Department of Economics Research Reports　　　　　Economics Working Papers Archive

1995

What is Old is New Again

Toni Gravelle

Citation of this paper:

Gravelle, Toni. "What is Old is New Again." Department of Economics Research Reports, 9501. London, ON: Department of Economics, University of Western Ontario (1995).

RESEARCH REPORT 9501

What is Old is New Again

by

Toni Gravelle

January 1995

Department of Economics, UNIVERSITY OF WESTERN ONTARIO

Social Science Centre

University of Western Ontario

London. Ontario. CANADA

N6A 5C2

WHAT IS OLD IS NEW AGAIN

by

Toni Gravelle[*]
Department of Economics
University of Western Ontario
London, Ontario
N6A 5C2

Abstract

Formal modelling of money's origin and function as medium of exchange has until recently been elusive. However, the advent of search-based models of money has contributed to a renewed interest in modeling money's medium of exchange function. As well as exploring the origins of commodity money, the search-based models of money allow for the endogenous emergence of valued fiat currency as well as analysis of other substantive monetary issues such as the rate of return dominance phenomena. This paper offers a review of the different search-based models of money and their findings. As well, this paper endeavours to relate and compare these new insights to some of the ideas put forward by late nineteenth- and twentieth-century theorist on the origins of money as a medium of exchange. This is done in order to give some historical perspective to these search models of money as well as to outline further avenues of research in modelling money as a medium of exchange.

I INTRODUCTION

It has now been a hundred years since Carl Menger wrote, in his "On the Origin of Money" (1892), this frequently quoted statement: "... that every economic unit in a nation should be ready to exchange his good for little metal disks apparently useless as such, or for documents representing the latter, is a procedure so opposed to the ordinary course of things, ... [it is] downright 'mysterious'". The mystery that Menger alludes to is why useless objects (little metal disks in his time) circulate as media of exchange. Menger, in addressing the question how does a certain object become money, concludes that the use of money emerges (in an evolutionary fashion) over time and is a consequence of individuals' self-interest guided by the "invisible hand". As well, he finds that the use of money requires individuals to believe other agents will accept it in turn.

Formal modelling of this matter has until recently been elusive. However, the advent of search theory in macroeconomics has led to the development of a new class of models which analyze the existence of money as a generally acceptable medium of exchange in a dynamic optimization framework. Specifically, works by Kiyotaki and Wright (1989,1991,1993), in which they develop a class of search-based models called Search-Theoretic Non-Cooperative Equilibrium (STNCE) models, have been the driving force behind a renewed interest in explaining the use of money as a medium of exchange. A sample of other contributors who follow Kiyotaki and Wright's approach include: Matsuyama, Kiyotaki and Matsui (1993), Kehoe, Kiyotaki and Wright (1993), Williamson and Wright (1994), Shi (1993), and Hendry (1993).

One of the purposes of this paper is to show that these STNCE models are only new in their analytical structure. In terms of ideas put forth, these models are in fact formalizing only *some* of the ideas attributed to early economic and social theorists such as Carl Menger and Georg Simmel. In examining in detail how well the STNCE methodology addresses Menger's and Simmel's insights on how money comes into and continues to exist, I find that the formalization of their ideas is incomplete. What

remains to be addressed is the broader issue explored by earlier theorists, of how instability in the social institution, embodied by money, may have detrimental effects on individual and social welfare.

The STNCE approach stands out in the field of monetary theory since it reverses a recent trend of modelling money as a store of value, while ignoring its services as medium of exchange and unit of account. The practice of modelling money simply as a store of value evolved as a byproduct of a search for 'sound' theoretical microfoundations for empirical generalizations associated with the "Monetarist" analysis of the 1960s and 1970s. These 'sound' theoretical foundations were sought in general equilibrium Walrasian modelling techniques, and that branch of monetary theory classified as "new monetary economics"[1] was one of the principle outcomes of the search in question. Unfortunately, this theoretical approach leaves no role for money to serve as a medium of exchange since, in the environment it postulates, markets behave 'as if' there are no costly frictions. Upon analysis, one finds that the coexistence in equilibrium of fiat money and divisible interest-bearing assets to be theoretically tenuous in these Walrasian models of money. Not surprisingly, one also finds that price inflation does not engender much in the way of social welfare costs.

In reality, fiat money does indeed exist, even when dominated in rate of return by other assets. One explanation, which emanates from new monetary economics, is that fiat money is held because of State imposed legal restrictions. This paper seeks to emphasize the STNCE methodology's ability to derive equilibria in which valued fiat money, dominated in rate of return, exists concurrently with alternative stores of value, and is held in the absence of State decrees. Also, this paper will illustrate the advantages of the STNCE approach over the Walrasian framework in modelling the institutional aspects of money.

In section II of this paper, a historical perspective on the literature dealing with the genesis of

---

[1]Hall (1982) seems to be the originator of this term taken up by Cowen and Kroszner (1987). Examples of work typical of new monetary economics, which are predominantly based on Overlapping Generations models, include Bryant and Wallace (1984), Sargent and Wallace (1982), and Hall (1982).

money and its medium of exchange function is presented. It highlights the ideas put forward by Carl Menger and Georg Simmel. Section III provides a brief outline of the STNCE approach and compares the insights derived from STNCE models to those of these earlier theorists. This section also suggests some possible avenues of further study dealing with other issues raised by these pioneers of the evolutionary theory of money. Section IV evaluates the importance of STNCE models for monetary theory. Finally, some concluding remarks are offered in the last section.[2]

II HISTORICAL PERSPECTIVE

Carl Menger was a pioneer in the development of the Austrian school's evolutionary approach to the genesis of money. The Austrian evolutionary theory of money argues that money emerges out of barter as a consequence of the self-interested interactions of individuals who make up an economic society. This "invisible hand" explanation of money's genesis rests on an assumption of "confidence" or "trust" on the part of individuals in monetary institutions, which in turn fosters the beliefs that determine money's value. Though ideas on *how* money first appears turn up in the literature before the development of the Austrian evolutionary theory (see footnote #4 below for an example), it was Menger who developed a concise explanation of how media's value is related to confidence in the monetary institutions.[3]

Menger, in his "On the Origin of Money" (1892), explains "... *how* it has come to pass that certain commodities ... should be promoted amongst the mass of all other commodities and accepted as the generally acknowledged media of exchange" (1892, p.241, italics my own). He proposes that the

---

[2]Since this paper was completed, Selgin (1994) has appeared. Selgin's paper is principally concerned with the implication of the evolutionary approach for the creation of new fiat monies, and, therefore, touches upon certain issues raised here. However, it does not discuss in any detail, the many points of contact between the older "Austrian Literature" and the modern STNCE approach to these issues.

[3]Other pioneering work on the evolutionary approach to the development of money is also attributed to Ludwig von Mises. See Ellis (1934) for a survey of monetary theories established in the German economic literature.

emergence of money requires an economic environment with the following three characteristics. *First,* the acceptance of money by any one agent must be based on his or her belief that other agents will accept it as well. Specifically, Menger argues that part of money's general acceptance in "mediate exchange" is due to its high degree of saleability. This high degree of saleability in turn, attracts more economic agents to exchange their less saleable commodities for this more saleable good (eventually to become money).

> "... when any one has brought goods not highly saleable to market, the idea uppermost in his mind is to exchange them, not only for such as he happens to be in need of, but, if this cannot be effected directly, for other goods also, which, while he did not want them himself, were never the less more saleable than his own."(1892, p.248)[4]

Menger indicates that the degree of saleability is in part, affected by the "want" of this commodity by other agents, as well as by such intrinsic properties as "transportability" and "fitness for presentation". In turn this "want" is affected by the degree of saleability of the object. That is, as more agents accept a commodity for the purpose of further trade the more saleable the commodity becomes. As this commodity becomes more saleable, agents become more willing to accept these goods until finally "...the relatively most saleable commodities have become 'money'..."(1892, p.250). Menger summarizes his first point by claiming that as time passes, the most saleable goods "... [will] in every market become the wares which it is not only in the interest of every one to accept in exchange for his own less saleable goods, but which are also those he actually *does readily accept.*" (1892, p.248, italics my own)

Second, Menger describes money coming into being "...as the spontaneous outcome, the unpremeditated resultant, of particular, individual efforts of the members of a society..."(1892, p.250). Moreover, he states:

---

[4]The value of saleable goods at market is certainly not new as this quote from Adam Smith's famous tome would indicate: "... [people] ... have endeavoured ... [to hold] ... a certain quantity of some one commodity or other, such as he imagined few people would be likely to refuse in exchange..."(1776, p.18).

"No accident, nor the consequence of state compulsion, nor voluntary convention of traders effected [the use money]. It was the just apprehending of their individual self-interest which brought it to pass ..."(1892, p.254)

He assumes explicitly that "Money has not been generated by law" (1892, p.255). Rather, it is the unorganized efforts of individuals, each taking actions in hope of increasing their economic well being.

Third, Menger suggests that "...each individual would *learn*, from his own economic interests, to good heed that he bartered his less saleable goods for those special commodities which displayed ... a wide range of saleableness both in time and place" (1982, p.248, italics my own). He explains that as time goes on, agents become "increasingly conversant" with the economic advantages of exchanging their less saleable items for the most saleable objects. Eventually, those objects become "generally acceptable media of exchange". At first, the habit of exchanging less saleable for more saleable goods is localized within a small part of the community. This behaviour becomes wide spread as agents learn of the potential economic gains by observing the success of agents already in the habit of carrying out this type of exchange:

> "...it is clear that nothing may have been so favourable to the genesis of a medium of exchange as the acceptance, on the part of most discerning and capable economic subjects, for their economic gain, and over a considerable period of time, of eminently saleable goods in preference to all others. In this way practice and habit have certainly contributed not a little to cause goods, which were most saleable at any time, to be accepted not only by many, but finally by all..."(1892, p.249)

Thus, Menger's third point emphasizes that the establishment of a generally acceptable medium of exchange, money, is achieved over many generations and requires that agents be able to learn of the advantages of indirect trade and money.

Menger gives a somewhat broader, more sociological version of his explanation of money's origin

5

in his book *Problems of Economics and Sociology* (1882). There, he emphasises money's role as a social institution as well as the evolutionary and "invisible hand" aspects of its genesis. Menger asserts that money, as with the legal constructs of society, is not the result of self-conscious collective efforts on the part of individuals. Rather, the institution called money is the outgrowth of customs or habits based on trust which at first, is between traders who are acquaintances, but eventually evolves to be a trust between traders and a third party, society itself.

Menger's characterization of money's origin as being comparable to the origin of social institutions such as law, was taken up by Georg Simmel in his book *Philosophy of Money* (1907).[5] Georg Simmel is described as a turn of the century "social philosopher and pioneer of modern sociology" who "laid bare [the nineteenth century view of money's] origins and foresaw its consequences."[6]

Simmel believed that as well as being the spontaneous result of social evolution, money incorporates or embodies the mutual trust that exists within society. The holder of money can trust that somebody else in the community will, in exchange for the money he now holds, return to him a service equivalent to that he had previously rendered to society in exchange for money. Money is valued because of the community's ability to incorporate a society's mutual trust in the form of money. Like Menger, Simmel believes that "society" acts as a "third party" whose role is to perform the services of an intermediary and thus to relieve individual agents engaged in the trading process of the need to waste effort and resources building up a reputation as a trustworthy trader. Specifically, trades in which money changes hands, no longer simply involve two agents because when money is used, "the value of exchange

---

[5]The works of Simmel have already been reviewed by Frankel (1977) and by Laidler and Rowe (1980), both of which argue in favour of the importance of Simmel's insights to modern monetary theory. It should be understood that this brief review of Simmel's ideas on money's origin and its medium of exchange characteristics owes a debt to both of these works. As is pointed out by Laidler and Rowe, one should also note that "...Simmel seem[s] to have drawn heavily on the work of Carl Menger, but later Austrians ... in their turn drew on him." (1980, p.97)

[6]Frankel (1977), pp.4-5

given by one party ... [must be] a claim upon definite values ... whose realization depends upon the economic community as a whole ..." (1907, p.77).

For Simmel, the benefits of the social institution, money, are akin to the gains that arise from converting a personal trust to a general trust throughout society. Such general trust eliminates the uncertainty that can arise from the unforeseeability of the action of other individuals, thus allowing agents to pursue their own economic advantages with less trepidation and more single-mindedness than would otherwise be possible. Simmel's broader characterization of money's role as being comparable to that of a social institution, is in effect, an extension of Menger's first point, that agents value and hold money partly because they believe (and trust) that money will be accepted by other agents in the future. The idea that money is accepted in trade as a medium of exchange because agents believe it will be accepted by others in return, is simply a consequence (or, using economic terminology, a special case) of money's nature as a social institution. In fact, Simmel goes so far as to imply that trust is what generates these beliefs. Laidler and Rowe (1980) summarize his views on this issue:

"... [money's] value in turn is underpinned not so much by physical properties of money as by an implicit guarantee given by the community as to the acceptability of money ..." (1980, p.99)

The implication of Simmel's argument, is that money's services are inherently public in nature. Underlying this conclusion however, is a requirement for continued trust in money, and for Simmel, trust in money must be underpinned by trust in monetary order. He believes that short-term uncertainty about the purchasing power of money will have long-run effects, because the adjustments engendered by short-run uncertainty can permanently affect that order.

"For the transitional period, the instability and difficulties of which are admitted, would ... become a *permanent condition*, and the state of adjustment that is attainable in principle for any quantity of money would never be reached ..." (1907, p.164, italics my own)

Also, as Frankel succinctly summarizes, Simmel believes that,

"...the maintenance of a free monetary order implies that contracts freely made in money do, as such, carry society's guarantee that the measuring-rod of money in terms of which they are made will not be deliberately tampered with by anyone, *not even the government itself.*" (1977, p.40, italics in original text)

Therefore Simmel draws the conclusion that uncertainty in the purchasing power of money would undermine this society's trust in money. To be precise, Simmel fears price level fluctuations because their occurrence will reduce agents' trust in monetary order, the mutual trust required to insure the continued acceptance of money, and hence undermine the institution called money.

Laidler and Rowe (1980) argue that the "Austrian" line of thought summarised above has important implications for modern monetary theory, which can be brought out by contrasting Simmel's characterization of money to the current mainstream point of view. The latter has it that money acts as a store of value and is held as any other durable good by utility maximizing agents. Laidler and Rowe indicate that, if money is assumed to be a store of value, the consequences of variations in its purchasing power are purely private, but when money's medium of exchange function is emphasized, such variation would undermine the process of monetary exchange. This in turn would hamper the efficiency of market mechanisms reducing the possibility of (or increasing the costs of) trading, and thus "reduce the number of mutually beneficial and desired exchange that actually took place ..." (1980, p.102). They conclude that modern economic theory underestimates the effects of monetary instability when it is compared to the concerns put forward by the "Austrians".

The Austrian view on money's origin and nature was not uncontested. Georg F. Knapp, in his *State Theory of Money* (1924) contended that fiat money is created and regulated by the State. As stated above, Menger viewed (commodity or fiat) money as a social institution dependent on individual beliefs that evolved over many generations out of uncoordinated self-serving behaviour. Though Menger concedes that once a medium of exchange has been established the State may enhance this money's ability

to act as such, he finds the idea that the use of a particular money is dependent on regulation or force is absurd. Specifically, he argues that money created by State will not be valued unless there exists individual beliefs that the rest of the population will accept this money as a general medium of exchange.

Frankel suggest that Knapp makes the analytic mistake of viewing government and money as being institutions separate from society. Frankel, by taking into consideration Simmel's and Menger's ideas on money being a social construct, explains that money should no more be regarded as separate from society than economic activity should. For Frankel, it is not the State — if it is assumed to be acting outside of society — that can change the monetary order but it is "changes ... in society as a whole — in its beliefs, goals and institutions ..." that are important to the existence of money. As I shall indicate in section IV, this same criticism can be applied to the modern legal restrictions explanation of the existence of fiat money.

III THE STNCE APPROACH AND ITS SIMILARITY TO THE IDEAS OF THE EARLIER MONETARY THEORISTS

As Ostroy and Starr (1990) show, a shared feature of all STNCE models of money is that agents meet randomly and sequentially in pairwise fashion to carry out bilateral trades. The trading process itself is characterised by a *quid pro quo* requirement at the time of exchange, meaning that equal market value must be given and received. Agents are typically restricted to holding one type of object (good or money) and no more than one real unit of that object. This *inventory restriction* then implies one-for-one trades, trivially satisfying the *quid pro quo* requirement. Because many of the STNCE models are variants of it, the Kiyotaki and Wright "A Search-Theoretic Approach to Monetary Economics" (1993) model will be used as a basis for the following summary of the STNCE features. In that model, and others that follow its lead, a number of infinitely-lived agents each specialize in the production of indivisible consumption goods which cannot be consumed by the agents themselves. The agents are assumed to have

9

heterogeneous preferences over these goods. Specifically, each agent is thought of as having a most preferred (or a set of most preferred) good (goods). The amount of utility derived by an agent can be pictured as reaching a maximum — if for example goods had colour as their only preference characteristic — when the agent consumes a good of his or her ideal colour. Utility would decrease as the agent consumed goods further away from this ideal colour. There are two variants of "most preferred good" preferences. *Discrete preferences*: here there is a limited number of goods, three for example, and agents derive positive utility only from one of these goods. In this discrete case, goods are differentiated by intrinsic or physical properties such as storage cost or ease of transport, as well as by the fact that they yield different utility to different individuals. *Symmetric preferences*: here there exists a continuum of (intrinsically) symmetric goods for which each agent derives, with probability x, some positive utility from consumption of a good selected at random.

The *symmetric* preference relation is more tractable in demonstrating a role for fiat money. Since the goods are undifferentiated by transport or storage costs, there is no "natural"[7] candidate to play the role of commodity money. A parameter x is used to characterise the double coincidence of wants problem stated in Jevons (1875). Specifically, in the STNCE approach, agents are assumed to want only goods for which they derive positive utility from consumption, with the parameter x being the probability that an agent would derive positive utility from the good held by his trading partner. Thus, the typical agent, upon meeting a trading partner with a good, will wish to acquire this good with probability x. Therefore x^2 represents the probability that two traders will consummate a barter exchange; the probability of a double coincidence of wants being satisfied. Obviously, smaller values of x make barter more difficult because the probability of a double coincidence of wants, x^2, is smaller. For x=1, barter becomes trivial in the sense that any good is accepted in trade.

---

[7]Natural, when speaking of its physical or real properties, such as storage costs. In other words, the commodities can be thought of as having the same ease of transport but may be painted with a different colour yielding various levels of utility to various individuals.

The trading process, in the STNCE class of models, has agents searching for exchange partners in a trading area and facing transaction costs should they actually trade. They choose trading strategies, decision rules determining whether or not, on any encounter, they should trade. These decision rules are determined in such a manner as to *maximize their expected discounted utility* from consumption net of any transaction costs, *given the strategies of others.*

Because authors using this search theoretic approach typically wish to show that valued fiat currency can exist in equilibrium, they assume that, at the outset, fraction M of the agents are endowed with fiat money while the rest are initially endowed with a real commodity. If they do trade, agents holding money are required to spend all their holdings in exchange for one unit of a real commodity. Therefore there are two types of traders, each defined by what they bring to the market area, either one unit of real balances (money traders) or one unit of the real commodity (commodity traders).

The critical question is to determine whether traders holding a commodity will accept fiat money in exchange for it. The notion that agents will accept money in trade because they expect that others will do the same, is formalized in STNCE models by determining a commodity trader's strategy when meeting a money trader. Let Π denote the probability that a randomly selected commodity trader accepts money, so that, when a money trader meets a goods trader, the money trader knows that commodity traders in general accept money with probability Π. Now let π denote a commodity trader's optimal strategy when he meets a money trader, that commodity trader's probability of accepting money. For example, if the expected utility of holding money (becoming a money trader) is always greater than remaining a goods trader, then π will be equal to one. However in general, π is dependent on Π, the societal beliefs, if you will, of other agents. This means that if Π is low enough, it may never be optimal for the goods trader to accept money, thus making $\pi=0$.

A pure money equilibrium can exist in such a framework, however, and is described as follows. When the beliefs are such that $\pi > x$, money will be accepted in the exchange, by any encountered trading partner holding goods, with higher probability than goods. Since money is accepted more often, the expected gain to becoming a money trader is greater than that remaining a goods trader. The commodity trader's best response when meeting a money trader is therefore to always accept money (π=1). Since π=1 for all goods traders, money becomes universally accepted. This in turn implies that π=1 in this, the pure monetary equilibrium. Note that in equilibrium, beliefs about the general acceptability of money are self-fulfilling.

There are in general, three steady-state equilibria in a STNCE model of the type we have described. These can be described as: a pure monetary equilibrium where π=1, a nonmonetary equilibrium where π=0 (money is never accepted in exchange), and a mixed monetary equilibrium in which π=x and $\pi\epsilon$[0,1] (money is accepted in some exchanges).

The foregoing analysis characterises equilibria, but says nothing about how they are reached. Until Robert Jones' "The Origin and Development of Media of Exchange" (1976), modern work on the medium of exchange role of money did not explicitly address Menger's question: *how can an object become a generally accepted medium of exchange*? It illustrated how money could overcome the difficulty of achieving an efficient allocation within a decentralized exchange economy. In other words, it explained *why* a general medium of exchange was necessary, or what was the economic gain from the use of a general medium of exchange. Only incidentally did it shed light on aspects of money's genesis. Jones' model, on the other hand, captures the Austrian "invisible hand" view of the origin of money by demonstrating that agents, through their self-interested cost minimizing (welfare maximizing) behaviour, choose, as Menger puts it, without "...state compulsion, nor voluntary convention of traders" (1892, p.254),

to use a commodity money in an indirect exchange process, rather than barter.

Specifically, Jones' framework has exchanges of commodities taking place bilaterally and sequentially. He assumes that agents choose between a direct trading strategy and an indirect (2 stage) trading strategy. The conclusion drawn by Jones is that indirect exchange may be optimal in some equilibria, since it may minimize exchange costs. Should indirect exchange be favoured, agents will choose the commodity that is most frequently bought and sold as the intermediary commodity, which in turn becomes a commodity money.[8] Jones' model also formalizes the learning process described by Menger. Jones presents an adaptive formula that has the agents' estimate of the fraction of individuals in the market wishing to purchase the various goods, an estimate that is revised in accordance with the actual state of the market. Over time, a locally stable equilibrium pattern of exchange emerges, with the particular level of monetization of trade to which the economy converges, depending on the initial pattern of trade. Jones finds that the relative "commonness" of goods — a market characteristic rather than an intrinsic characteristic — plays a role in determining which good evolves into commodity money.

Jones' approach does not directly address Menger's point about the genesis of money being dependent on the agents' beliefs about the acceptability of money. STNCE models add to the insight provided by Jones by making it clear that, as well as arising from the uncoordinated market behaviour of economic agents, money is a creation of social acceptability.[9] It is an essential insight of the STNCE approach that money must be believed to be a general medium of exchange before it can actually fulfil that role. This point emerges clearly in Kiyotaki and Wright's seminal earlier paper "On Money as a

---

[8]Oh (1989) and Iwai (1988), with the use of more sophisticated trading strategies, develop updated versions of Jones (1976) model.

[9]It can be argued that in modelling the individual's belief about the state of the market (ie. the proportion of individuals wishing to buy each good) that Jones also formalizes Menger's point about the agents beliefs. However, I put forward the interpretation that the agents' beliefs, in Jones model, are estimates of the relative abundance of each good rather than beliefs about the societal acceptability of each good. I admit, the difference in interpretation is a subtle one.

Medium of Exchange" (1989). There they demonstrate that even if an object has physical properties, such as storability, making it a natural candidate for the role of commodity money, these properties may be overridden as the deciding factor in the choice of a commodity money strictly because a necessary condition for it to play this role, namely that agents believe that the object will be accepted by others, is missing. Therefore, the model set out in Kiyotaki and Wright (1989) is a logical starting point for a comparison of issues addressed by the early theorist and the findings derived from search-based models of money.

The Kiyotaki and Wright (1989) model involves three indivisible goods and three types of agents, with each agent deriving utility from only one of these goods. They assume the preference relation described as *discrete*. The three commodities in their model have different storage costs (or different physical properties). Depending on the commodity's intrinsic or physical properties and the extrinsic beliefs of the agents, Kiyotaki and Wright derive equilibria in which one (or even two) of the commodities become the medium (or media) of exchange. In one equilibrium, the low-storage-cost object serves as commodity money. However, Kiyotaki and Wright demonstrate that another equilibrium exists in which the highest-cost object (the least natural candidate for money) circulates as commodity money provided that other agents believe that it will be the most readily accepted. In this equilibrium, the dependence of the medium of exchange selection on the population's beliefs is all important, and its existence shows that this model (as do all STNCE models) captures the idea stressed by Menger (his first point) that the emergence and continued existence of a generally acceptable medium of exchange depends on societal beliefs or customs.

Beliefs about money's degree of acceptability becomes even more important in modelling the existence of valued *fiat* currency. As we saw in discussing Kiyotaki and Wright (1993), the individuals' self-fulfilling beliefs (π above) are critical in determining whether fiat currency will be accepted in trade. Simmel's idea that money derives its value not from its physical properties, but from a guarantee given

by the society itself as to its acceptability in future trades, is thus highlighted in this model. Specifically, it is possible to interpret the parameter π, the measure of money's general acceptability, as measuring the trust that other individuals have in money. For example, when $\pi=1$, an individual who is contemplating accepting money in trade, believes that there exists an absolute guarantee that some future trading partner will in turn accept it. It is also worth stressing that because all STNCE models describe the maximizing behaviour of agents, Menger's second insight, that money emerges out of the decentralized, sequential and *optimal* decision-making process, is indeed formalized by them.

There remains one point of Menger's which the STNCE approach has yet to address. As was noted above, these models are typically used to characterise steady state equilibria. However, they ignore the learning and evolutionary aspects of the origin of money expounded by the Austrian school, Menger's third point. Since all beliefs are self-fulfilling in the steady state equilibria, there is no learning involved in the maintenance of the monetary institution, as there would be during its evolution. There is no mechanism which explains how expectations of money acceptability (π) are developed or generated within society. It may be possible to address this issue by modelling some explicit dynamic activity within the STNCE framework in which agents are able to learn the advantages of using an intermediated object possessing high saleability properties. Presumably, beliefs would have to be updated (perhaps in a Bayesian manner) as more agents learned to use the more saleable objects to achieve their final allocation. Saleability of an object at any moment would then have to be dependent on these changing beliefs as well as the varying level of use of the object as a medium of exchange.[10] What seems to be called for is an

---

[10]Kehoe, Kiyotaki and Wright (1993) derive dynamic equilibria using a search-based model similar to Kiyotaki and Wright (1989). However, the model does not formalize the mechanics involved in learning (the updating of beliefs in particular), which is described by the forerunners.

integration of the insights yielded by Jones' model into the STNCE framework.[11]

A criticism of many search-based models of money is that prices are not explicitly determined within these models. By introducing a bargaining mechanism between trading partners into the STNCE framework, Hendry (1993) shows that it is possible to have endogenous price determination within this framework.[12] With endogenously determined prices, Hendry is able to analyze some aspects of the issue of neutrality within a search-based model of money. Specifically, he finds that when the money inventory restrictions are severe (ie when an agent is allowed to hold 0 or 1 unit of nominal money),[13] money is non-neutral since any increase in the aggregate money supply will have a less than proportional affect on the aggregate price level in equilibrium. However, money is shown to be asymptotically neutral as the inventory restrictions are decreased.

As yet, the STNCE literature has failed to formalize possible interactions between price volatility or inflation and societal beliefs. Assuming, as Simmel asserts, that increased price level fluctuations or inflation causes a decrease in the willingness of maximizing individuals to accept money in an exchange, the societal acceptability (or measure of trust) of money (π above) would be negatively affected. It would seem plausible that the neutrality of money conclusion put forward by Kiyotaki and Wright (1993) and the asymptotic neutrality of money in Hendry's (1993) work would then no longer hold in all circumstances.

---

[11]As we have seen, Jones' model closely parallels Menger's description of the learning process.

[12]Shi (1993) also produces a search-based model of money in which prices are endogenously calculated.

[13]Hendry (1993) relaxes the inventory restrictions typically assumed in the STNCE environment. Specifically, he allows the agent to simultaneously hold both money and a good rather than one or the other. As well, the agent is assumed to be able to hold up to M discrete nominal units of money where $M\epsilon\{1,2,3...\}$. The important modification found in Hendry's model is not the use of nominal money balances in itself, it is that an agent can hold various amounts of discrete nominal money units as well as a good.

On the other hand, Menger's idea that once a universal medium of exchange has been established in society, the State can enhance this money's ability to act as a medium of exchange by standardizing the form it takes and by accepting it in trade may be addressed in a STNCE framework. The State, being a large trading entity in the economy, would affect, by its behaviour, the beliefs of other agents about money's acceptability. It would therefore seem possible to formulate a STNCE model in which the population acceptability of money (π) depends on the number of transactions that the state carried out with money.

IV NEW MONETARY ECONOMICS VERSUS THE STNCE MODELS OF MONEY

The last two decades have seen monetary theorists seeking microfoundations for the analysis of various issues in macroeconomics. Those who have applied general equilibrium analysis and Walrasian market theory to monetary topics have found that money plays no unique role in an environment in which market prices are set costlessly and in which there are no trading frictions. The only function for money in such an environment is as a store of value. That is why Overlapping Generations[14] models have been frequently used (in modelling money) by contributors of what has been dubbed "the new monetary economics."

When assets with greater rates-of-return than money are introduced into an Overlapping Generations framework, the continued existence, in equilibrium, of valued fiat money, which can be thought of as "non-interest-bearing, intrinsically valueless store of value"[15], can not be supported.[16] A

---

[14]This microfoundations Walrasian market theory analysis also brought the development of Cash in Advance (CIA) models in which money is valued because of an exogenously imposed medium of exchange function for money. Fiat money is required in these models for the purchase of consumption goods.

[15]Laidler (1990), p.104

17

result that arises directly from modelling only money's store of value function. This is succinctly put by Laidler in his work *Taking Money Seriously* (1990).

"To treat money [as a store of value] of course immediately rules out of court the traditional analysis of the welfare costs of inflation. Indeed it goes much further, because any expected rate of return on money below that yielded by productive assets ... will lead to its not being held at all. If money bears explicit interest at market rates, it becomes indistinguishable from other assets, but if it does not, and consists of some intrinsically valueless item, then expected inflation at any rate in excess of minus the real rate of interest immediately leads to money's disappearance from the economy, which nevertheless continues to function in its absence!" (1990, p.104)

However, as an empirical fact, fiat currency does circulate and its rate-of-return is dominated by default-free securities (or risk-free interest-bearing assets). Neil Wallace, in his "A Suggestion for Oversimplifying the Theory of Money" (1988), suggests that fiat currency circulates because of "unnatural" State created barriers limiting "substitution between privately issued inside money, ... and outside or government issued money ..."(1988, p.26). He argues that without legal restrictions, we have either

" ... a world in which currency as we know it —non-interest-bearing currency— continues to be valued and all real returns are driven down to approximately that on such currency, or ... a world in which currency as we know it disappears and the currency we use is different stuff, perhaps claims denominated in terms of some commodity like ounces of gold..." (1988, p.29)

This line of argument also suggests that there should be "laissez-faire" in matters of monetary institutions because intervention (legal restrictions) on the part of the government is welfare-reducing.[17]

---

[16]Because of their frictionless Walrasian constructs, the existence (in equilibrium) of fiat money in CIA models is equally tenuous without legal restrictions. Specifically, these are restrictions in the pattern of trade as well as restrictions on the agents ability to issue their own currency or, to be more exact, to issue liabilities that could be traded for goods. Therefore many of these comments apply to CIA models as well.

[17]See Wallace (1988) or Sargent and Wallace (1982) for examples of such arguments.

18

In their "A Contribution to the Pure Theory of Money" (1991) paper, Kiyotaki and Wright illustrate the robustness of valued fiat currency equilibria by showing that even when rate of return dominated by other assets, fiat currency may still circulate in equilibrium. Thus under laissez-faire, fiat money does not vanish so long as it is believed to be the most liquid (or the most saleable) item of exchange. That fiat money should exist in such circumstances is due to the non-Walrasian market frictions in the STNCE world, and the public services yielded by money in coordinating market exchanges. Matters which are absent from Walrasian Overlapping Generations models. The STNCE literature shows that money does not need to be designated as legal tender or have a rate of return equal to other assets in the economy in order to exist. All that is required is that society believes that money will be the generally accepted medium of exchange.

This suggests that the same criticisms put forward by Frankel (1977) about Knapp's *State Theory of Money*, may be applied to the legal restrictions explanation of fiat money's existence. Specifically, by viewing the State (and its imposed legal restrictions) as acting upon society from the outside, the new monetary economics fails to capture some of the important welfare effects of monetary instability caused by say, purchasing power uncertainty.

Now it must be said that in a world in which economic activity takes place over time and in which the future is uncertain, stores of value capable of insuring against unforeseen events are important, and money (even fiat money), along with other assets, can provide such insurance. Just as the Overlapping Generations models do not capture the richness of what occurs at a point in time in the friction laden markets where current goods and services are traded, the STNCE approach does not capture the richness of what happens over time. The STNCE framework, in its current state of development, is one in which goods do not appear in a stochastic manner, and which there are no real uncertainties about future consumption needs, and in which, therefore, there is no need to save. Thus, it should be understood that the medium of exchange and the store of value function (as well as the unit of account function) are

complementary in the explanation of the existence money.

V CONCLUSION

It is evident that the STNCE class of models represent an important advance in monetary theory. However, the implications of this class of models gain added importance when compared with older "Austrian" ideas on the origin of money. Their ability to formalize the ideas put forward by Menger, specifically that for money to exist as a medium of exchange it must be believed to be a medium of exchange, is striking; and their tractability also makes them useful when it comes to addressing such questions of current interest as the existence of the rate of return dominated money. Furthermore, their emphasis on money's medium of exchange function and their ability to show that fiat or commodity money exists simply because of belief held by agents, makes them a natural tool for further analysis of "Austrians" ideas about the evolution of money, and about the importance of price stability as a factor affecting its acceptability.

REFERENCES

Bryant, J.B. and N. Wallace (1984). "A Price Discrimination Analysis of Monetary Policy", *Review of Economic Studies*, Vol. 51, No. 2, pp.279-288.

Cowen, Tyler and Randall Kroszner (1987). "The Development of the New Monetary Economics", *Journal of Political Economy*, Vol. 95, No. 3, pp.567-590.

Ellis, Howard S. (1934). *German Monetary Theory*, Cambridge Mass., Harvard University Press.

Frankel, S. Herbert (1977). *Two Philosophies of Money: The Conflict of Trust and Authority*, New York, St. Martin's Press.

Hall, Robert (1982). "Monetary Trends in the United States and the United Kingdom: A Review from the Perspective of New Developments in Monetary Economics", *Journal of Economic Literature*, Vol. 20, No. 4, pp.1552-56.

Hendry, Scott (1993). "Prices in a Search Model of Money" in unpublished doctoral dissertation *Search Models of Money*, University of Western Ontario, pp.41-84.

Iwai, K. (1988). "The Evolution of Money — A Search Theoretic Foundation of Monetary Economics", *University of Pennsylvania CARESS Work Paper, No. 88-03*.

Jevons, W. Stanley (1875). *Money and the Mechanics of Exchange*, London, Appleton.

Jones, R.A. (1976). "The Origin and Development of Media of Exchange", *Journal of Political Economy*, Vol. 84, No. 4, pp. 757-775.

Kehoe, T.J., N. Kiyotaki and R. Wright (1993). "More on Money as a Medium of Exchange", *Economic Theory*, Vol. 3, No. 2, pp. 297-314.

Kiyotaki, N. and R. Wright (1989). "On Money as a Medium of Exchange", *Journal of Political Economy*, Vol. 97, No. 4, pp.927-954.

Kiyotaki, N. and R. Wright (1991). "A Contribution to the Pure Theory of Money", *Journal of Economic Theory*, Vol. 53, No. 2, pp.215-235.

Kiyotaki, N. and R. Wright (1993). "A Search-Theoretic Approach to Monetary Economics", *American Economic Review*, Vol. 83, No. 1, pp.63-77.

Knapp, Georg F. (1924), Translation [1936]. *The State Theory of Money*, Abridged and translated by H. M. Lucas and J. Bonar, London, Macmillan.

Laidler, David and N. Rowe (1980). "Georg Simmel's Philosophy of Money: A Review Article for Economists", *Journal of Economic Literature*, Vol. 18, No. 1, pp. 97-105.

Laidler, David (1990). *Taking Money Seriously*, Toronto, Philip Allan.

Matsuyama, K., N. Kiyotaki and A. Matsui (1993), "Towards a Theory of International Currency", *Review of Economic Studies*, Vol. 60, No. 2, pp. 283-307.

Menger, Carl (1892). "On the Origin of Money", *Economic Journal*, Vol. 2, No. 1, pp.239-255.

Menger, Carl (1871). Translation [1950]. *Principles of Economics*, First, general part. Translated and edited by James Dingwall and Bert F. Hoselitz, with an introduction by Frank H. Knight. Glenco, Ill., Free Press.

Menger, Carl (1882). Translation [1963]. *Problems of Economics and Sociology*, Translated by Francis J. Nock, edited with an introduction by Louis Schneider, Urbana, Ill., University of Illinois Press.

Oh, S. (1989). "A Theory of Generally Acceptable Medium of Exchange and Barter", *Journal of Monetary Economics*, Vol. 23, No. 1, pp.101-119.

Ostroy, Joseph and Ross Starr (1990). "The Transaction Role for Money", in B. Freidman and F. Hahn (eds.), *Handbook of Monetary Economics*, Amsterdam, North-Holland.

Sargent, T. and N. Wallace (1982). "The Real-Bills Doctrine Versus the Quantity Theory: A Reconsideration", *Journal of Political Economy*, Vol. 90, No. 6, pp.1212-1236.

Selgin, George (1994). "On Ensuring the Acceptability of a New Fiat Money", *Journal of Money, Credit and Banking*, Vol. 26, No. 4, pp.808-826.

Shi, Shouyong (1993). "Money and Prices: A Model of Search and Bargaining", manuscript, University of Windsor.

Simmel, Georg (1907). Translation [1978]. *The Philosophy of Money*, Translated by T. Bottomore and D. Frisby. With an Introduction by D. Frisby, London and Boston, Routledge and Keegan Paul.

Smith, Adam (1776). *The Wealth of Nations Vol. 1*, Homewood, Illinois, Richard D. Irwin, Inc.

Wallace, Neil (1988). "A Suggestion for Oversimplifying the Theory of Money", *The Economic Journal*, Vol. 98, No. 390, pp. 25-36.

Williamson, S. and R. Wright (1994). "Barter and Monetary Exchange Under Private Information", *American Economic Review*, Vol. 84, No. 1, pp. 104-123.