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Coordination in the use of money

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ABSTRACT

Fundamental models of money, while explicit about the frictions that render money essential, are silent on how agents actually coordinate in its use. This paper studies this coordination problem, providing an endogenous map between the primitives of the environment and the beliefs on the acceptability of money. We show that an increase in the frequency of trade meetings, besides its direct impact on payoffs, facilitates coordination. In particular, for a large enough frequency of trade meetings, agents always coordinate in the use of money.

1. Introduction

The principle that the use of money should be explained by its essentiality is well established among monetary theorists.[1] Indeed, a precise description of the frictions (e.g., limited commitment and limited record-keeping) which render money essential is a central element in fundamental models of money, such as random matching, overlapping generations, and turnpike models. However, these models typically exhibit multiple equilibria, including one in which money is not valued and have no say on which equilibrium will be played. This paper takes steps towards filling this gap by exploring how the primitives of an economy impact agents' ability to coordinate in the use of money.

The analysis is cast in a search model of money along the lines of Kiyotaki and Wright (1993). The key departure from their environment is the assumption that money is not fiat. We let the economy experience different states over time, and assume that while money is intrinsically useless in a large region, some states have an impact on the characteristics of money. There are states where money is either intrinsically useful or convertible into something useful, and states where either the use of money may involve some intrinsic disutility or money becomes less valuable as a medium of exchange (which is the case, for instance, of a hyperinflation). In particular, there are faraway states where either accepting or not accepting money is a strictly dominant action.

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[1] Money is essential if it achieves socially desirable allocations which could not be achieved otherwise. Kocherlakota (1998) and Wallace (2001) are key references.

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The main result is that there exists a unique rationalizable equilibrium. If the gains from trade are relatively large and agents are relatively patient, agents coordinate in the use of money in all states in which money has no intrinsic utility (and also in some states in which money has negative intrinsic utility). If instead the gains from trade are small and agents are relatively impatient, agents never coordinate in the use of money in states in which money has no intrinsic utility (and also in some states in which money brings positive intrinsic utility).

It turns out that patience, which can also be interpreted as the frequency of trade meetings, critically helps agents coordinate in the use of money – more so than an increase in the gains from trade in a given meeting. Intuitively, an agent that expects to face many trading opportunities is willing to accept money even if he holds relatively pessimistic beliefs as to the acceptance of money in the near future. Since all agents make the same reasoning, pessimistic beliefs on the acceptability of money cannot be part of an equilibrium. As the frequency of trade meetings goes to infinity, agents coordinate in the use of money irrespective of the difference between the utility from consumption and the production cost.

The paper relates to the literature on global games and to the literature on equilibrium selection in dynamic games with complete information, in particular, Frankel and Pauzner (2000) (FP), and Burdzy et al. (2001) (BFP). We share with these papers both the assumption that there exist faraway states where it is strictly dominant to choose a particular action and the result that the ensuing equilibrium is unique. One relevant difference is that in a monetary economy, the benefit of exerting effort in exchange for money depends on how agents will behave in the near future and not on how they behave today. This eliminates equilibria in which an agent chooses a particular action in a given period simply because he believes that all the other agents will choose the same action in that period. In order to deal with this problem, FP and BFP assume that each agent has only a small chance of changing his action in any given period, which prevents the multiplicity of equilibria that arises when agents are allowed to continuously shift from one action to another. We do not need an extra assumption to tackle this issue.[2] In terms of results, an important difference is that in FP and BFP, an increase in the time discount factor does not help to select the efficient outcome. In their model, if the time discount factor is large enough, the risk-dominant equilibrium is selected regardless of whether it is efficient.[3] This suggests that the coordination problem involved in the use of money is markedly different from that present in other (non-monetary) settings in which coordination matters.

Finally, there is a strand of models within monetary economics that studies how the addition of an intrinsic utility to money may help to reduce the set of equilibria. In overlapping generations models, the focus is on the elimination of monetary equilibria that exhibit inflationary paths (e.g., Brock and Scheinkman, 1980; Scheinkman, 1980). In search models of money, the objective is to characterize the set of fiat money equilibria that are limits of commodity-money equilibria when the intrinsic utility of money converges to zero (e.g., Zhou, 2003; Zhu, 2003, 2005; Wallace and Zhu, 2004). A result that comes out of this work is that if goods are perfectly divisible and the marginal utility is large at zero consumption, autarky is not the limit of any commodity money equilibria. This result critically depends on the assumption of a sufficiently high probability that the economy reaches a state where money acquires an intrinsic utility. In contrast, our results on coordination in the use of money hold even if the probability that money ever acquires intrinsic utility is arbitrarily small and the probability it ever acquires intrinsic disutility is equal to one. Thus, coordination in the use of money is not simply the result of working backwards from a distant future where money is sure to acquire a positive intrinsic utility. What matters to determine whether agents will coordinate or not are the primitives of the environment, i.e., the gains from trade and the rate at which agents meet.

The paper is organized as follows. In Section 2, we present the model, deliver the main result, and discuss the assumptions. We also examine how the primitives of the environment impact agents' ability to coordinate in the use of money. In Section 3, we conclude. All omitted proofs are available in an online appendix.

2. The main result

In this section, we present the environment of the model and shows it exhibits a unique rationalizable equilibrium.

2.1. Environment

The environment is a version of Kiyotaki and Wright (1993). Time is discrete and indexed by t. There are k indivisible and perishable goods and the economy is populated by a unit continuum of agents uniformly distributed across k types. A type i agent derives utility u per unit of consumption of good i and is able to produce one unit of good $i+1$ (modulo k) per period, at a cost $c<u$. Agents maximize expected discounted utility with a discount factor $\beta \in (0,1)$. There are k distinct sectors, each sector specialized in the exchange of one good. In every period, agents choose which sector they want to visit but inside a sector they are randomly and pairwise matched. Each agent faces one meeting per period, and meetings are independent across agents and over time. There exists a storable and indivisible object, which we call money. An agent can hold at most one unit of money at a time, and money is initially distributed to a measure m of agents.

[2] A similar issue arises in static coordination games. The literature on global games (e.g., Carlsson and van Damme, 1993; Morris and Shin, 1998) has shown that a small amount of asymmetric information can lead to a unique equilibrium. In contrast, there is symmetric information in our model but that does not lead to multiplicity of equilibria.

[3] Analogously, in global games, the risk-dominant equilibrium is selected if the idiosyncratic differences in information among agents are arbitrarily small.