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Acceptability, Means of Payment, and Media of Exchange*

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Arguably the most important function of money is its role as a medium of exchange. Wicksell ([1906] 1967, p. 15) defined a *medium of exchange* to be "an object which is taken in exchange, not on its own account, . . . not to be consumed by the receiver or to be employed in technical production, but to be exchanged for something else within a longer or shorter period of time." He further defined a *general* medium of exchange to be an object "which is habitually, and without hesitation, taken by anybody in exchange for any commodity" (Wicksell [1906] 1967, p. 17). Related notions include a *means of payment*, which is an object used to pay for purchases and settle debts, and a *general* means of payment, which is an object that can always be used to pay for any purchase or settle any debt.

There could be circumstances where the concepts of means of payment and media of exchange differ. For example, there could be legal restrictions that imply taxes are payable in some object, which would make it a means of payment, at least for tax purposes, but this would not necessarily mean that it is accepted as a medium of exchange by private agents. Nevertheless, for the purposes of this essay, we will ignore such circumstances and use the terms *means of payment* and *media of exchange* interchangeably. We are mainly interested in which sorts of objects will be used as media of exchange and in what circumstances.

Objects and Circumstances

A *commodity money* is an object used as a medium of exchange that also has use as a consumption good or a productive input, at least potentially. A *fiat money* is an object used as a medium of exchange that will never be used as a consumption good or a productive input. More precisely, Wallace (1980) defines *fiat money* to be money that is intrinsically useless and inconvertible. *Intrinsic uselessness* refers to the property that the object will never be used as a consumption good nor as a production good, while *inconvertibility* refers to the fact that it is not backed by something that has intrinsic worth. Von Mises ([1912] 1934) provides an early discussion of the threefold classification of economic objects into consumption goods, production goods, and media of exchange. Many objects, including any commodity money, for example, can play more than one role; but fiat money by definition is only a medium of exchange and never a consumption or production good.

A natural question is, What makes an object more or less desirable as a medium of exchange? A related but different question is, What makes an object more or less likely to become a medium of exchange? Textbook discussions describe many of the intrinsic properties of objects that make them desirable media of exchange or money, such as storability, recognizability, durability, divisibility, and so on. In addition to these intrinsic properties, Menger (1892) also emphasized what he called "saleability," or what we call *acceptability*. We define the *acceptability* of an object here to be the probability that it is accepted in exchange by other agents at a given price. (Whether or not an object is accepted can depend on the amount offered—for example, it may be difficult to buy a package of cigarettes in England with U.S. dollars at the official exchange rate, although perhaps not if one is willing to pay a sufficient dollar price—but we will ignore this here by taking price as given; see Lippman and McCall 1986.)

When an object is more readily acceptable to other people in the economy, it is more likely that each individual will desire it and accept it as a medium of exchange. The implication is that the property of acceptability can have a self-reinforcing nature. Of course, acceptability depends on time, place, and circumstance and is not constant. For example, it is hard to buy cigarettes late at night with a large-denomination U.S. bill even in the United States. Also, things that serve as fiat or commodity money in one place or time need not serve as money at other places or times, as history illustrates.

These observations lead to the conclusion that acceptability may not actually be a property of an object as much as it is a property of social convention. In more technical economic language, we would say that the acceptability of an object is a property of an equilibrium, or perhaps a property of an object in a particular equilibrium.

An Example

Our next goal is to present a simple example of a theoretical economic model that determines acceptability endogenously and illustrates these points. The model is based on Kiyotaki and Wright 1991 and forthcoming, where the interested reader can find several elaborations and applications. (A survey of related models can be found in Ostroy and Starr 1990.)

Consider an economy with a large number of infinitely lived agents and a large number of perfectly storable consumption goods, with the property that each agent consumes a fraction x of the goods and each good is consumed by a fraction x of the agents. Assume that all goods are produced by equal numbers of agents, but that agents do not produce goods that they themselves consume. These goods are all indivisible and come in units of size one. When an agent consumes one unit of a consumption good, the agent receives utility u and immediately produces a new good at a cost in terms of disutility c. Note that agents cannot produce without first consuming.

At the initial date, we randomly endow some of the agents with consumption goods and the rest of the agents with an intrinsically worthless object that we call *money*. Let M be the fraction of agents endowed with money, and assume for simplicity that this money object is also indivisible and that each agent endowed with it is endowed with exactly one unit. Agents meet bilaterally and at random once each period and trade if and only if it is mutually advantageous. However, there is a transaction cost in terms of disutility, denoted by ε, that is incurred by the receiver whenever that agent accepts any consumption good in trade. For simplicity, there is no transaction cost to accepting money here, but this is not essential. (See Kiyotaki and Wright 1991.)

We seek Nash equilibria in trading strategies, in which each agent chooses whether to trade or not in order to maximize the expected discounted utility of consumption net of production and transaction costs, taking the trading strategies of other agents as given. Here we focus on steady-state equilibria, where things do not change over time, and also on symmetric equilibria, where no agent or good is treated differently from any other. A property of such an equilibrium is that agents trade one commodity for another commodity if and only if the latter is one of their consumption goods. The reason is that, when other agents are treating goods symmetrically, the acceptability of all goods is the same, and therefore there is no advan-

tage to trading one good for another if the latter is not going to be consumed. Since there is a transaction cost, agents therefore never exchange one good for another unless they are going to consume it.

Hence, in the equilibria under consideration, commodities will never be used as media of exchange, and therefore there will be no commodity money; however, fiat money could still potentially act as a medium of exchange, and this will be the focus of our attention here. (Commodity money is analyzed in a related framework in Kiyotaki and Wright 1989.) Additionally, the fact that individual agents do not accept commodities that they do not consume means that the acceptability of any consumption good is x, since x is the probability with which any good is one that a random agent consumes. Thus, when two agents with commodities meet, a barter transaction will be consummated if and only if there is a "double coincidence of wants," as Jevons (1875) put it, in the sense that each of the two agents is willing to consume the commodity which the other is trying to trade. A double coincidence happens with probability x^2. The thing to be determined is the acceptability of money—that is, the probability with which money is accepted.

To analyze this, suppose a representative agent accepts money with probability π when others accept it on average with probability Π. We will determine the agent's payoff from following this strategy and then find the agent's optimal choice of π, or best response, given Π. Let V_c and V_m denote the payoffs, respectively, when the agent has a commodity and when the agent has money at the end of each period, and let β denote the discount factor between periods. When the agent has a commodity, he or she acquires a consumption good next period if and only if the agent meets someone else with a commodity and a double coincidence occurs, which happens with probability $(1–M)x^2$. This yields utility $U = u - \varepsilon - c$ (which we assume is positive) from consumption net of transaction and production costs. Further, the agent ends next period with money if he or she meets another agent with money and both sides agree to trade, which occurs with probability $Mx\pi$, and ends next period with a commodity in all other instances. Hence, the payoff to having money and trying to barter is

$$(1) \qquad V_c = \beta\{(1–M)x^2U + Mx\pi V_m + (1–Mx\pi)V_c\}.$$

Similarly, when our representative agent has money, he or she acquires a consumption good next period if and only if the agent meets someone with a commodity and the two agents agree to trade, which occurs in this case with probability $(1–M)x\Pi$. Further, our agent ends next period with a commodity with this same probability and with money otherwise, since the only way an agent with money can ever acquire a commodity is to trade for one consumption good, consume, and produce. (It can be shown that agents never trade money for commodities that they do not consume in equilibrium.) Hence, the payoff to having a commodity is given by

$$(2) \qquad V_m = \beta\{(1–M)x\Pi(U+V_c) + [1 - (1–M)x\Pi]V_m\}.$$

By manipulating these two equations, it is easy to verify the following results. First, if $\Pi < x$, then $V_m < V_c$; that is, when money is less acceptable than commodities, the payoff from trading with money is less than the payoff from barter. In this case, the individual's best response is never to trade commodities for money, which means $\pi = 0$. Second, if $\Pi > x$, then $V_m > V_c$; that is, when money is more acceptable than commodities, the payoff from trading with money is greater than the payoff from barter. In this case, the individual's best response is always to trade commodities for money, which means $\pi = 1$. Finally, if $\Pi = x$, then $V_m = V_c$; that is, when money is just as acceptable as commodities, the payoffs from trading with money and from bartering are equal. In this case, the individual is indifferent to accepting money and could choose any π between 0 and 1.

Therefore, there are exactly three equilibria in the model: $\Pi = 0$, $\Pi = 1$, and $\Pi = x$. In the first case, money is not acceptable; in the second, it is a generally acceptable medium of exchange; and in the third, it is a partially acceptable medium of exchange. Although the intrinsic properties of money are the same in each case, expectations as to acceptability have a self-fulfilling tendency, which influences whether or not money serves as a medium of exchange and whether it is generally or only partially acceptable. Notice also how the use of money helps to alleviate the difficulty of pure barter. When $\Pi = 1$, a double coincidence is not required to acquire consumption goods; one can first sell produced goods for money and then use the money to buy consumption goods. Especially when x is small, as it will be when there are many highly specialized commodities in existence, for example, the use of a generally acceptable money can entail a substantial increase in the efficiency of exchange.

Intrinsic Properties

The above example illustrates one way in which the use of a medium of exchange and its acceptability can be determined endogenously in a model. Acceptability is not actually a property of the object, but depends on which equilibrium we are in. However, this is not to say that intrinsic properties of objects are unimportant. Suppose, for example, there is a per-period storage cost of holding money, denoted by k. For small positive k, there are still three equilibria, as described above, except now the equilibrium where money is only partially acceptable has $\Pi > x$ because money's acceptability has to increase to compensate for the deterioration in its fundamental properties. Thus, even if the flow return on money (which is $–k$ in this example) is less than that on real commodities (which is zero in this example), there are still equilibria in which money circulates, because of its acceptability. (See Hicks 1935 for a discussion of this issue.) If k gets sufficiently large, however, then there cannot exist any equilibrium where money is acceptable, and the unique equilibrium entails $\Pi = 0$. A sufficiently bad money has no hope of serving as a medium of exchange.

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