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Money and exchange in an economy with spatially differentiated agents

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Abstract

The impact of money supply on the real variables and on utility is an important question in monetary economics. Most previous works study this impact in representative agent economies, often under perfect foresight. With such a framework, however, the use of fiat money as a medium of exchange cannot be endogenously explained. This paper, by contrast, considers an economy where fiat money is intrinsically necessary for exchange, due to the local structure of interaction among agents. It investigates the transitory and permanent impact of local or global injections of money on the dynamics of exchanged quantities, prices, and individual welfares, and the mechanisms that explain this evolution.

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1. Introduction

Standard economics are unable to explain, and in fact negate, what might prima facies be considered the most ubiquitous economic phenomenon: The use of intrinsically useless money (that is, of fiat money) in exchange. Indeed, the mainstay of economics, general equilibrium theory, postulates an anonymous, global, and atemporal market. On this market, all individual buy and sell decisions are instantaneously

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coordinated by some abstract mechanism which is assumed to guarantee certain efficiency conditions, but remains otherwise unspecified. The only elements of information used by the economic agents are their own primitives (preferences, endowments, etc.) and the relative (not the absolute) market prices—whereby the latter efficiently pool the entire set of the individual primitives. Since every agent simultaneously faces all others, any exchange can in principle be conducted as a barter. Moreover, even if money was used for exchange for some unspecified reason, its quantity would not affect the relative prices and thus the real quantities.

In reality, however, money is essentially related to the spatial and dynamic character of the exchange process. Real agents make transactions locally and sequentially. Money then facilitates mutually beneficial transactions in the absence of double coincidence of wants, that is, in situations where the buying agent is unable to provide the goods the selling agent wants in return [1,2]. It stores value between subsequent transactions. Also, there is strong empirical evidence that changes in the quantity of money do indeed affect real values, at least on the short term, see e.g. [3]. Thus, in the real world, money is needed for a satisfactory functioning of the economy, and changes in the quantity of money may affect this functioning.

To explain the use of intrinsically useless money in payments for commodities and to finely analyse the economic implications of changes in the quantity of money, models are therefore required that take into account restrictions on the operation of markets, such as limited information and/or communication, limited market participation, spatial separation and local interaction [4]. In this paper, we present a model with spatially differentiated agents who exchange only with their direct neighbors, and use only the local information directly generated by the exchanges to form their decisions. Such models are fairly rare in the literature—see above all [5–7,4]. To justify the use of fiat money, these models typically assure an absence of double coincidence of wants by making specific assumptions on which goods the individual agents want to buy respectively sell. In the present model, by contrast, every agent wants to consume all goods. It is essentially the spatial structure of trade that insures that barter or non-tradable IOUs are impossible. Moreover, the emphasis is on the dynamic properties of the model under changes in the quantity and distribution of money, rather than on the existence and efficiency properties of the equilibrium.

2. The basic model

2.1. Agents, goods, and preferences

We consider an economy with n agents i , $i = 1, \dots, n$, and n goods j , $j = 1, \dots, n$, where $n > 2$, and with discrete time $t = 0, 1, 2, \dots$. The goods are tradable but perishable and non-durable in the following sense. They can be exchanged among agents an infinite number of times, without alteration or costs. However, they cannot be stored: At any given t , the goods must be either consumed by the agent that holds them, or handed over to another agent. Consumption of a good is the only source of utility, but leads to its physical destruction.

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