowers will find it acceptable to default on purpose. In addition, because dishonest borrowers have higher expected returns than the honest ones, competition could push the latter group out of the market if they do not choose to renege. It follows that as Z decreases the weight of honest borrowers decreases too, and the supply curve shifts closer to the vertical axis. Therefore, it could be argued that a low level of legal protection is most probably characterised by a large proportion of dishonest borrowers, which is the case (a) in Fig. 12.

If we assume that a transition country is characterised by a weak legal framework ($Z \approx 0$) its supply of funds according to our previous discussion is likely to be L_2 in panel (a) of Fig. 12, which is clearly lower compared to the supply of funds of a country with an advanced legal framework L_1. The impact of an improvement in legal protection in a transition country on its supply of funds is straightforward. As Z increases the point where the supply curve S_1 jumps to S_2, which is also the point where the bank ends expanding lending and starts credit rationing, moves more and more to the right. Hence, as the legal framework improves the availability of funds increases and eventually when $Z > r_2 L$ for every borrower, the supply would meet the demand of funds at r_2 and there will be no credit rationing in equilibrium.

In sum, the weaknesses of legal framework (relatively low Zs) in transition countries could reduce banks' expected returns and therefore their supply of loans considerably because of the adverse incentive (or moral hazard) effect, i.e. more borrowers are tempted not to return the loan.

The quality of information flows

Due to the rapid structural changes that took place in transition countries, the old mechanism of information flows were seriously disrupted or became completely irrelevant, e.g. the old accounting systems were inadequate to accurately record the activities of many new private enterprises. As new structures have been set up and consolidated, transition economies still remain characterised by poor flows of information. In some cases this is related to the implementation of new accounting systems and reporting procedures, unfamiliar to many companies and credit analysts alike. However, sometimes the information is also intentionally hidden by enterprises to evade taxation. Many private businesses are reluctant to disclose information to banks for fear it will be leaked to the fiscal

authorities. In addition, the track records of the newly emerged private firms, which constitute the bulk of banks' borrowers, are very short.

Poor information flows, as in the case of inadequate credit analysis skills, makes it difficult for banks to accurately assess the risk of extending loans. Therefore it could have similar detrimental effects on banks' supply of loans. In addition, when the borrowers intentionally conceal information, asymmetric information between them and the bank widens. This increases the possibility that the negative effects of adverse selection and the moral hazard on the bank's expected profit will exceed the positive effect of an increase in the loan interest rate. Hence, the chance of type 1 or pure credit rationing in transition countries are relatively high because of these poor information flows.

Collateral

An important instrument that can be used by banks to overcome the credit rationing problem is collateral. The bank could demand a collateral which makes borrower's expected return of choosing risky projects lower than the expected return of safer projects. However, collateral might not be an option that banks can easily use in transition countries. This is due to the low level of personal and corporate wealth and the weaknesses in the legal system.

Leaving out the role that the collateral could play as a sorting device in solving the credit rationing problem, the lack of collateral could have a more direct negative effect on the supply of loans. If we consider the example in Fig. 5 (above), where the borrower has to choose between a safe project (a) and a risky one (b), as collateral (C) decreases the intersection between the two alternative projects shifts leftwards closer to the vertical axis. In particular if $C = 0$ (no collateral) then we get a similar situation to that depicted in Fig. 13.

Now at every interest rate the risky project (b) has a higher expected return compared to the safe project (a). It follows that all borrowers will choose the project with the highest expected return (b), but also the riskier one. If we compare the bank's expected return in the two cases, when there is a positive fixed collateral (Eq. 24 below) and when there is no collateral (Eq. 25), the expected return in the later case is lower for two reasons. First, in absence of collateral the probability of repayment is smaller compared to the case with positive collateral when the interest rate is below C/L (see Fig.

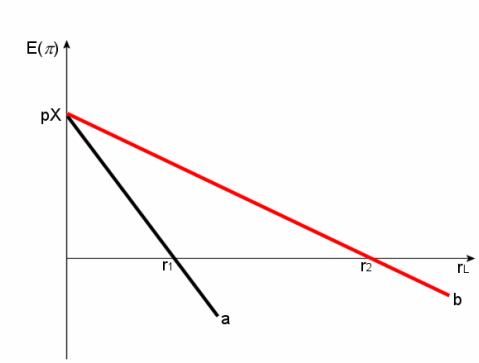

Fig. 13: Alternative projects without bankruptcy costs and collateral

5). Second, in the case of zero collateral the bank carries all the cost of a project failure. Hence, at any interest rate, its expected profit is lower by the amount of the collateral that the bank could have recovered in the case of the borrower defaulting.

If $C > 0$

$$\rho = \begin{cases} p_a r_L L + (1 - p_a)C & if \quad r < C/L \\ p_b r_L L + (1 - p_b)C & if \quad r > C/L \end{cases} \tag{24}$$

If $C = 0$

$$\rho = p_b r_L L \tag{25}$$

The supply of loans in the case of no collateral and in the case of a fixed amount of collateral, are represented in Fig. 14a. The equilibrium supply of loans when C=0 (L_2) is clearly lower than the equilibrium supply of loans when C>0 (L_1).

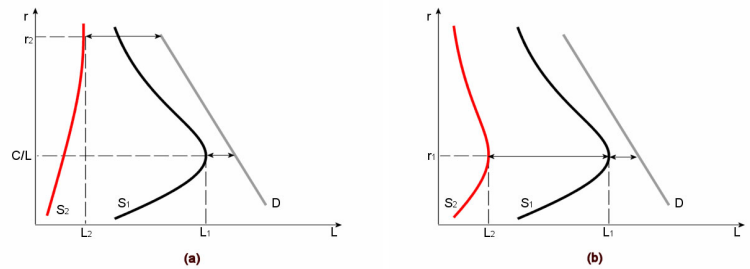

Fig. 14: The supply of loans when C>0 (S_1) and when C=0 (S_2), in the case of (a) moral hazard and (b) adverse selection

For simplicity reasons, the above discussion was based on the moral hazard model, but the results are not very different if we use the adverse selection model where there are two groups of borrowers rather than two alternative projects (Fig. 14b). In both models the magnitude of credit contraction due to lack of collateral will be larger if the risk of project failure is high. Therefore the lack of collateral could be particularly damaging for transition countries where the average risk of projects is expected to be relatively high.

Multiperiod credit rationing

The above discussion was based on a single period model. It could be argued that if the arguments were based on a multiperiod model, the impact of the moral hazard behaviour of borrowers on the supply of loans in transition economies would have been less pronounced. For instance, in presence of a weak legal environment some borrowers could decide to remain 'honest' and pay back the loan because they want to build up a long run relationship with the bank. On the other hand, the dishonest borrowers that choose a quick short run profit by not returning the loan, will be penalised in the future by being redlined by banks. Therefore the bank may use future credit rationing as a dynamic incentive device to discipline borrowers' behaviour in the absence of collateral and legal protection.

However, use of the threat of future credit rationing could also be problematic as an incentive device in transition economies. An important

necessary condition for the multiperiod credit rationing to work was that all banks should reject the 'dishonest' borrowers in the future. While it is in the interest of all banks to do so, banks in transition countries may not always be willing to share information about their borrowers. Thus, the argument of poor flows of information in transition countries could extend also to those between banks, in which case the multiperiod credit rationing could fail as an effective incentive device.

In addition to the problem of communication between banks, it could also be difficult to distinguish between those borrowers who default because of moral hazard behaviour and those who default due to 'bad luck' or to the adverse macro and microeconomic conditions of transition. Failing to make such distinction would still lead to a type 1 credit rationing. Therefore, although the multiperiod credit rationing could ease the moral hazard behaviour of borrowers in transition economies it may not be an effective substitute incentive device for an effective legal framework or collateral.

Credit rationing and credit ceilings

In transition economies credit rationing could also occur because of the direct quantitative controls imposed by the monetary and/or regulatory authorities upon the amount of lending that banks are allowed to provide (credit ceilings). During the early stages of transition, the monetary authorities used credit ceilings as an instrument for conducting monetary policy because of the inefficiency or the absence of other indirect instruments. However, as the monetary authorities in many transition countries have switched to indirect monetary policy instruments or are planning to do so, this form of credit ceiling and the consequent credit rationing will eventually cease.

Under-served groups

In transition countries there are also distinguishable groups of borrowers which are of interest to banks trying to identify the 'safe' from 'risky' borrowers. For instance, banks generally make a distinction between foreign and domestic investors. In addition, among domestic investors there are other distinct groups like large and small businesses or new and mature ones. In this case, the second type of credit rationing (redlining) could take

place, where some groups are severely rationed or completely excluded form the credit market.

Let us start by assuming that there are two observably distinguishable groups of borrowers – foreign investors and domestic investors. If we denote the bank interior optimal interest rate by r_f and r_d for foreign and domestic investors respectively, then we should expect that $\rho_f(r_f)>\rho_d(r_d)$, where $\rho_i(r)$ is the gross expected return function of bank for the investor i. These expectations are based on beliefs like foreign investors are more reliable and experienced, they face higher bankruptcy costs, have better flows of information and lower transaction costs, and offer safer collateral. If the cost of providing loans, as illustrated in Fig. 16, is greater than δ_2, for instance at δ^* then domestic investors will not get credit at all, while foreign investors will get all the credit they want at the interest rate r_2. Only if the cost of providing credit falls to δ_2 will the domestic investors have access to credit, but still they will be credit rationed (Fig. 16).

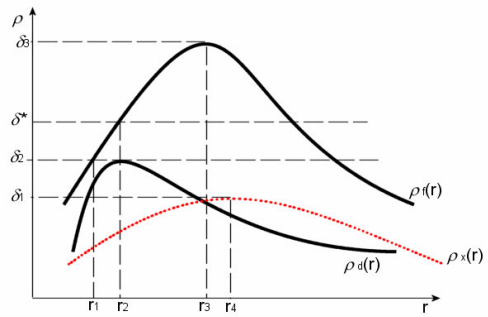

Fig. 16: Credit rationing between different groups

The same argument can be used to explain why banks concentrate mostly on large business rather than small and medium ones. If we denote the group of small and medium enterprises (SMEs) by x, we should expect that gross returns of banks from these businesses will be quite low, as again illustrated in Fig. 16. These expectations of low returns are based especially on the SMEs' inability to meet collateral requirements, the poorer flow of

information, higher transaction costs and the lack of financial and other skills for project evaluation. So the group of SMEs might be excluded completely from the credit market or 'redlined' because there is no interest rate at which this group of businesses will be considered for credit. A similar rationale could also apply in the case of new businesses that lack sufficient history to convince banks about their creditworthiness.

There are also other groups that can be distinguished among domestic investors. Banks may discriminate between those investors operating in or close to the capital city, and those operating in other regions. In some transition countries like Albania, there is a high concentration of economic activity in the capital city and nearby areas compared to the other cities. This implies that in the capital city and the nearby areas the informal and formal information flows and the rule of law are superior, hence the asymmetric information and moral hazard problems are lower than in provinces. This means lower risk and higher expected return for the investors (banks) in this area. Finally, banks may also differentiate between businesses according to their area of activity.

4 A critique of credit rationing theory

Most of the criticism of the credit rationing model has been aimed at the simplifying assumptions of the model. Some authors, e.g. Bester (1985) discussed previously, have developed models that provide the bank with instruments with which it can solve the adverse selection and the moral hazard problems. To some extent this fits the case of developed countries where banks already have a variety of instruments that can be used as sorting and incentive devices. However, in the particular case of transition economies, banks face more severe asymmetric information problems and uncertainties, but they do not possess as many instruments (e.g. collateral) as their counterparts in the developed countries. Therefore the credit rationing theory is less open to criticism under the adverse conditions of transition countries.

Credit rationing theory has also been criticised for concentrating mainly on how banks allocate existing resources and disregarding the endogenous creation of money (Piegay, 1999). Wolfson (1996) has been one of the first to bring these two concepts together. Wolfson argues that banks will try to

accommodate any demand for credit by adjusting their reserves accordingly.[25] However, the borrowers' demand that banks try to meet is not the same as the borrowers demand term we have used throughout this paper. Banks will try to serve only the demand of those borrowers who are perceived to be creditworthy. The difference between this demand, which Wolfson calls 'effective' demand, and the original demand is interpreted as credit rationing. Any factor that affects the perception of banks about the future creditworthiness of borrowers could lead to a change in the effective demand curve and therefore to a change in credit rationing.

Some of these factors were analysed in Section 3, although under a different framework which ignored money creation. Nevertheless, the results based on Wolfson's approach should not be very different from those obtained above. If, for any reason, banks' uncertainty about the likelihood of loan repayments increases, credit rationing would increase in both Wolfson's and our cases. However, while Wolfson argues that credit rationing increases because of the decrease in effective demand followed by supply, we would argue that credit rationing increases due to the low level of banks' loans supply. In so far as both the effective demand in Wolfson's model and the supply in our model depend on banks' perceptions about borrowers' creditworthiness, and as long as there is no explicit limit on the availability of banks' funds in our model, the two approaches should be broadly similar.

This similarity of the two frameworks extends even to the case of distinguishable groups of borrowers. In Fig. 17, if the bank's cost of loans is at δ_2 it would find only the second group of borrowers creditworthy and will provide them with all the credit they demand. In this case the effective demand is that of the second group (D_2) while credit rationing equals the demand of the first group (D_1), which is left completely out of the market. Beside the different approaches used by S-W and Wolfson on how banks form their opinion about the creditworthiness of different borrowers, the results appear to be very similar. However, the endogenous money assumption that banks will offer any amount of loans to the creditworthy borrowers means that the marginal group, and all the groups of borrowers above that (Fig. 9), will never be credit rationed. This is in contrast to S-W's

[25] This is similar to the rationale of mark-up models of endogenous money (e.g. Kaldor, 1985 or Moore, 1988).

argument that the marginal group, or any other group above it, could be subject to type 1 credit rationing if banks lack the necessary funds.

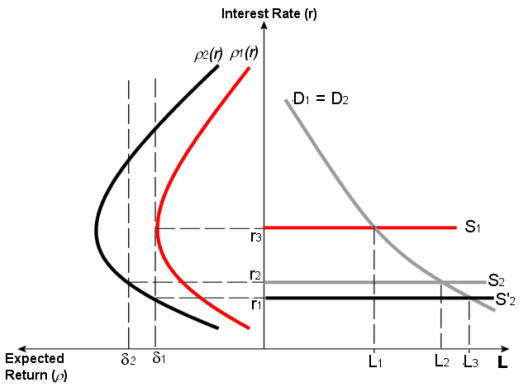

Fig. 5.17: Type 2 Credit Rationing

5 Conclusions

The orthodox literature on FI suggests that FIs, like banks, should play a critical role in the development of transition countries by channeling savings into the most productive investment projects. However, this prediction of the orthodox theory of FI seems to lack empirical support when applied to transition countries. Although the private sector has grown rapidly, the level of FI in terms of outstanding credit to the private sector as a percentage of GDP has remained very low. In this paper we have set out and extended an alternative theory that is better suited than the orthodox theory to analyse the development of FI in transition countries. Based on this theory we have argued that the presence of severe informational problems and moral hazard behaviour in transition countries makes it difficult for banks to distinguish between different groups of borrowers simply on the basis of the interest

rate. Although collateral and the screening process could solve this sorting problem, in practice they are either ineffective or too costly. Under these circumstances it is likely that banks in transition economies reject many productive projects that come from business or groups of businesses that are believed to be prone to moral hazard behaviour. The credit rationing phenomenon is aggravated by the macro and microeconomic uncertainties in transition economies that adversely alter the confidence with which banks estimate the risk of different projects, independently from their ability to gather and process information. In addition, it was argued that the negative impact of the legal framework's weaknesses on the development of FI in transition countries is related to the adverse incentive effects it has on borrowers' behaviour not to return loans. In sum, the predictions of the alternative theoretical models developed in this paper concerning the development of FI in transition countries is much more pessimistic than that of the orthodox theory. If weaknesses of factors internal and external to banks persist, the role of FIs in solving informational problems and boosting intermediation could remain very limited.

References

Allen, F., and Santomero, A. M. (1997) "The Theory of Financial Intermediation," *Journal of Banking and Finance*, Vol. 21, pp. 1461-1485.

Bester, H. (1985) "Screening vs. Rationing in Credit Markets with Imperfect Information," *The American Economic Review*, Vol. 75, No. 4, pp. 851-855.

Buch, C. M. (1996) *Creating efficient banking systems: Theory and evidence from Eastern Europe*, Kieler Studien, Tubingen: Mohr (Siebeck)

Devinney, T. M. (1986) *Rationing in a Theory of the Banking Firm*, Studies in Contemporary Economics series, Berlin.

Hodgman, D. R. (1960) "Credit Risk and Credit Rationing," *Quarterly Journal of Economics*, Vol. 74, pp. 258-78.

Jaffee, D. M., and Modigliani, F. (1969) "A Theory and Test of Credit Rationing," *American Economic Review*, Vol. 59, pp. 837-888.

Jaffee, D. M., and Russell, T. (1976) "Imperfect Information, Uncertainty, and Credit Rationing," *Quarterly Journal of Economics*, Vol. 90, No. 4, pp. 651-666.

Jaffee, D. M., and Russell, T. (1984) "Imperfect Information, Uncertainty, and Credit Rationing: A Reply," *Quarterly Journal of Economics*, Vol. 99, No. 4, pp. 869-872.

Jaffee, D., and Stiglitz, J. E. (1990) "Credit Rationing" in Friedman, B. M., and Hahn, F. H. eds. *Handbook of Monetary Economics, Vol. 2*, Elsevier Science Publishers, New York.

Kaldor, N. (1985) "How Monetarism Failed," *Challenge*, Vol. 28, No. 2, pp. 4-13.

Keeton, W. (1979) *Equilibrium Credit Rationing*, Garland Press, New York.

Keynes, J. M. (1937) "The General Theory of Employment" in Shaw, G. K. eds. *The Keynesian heritage*. Vol. 1, Schools of Thought in Economics series, no. 1, Elgar, Aldershot, 1988, pages 7-21.

Moore, B. J. (1988) "The Endogenous Money Supply," *Journal of Post Keynesianists Economics*, Vol. 10, No. 3, pp. 372-385.

Piegay, P. (1999) "The New and Post Keynesian Analysis of Bank Behaviour: Consensus and Disagreements," *Journal of Post Keynesian Economics*, Vol. 22, No. 2, pp. 265-283.

Riley, J. G. (1987) "Credit Rationing: A Further Remark," *American Economic Review*, Vol. 77, No. 1, pp. 224-227.

Rothschild M., and Stiglitz, J. E. (1970) "Increasing Risk: I, A Definition," *Journal of Economic Theory*, Vol. 2, pp. 225-243.

Shapiro, C., and Stiglitz, J. E. (1984) "Equilibrium Unemployment as a Worker Discipline Device," *American Economic Review*, Vol. 74, pp. 433-444.

Stiglitz, J. E., and Weiss, A. (1981) "Credit Rationing in Market with Imperfect Information," *The American Economic Review*, Vol. 71, No. 3, pp. 393-409.

Stiglitz, J. E., and Weiss, A. (1983) "Incentive Effects of Terminations: Applications to the Credit and Labour Markets," *American Economic Review*, Vol. 73, No. 5, pp. 912-927.

Stiglitz, J. E., and Weiss, A. (1985) "Credit Rationing with Collateral," Bell Communications Research Economics Discussion Paper No. 12.

Stiglitz, J. E., and Weiss, A. (1987) "Credit Rationing: Reply," *American Economic Review*, Vol. 77, No. 1, pp. 228-231.

Waller, C. J., and Lewarne, S. (1994) "An Expository Model of Credit Rationing," *Journal of Macroeconomics*, Vol. 16, No. 3, pp. 539-545.

Williamson, S. D. (1987) "Costly Monitoring, Loan Contracts, and Equilibrium Credit Rationing" *Quarterly Journal of Economics*, Vol. 52, No, 1, pp. 135-145.

Wolfson, M. H.(1996) "A Post Keynesian Theory of Credit Rationing," *Journal of Post Keynesian Economics*, Vol. 18, No. 3, pp. 443-470