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## **Invisible Hand Processes and the Theory of Money**

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**Abstract:**

This paper explores, and rejects, the plausibility—advanced by a number of economists and recently re-affirmed by Robert Nozick—of employing an ‘invisible hand explanation’ to account for the existence of money as a medium of exchange. It argues that money is not necessarily more efficient than barter as a means of effecting a multiplicity of desired exchanges, and that its use is not a dominant strategy under standard theoretical conditions of individual rational choice.

*JEL Classification:* B, D.

*Keywords:* barter, double coincidence of wants, asset value, Prisoner’s Dilemma.

“The aim is to restore sound money—a situation where the currency of the realm can be a store of value as well as a means of exchange.”  
—Margaret Thatcher, Guildhall Speech, *The Times* 13.11.79

A recurring and distinctive theme of modern social philosophy has been the role played by the ‘invisible hand’ in bringing about socially beneficial results from actions performed by self-interested individuals. From the works of Bernard Mandeville and Adam Smith to the writings of Friedrich von Hayek and Robert Nozick, it has been argued that individuals engaged solely in the rational pursuit of their own ends can act in such a way as to further the ends of others, without entertaining any desire or intention to do so. Nor are the good works of the invisible hand seen as confined to the mutually advantageous outcomes of bilateral exchanges. They are said to extend to the creation of institutions and practices which operate to the advantage of all who are subject to or participate in them. Recently, Robert Nozick has renewed the claim—originally advanced by Carl Menger and Ludwig von Mises—that the creation of money as a common medium of exchange is fully explicable as an invisible hand process. He maintains that, regardless of what may have been the actual historical circumstances of the creation of a society’s medium of exchange (state fiat, social contract, etc.), the emergence of money could have come about simply as the unintended effect of individuals independently pursuing their own interests.

“Was Locke wrong in imagining a compact necessary to establish civil society? As he was wrong in thinking (sects. 46, 47, 50) that an ‘agreement’, or ‘mutual consent’, was needed to establish the ‘invention of money’? Within a barter system, there is great inconvenience and cost to searching for someone who has what you want and wants what you have, even at a marketplace, which, we should note, needn’t become a marketplace by everyone’s expressly agreeing to deal there. People will exchange goods for something they know to be more generally wanted than what they have. For it will be more likely that they can exchange this for what they want. For the same reasons others will be more willing to take in exchange this more generally desired thing. [...] No express agreement and no social contract fixing a medium of exchange is necessary.” (Nozick 1974, 18; also 1977, 357)

Although technical economic works on monetary theory are typically less concerned with the conditions under which a medium of exchange emerges—and still less concerned with the character of the explanation for such emergence—their accounts of the functions of money often presuppose the truth of Nozick’s claims. What this essay aims to suggest is that the emergence of a common medium of exchange cannot so readily be attributed to the operation of an invisible hand process inasmuch as (i) there is no *a priori* reason to impute greater social advantage to the use of a common medium of exchange as such, and (ii) although there can be reasons to impute greater social advantage to the use of money, these reasons characteristically obtain under intentionally-created *visible* hand conditions.

Almost without exception, works on the nature of money describe it as performing four distinct functions. The first and most important of these is said to be to serve as a medium of exchange. Second, it performs an asset function or acts as a store of value. Both of these functions are held to be necessary features of money, whereas its third and fourth functions—to act as a unit of account and to act as a standard of deferred payment—are not. In the argument that follows, I shall not be concerned with these latter two functions. Rather, I shall try to show that, very far from its being the case that the foremost property of money is its serviceability as a medium of exchange, this is not a necessary feature of money at all. It will be argued that the case for claiming that money is invariably a more efficient means than barter of effecting exchange is groundless and that, strictly speaking, performance of an asset function is the only necessary function of money.

Some writers have allowed that these two functions may not be entirely distinct, though they persist in assigning priority to the medium of exchange function. Thus W. T. Newlyn states:

“For the purpose of analysis it will be necessary to treat these two functions separately, but it will subsequently be argued that they are not distinct. The asset function of money is of crucial importance in

monetary theory, but the performance of this function is not necessary to a definition of money. A medium of exchange is money even though it serves as an asset to no greater extent than is necessarily implied in its exchange function.” (Newlyn 1971, 2)

This latter claim, that the exchange function of money necessarily implies its service as an asset, is correct but fundamentally misleading. For the exchange function consists in nothing more than money’s serving as an asset. And the suggestion that it primarily consists in a service other than this one is both erroneous and the source of an important theoretical oversight. It is, indeed, this oversight that has led Nozick and others to imagine that money could be the possible product of an invisible hand process.

Consider the following standard account from a widely used textbook:

“An individual, for instance, a farmer, who has grown more turnips than he can or desires to eat may find some other farmer who has grown more wheat than he desires to eat and the two may strike a bargain. However, such methods of trading are useful only when very few such bargains are necessary to channel the produced commodities from the producer to the final purchasers. Otherwise, barter transactions require expenditure of time and effort that could be better spent on production of goods or on leisure. [. . .] A drastic increase in efficiency may be accomplished when *money* is used as a medium of exchange. Without money, an owner of good A who desired some other good X may have been forced to exchange good A for good B, good B for good C, and so on, whereas with the use of money this chain of transactions may be cut to merely two: the sale of good A for money and the purchase of good X for money.” (Pesek and Saving 1968, 4)

There are two difficulties besetting stories such as this one. First, their tellers are remarkably uncurious about how convenient the barter chain of transactions outlined above might have proved for the *buyers* of goods A and B. Second, they rarely trouble to inform their readers of what then happens to the *cash seller* of good X, taking it rather for granted that he will presently proceed to purchase good C (or whatever) with his receipts. I do not, of course, wish to query the claim that this is what he will *try* to do. Rather, I want to draw attention to the nature of the reasons for believing that he will *succeed* in doing so.

Accounts of the superior efficiency of the use of money typically begin with the observation that the operation of a barter system depends upon the ‘double coincidence of wants’: there must be someone ‘who has what you want and wants what you have’. And it is the relative infrequency (or non-necessity) of double coincidences of wants among traders that is held to render the use of a common medium of exchange more efficient than barter, inasmuch as it *reduces the number of transactions* required to clear the market: that is, required to achieve the state of affairs where everyone has what he wants and can afford

of what is available from others. Is the use of money necessarily more efficient in this respect? Consider the following situation in which eight numbered individuals are each possessed of a different lettered commodity which they wish to exchange for another commodity. This situation contains no double coincidences of wants.

1	wants	A	and is prepared to trade			B.
2	"	C	"	"	"	D.
3	"	E	"	"	"	F.
4	"	G	"	"	"	H.
5	"	B	"	"	"	C.
6	"	D	"	"	"	E.
7	"	F	"	"	"	G.
8	"	H	"	"	"	A.

Table I

If money is used, the minimum number of transactions required to satisfy everyone's demands is *eight*. These are shown in Table II.

1	buys	A	from	8.
2	"	C	"	5.
3	"	E	"	6.
4	"	G	"	7.
5	"	B	"	1.
6	"	D	"	2.
7	"	F	"	3.
8	"	H	"	4.

Table II

But if barter rather than money is used, the minimum number of required transactions is only *seven*. These are shown in Table III.

1	trades	B	for	A	with	8.
2	"	D	"	C	"	5.
3	"	F	"	E	"	6.
4	"	H	"	G	"	7.
5	"	D	"	B	"	8.
6	"	F	"	D	"	8.
7	"	H	"	F	"	8.

Table III

So while one ought not to leap to any hasty conclusions, the belief that the use of money necessarily reduces the number of transactions required in the absence of double coincidences of wants is, at least, not self-evidently true.

Thus it is sometimes suggested that one feature of money that renders its use more efficient than barter lies in the fact that it is *divisible*, whereas some

of the commodities offered for exchange may not be. Hence it is claimed that, in the absence of any double coincidence of wants, the owners of more valuable indivisible goods must be worse placed (under barter) to obtain the severally less valuable goods they want from the various persons supplying them, without a larger number of transactions being needed.

Again, is this true? Consider the following situation in which six persons are each possessed of varying amounts of different commodities and in which there is no double coincidence of wants. We shall further suppose that one of these commodities, F, is more valuable than any of the other commodities and that it is indivisible. (If it were not more valuable, its indivisibility would not pose the alleged difficulty.)

1	wants	8B	and	4C	and is prepared to trade	32A.
2	"	4C	"	2D	" " " " "	16B.
3	"	2D	"	1E	" " " " "	8C.
4	"	1F	"		" " " " "	4D.
5	"	16A	"	8B	" " " " "	2E.
6	"	16A	"	1E	" " " " "	1F.

Table IV

If money is used, the minimum number of required transactions is *eleven*. These are shown in Table V.

1	buys	8B	from	2.
1	"	4C	"	3.
2	"	4C	"	3.
2	"	2D	"	4.
3	"	2D	"	4.
3	"	1E	"	5.
4	"	1F	"	6.
5	"	16A	"	1.
5	"	8B	"	2.
6	"	16A	"	1.
6	"	1E	"	5.

Table V

But if barter rather than money is used, the minimum number of required transactions is, as before, only *seven*. These are shown in Table VI.

Again, the fact that the required number of transactions is actually *less* under barter than when money is used, should not immediately lead us to reject longstanding claims for the latter's inherently greater transactional efficiency. Might there not be considerations other than the generally proffered one—of minimizing the number of transactions required—that would tell conclusively in favour of the greater efficiency of money?

6	trades	1F	for	32A	with	1.
5	"	1E	"	16A	"	6.
5	"	1E	"	8B	"	2.
4	"	4D	"	1F	"	1.
3	"	4C	"	2D	"	1.
1	"	2D	"	8B	"	2.
2	"	1E	"	4C	"	3.

Table VI

One argument which might be entered in behalf of money's greater efficiency, and against the persuasiveness of the foregoing transaction tables, is that under barter there is no reason to suppose that the set of transactions actually performed by rational traders to satisfy their demands would constitute the minimum required to do so. Whereas this is allegedly not true when money is used. In the barter system and where there are no double coincidences of wants, traders must presume that there will be transactions which some of them undertake that will have to involve them in accepting goods which they will then need to exchange with others for the goods they want.

Of course, the same is true—indeed, true without exception—of all exchanges when money is used. But could not those engaged in barter make a 'mistake' in their choice of these intermediate goods? Consider the fifth and sixth transactions in Table III above. If 5 had mistakenly exchanged with 7 instead of 8, and if 6 had then mistakenly exchanged with 8 rather than 7, the minimum number of required transactions would then have been nine and not seven: one more than was required with the use of money.

That mistakes of this kind are possible seems undeniably true. What needs to be considered, however, are the conditions required for such mistakes to occur. In the case just mentioned, 5 trades with 7 because he *does not know* that there is someone (namely 8) who will give him the B he wants for the D he has. Similarly, 6 trades with 8 because he does not know that there is someone (now 7) who will give him the D he wants for the F he has. Both had previously traded with 2 and 3 (second and third transactions, Table III) in the hope that they were thereby acquiring intermediate goods which they would be able to exchange for the goods they wanted. Their hopes were dashed when, through ignorance, they came to see that their receipts from those initial transactions would not accomplish this for them.

But, and this is surely the point, *the existence of money is no remedy for such ignorance*. The fact that there is a common medium of exchange implies only that if there is someone wanting to exchange an X for something else, he will accept a certain sum of money in return for it. It in no way implies or suggests that there is an X available at a price I can afford. So if I sell my goods in order to obtain an X, the fact that my transactions are conducted via a common medium of exchange is no guarantee that I can succeed in buying an X with my proceeds: that is the burden of Mrs. Thatcher's complaint in the initial quote. And if I do not succeed in doing so, the sale of my goods was a 'mistaken' transaction since I have been left with no goods at all. Had I but known that I would be unable to

secure an X, I should not have offered my goods for sale and all demands would have been satisfied with fewer transactions.

Perhaps the case for the greater efficiency of money in exchange can be put differently and more compellingly. One might argue that, for any set of demands which traders already know to be satisfiable, money more probably minimises the number of transactions performed to satisfy them. ('More probably' because, as we have seen, this is far from necessarily true inasmuch as the minimum number of transactions required is greater under money than under barter.) The grounds for such a claim are held to lie in the fact that under barter, but not under money, traders will need to know more than that their demands are satisfiable, i.e. more than that their receipts for their goods will secure for them the goods they want. It is this allegedly greater amount of required information that renders barter less likely to be maximally efficient.

Again, however, this claim is ill-founded. For even if traders know only that their receipts will secure the goods they want, they will have sufficient reason to accept any proposal of barter made to them. Hence all that each need do is to approach whomever is in possession of the goods he wants and to exchange the goods he has for them. This is precisely the procedure that would be followed when money is used under the same informational assumption—the only difference being that under money, but not under barter, every trader must engage in at least two transactions.

What follows from all this is *not* that it is irrational to use money rather than to engage in barter. It is that the reasons for using money are not to be found in stories about its expediting the exchange of goods by enabling it to be performed with fewer transactions. These reasons are to be found elsewhere. A necessary, though by no means sufficient, reason for accepting money in exchange for one's goods consists in the belief that the goods one wants from others are not immediately available. A sufficient reason for doing so consists in the belief that, at some time later than when one sells one's goods, others will supply one with the goods one wants in exchange for one's current receipts. That this latter sort of belief is not invariably well-founded is the fact to which Mrs. Thatcher and many others have given ample testimony. What then are the possible grounds for such a belief?

To answer this question, let us perform a quite modest thought experiment by trying to conceive of money as itself a good. What kind of good is it? We have seen that it is not a good that necessarily increases our trading efficiency in securing the goods we want. Rather, it is (ostensibly) a good which will, so to speak, deliver the goods we want at a later time. In this sense, the appropriate metaphor might consist in depicting money as an ultra-versatile piece of equipment or, less fancifully and more pertinently, as a stocked storage facility. It is only *if* it performs the store of value function that money can rationally be used as a medium of exchange. But unlike the possession of an all-purpose machine or a stocked storage facility, the possession of a certain sum of money does not ensure the availability of the goods one wants at that later time. For this later availability necessarily depends upon the choices of persons other than oneself.

Crucially, it depends upon the choices of those who (one hopes) will then be supplying the goods one wants. So one’s belief in the later availability of these goods and in their purchasability with one’s current receipts must be based upon a belief that others will supply those goods and will prefer to exchange them for that sum rather than only for more money or other goods at that time. That future suppliers will be willing to accept that sum for their goods is a belief which, in turn, can only be entertained if one further believes (i) that they will *then* want—as one *now* wants—to defer purchases of goods until a still later time, and (ii) that they will then believe that they will be able to secure those goods with that sum at that still later time. The interminably regressive structure of the warrant for these beliefs is reasonably apparent. It is certainly true to say that the acceptability of money

“falls within that perplexing but fascinating group of phenomena which is affected by self-justifying beliefs. If the members of a community think that money will be generally acceptable, then it will be; otherwise not.” (Newlyn 1971, 2–3)

But the belief that money will be generally acceptable is not itself one which can rationally be auto-generated.

For what should be fairly obvious at this point is that we have ventured on to the familiar terrain of the Prisoner’s Dilemma. Consider the two-person world of individuals 1 and 2, each of whom is possessed of money and a stock of goods. Four transactional outcomes confront each of them as alternative possibilities: (a) keeping one’s own goods and acquiring the other’s goods; (b) relinquishing one’s own goods and acquiring the other’s goods; (c) keeping one’s own goods and not acquiring the other’s goods; (d) relinquishing one’s own goods and not acquiring the other’s goods. With respect to the use of money, there are two alternative strategies which each may pursue: to accept money in exchange for one’s goods or to refuse money in exchange for one’s goods. A quick glance at the conventional payoff matrix shows that, for each person choosing independently, refusal to accept the other’s money is the dominant strategy where  $a > b > c > d$ .

		individual 2	
		accept	refuse
individual 1	accept	b, b	d, a
	refuse	a, d	c, c

So each, if unable to rely upon the other’s acceptance of money, will rationally prefer to retain his own goods rather than relinquish them in exchange for money. And as in the standard case of this positive sum non-cooperative game, they will thereby secure an outcome (c, c) which is worse for each of them than the outcome consequent upon relying on the other’s acceptance of money (b, b).

It is not my purpose here to discuss the various policies or institutions—the *visible* hand arrangements—required to induce the reliance which would render acceptance of money a rational strategy.<sup>1</sup> Nor shall I review the different *ad hoc* empirical stipulations, found in many works on monetary theory, whereby the dilemma just displayed is in effect side-stepped through an ascription either of unique substitution properties to money,<sup>2</sup> or of market imperfections to the process of competitive exchange.<sup>3</sup> Rather, the aim of this argument has been simply to show (i) that money performs no exchange-mediating function independent of its asset function, and (ii) that it performs the latter function only under certain cooperative conditions which are not present in the exchange relationships inferable from standard individual preference axioms or the assumptions of independent rational choice. It follows that the existence of a common medium of exchange cannot be explained by reference to invisible hand processes.

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<sup>1</sup> Steiner (1982, 285–286) argues against the consistency of the standard third party enforcement solution to the Prisoner’s Dilemma.

<sup>2</sup> This appears to be implicit in the ‘regression theorem’ of money, first advanced by Menger (1950, ch. VIII and appendix J) and developed by von Mises (1953, ch. I); see also Nozick (1974, 18, and 1977, 357). According to this theorem, a common medium of exchange must also be a widely demanded consumption good, e.g. gold. What this theory cannot account for, in a non-circular fashion, is how the level of acceptability in exchange enjoyed by such a commodity could be greater than the level of consumption demand for it—which it would have to be, in order to function as a circulating common medium of exchange.

<sup>3</sup> Thus Niehans (1978, 1–3) observes that “Economists have always found it more difficult to analyze the services of a medium of exchange than those of producer and consumer goods. This is because a medium of exchange derives its usefulness from some sort of imperfection or ‘friction’ in the market, while the essentials of value and allocation can be understood on the assumption of perfect or ‘frictionless’ markets. For about a century, economic thinking about these problems has been dominated by what may be called the ‘neoclassical tradition’, characterized by an effort to incorporate money into the general equilibrium framework without making the underlying market imperfections explicit. [...] In particular, it was not clear whether the transition from barter to monetary exchange could be expected to take place spontaneously under the pressure of market forces whenever it promised welfare gains or whether it required an ‘invention’, combined with persuasion, convention or compulsion.”