



Credit rationing, interest rates and capital accumulation[☆]

Mahmoud Sami Nabi^{a,b,*}, Mohamed Osman Suliman^{b,c}

^a LEGI- Tunisia Polytechnic School, University of Carthage; University of Sousse, IHEC, Tunisia

^b ERF, Cairo, Egypt

^c University of Sharjah, Sharjah, UAE

ARTICLE INFO

Article history:

Accepted 9 June 2011

JEL classification:

O11
O16
O41

Keywords:

Credit rationing
Capital accumulation
Interest rate
Rule of law

ABSTRACT

A simple endogenous growth model is developed to characterize credit rationing through the capital accumulation process. The model shows that credit rationing on investment loans decreases as capital accumulates and the enforcement cost decreases. We find that the evolution of the interest rate factor (lending interest rate/depositing interest rate) has a similar pattern to the credit rationing probability. However, simulations show that the evolution of the interest rate spread through the capital accumulation process depends on the degree of the enforcement cost. In the empirical part of the paper, we consider fifty-two countries, at different stages of development, over the period 1995–2005. We confirm the theoretical findings relative to the evolution of the interest rate spread and interest rate factor with capital accumulation. These results suggest that, for economies endowed with costly contract enforcement, the interest rate factor could be a better proxy of credit rationing than the interest rate spread.

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1. Introduction

This paper investigates two issues. The first issue concerns analyzing the evolution of credit rationing through the capital accumulation process in presence of two types of credit market imperfections: asymmetric information and enforcement cost. The second issue delves with providing a proxy for the credit rationing based on the lending and deposit interest rates.

The literature identified two types of rationing. The first type called disequilibrium rationing was proposed by [McKinnon \(1973\)](#) and [Shaw \(1973\)](#). It corresponds to a situation in competitive markets with perfect information where financial repression generates an excess demand for loans. In the second type called equilibrium rationing, excess demand exists as a result of imperfect information which leads to adverse selection and moral hazard. The literature which highlighted this type of credit rationing ([Gale and Hellwig, 1985](#); [Jaffee and Russell, 1976](#); [Keeton, 1979](#); and [Stiglitz and Weiss, 1981](#)) has attempted to explain why a rational bank keeps the lending rate inferior to a certain threshold and limits the amount of loans. In [Jaffee and Russell \(1976\)](#) and [Gale and Hellwig \(1985\)](#), credit is rationed in the sense that an individual borrower receives a smaller loan than she would like, given the offered interest rate. In [Keeton](#)

(1979) and [Stiglitz and Weiss \(1981\)](#) borrowers are identical ex ante, but some receive loans and others do not. When deciding about supplying a loan, a bank takes in account the interest payment it will receive and the probability that the loan will be repaid. However, generally there is asymmetric information between the bank and the borrowers about the latter. Since, the bank doesn't observe the type of the borrowers, it perceives those who are willing to borrow at high interest rate to be worse risks with low repaying probability (Adverse selection). Hence, the probability of repayment within the pool of borrowers decreases as the interest rate exceeds a given threshold. In consequence, banks engage in credit rationing rather than raise interest rates because in a world of information asymmetry, higher interest rates may induce adverse selection and defaults.

According to [Stiglitz and Greenwald \(2003\)](#) the issue of credit rationing requires a new paradigmatic framework where the rate of interest is no longer a money market-clearing price, but the result of the portfolio decisions of banks and lenders in light of asymmetric information. This affirmation supports the credit-rationing view initiated by [Stiglitz and Weiss \(1981\)](#) which puts more emphasis on the asset side, that is, changes in bank loan and other credit variables, independent of changes in the quantity of money, are the determinants of real fluctuations. By way of contrast, according to the monetarist view ([Friedman and Schwartz, 1963](#)), monetary disturbances affect the real economy through changes on the liability side of the bank's balance sheet. Changes in bank deposits impinge directly or indirectly on spending through changes in interest rates, while the composition of the bank portfolios on the asset side remains insignificant. Support for the credit-rationing view has been provided by [Calomiris and Hubbard](#)

[☆] The authors would like to thank two anonymous referees and participants for helpful suggestions on an earlier version of the paper. All remaining errors are our own.

* Corresponding author at: LEGI-EPT, BP 743, 2078 La Marsa, Tunisia.

E-mail addresses: nabi@univ-paris1.fr (M.S. Nabi), Osman.Suliman@millersville.edu (M.O. Suliman).

(1989) through the structural vector autoregressive (VAR) simultaneous equation model. Bordo et al. (1990) expanded this model by adding factors to incorporate monetary variables into the credit-rationing model. They found support for both the credit and monetary views. However, King (1986) found that money dominated credit in a study based on Granger-causality tests and standard VARs. Bond et al. (2008) concluded that an efficient credit market would improve the efficiency of producers (entrepreneurs) partly by allowing the most productive producers to expand and partly by reducing the incentive for inefficient firms to remain in the market.

The efficiency of credit markets and more precisely the credit contracts enforcement costs is an important feature to consider when analyzing credit rationing mainly in developing countries. Bond et al. (2008) show that the Colombian entrepreneurs are subject to severe enforcement problems which dampen the expansion of their high earning potential investments. Besides, their study reveals that enhancing the functioning of credit markets would be beneficial mainly to the modest-wealthy households with promising business opportunities.

The principal objective of this paper is to analyze simultaneously the impact of capital accumulation on credit rationing and the ability of the interest spread to signal rationing for different levels of the enforcement cost with a collateral evolving with the capital accumulation process. The latter two features are very important to consider for the two following reasons. On the one hand, as noted by Burke and Hanley (2006) research in the field of credit contracts lacks the correspondence between the theory and evidence on the relationship between interest rate margins and collateral. Indeed, over-optimism models posit a positive relationship between the two. However, the screening model theories predict a trade-off between collateral and interest margins. This exposed them to the criticisms regarding their failing to reflect the potential simultaneity between collateral and interest margins. Indeed, as noted by Coco (2000) and Parker (2002) banks could use collateral as a second instrument with the interest margins in order to achieve separation equilibrium between good and bad risks and shaking off excess credit demand. In our model the collateral increases through the capital accumulation process and interestingly we show that its relation with the interest margin depends on the level of the enforcement cost. On the second hand, the latter is important to consider in order to isolate the impact of a reduction of the enforcement cost (due for example to an improvement of the judicial system) from that of credit rationing. Indeed, it has been shown empirically by Bond et al. (2008), and Mitchener and Ohnuki (2008) that improvement of the institutional environment reduces the interest rate spread.

We show theoretically that credit rationing on investment loans declines as capital accumulation (higher per capita income) and the enforcement of credit contracts improves. Besides, this evolution is much more correlated with the evolution of the interest factor (lending interest rate/deposit rate) than with that of the interest rate spread (lending rate–deposit rate). Indeed, the sign of the correlation between the credit rationing probability and the interest rate spread depends of the level of the enforcement cost. Indeed, when the enforcement cost is below a determined threshold, the correlation between the interest spread and credit rationing probability is negative. In the opposite case, it becomes positive. At the contrary, we show that the correlation between the interest rate factor and the credit rationing probability is always positive. Therefore, we conclude that the interest factor as a proxy for credit rationing is superior to the interest rate spread. In the empirical part of the paper we consider fifty-two countries, at different stages of development, over the period 1995–2005. We confirm the theoretical results about the evolution of the interest rate spread and interest the factor across the development process.

This paper is organized as follows. In Section 2 we present a short literature review on the relationship between credit rationing and capital accumulation. Section 3 develops the endogenous growth model. Section 4 presents the data and empirical strategy. In Section 5

we discuss the empirical results. Some concluding remarks will be offered in Section 6.

2. Literature review

Numerous papers have set up theoretical models to examine the relationship between credit rationing and the real economy and more specifically on capital accumulation and growth. Bencivenga and Smith (1993) develop an endogenous growth model with adverse selection problem in the loan markets. They show that credit rationing increases after an improvement in the technology for producing capital and causes lower growth. In a neoclassical growth model, Bose and Cothorn (1996) demonstrate that the negative impact of credit rationing on investment diminishes across the capital accumulation process. In turn, a reduction in credit rationing on investment loans fosters capital accumulation. Hung (2005) shows in a modified version of Bencivenga and Smith (1993) that credit rationing on both investment and consumption loans decreases as capital accumulates but increases as the government imposes policies of financial repression. Krasa et al. (2008) construct a two-period model identifying a credit rationing equilibrium inherent to an enforcement problem in the legal system. The latter rests on two key parameters. The first one is the efficiency of enforcement captured by the cost paid to secure rights in court. The second one is the percentage of total assets that a court can seize. It is this second type of enforcement cost that we consider in our model.

This paper belongs to the aforementioned literature since it examines the impact of capital accumulation on credit rationing in the presence of asymmetric information and costly enforcement. The latter is an important feature to consider when analyzing credit rationing mainly in developing countries. However, the theoretical model we propose diverts from the aforementioned by exploring a proxy for credit rationing throughout the capital accumulation process. It particularly analyzes the ability of the interest rate spread to capture the degree of credit rationing at a given stage of the capital accumulation process and for a given level of the enforcement cost.

Finding a proxy for the credit rationing figures also among the objectives of Jaffee and Modigliani (1969) who asked the following question: “Can credit rationing be measured”? Their theory identifies two types of rationing: equilibrium rationing and dynamic rationing. The first type occurs when the lending rate is set at its long-run equilibrium level. Whereas, the second type occurs in the short run when the loan rate has not been fully adjusted to its long-run level. Besides, they prove that the spread between the long-run lending rate and the short-run lending rate is a good proxy for the dynamic rationing. Gertler et al. (1990) have also showed that the interest rate spread reflects the variation in credit market imperfection and agency costs which in turn causes investment's fluctuations. This is shown in a two-period model of investment and financial contracting under asymmetric information which they test on US data. More recently, Nkusu (2003) while emphasizing the importance of treating the lending and deposit rates of interest as distinct shows that the interest rate spread is indicative of the default risk and has negative impact on incremental loan amounts.

The originality of our theoretical model relatively to this second wave of literature is that it questions the ability of the interest spread to proxy credit rationing at different stages of the capital accumulation process and for different levels of the enforcement cost. In the theoretical part of the paper we develop a model based on the overlapping generation framework proposed by Diamond (1965) and adapted by Matsuyama (2000, 2004), incorporating an enforcement cost and the indivisibility of the investment projects. Our model is, nonetheless, different from the original framework. Firstly, it utilizes an endogenous growth specification of the capital accumulation technology. Secondly, it incorporates a banking system exposed to information asymmetry through adverse selection. The model assigns two roles to a competitive banking sector: financing indivisible investment projects and enforcing the debt contract. Indeed, banks receive deposits from

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