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WOULD PRICING CURRENCY LIKE CARS  
ACHIEVE EFFICIENCY?

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A form of nonpar pricing contributes to the efficient use of expensive durable assets like automobiles. Can it do the same for units of currency, which are much less expensive and also less convenient to nonpar price? Quite likely not, but considering how such a system might work for currency provides an ideal system to compare against the more practical currency systems that might be adopted.

Relative to the prices of the materials they are made of, automobile prices decline as the automobiles wear out. A new automobile is made by expending time and effort to convert steel and other commodities into a new form—a machine that can transport people and goods. Because of the costs of converting commodities into automobiles, new autos are supplied at a price which covers the cost of the commodities plus the cost of converting the commodities into an auto. Consumers are willing to pay more for an auto than for the commodities it is made from because the auto, unlike the commodities, provides a service--transportation. As the auto is used, it wears out and the value to the consumer of its transportation declines relative to the costs and inconveniences of keeping it going.<sup>\*/</sup> Finally, when the value of the auto's transportation services fall below the cost and disutility of keeping it going, the car is worth no more than the scrap value of its remaining commodity content, and for practical purposes it is no longer an automobile.

This life cycle determines the price of new and used cars of all qualities. When an auto is new, the premium between its price and the value of the commodities it contains equals the marginal noncommodity costs of auto production, and consumer demand makes the premium also

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<sup>\*/</sup>Included in the costs of using an auto is the value of the loss in the auto's commodity content due to friction, rust, collision, etc.

equal the present value of the current and future transportation services (net of the costs and disutility of operation) it will provide. The premium ends up at zero when the finite lifespan of the auto is over. In between, when the auto is a used car, we expect its premium to decline as the auto wears out, reflecting at each moment the shrinking present value of the remaining current and future net transportation services it will provide.

This pricing pattern for new and used autos is optimal. The present value of the stream of future net marginal transportation benefits that consumers will derive from each new auto purchased equals the price of the auto, which in turn equals the marginal social cost of producing the new auto, so new car production would be consistent with maximizing net social benefits. Old autos, in turn, are used as autos until, and only until, the social cost of operating them as autos exceeds the value of the transportation services they provide.

This nonpar pricing scheme for automobiles can also be optimal when different kinds of autos are produced. Suppose auto A and auto B are produced from the same commodities, but auto A is constructed more carefully, with more labor, and thus wears out more slowly. Because of auto A's greater marginal cost of production, its price when new would have to be higher than the price of auto B, but consumers would pay this higher price only if and up to the point at which the present value of the marginal benefits of the extra net transportation services Auto A would provide over its longer lifespan equaled its additional marginal cost. It is also possible that, due to different tastes or incomes, some consumers would buy Auto A and some Auto B. In this case, both autos' premiums over scrap value would decline over time to zero, but for any given mileage (i.e., cumulative use), the premium on an Auto A would be higher than on an Auto B.

Note that an automobile's theoretical price premium over time is independent of the number of times it is actually resold. Each owner takes a capital loss on the auto (the auto's price declines relative to the value of the commodities it contained when bought, so the owner would have been better off financially to buy these commodities instead of the auto), and this loss is exactly offset by the value of the transportation services the owner receives from the auto. In effect, each owner is just a user of the auto and incurs a capital loss that represents rent paid for net services delivered. The present value of the net services to be delivered determines the price of the auto.

Gold coins have many characteristics in common with automobiles. They are produced from a raw commodity, but only at the expense of time, effort, and other services and materials. They deliver services over time, in the form of the convenience that consumers derive from the fact that coins are easier to carry and exchange than bullion and other stores of wealth. However, as they circulate, they become both lighter and less regularly shaped, eventually losing the characteristics that made them worth more than their weight in gold. At this stage, when the coins are of no more use to consumers than an equal weight of bullion, the coins have reached scrap or meltdown quality.

If gold coins have so many of the characteristics of automobiles, can they be priced like automobiles, with a premium over commodity value that gradually decays to zero? For this to happen, consumers must be able to recognize the quality of any coin (a measure of the stream of services it can still render) and to compute how prices vary with quality. To simplify our analysis, let's assume that consumers can do these two things instantly, costlessly, and exactly.

In this economy it appears that gold coins would be priced as our automobiles were priced and that, for the same reasons as for automobiles, this would be optimal. If we suppose that new coins can be minted at fixed cost, they would be supplied at a price equal to this cost plus the cost of the bullion they contain. Consumers would equate each new or old coin's premium above commodity value to the present value of the marginal net exchange benefits that the coin will provide over its remaining lifespan, and consumers would have no trouble doing this because of the two special talents we have assumed they have. Coins would circulate until they were no more convenient than an equal weight of bullion, at which time they would be melted down. The price path over time would depend only on the value of the services they could still provide and would be independent of the number of their owners. If two coins of different durability were in demand, the premium on the more durable coin would be larger (for a given amount of previous use), but for both coins an owner's capital loss would be exactly offset by the value of services received from the coin.

The same arguments can apply to nonpar pricing of fiat currency, such as modern U.S. coins and bills. The analogy to automobile pricing is less direct in this case, because the value of the commodities contained in a fiat coin or bill is essentially zero and yet fiat coins and bills are priced well above the cost of minting or printing them. We will not discuss here how fiat currency--currency without valuable commodity content or backing--can have value.<sup>\*/</sup> Instead we will simply assume that fiat coins and bills of some denominations have value.

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<sup>\*/</sup> Among other things, the value of fiat money depends on fiscal and monetary policy as well as on the laws governing financial intermediation. For further discussion, see . . . ?

Let's continue to assume that consumers have the abilities to effortlessly recognize the quality and compute the value of currency units. If we also assume that there is a government that will issue a new unit of any denomination coin or bill if it is paid an old unit plus the cost of minting or printing the new unit, an optimal nonpar pricing scheme again seems to follow. Because of their insignificant commodity content, fiat bills and coins have no scrap or meltdown value. Their price, however, can not fall below their face value, or else arbitragers would profit by purchasing these discounted bills and coins and apply them at face value toward the purchase of a new bill or coin. Apart from this difference--that government guaranteed face value rather than scrap or meltdown commodity value sets the price of a worn out bill or coin--the fiat currency economy is identical to the gold coin economy. As in that economy, nonpar pricing is optimal.

Note that in this fiat currency economy, nonpar pricing of one-dollar bills and one-dollar coins would allow the marketplace to determine how many of each type should circulate. For example, even if greater production costs for coins caused the premium on new coins to exceed the premium on new bills, some consumers might rationally prefer coins because they wear out very slowly and thus deliver a much longer stream of net services. Other consumers, perhaps those who dislike carrying heavy coins, might prefer the paper ones; for them the net services per unit of time derived from coins are less than those derived from bills, and even the longer lifespan of the coins doesn't make up for this. So either coins or bills or both or neither might circulate. They will circulate only if the present value of the net services they provide matches the cost of printing or minting them, and if they do circulate consumers demand will make the

match exact. If both circulate, then it must be true that over any interval their total returns--the value of the services rendered during the interval less the capital loss over the interval—are equal.

In fact, of course, currency is not likely to be priced this way. One reason, discussed in the body of this article, is that it would be inconvenient for real currency users, who lack the abilities--to instantly and effortlessly recognize and place a monetary value on the quality of currency--that we have assumed for our hypothetical currency users. These inconveniences, such as keeping track of daily depreciation on a coin or a bill that amounts to a few ten-thousandths of a cent, could probably lead currency users to recognize and distinctly price at most a few broad classes of currency quality.

A further difficulty, ignored in our development of the pricing-like-automobiles scheme, is providing a means to make change in small fractions of a cent. This would be necessary if, for example, the price of an Anthony dollar were to decline smoothly from \$1.03 when it is new to \$1.00 when, 30 years later, it is worn out. This difficulty seems fundamental. On the one hand, providing currency to make very small change could easily cost more than the total amount of change to be made. The cost of producing pennies is about two-thirds of the face value of the pennies produced, and this ratio would almost certainly exceed one for the much smaller units of currency needed in our system. On the other hand, if there were a noncurrency change-making system that operated at almost zero cost, then the efficient choice would be to abolish currency and use this system instead. So either change can't be made at a cost that makes pricing currency like automobiles efficient; or, if it can be, a better choice is to abolish currency. This is a further reason to expect that currency

would not depreciate smoothly and that currency users would recognize only a few broad classes of quality of currency. As mentioned in the body of this article, the optimality of such limited nonpar pricing systems is difficult to evaluate.