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Aggregate risk, credit rationing and capital accumulation

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Abstract

Financial intermediation plays an important role in the capital allocation process in developing economies. Financial markets are often subject to aggregate risk. This risk, which cannot be eliminated by diversification, can affect the fundamental viability of a financial intermediary and disrupt the capital accumulation process. The model considers a bank that faces excess demand in the loan market. The bank can ration credit by loan quality and by loan quantity. Intermediaries react to aggregate risk by being more selective in the criteria they use to screen loan applicants. The interaction of credit rationing and intermediaries default probability affects capital accumulation. The more efficient the banking system in resolving borrower default and banking failures, the more industries can be financed for a given opportunity cost. © 2003 Board of Trustees of the University of Illinois. All rights reserved.

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1. Introduction

Financial intermediation plays an important role in the capital allocation process. This role is especially important for developing economies where financial intermediaries allocate a large proportion of savings. In developing economies, financial markets are often subject to aggregate risk. This risk, which cannot be eliminated by diversification, can affect the fundamental viability of a financial intermediary. That is, when not all risk can be diversified away, some financial intermediaries may fail. These failures may disrupt the capital accumulation process and reduce growth, affecting the economy as a whole. This link between bank failure and growth has not been addressed by the theoretical literature since most researchers assume that intermediaries can diversify away all risk by portfolio diversification. Empirical evidence shows that in many countries, financial intermediary failures have a large impact on GDP.¹

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This paper analyzes the capital accumulation process of an economy where entrepreneurs finance projects through intermediaries. Entrepreneurs are subject to equilibrium credit rationing and intermediaries face aggregate risk.² Credit rationing and aggregate risk affect capital accumulation, generating changes in the rate of growth and in the level of steady state capital. We use a costly state verification model based on Williamson (1986), Boyd and Smith (1997, 1998), Guzman (2000), and Hamada and Sakuragawa (2000) that resembles banking and permits the analysis of alternative banking institutional frameworks. Specifically, the effect of changes in the efficiency of the banking system can be analyzed, i.e., different institutional arrangements in how banks deal with clients that default give rise to different costs of resolving bank failures. In addition, the effect of institutional changes in the way an economy deals with bank failures can be analyzed, i.e., how depositors recover their deposits when banks default.

The model considers a bank that faces excess demand in the loan market. The bank can ration credit in two ways. First, the bank can ration by loan quality. This case is based on a particular homogeneous characteristic of a borrower's project that the bank can observe—quality. Banks sort borrowers based on this characteristic. Borrowers with projects of a sufficiently high quality obtain loans while others are rationed as a group. We assume that this characteristic affects the distribution of project risk in a way that preserves the mean return. In this precise sense, credit rationing by quality occurs as some borrowers are deemed to be too risky by the bank, and they are denied loans. Second, rationing by loan quantity occurs when, for a given group with the same characteristics, some members receive loans but other identical agents are rationed.

One interesting aspect of the model is that aggregate risk affects the asset side of the intermediary's balance sheet. Intermediaries may default and go bankrupt if an adverse aggregate shock reduces the profitability of their loan portfolio. Since Diamond and Dybvig's (1983) seminal contribution, most attention in the economics literature has focused on bank failures due to speculative bank runs on deposits—or the liability side of the bank's portfolio. While both sides of the portfolio are important, the IMF reports that most recent bank failures have been triggered by deterioration on the asset side of the bank's portfolio.³ In this model, riskier borrowers decrease the return from the bank's portfolio. Intermediaries react to aggregate risk by being more selective in the criteria they use to screen loan applicants. By increasing portfolio quality, banks reduce expected monitoring expenses. However, there is an increase in credit rationing by loan quantity that reduces diversification in the bank's loan portfolio. Under certain conditions this can decrease the overall productivity of the economy. This trade off between the reduction in expected monitoring costs and productivity has not been considered by the literature.

The model studies the effect of credit rationing on the level of production. Banks index projects by a measure of risk and use this characteristic to sort applicants.⁴ Different industries are known to differ in their risk characteristics. A more efficient banking system, which we interpret as a system with lower expected monitoring costs, can finance riskier borrowers or riskier industries. We assume that expanding the scope of projects funded creates opportunities for more business.⁵ We show that economies with more efficient banking systems lend to riskier borrowers. This decreases capital accumulation since the failure probability and the expected monitoring cost get larger. However, the gains from increasing the scope of projects funded reduce the credit rationing problem and generate an increase in the per capita capital level that offsets the loss. We specify a condition that determines which effect will dominate.

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