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Banks as coordinators of economic growth and stability: Microfoundation for macroeconomy with externality

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Abstract

Competition among banks promotes growth and stability for an economy with production externality. Following Arrow and Debreu (1954) [6], I formulate a standard growth model with externality—a two-period version of Romer (1986) [39]—as a game among consumers, firms, and intermediaries. The Walrasian equilibrium, with an auctioneer, does not achieve the social optimum. Without an auctioneer or intermediaries, I show that no Nash equilibrium exists. With several banks strategically intermediating capital, a Nash equilibrium emerges with a realistic institution, i.e., an interbank market with a negotiation process in the loan market. The equilibrium outcome is uniquely determined and socially optimal.
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1. Introduction

I formally identify an essential role that banks play: A strategically competitive banking sector serves as a decentralized mechanism to internalize positive production externality among firms, thereby facilitating economic growth. To clarify this role, I shut down banks' roles that have been considered in the banking literature. The model does *not* assume any exogenous stochastic shocks, informational problems, illiquid projects, and transaction costs.[2]

The strategically competitive banking sector also brings stability in an economy with production externality by supporting a Nash equilibrium. Without any financial intermediaries, I show that an economy with production externality, which often appears in the economic growth literature, faces serious instability because a Nash equilibrium does not exist. To support an equilibrium, I further find that an additional institutional setup among banks is necessary: an interbank market with a negotiation process in the loan market. This institutional setup can be viewed as an optimal mechanism to internalize the externality.

My model is based on a canonical growth model with externality, essentially the same as in Romer [39].[3] In his model, investment of a firm is assumed to raise marginal products of other firms. Because of this Marshallian externality, the competitive equilibrium is *not* Pareto optimal: Investment is lower and the growth is slower. This result has been supporting a case for subsidies (e.g., transportation and R&D) or patents for firms to increase their investments.

In Romer [39] and many other growth papers, the capital market is assumed to be competitive in the Arrow–Debreu sense: Financial activity is conducted only by a security market. But, what happens if banks intermediate the capital market?

I first formulate a two-period version of the Romer growth model in the spirit of Arrow and Debreu [6]: An economy is a game among consumers, firms, and an auctioneer. The auctioneer, as an abstraction of a security market, intermediates the financial transaction and converts savings to capital. Not surprisingly, the equilibrium allocation is the same as in Romer [39]: The Walrasian equilibrium is *not* Pareto optimal.

I then modify the model so that banks clear the capital market. An economy becomes a game among consumers, firms, and banks. Banks strategically compete with each other in deposit and loan markets. I find that, with an additional institutional setup, a Nash equilibrium exists, and it is Pareto optimal.

Banks, in this paper, are different from the Walrasian auctioneer in Arrow and Debreu [6]. While the auctioneer offers only price, a bank can post a contract that specifies both price and quantity (e.g., loan rate and amount). With this more realistic contract space, every bank has an incentive to become a monopoly lender, because, if a bank becomes a monopoly lender, it can tailor the loan contracts to extract all the rents from all firms, including any external effects. Knowing this, banks will compete aggressively for deposits by driving the deposit rate up to the return that a monopoly lender would obtain. In the equilibrium, many banks and firms operate at zero profit under the interest rate that equals the socially optimal level. Also, in the equilibrium, savings and loan amounts become equal to the socially optimal levels.

There is a caveat, however. To be clear, the other allocation cannot be an equilibrium: The interest rate below the monopoly lender's return would be upset by a rival bank, and the interest rate above the monopoly lender's rate cannot be technically feasible to prevail. Yet, there is a

[2] The banking literature, so far, has explained banks' advantage over markets mainly as mitigation of informational problems and economization of transaction costs. See, for example, a textbook by Freixas and Rochet [23].

[3] The growth process with externality is originally considered by Shell [40].

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