

A dynamic analysis of an economy with banking optimization and capital adequacy regulations

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Abstract

In this paper, we investigate the short-run and long-run macroeconomic effects of bank net worth and capital adequacy regulations. In general, capital adequacy regulations work as a stabilizer in the sense that they reduce the macroeconomic effects of negative productivity shocks. In addition, strengthening of the regulations increases the long-run capital stock, although it may lead the economy to a recession in the short run. However, the timing of the introduction of tight regulations is important. If the regulations become tighter when a negative productivity shock occurs, the economy falls into a long and severe slump. This is consistent with what the Japanese economy has experienced after the bubble economy.

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1. Introduction

The Japanese economy has been in a serious prolonged slump, which is sometimes referred to as *the lost decade*. According to Hayashi and Prescott (2002), an exogenous productivity slowdown could be one of the causes of this slump. Although Hayashi and Prescott do not focus on credit channel, there has been a consensus among many economists and business people that the underperforming debts or bad loans in the Japanese banking sector make it difficult for the

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economy to recover from the recession¹. Due to these bad loans, the capital adequacy ratios of Japanese banks have been very low: most of them have been just above the requirement set by the Bank for International Settlement (BIS). In order to comply with the BIS regulation, the banks had to decrease the amount of lending to companies. The final disposal – writing off the bad loans from their balance sheets – accelerated and lending was reduced to small- and medium-sized firms, which are considered to be “underperforming borrowers.” This reduction, in turn, has had negative impacts on private investment and has thus prevented the economy from recovering.

To examine whether the aforementioned reasoning is valid, one should use a macrodynamic model with a rigorous microfoundation of banks’ behavior. Therefore, this paper employs a dynamic version of the seminal model of [Holmstrom and Tirole \(1997\)](#) in order to assess the above common interpretation. Holmstrom and Tirole show that bank net worth affects banks’ behavior and has significant impacts not only on the nominal economy but also on the real economy. For instance, capital tightening such as credit crunches or collateral squeezes reduces business investment. However, in Holmstrom and Tirole’s model, the responses of interest rates to the shocks are not fully endogenized based on banks’ optimization. In addition, it may be considered a “static” model in the sense that the accumulations of physical capital and net worth are not explicitly considered.

The model presented in this paper extends Holmstrom and Tirole’s model in three directions: (i) it incorporates the accumulations of physical capital and net worth, (ii) sheds light on banks’ rigorous optimization behavior, and (iii) explicitly considers capital requirement regulations. [Repullo and Suarez \(2000\)](#) also introduce capital requirement regulations into Holmstrom and Tirole’s framework in order to demonstrate that a contraction in bank net worth or a tighter regulation decreases bank lending to firms and hence reduces the aggregate investment. However, their analysis is not based on the explicit profit-maximizing behavior of banks.

[Kopecky and VanHoose \(2004\)](#) analyze the effect of bank capital requirements on the loan transmission mechanism. They clearly show that risk-based capital requirements change both short- and long-term loan market outcomes. However, since the accumulation of physical capital and net worth are not considered, the effect of regulation on the evolution of the economy is beyond their scope. On the contrary, taking these accumulations into account, the model in this paper deals with not only the stationary states but also the transitional paths that follow productivity shocks.

[Santomero and Seater \(2000\)](#) also highlight the macroeconomic effects of banks’ role of monitoring their borrowers’ behavior. They consider banks to be social financial intermediations that merely execute the process of lending and monitoring at socially optimal levels on behalf of the economy as a whole rather than maximizing their profits. They show that the optimal levels of monitoring and the associated lending are independent of the shocks to the economy. This implies that bank behavior has no inherent importance in the propagation of economic fluctuations. Undoubtedly, this result depends crucially on the assumption that banks are unconcerned with their profits.

Incorporating banking optimization into Holmstrom and Tirole’s model, [Ennis \(2001\)](#) shows that the existence of banks enhances economic growth. In his model, banks can prevent their borrowers from investing in too risky projects by monitoring their behavior. This, in turn, facilitates

¹ [Andolfatto \(2003\)](#) examines the monetary implications of the Hayashi and Prescott model to show that an exogenous negative productivity shock can explain not only the real aspects but also financial developments such as a steady decline in bank lending and the money multiplier, unexpected declines in inflation, and near-zero nominal interest rates in the post-bubble Japanese economy.

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