

34

Reprinted from:
TRADE, STABILITY AND MACROECONOMICS
Essays in Honor of Lloyd A. Metzler
© 1974
ACADEMIC PRESS, INC.

**THE THEORY OF MONEY AND INCOME
CONSISTENT WITH ORTHODOX VALUE THEORY**

Earl A. Thompson.
University of California
Los Angeles

Introduction

The challenge of Metzler's classic article, "Wealth, Saving, and the Rate of Interest" [17], has gone unanswered. The literature has remained without a model which captures the full logic of the classical theory of money and income. The main purpose of this chapter is not to specify such a model; it is to derive the theory of money and income that is consistent with orthodox value theory (i.e., Ricardian and neoclassical value theory and the competitive model of Arrow and Debreu). However, quite by accident, it turns out that any such theory of money and income must have all of the essential properties asserted by classical monetary economists.

The chapter proceeds as a development of the properties of any money economy which is constrained to be consistent with orthodox value theory, a theory which has a perfectly competitive, private supply of all goods. The central theoretical results are: (1) there is a money economy that is consistent with orthodox value theory, and (2) in any such economy, which we will call a "perfectly competitive money economy," there is: (a) a classical dichotomy between the real and monetary sectors, (b) an absence of real balance effects,

(c) an absence of effects of expected inflation on the real sector of the economy, and (d) an imperviousness of output prices and employment in a sticky-wage economy to shifts in capital productivity, thrift, liquidity preference, and the money supply of any individual.

These results are in sharp contrast to the central propositions of numerous modern monetary theorists. With respect to the first result, leading modern day authors have alleged an inconsistency between any money economy and orthodox value theory. Some of these authors (e.g., Friedman [8] and Pesek and Saving [22]) have claimed that money cannot attain a positive equilibrium value in an orthodox model in which nominal money is costless to create and competitively supplied. Since a good with a zero price cannot be used as a medium of exchange, this implies that the orthodox model cannot be extended to include money. Other authors (e.g., Marschak [15] and Radner [25]) have argued (each for a slightly different reason) that money, however supplied, would have a zero total value under the informational perfections of the standard competitive model. In working out the basic money model implied by the standard competitive model in Sections I.A and I.B, we shall see that these modern day authors have failed, each in his own way, to characterize accurately the information structure implicit in the standard competitive model. Section I.C then demonstrates the existence and Pareto optimality of an equilibrium consistent with orthodox value theory in which money emerges as an individually selected, specialized medium of exchange.

Regarding the second result, the set of properties we derive for any money economy consistent with orthodox value theory contains all of the properties that modern monetary theorists have represented as *logical* fallacies in the classical view of a money economy. Keynes in his *General Theory* [12], and all later writers of note, have considered the classical view of a money economy logically defective in that it does not allow shifts in capital productivity, thrift, and liquidity preference ever to affect prices or employment. As Metzler pointed out, Pigou [24] and others have implicitly *criticized* classical monetary theory by alleging that real cash balances have belonged in the excess demand functions for nonmonetary goods all along. Patinkin [21] has criticized classical monetary doctrine for having equilibrium relative prices between nonmonetary goods determined in the nonmoney markets and a unique level of equilibrium money prices determined in the money market. Friedman [7], Bailey [4], Marty [16], and Kessel and Alchian [11] have argued that shifts in the future money supplies, when prices are correctly anticipated and money is neutral, will generally have real effects on the economy, a fact which classical writers did not include in their theoretical discussions. Sections I.D and II.E show how each of these criticisms is inapplicable to a competitive money model and that the so-called fallacies in the classical view of a money economy are in fact necessary properties of any perfectly competitive money model.

Sections II.F and II.G specify the possible sources of involuntary unemployment in a perfectly competitive money economy and note the substantial evidence for the resulting theory of economic fluctuations in pre-1934 industrialized economies. Previous theories, by failing to specify the basic informational imperfection leading to involuntary unemployment, or by treating a Say's law economy [27] as if it were somehow immune to aggregative unemployment, have apparently failed to bring out the vulnerability of employment to certain shifts in technology and tastes in a classical money economy. As a result, previous theories have misled us as to the cause of the Great Depression, misled us into searching for Keynesian or Quantity Theory-type explanations. Correspondingly, we have been led away from understanding the fundamental change in the relevant macrotheory and the fundamental improvement in potential employment stability that occurred with the destruction of the fully convertible gold standard in 1934.

Section II.H shows the impossibility of *permanent* involuntary unemployment despite the absence of Pigou effects in a perfectly competitive money economy.

I. The Theory of Money Consistent with Orthodox Value Theory

A. PROPERTIES OF ANY MONEY MODEL CONSISTENT WITH ORTHODOX VALUE THEORY

The standard competitive model (e.g., Debreu [6]) specifies equilibrium allocations of real resources for given initial allocations. But it does not specify the *process* of achieving equilibrium allocations. Money is used as an intermediate good in transactions, achieving final allocations from initial ones. Therefore, since our model is a money model, our "equilibrium" necessarily specifies more information than the "equilibrium" of a standard competitive model. In particular, our equilibrium specifies a complete set of transactions in a private property system.

Despite the fact that our money model specifies more information than is provided by a standard competitive model, consistency with the standard competitive model implies a very special kind of money economy. First, in the standard competitive model, there are no transaction costs resulting from an equilibrium set of transactions. Equilibrium transactions leading to a standard competitive equilibrium's final allocations of resources must all be costless transactions. Transaction costs are dead-weight losses—losses due to imperfect contract information that an idealized central allocator could avoid. The laissez faire implication of the orthodox model, monetary or not, would not exist if transaction costs were to appear in achieving the equilibrium's final allocations of resources. (This is elaborated by Thompson [33].)

Second, in any economy with a determinate money, there are positive total transaction costs for some *conceivable* transaction sets. For if all *conceivable* transactions sets yielding the equilibrium's final allocations were totally costless, there would be no determinate money; one good could serve as a medium of exchange as well as any other, and no good would have to serve as money, which is defined as a specialized medium of exchange. However, no costly transaction set can be an *equilibrium* transaction set; the use of a particular asset as a specialized medium of exchange must be so efficient that it drives equilibrium transaction costs down to zero if the equilibrium is to contain a standard competitive equilibrium.

It is not correct to infer, as have several modern authors, from the fact that an economy with a determinate money implies informational imperfections for *some* sets of transactions, that an economy with a determinate money implies informational imperfections for *equilibrium* sets of transactions. A widespread argument, probably best developed by Marschak [15], goes: "No rational individual would hold a positive amount of money in the absence of transaction costs, for he would always prefer to buy, hold, and later sell an interest-bearing asset rather than hold onto barren money before his next ordinary purchase." But money need not be barren; indeed we shall find that in a money model consistent with orthodox value theory, money bears as much interest as the purchased asset. This, however, raises the objection: "If money bears interest, why should anyone, in the absence of transaction costs, hold anything but arbitrary amounts of their assets in the form of money, for they should be indifferent between (a) holding onto their money and (b) buying, holding onto, and later selling a different interest-bearing asset before their next ordinary purchase?" The answer to this, as we have seen, is that while there are zero costs of the monetary transactions that characterize the equilibrium set of transactions in a money economy consistent with orthodox value theory, there are positive costs of some unchosen, or disequilibrium, transactions.¹

In a similar slip, Radner [25] argues that since a money economy implies an advantage to transactions in the future and therefore positive transaction costs in using only current transactions (including transactions in commodity futures) to allocate future resources, a money economy implies positive transaction costs, which is inconsistent with the standard competitive model. The error here is again the tacit neglect of the case in which the reliance on trans-

¹ Although not yet widely recognized, it is true of *any* model of orthodox value theory, monetary or not, that there are zero transactions costs in equilibrium and positive transactions costs in some disequilibria. This is developed by Thompson [33]. Transaction costs out of equilibrium are, for example, generally necessary to prevent the breakdown of decentralization by way of the monopolization of selling activities.

itions in the future, working through money, operates to remove the contract formation costs from the equilibrium set of transactions.²

Since any real cost of providing the specialized services of a medium of exchange would be a transaction cost, a money model consistent with orthodox value theory has a zero cost of providing the services of the medium of exchange. We shall adopt the standard convention that money is paper, rather than a commodity, money. (A rationalization of this assumption appears at the end of Section C.) Zero costs of providing the service of the medium of exchange therefore implies zero costs of creating and transferring the paper money.

A third property which characterizes orthodox value theory is that all assets are created according to a rule of wealth maximization for the price-making creators, who receive all of the returns from their creation as long as the creation and sale does not reduce the property of others. Thus money is privately rather than "governmentally" produced. We shall hereafter refer to a money economy consistent with an orthodox value theory as a "perfectly competitive money economy."

THE POSITIVITY OF THE PRICE OF MONEY IN A PERFECTLY COMPETITIVE MONEY ECONOMY

A recent proposition regarding the production of money under competitive conditions is the following: "Since the cost of producing money is zero, the perfectly competitive real price of money is zero." (See, for example, Friedman [8] and Pesek and Saving [22].) Since an asset with a zero price cannot be used as a medium of exchange, the proposition implies the impossibility of a perfectly competitive money economy. But the proposition implies a violation of private property because the holders of one creator's money suffer a loss of utility from the reduction in their real cash balances occasioned by the supplies of the other money creators. To avoid these violations of private property, each money creator in the competitive model must be able to freely force his claim to issue money with a unique physical characteristic.³ For

² Actually, Radner does not put his argument in terms of transaction costs, but rather in terms of uncertainty with respect to future demands under given future states of nature. While this uncertainty is neither necessary nor sufficient for markets in the future (see Sampson [33]), Radner infers both. We have therefore dealt with a repaired version of Radner's argument.

³ My colleagues Armen Alchian and Benjamin Klein have independently uncovered this characterization of competitive money production (see Klein [13]). The difference between their analyses is that their argument has been that the appearance of "competing monies" or "brand names" alters some models, while mine is the stronger claim that the conditions of the zero-price competitive money model represent a violation of the private property condition of orthodox value theory.

example, one money creator can obtain the sole right to issue blue money; others then must issue money of a different color. This prevents competitive sellers from depreciating the real product of one another. After a certain nominal money supply is produced, a seller's permanent doubling of his own produced money stock will simply halve the price of his money in terms of all other assets. Since the money creator's product is then the real balances he creates, he finds that to induce people to hold more of his product, he must make it more attractive. This is done—when direct interest is not paid on money—by committing himself to repurchasing some of the money with commodities (or other monies) at future dates, thereby decreasing his customer's cost of holding onto his money because of its subsequent real appreciation. Zero profits to a money creator will emerge once the principal and own interest on the asset initially obtained by selling money equals his corresponding future sales in the process of retiring his initially issued money. No money creator who offers a less generous repurchase plan can receive a positive price for his money. Although the return to the money holders comes in the indirect form of price-level deflation, the money creators are, in effect, paying real interest to the holders of their money at a rate equal to the own rate of interest on the assets initially sold to the money creators.

We now remove the artificial prohibition of the direct payment of interest on money. Our general argument becomes: Since it costs nothing to produce the nominal money, a competitive producer-seller will find that in order to sell it for a positive price—which is necessary for there to be any positive quantity of the money demanded—he must pay what amounts to real interest on the asset, devising through the tie-in sale of monetary services and commodity (or other money) interest, a salable money. Money, which yields the joint benefit to the buyer of real interest and monetary services, has a price which is equated in competitive equilibrium with the cost of providing the entire money asset. This cost, in an equilibrium without transaction costs, is the cost of the real interest payments on money. Thus, an equilibrium in a perfectly competitive money economy yields an allocation at which the marginal service value of money is zero. Many recent authors (e.g., Samuelson [26], Friedman [9], and Kessel and Alchian [11]) have conjectured that an equilibrium in a money economy (implicitly one with no transaction costs in equilibrium) is Pareto optimal only when the marginal service value of money is zero. But they have failed to see that the free market production of money achieves this condition. Pesek [23], for example, claims that competition cannot possibly achieve the optimum. He argues: Since an optimum requires a zero marginal use-value of monetary services, the price of money in this optimum would have to be zero. But we have seen that this does not hold when competitive interest is paid on money.

For the remainder of this chapter, we assume that our competitive money

creators, rather than committing themselves to eventually retiring their issues, compete by offering direct interest on paper money (in the form of real commodities or the monies of other money creators) equivalent to the real return on a specified real good. This implies that money is "convertible" into the specified real good (or its value equivalent) at an intertemporally fixed rate. If the good into which money is explicitly convertible generates no commodity return, but only continual relative price inflation while it is serving to back money (e.g., noncoupon debt or undeveloped land), then there are no transactions representing interest payments on money even though direct real interest accrues on money equal to the real return on the specified real good. There appears to be a reasonable similarity between our competing money creators and bankers in the gold standard era; and we shall hereafter call our money creators "bankers."

C. THE EXISTENCE AND PARETO OPTIMALITY OF AN EQUILIBRIUM IN A PERFECTLY COMPETITIVE MONEY ECONOMY

We can now prove that an equilibrium in a perfectly competitive money economy exists and is Pareto optimal. First consider final equilibrium allocations of real resources. Since the marginal service value of money is zero, money does not, in equilibrium, enter the wealth constraint, utility function, or feasible production set of any individual apart from its generating an interest return. The fact that a real interest return is the sole return provided in a nonreal asset makes the asset equivalent to a real bond in an orthodox model which contains real bonds as well as real assets. If the real bonds serving as money create individually nonoptimal intertemporal allocations, borrowing and lending through the nonmonetary bond market will reestablish the individual optima. A final equilibrium allocation of resources in such an environment, according to the well-known results of Arrow [2] and Debreu [6], exists and is Pareto optimal (assuming a finite horizon, no collective-type goods, transitive wealth, continuous preference relations, nonsatiation, and closed, convex consumption and feasible production sets).

Now consider the equilibrium set of transactions.⁴ We wish to show that an equilibrium set of transactions in a perfectly competitive money economy exists and achieves the final allocations of the standard competitive model. We shall do this for the following special case: We assume that there is a "natural" transaction process. In this process (a) following Ostroy [19], each individual meets separately with every other individual in sequential fashion

The question of the existence of a competitive equilibrium set of transactions implying the existence of money is novel and our proof is rather technical. The novelty of the question suggests that most economists are willing to simply assume the existence of such an equilibrium. The reader so inclined is advised to skip the remainder of this subsection and proceed on to Section D.

during each trading period (which is of sufficiently short duration that no transaction costs arise due to delays in achieving the final commodity allocation of each period), and (b) following Starr [30], each individual transfers a good when and only when he has an excess supply of the good and his trading partner has an excess demand for the good.⁵ These specifications imply, when "prices" are standard competitive equilibrium prices and there are no costs of any transaction in this "natural" exchange process, that once every individual has met with everyone else in a given period, he will have no excess demand for any commodity in that period.⁶ (This is Ostroy's "Principal Proposition.")

We add to the natural transaction process that the asset which one receives in exchange for positive net commodity supplies is an IOU denominated in a specified good but payable in goods of the debtor's option at the time of repayment (where the relative values between these goods are the then-ruling relative prices). Once the period's final allocation of real resources is reached, an individual will still generally own some of these debts of others and owe some of these debts to others, although the *sum* of these positive and negative debts is zero for each individual (Starr [30, Theorem I], Ostroy [19, "Misleading Existence Theorem"]). The natural exchange process thus continues on into a second round after the final allocation of real commodities is reached, where now the bilateral exchanges are all exchanges of IOU's and each indi-

⁵ Part (b) of the "natural" process is also a rational transaction strategy for individuals to adopt. This holds for the same reason that a bird in the hand is worth two in a bush. Given part (a) and assuming that an individual does not know his later transaction opportunities within the period, an individual is never assured of being able to reduce commodity excesses with later trading partners when he refuses the opportunity of reducing them in transactions with his current trading partner. On the other hand, as we shall note, by adopting the strategy in part (b) of the process, all excess commodity demands of all individuals at equilibrium prices will become zero. The "natural" transaction process is thus also an equilibrium process, given the assumption in part (a).

However, if other individuals do not adopt the strategy in part (b), then an individual who does adopt it will not generally be able to satisfy all of his excess commodity demands in the period. Then, if some goods are complements, an individual may be worse off by adopting the strategy in part (b). For his purchase of a left glove today is a loss if he cannot purchase a right glove tomorrow. Therefore, under such complementarities, there may be an *equilibrium* set of decentralized strategies which does not satisfy the conditions of a competitive equilibrium—it may pay to go without gloves rather than endure the risk of buying a right glove without being able to find a seller of a left one. To avoid these breakdowns in market communication, we would assume that each individual knows his future trading possibilities within the period. This assumption, which is implied by an alternative to the "natural" transaction process discussed later in this subsection, would make part (b) of the "natural transaction process" an arbitrary, but still rational, trading strategy.

⁶ This result uses single-period budget constraints so that claims for delivery of assets in future periods are included as "commodities." This general definition of commodities is maintained throughout this chapter.

vidual *in turn* meets all of his creditors. The transactions in this round do not generally lengthen the previously specified trading period because such IOU's may be traded in the subsequent round of trading in commodities. A holder of a mature debt has an excess supply of the debt, and the debtor has an excess demand for the debt. For payment, creditors receive their own IOU's or the IOU's of third parties, which are acceptable because these third parties could not have already taken their turn at meeting all their creditors. No new debt is created, because each debtor owns sufficient IOU's of others. Each such trade therefore reduces the total stock of existing debts by at least the amount one party owes to the other. And since each debtor must meet all of his creditors in turn, no debts are outstanding at the end of this second round.

So our "natural" set of transactions in a world with no costs of the transactions in this set achieves competitive equilibrium allocations of resources without the appearance of any specialized medium of exchange. This is an apparently new, but rather trivial, result.

To move on to the possibility of a *competitive equilibrium* set of transactions, let us alter the hypothetical condition on transaction costs by assuming that IOU contracts of many—but not all—debtors are now costly to trade to third parties because third parties do not costlessly know the precise conditions and legal validity of these primary debt contracts or of contracts guaranteeing the default-risk status of the debtor. The *natural* transaction set now entails positive transaction costs. In the natural process, some individuals, those whose default-risk status and contractual debt obligations are now not costlessly recognizable by third parties, would have to pay a premium for some of their commodities to reflect the future costs to their commodity suppliers of verifying their default-risk status and contractual obligations to others. Such individuals will, before trading in commodities, *separately, rationally* trade debts with individuals whose default-risk status and contractual debt obligations are known by everyone. This begins a rational revision of the natural exchange process. In what was the first round and is now the second, individuals pay to their net suppliers of commodities debt obligations of the individuals whose default-risk status and contractual obligations are understood by everyone. The commodity suppliers in turn have no trouble purchasing goods with the costlessly recognizable debt. This debt is thus chosen as the common medium of exchange, so we may call it money and its creators, bankers. Our model is thus unique in that not only may it be efficient for a group of individuals to use a common medium of exchange, but the use of a medium of exchange results from the decentralized, rational decisions of individuals in the model. On the third round of transactions, where debts are the only assets traded, first the nonbankers meet their creditor-bankers to pay off all of their bank debts. (This is possible because the value of each individual's accumulated intraperiod debt liabilities still equals the value of his

accumulated intraperiod debt assets.) After that, the bankers meet one another for debt collection according to the natural process. The monies of third parties are accepted to clear debts between bankers, and the total debt of each banker to the others equals his total money holdings. Therefore, as above, once each of these debtors has met all of his creditors in turn, there is no longer any debt (money) outstanding. The rationally revised natural exchange process thus produces an equilibrium set of transactions which has zero transaction costs and achieves a standard competitive equilibrium.

In the above exchange process, money is serving only as a medium of exchange; it is not held for durations sufficient for time productivity or time preference to exist within holding periods. Consider, however, the possibility of borrowers' supplying longer-term debts to bankers. To guarantee that competitive bankers will make some such loans and still retain the zero-transaction-cost feature of the standard competitive model, assume that the demand for these longer-term loans exceeds the amount which nonbankers can supply at zero transaction costs, while bankers can always supply such loans at no transaction costs. The assumption is, in a sense, plausible because bankers, in contrast to nonbankers, make these loans by simply extending the maturities on existing loans. Since bankers now make loans maturing beyond the end of a trading period, they cannot pay off their current obligations with the repayments of their debtors. However, because profits to banking are zero in equilibrium, bankers must offer the interest they earn on their loans to the holders of their money; and an individual who, under zero lending costs, made loans now being made by bankers is now best off by accepting interest-bearing money in light of his preference for the future return and his positive costs of such lending. (An individual in the world without direct lending costs, who did not lend at maturities exceeding the end of the trading period, is faced with the same opportunities and will therefore still not hold any debt past the end of the trading period.) Consequently, we can specify a new competitive equilibrium set of money-commodity transactions, in a world in which there are positive lending costs to some individuals, but zero costs to others. It is the same equilibrium set of transactions as in the previous case, only with bankers now providing the loans which are now costly for some nonbankers to negotiate and providing these same individuals with a money which they will hold in place of their original loans because it bears the same interest as did those loans. Specifically, the transaction process proceeds as follows: First, bankers exchange their monies for personal debts maturing within the period. Second, all individuals meet one another sequentially to clear excess demands for all commodities (including bonds). Third, nonbankers other than those who wish loan extensions pay off their bank debts, leaving an outstanding aggregate money supply held by nonbankers at the end of the period equal to the aggregate monetary value of these loan

xtensions. Finally, each banker in turn meets all of the other bankers to exchange monies, paying his debts with his own interest-bearing money whenever he, because of his loan extensions, has insufficient receipts to cover current obligations, and the others, because their money is being held by nonbankers (i.e., the excreditors of the bank-debtors), have insufficient interest-bearing debt to meet their future obligations as bankers.

In this way a competitive equilibrium set of transactions with money is derived out of a natural set of transactions by introducing certain transactions. While the particular description of the equilibrium set of transactions is dependent upon our description of a natural transaction process, none of our results will depend on the particular set of transactions representing the equilibrium set. It is only necessary that there exists a competitive equilibrium set of transactions in which money is employed to reach the real allocations defined by a standard competitive equilibrium. We have shown that there is a model of the transaction process yielding such a solution set of transactions. The model is based, however, on the thoroughly unrealistic assumption that each individual naturally meets separately with every other during each period. An alternative model, which does not contain this assumption, is provided by assuming, realistically, that whenever there is a change in the individuals who receive the benefits from real commodities, a technical transaction, including an act of transportation, is required. Then, since an individual cannot be in two places at the same time, deliveries from one individual to the others must be sequential. Since each delivery at a given time to a unique location, each delivery represents a different market. The transaction process in real commodities is then given by the optimal delivery pattern of real commodities determined in a standard competitive equilibrium.⁷ Personal debts are, once again, used to match commodity deliveries. In some cases these debts may be repaid without a sale of the debts to third parties. But in an unrestricted technology, there are always cases in which these debts must be sold to third parties in order for the creditor to receive his normal commodity return. Allowing, once again, the transaction costs of sales to be positive for the debts of some individuals and zero for the debts of others, the latter debts are individually, rationally purchased with the former debts. The resulting monetary theory is not different than that derived above with respect to any of the properties of economies treated in this chapter.

⁷ A problem with such a formulation is that the requirement of overhead transportation implies nonconvexities in production or preference sets and thus nonconvex demand or supply correspondences for some price vectors. Such nonconvexities may easily present themselves in which no parametric prices can exist which equate quantities demanded and

We now proceed by deriving properties of a perfectly competitive money economy that distinguish it from the money economy described by modern monetary theorists.⁸

D. THE VALIDITY OF THE "INVALID" CLASSICAL DICHOTOMY

Classical and neoclassical monetary theorists, as Patinkin [20] has stressed, assumed that equilibrium relative prices between real assets (including rights to future assets, or "bonds") were determined solely in the real asset markets. This, Patinkin claims to have shown, is consistent with a general equilibrium only if there is an "indeterminate" level of money prices regardless of the money supply. The now familiar argument can be paraphrased to read: "If equilibrium relative prices between real assets are determined in the markets for real assets (i.e., determined with Casselian demand and supply functions for real assets only), then, by Walras' law, the money market must be in equilibrium for such relative prices regardless of the level of money prices and the money supply. Thus the money price level under a classical dichotomy may be anything; it is arbitrary even for a fixed money supply."

But Patinkin's analysis implicitly requires all nonmonetary assets to generate real services (which include contractually specified future services). And this requirement is inconsistent with a money economy consistent with orthodox value theory because in such an economy some asset must yield current money-backing services, and these are obviously not part of the productive or consumptive services appearing in orthodox value theory.

Suppose, following Patinkin's standard example, we start out in an equilibrium in an economy admitting a classical dichotomy and then experimentally increase all money prices in the same proportion, keeping the money supply constant. In the absence of money illusion and distribution effects, the demand for nominal money increases. Patinkin claims that the resulting excess demand for money implies an inconsistency because an excess supply of real assets would then have to arise to satisfy Walras' law, but cannot because we have not altered relative prices. But an equivalent excess supply of *nonreal, nonmonetary* assets only need arise given that relative prices between nonmonetary assets have not changed. In fact, this is exactly what happens in a perfectly competitive money economy. The individuals who want more money necessarily plan to offer correspondingly more real goods to the money creators for money-backing purposes; and this *in itself* creates an excess supply of nonmonetary assets *equivalent* to the excess demand for money. And since the individuals will receive a return on their extra money equivalent to that which they received when they owned the real goods being sold to obtain the

⁸ A mathematical development of the remainder of Section I is available (Thompson [34]). A mathematical development of Section II.A-E is also available (Thompson [35]).

money, the demand and supply relations for nonmonetary assets relevant for determining relative prices do not change. The point is that the real goods brought to the money creators now perform the *added* function of backing the medium of exchange. Before the excess demand for money appeared, these goods had only the potential of generating an asset that yielded money-backing services. The excess demand for money creates a nonmonetary asset. Thus, an equivalent excess supply of a nonmonetary asset, one providing backing services for a medium of exchange, is induced by the excess demand for money; the zero excess demand for those assets which appeared in the original equilibrium will remain. The market for money (and thus for money-backing services) can then be used to determine an equilibrium price level for a given money supply or, more descriptive of classical monetary analysis, an equilibrium money supply for a given price level.

Since the money-backing *services* of a good are provided free of cost, we might alternatively place a zero-price weight on the positive excess supply of the assets representing streams of money-backing services. But then, evaluating each asset at the price of its corresponding *service stream* and *not* at the price of the *good* generating the asset and its service stream, the original increase in demand for money would be a positive excess demand for a freely supplied service. So the excess demand for money services would also be of zero value. Either way, no positive excess supply of commodities would be implied by the excess demand for money in being consistent with Walras' law. Assuming that the increase in the price level represented an increase in the conversion rate of money into commodities, the excesses are cleared once the excess demand for monetary services induces the nominal money supply to increase to meet the higher demand. So, once again, we have a classical dichotomy and a determinate supply of real cash balances.

The classical dichotomy is easy to construct for a perfectly competitive money economy. Let the relative prices between real assets, and equilibrium in the real asset markets, be determined by the conventional method of orthodox value theory—without reference to money or any decentralized exchange process (e.g., Debreu [6]). Then impose transaction possibilities on the economy such that transaction costs are zero in achieving final, competitive allocations if and only if money is used in certain exchanges. At a given level of money prices, this implies that each individual has at least a certain nominal cash balance at each point in the transaction process. The balances comprise the money demands in the economy. Under perfectly competitive money supply conditions (described previously), these demands will be filled at no real cost. In this way, equilibrium money supplies, and thus real balances, are determined, but only after relative prices between nonmonetary assets have been determined in the real markets.

This construction implies the validity, in a perfectly competitive money

economy, of Say's law [27], viz., that the aggregate value of the excess demands for all real goods is identically zero. Say's law is supposed by modern analysts to imply (1) an identically zero excess demand for money, (2) an indeterminate price level, and (3) the impossibility of recessionary forces in some industries without expansionary forces in others. We have seen that the first two supposed implications are false. The third supposed implication—which was also apparently held by classical writers—will be shown to be false in Section II.G.

E. THE REAL BALANCE EFFECT

As noted in the Introduction, classical monetary theory has been implicitly criticized for failing to include the "real balance effect," i.e., an increase in aggregate wealth implied by a small drop in all commodity prices and a constant nominal money supply. There is no such effect in a perfectly competitive money economy with a money market initially in equilibrium, so that the classical theorists cannot be logically criticized for omitting it. This result is not entirely new; it is implied by Patinkin's claim that there is never any real balance effect in a model with only "inside," or privately produced, money [20]. While the argument of Patinkin has been shown to be incorrect by Pesek and Saving [22], we shall now see that there is a case in which the conclusion (but not the argument) holds, the case of a perfectly competitive money economy.

An overall price level reduction, i.e., a proportional reduction in all prices, for a given rate of conversion of money into a real asset, will create an arbitrage profit to the purchase of goods which back money, followed by their sale to the bankers at the conversion dates. The price level must return to its original level in order to restore equilibrium in the capital markets. But even if the real money supply were slightly increased, say by increasing the nominal money supply beyond its equilibrium level, there would be no increase in aggregate real wealth. This is simply because the increase in the real value of the monetary holdings of any individual is exactly matched by the increase in the real value of the debts that the bankers owe the individual as long as the competitive money market was initially in equilibrium.⁹

This result may be used to rationalize the absence of real balance effects in classical monetary discussions.

⁹ In Section II.H we consider the closely related question of the presence of "Pigou effects," the effects on excess demands of changes in the general price level. Pigou effects follow almost immediately from real balance effects in a modern money economy, but in the perfectly competitive money economy the flexible money supply makes the two effects different in nature. Nevertheless, the magnitude of the Pigou effect in a perfectly competitive money economy will be seen to be the same as that of the real balance effect—zero.

F. EFFECTS OF ANTICIPATED INFLATION

It has become standard, through the papers of Friedman [7], Bailey [4], Marty [16], and Kessel and Alchian [11], to argue that even if money is neutral, increases in *future* money supplies, for a given current money supply, do not merely increase *future* money prices in the same proportion when the future price increases are fully anticipated (and the demand for money is influenced by the cost of holding money). The reason is that the inflation will depreciate the real value of one's cash, thereby increasing the cost of holding cash relative to other assets in the current period. Switching into nonmonetary assets bids up the *current* price level and thereby lowers the current real cash balances in the system. The same effect is present in succeeding periods if the inflation is then expected to continue. The analysis makes the effects of inflation equivalent to the effects of a tax on money balances.

But, once again, the argument requires that competitive interest not be paid on money. When perfectly competitive interest is paid to the holders of money, bankers must pay interest on money equal in money value to the sum of the current rental and the expected price appreciation on the assets they obtain for their money. This sum would change with a change in expected future money supplies and proportionate change in future prices by an amount equal to the change in the expected inflation if no real effects were induced by the change in expected future prices and money supplies. But since the change in inflation would then not alter the return to holding *any* asset—including money—relative to any other asset, the hypothesized original allocation of real resources is an equilibrium allocation. So no real effects are induced by a change in expected inflation. A proportional increase in expected future prices and money supplies has no effect on the current price level. The returns and costs of holding money must change by the same amount when competitive interest is paid on money.

This result rationalizes the absence of distinctions between real and money interest rates and the absence of a monetary theory of interest in classical monetary theory, absences which are traditional bases for criticizing classical monetary theory.¹⁰

¹⁰ While our results so far have displayed, and will continue to display, a detailed correspondence between the properties of a perfectly competitive money economy and the properties which most classical economists explicitly or implicitly believed to hold for a "laissez faire" money economy (see Schumpeter [28, pp. 729-731]), it is not clear that classical economists were considering a perfectly competitive money economy. However, these economists did uniformly assume fixed convertibility of bank notes into nonmonetary assets in their laissez faire systems. Under perfect competition, such assets would have to generate their valuable returns solely in terms of expected real price appreciation and not in terms of current services. This does correspond somewhat to the classical support of gold

II. The Theory of Income Determination Consistent with Orthodox Value Theory

A. THE PROBLEM

We now proceed to examine the short-period effects of various exogenous shifts on "involuntary unemployment" in a perfectly competitive money model. These effects are compared with the effects that emerge in a modern money model. We shall use the same theory of "temporary equilibrium" for both economies. (See Hicks [10] or Arrow and Hahn [3]). A temporary equilibrium is an equilibrium over an interval of time sufficiently small that expectations of all prices within the period are correct, while expectations of prices in trades in future periods are, in general, incorrect. All the properties of a perfectly competitive money economy which were developed previously (except for Pareto optimality) obviously hold for temporary as well as full equilibria. A temporary equilibrium containing "involuntary unemployment" is said to exist when the current-period supply curves of labor are based on incorrect perceptions of future wage offers or output prices and, as a result, laborers waste their current-period labor services on bargaining, searching, so adopting nonmarket vocations. We assume that a permanent reduction in the values of the marginal products of labor at the preshift, full-equilibrium quantities of labor will create involuntary unemployment. This amounts to assuming "sticky money wages."

Rudiments of a theory rationalizing this assumption are found in the book by Alchian and Allen [1]. We rationalize sticky money wages here with the hypothesis that some workers mistakenly regard reductions in their current wage offers as a result of their lower value productivities at those jobs *relative to* alternative jobs or the result of an attempt at tougher wage-bargaining by their employers. An economy which experiences no changes in technology or tastes and whose prices are not substantially bargained—i.e., the traditional

(which, during the classical era (ca. 1775–1850), significantly appreciated in real terms (see Viner [37].)) as backing for all note issues.

Furthermore, there is abundant evidence of the assumption by leading classical monetary economists of the applicability of much of modern monetary analysis in the presence of an inconvertible, government-supplied, paper money. One example is Thornton's famous analysis [36] of employment dynamics under inconvertible paper money. Another is Say's recognition of the fact that anticipated inflation with inconvertible paper money leads to increases in the transactions velocity of money (see Schumpeter [28, p. 710n]). Another prominent example is the analysis of Mill [18], which has deceived several modern authors not aware of the theoretical importance of convertibility into believing that Mill, and ergo the classical economists, were essentially modern monetary theorists (e.g., Becker and Baumol [5], Samuelson [26]).

underdeveloped economy—will experience no involuntary unemployment because workers there know from experience that lower money wage offers by their current employers are common to all employers. Involuntary unemployment can arise only in countries which have sufficient shifts in technology, tastes, or bargaining from one firm to another to lead some workers to confuse a shift down in the full equilibrium wage level with a shift in technology, etc., which is particular to only certain employers. The empirical presumption that business cycles containing substantial inefficient unemployment are a disease only of modern industrial societies is rather strong evidence in favor of the hypothesis we are using to rationalize sticky wages.

We shall first examine the effects on involuntary unemployment in a perfectly competitive money economy of those exogenous shifts which have long served to distinguish modern unemployment theory: shifts in the demand for money, the supply of money, the marginal efficiency of capital, and the propensity to consume. These effects are contrasted with those that arise in a modern, Keynes–Patinkin monetary environment. We then examine the effects of shifts in the marginal product of labor and input supplies. Finally, we complete a taxonomy of shifts by considering shifts which alter the relative prices between different outputs.

B. SHIFTS IN THE DEMAND FOR MONEY

Suppose that transaction costs become positive in present exchanges of real assets occurring in an original equilibrium and that the extended use of money would obviate these costs. (For example, suppose the original equilibrium included present trades in which each of two capital owners accepted output futures from one of two producers, and now these trades become costly because each of the capital owners now plans to consume the future output of the producer who does not use his capital. And these producers and capital owners can, if they are given the extra money, costlessly adjust to the change by switching to present trades of capital for money and future trades of money for output.) This shift increases the demand for money at original equilibrium prices. Since bankers can supply the money at no real cost, we immediately arrive at a new equilibrium with no change in prices or the allocation of scarce resources. More money is demanded, more is supplied, and no utility or price is altered. (Completing the above example, in a perfectly competitive money economy the capital owners avoid transaction costs by first selling capital to a producer for a money on which he is paid the real return on the capital and then purchasing the output of the other producer at the end of the period; and each of the producers borrows the money from a banker to pay for their capital input, paying real interest on their loan, and finally repaying the principal at the end of the period with the proceeds from the sale of their capital outputs.)

This argument for the dynamical efficiency of an elastic free-market money supply was seen and emphasized by most classical writers, including Adam Smith and J. B. Say. But the argument has gradually fallen into ill-repute as it has come to be interpreted to mean that a money supply that does not bear *competitive interest* should expand (and contract) as aggregate money income expands (and contracts).¹¹

In contrast to the perfectly competitive money model, the modern Keynes-Patinkin-Friedman money model has upward shifts in the demand for money (or increases in "liquidity preference") recessionary in that the resulting excess demand for money can be cleared only through reductions in output prices and thus value marginal products and employment rather than through market-induced increases in the supply of money.

C. SHIFTS IN THE SUPPLY OF MONEY

If there is an increase in the supply of money (without a corresponding change in the conversion price) in the original equilibrium of a perfectly competitive money model, it would represent an overissue and holders would, rather than trade it to nonbankers, hold it as a real asset or return such money to its creators. This effect was popularly emphasized by classical monetary writers, especially leaders of the "Banking School," such as Tooke and Fullarton, who had the support of the greater part of the scientific community, including Mill in the 1840's. (See Schumpeter [28].) Thus there is obviously no effect of changes in the supply of money on prices or employment in a perfectly competitive money economy as long as the conversion price of money is retained.

In a modern money model, money does not bear competitive interest, so an increase in supply is not held as if it were a real asset, and money cannot be simply returned to an issuer because of the finite elasticity of the money-supply function. Hence the money is spent and prices are bid up. The analysis is similar for reductions in the money supply.

D. SHIFTS IN THE MARGINAL EFFICIENCY OF CAPITAL

Suppose now that the perceived future productivity of currently produced assets shifts down. In a modern money economy, this shift results in a decrease in the return to capital and bonds relative to money and thus induces an excess

¹¹ The standard critique of the dynamics under the classical policy of a flexible private money supply has consequently been that under such a policy an increase (decrease) in the nominal prices of real assets generates an increase (decrease) in the nominal money supply, thus creating the possibility of procyclical variations in the money supply. The critique is obviously based on a failure to retain convertibility at a fixed rate as part of the set of all classical monetary institutions.

demand for money. The corresponding excess supply of nonmonetary goods implies a recession in the current period. But, in a perfectly competitive money economy, where perfectly competitive interest is paid on money, the decrease in the marginal efficiency of capital creates an equal decrease in yield to the competitive bankers, who therefore must react by lowering the yield they pay on money by an equal amount. This produces a situation in which money is no more attractive than before the shift. The drop in the marginal efficiency of capital therefore simply reduces the temporary equilibrium market rate of interest by the same amount, current investment remaining at its original level. (This ignores interest-induced shifts in consumption; we shall see later that no employment effects result from shifts in the propensity to consume in a perfectly competitive money economy.)

A lower real interest on money as well as other assets does not itself induce any involuntary unemployment, even though it lowers a worker's effective real wage. The reason for this is that the lower interest payment on money, unlike a lower nominal wage offer, is known by each money holder to apply to all money holders. The lower interest payment on money cannot be regarded by a rational worker as a reason for making the changes in search, nonmarket vocation, or bargaining that he would make (and regret) in the case of a small drop in nominal wages. That is, the decreased interest on his money wage cannot be rationally regarded by a worker as the result of his lower value productivity in his current job relative to alternative, future jobs or the result of an attempt at tougher labor bargaining by his employer. (This form of argument first appears in the book by Leijonhufvud [14].) The same argument applies to changes in a conversion price of money into capital, so that shifts in such a conversion price (such as those implied in Sections I.D–I.F) in a perfectly competitive money model also have no real effects.

Thus, the most distinguishing recessionary shift of the Keynesian model is ineffective in a classical economy because a decline in the marginal efficiency of capital implies an equal induced decline in the market rate of interest on money, so that no change in the relative cost of holding money occurs.

E. SHIFTS IN THE PROPENSITY TO CONSUME

Suppose now there is a shift in plans so that current consumption decreases and planned future consumption increases. First assume it is a nonmonetary shift so that there is an equal increase in demand for investment goods in the form of bonds or real capital. Since there are as yet no alterations in the relative prices between consumption and capital goods, an assumption that serves to keep us in the environment of the standard income-expenditures model, the only possible effects of the shift on the aggregate demand for labor are through changes in bond prices. If bond prices are to remain the same, the increase in demand for bonds must be met by suppliers of bonds, who must

pari passu demand real capital. Under a constant cost of financial intermediation, this will occur and no recession will result. But if there is an increasing cost of such intermediation, a lower yield on bonds to consumers and a higher borrowing cost to producers results. This induces an increase in the demand for money and an equal reduction in factor demand by the producers, so a recession results. In an economy consistent with orthodox value theory, there are no lending costs and thus no increasing spread between borrowing and lending rates and no recession. The suppliers of bonds to the consumers obtain their interest by lending to the producers at no transaction costs; hence again there is no recession.¹²

Suppose now that the reduction in consumption represents a shift into money. In a perfectly competitive money model the bankers, who must pay real interest on the extra money that they supply, must *pari passu* provide the intermediate demand for holding investment goods or bonds that the money holders have now failed to provide. So there is no induced reduction in demand for real assets. In contrast, the bankers in the modern money model do not have the flexibility to expand their money supplies and real asset demands. So a reduction in output prices and thus a recession obviously results from the shift from consumption into money.

As a check of these results that the characteristic recession-creators in modern monetary theory have no recessionary impact in a perfectly competitive money economy, we can reproduce them graphically or mathematically. We can use a simple macromodel to describe the comparative static effects of the above shifts, since they do not alter relative output prices. In particular, we may use a model with only four markets: capital goods, money, and capital and labor services for the upcoming period. (Bonds are perfect substitutes for capital goods in a standard Keynesian environment, so it is redundant to include them in a separate market with a separate price.) Removing the market for capital goods with Walras' law, we can determine the temporary equilibrium—the current price level, wage rate, and interest rate—in the money and the two factor markets. This equilibrium can be constructed graphically in price-interest rate space as follows: First find, for each price level, the value of the marginal product of the fully employed capital that results from the employment that equilibrates the competitive labor market at that price level. Since the interest rate is the value of the marginal product

¹² However, even in an economy with positive costs of lending, if there is a competitive supply of money and a positive, competitive interest rate paid on money, no recession results from such a shift. (See Thompson [32].) The basic reason is that a reduction in the interest paid on money equal to the higher marginal lending costs will simultaneously leave the supply price of loans from the bank unaffected and leave the supply price of loans and capital from the consumers unaffected by preventing the consumers from attempting to substitute money for nonmonetary assets.

of capital plus the given, expected rate of price inflation divided by the price level, we have thereby determined, for each price level, the interest rate implied by equilibrium in the factor markets. Then find the interest rates that equate the demand and supply of money at each different price level. An intersection of these price-interest rate pairs determines a temporary equilibrium.¹³ The difference between the two economies discussed in this chapter is that a perfectly competitive money model has its money supplies infinitely elastic at the price level established by convertibility, while a modern money model has a constant money supply (or a money supply function) and has a demand function for money in which the interest rate appears as the cost of holding money. Graphically, the curve showing equilibrium in the factor markets is the same in the two economies, but in the perfectly competitive money model the money-market-equilibrium curve is a straight line parallel to the interest rate axis at the fixed conversion price, while in a modern money economy the money equilibrium curve has a positive slope, as does the curve showing equilibrium in the factor markets. The manipulation of these models to obtain the preceding results is straightforward.¹⁴

We now examine the effects of the remaining possible shifts.

F. SHIFTS IN THE MARGINAL PRODUCT AND SUPPLY OF LABOR

A shift in production functions generating a lower marginal physical product of labor or a shift out in the supply-of-labor curve in a modern money model will, of course, increase the temporary equilibrium rate of involuntary unemployment. The qualitative effects of these shifts are the same with classical, as with modern monetary institutions. Indeed, even the most classical of writers (i.e., Say [27, pp. 194–196]) admitted that unemployment resulted from such shifts.

In fact, still barring changes in relative output prices, it is only shifts in the marginal product or supply of labor that can alter the level of unemployment in a perfectly competitive money economy. This is easy to see: Unemployment in any temporary equilibrium can be altered only by altering the value of the marginal product curve or the money wage supply curve of labor. But since the money price of output is fixed by convertibility in a perfectly competitive money model, the only way to alter the temporary equilibrium unemployment rate is to shift the marginal physical product or real supply curve of labor.

¹³ The above is the only atemporal model consistent with a Keynes–Patinkin environment. The standard Keynes–Patinkin model is internally inconsistent. For a verification of these propositions, and for an intertemporal model, see Thompson [34].

¹⁴ One must note, however, that the only equilibria which count, i.e., which are stable, in a modern money model are those for which the interest rate that equilibrates the money market is more sensitive to a small change in price level than is the interest rate that equilibrates the factor markets.

With fully employed nonlabor inputs, we may conclude that the only way to change the rate of involuntary unemployment is to change input supplies or the rate of labor-favoring technical change. In fact, historical evidence (1860–1940) strongly suggests that the long (20-year) building business cycle—the largest and most widespread business cycle in modern history—has been due to a dynamic interaction between a kind of labor-favoring technical change and induced alterations in the supplies of certain inputs. (See Thompson [31].)

G. SHIFTS ALTERING RELATIVE PRICES BETWEEN REAL OUTPUTS

The preceding analysis in this section has treated all outputs as if they were physically homogeneous, so that relative output prices could not vary. As a consequence, the analysis could proceed in the same technological environment as the standard, income-expenditure model. Shifts in the demand for and supply of money, in real output, in the productivity of capital, and in the productivity and supply of labor exhaust the exogenous shifts possible in such a world.

Now we consider shifts in excess demands between the various real outputs and allow these shifts to alter relative output prices. We find—at long last—a shift for which the perfectly competitive money economy is clearly inferior to the modern money economy with respect to the magnitude of the induced alterations in involuntary unemployment. An example will suffice to show this. Suppose that an initial equilibrium in an economy with two real outputs is disturbed by a shift in demand between the outputs. The shift is toward the consumption good, which is produced only by capital, and away from the capital good, which is produced only by labor and under diminishing returns. First, consider the shift under perfectly competitive monetary institutions. Suppose that money is convertible into the consumption good.¹⁵ Since the shift cannot raise the money price of the consumption good, there must be a fall in the money price of the capital good and a corresponding drop in employment. This drop in employment may easily be more severe than the corresponding drop in a modern money model. To see this, consider the same price and thus employment change in the latter model. The lower price of one output and the constant price of the other (together with the higher interest rate implied by the constant rental on capital and the lower capital price) implies a lower demand for money than before the shift (together with a higher demand for capital as a store of value than in the perfectly competitive money

¹⁵ If money were convertible into capital in such a world, no shift in output demands could create any involuntary unemployment, because no shift could alter the price of capital and therefore employment. For the shift specified above, the price of consumption goods and rental on capital would simply climb sufficiently high that a new general equilibrium would be established.

onomy.) Since the money supply in a modern money model does not fall with money demand, there is an excess supply of money (together with an excess demand for the capital output) in the modern money economy at the postshift, temporary equilibrium prices of the perfectly competitive money economy. Assuming that an increase in the consumption-good price does not reduce the demand for capital output,¹⁶ clearing these excesses requires a higher price of capital and thus a lower rate of unemployment than in the perfectly competitive money economy.

More generally, any shift in demands that increases the relative price of the asset backing money relative to other, labor-using, outputs will obviously create involuntary unemployment starting from a full equilibrium in a perfectly competitive money economy.

There can be little doubt that classical monetary analysts, who were also inveterate policy advisors, put little or no weight on the recessionary significance of a rise in the relative demand for the asset backing money, i.e., gold.¹⁷ The policy neglect of these shifts permitted a series of sharp recessions caused by sudden increases in the demand for gold throughout the history of Europe and the United States. This is abundantly clear from the statistical work of Warren and Pearson [38]. The last such recession was the Great Depression, which saw a five-year increase in the real price of gold (1929–1934) whose magnitude was unprecedented in recorded history [38], an increase resulting from the return to the gold standard from 1924 to 1928.¹⁸ The free convertibility of money into gold was halted from 1931 to 1934 and replaced by what has become a system of government fiat money, a system represented in the modern money model.

¹⁶ Alternatively, assume that consumers all have the same, constant marginal rate of substitution between consumption and investment goods after the shift has occurred. Then the price ratio between consumption and investment goods, as determined by this rate, is the same after the shift in both of the economies under discussion. Consequently, the excess supply of money in a modern money model at the temporary equilibrium prices of the perfectly competitive model implies proportionately higher prices of all outputs in achieving a temporary equilibrium in the modern money model.

¹⁷ Even the leading employment pessimists of the classical era—the “general glut” theorists such as Malthus and Sismondi—had their recessions due only to shifts in the supply of labor. (See Sowell [29].)

¹⁸ The move back to the gold standard and consequent increase in the real price of gold would probably not have created a depression if the countries had made a common decision to return to the gold standard at the same time. In such a case, the countries would probably have recognized the substantial effect that the return to the gold standard would have on the real value of gold and therefore would have returned at a much higher conversion rate of money into gold, a rate which would have reflected the substantial world inflation (33% in United States wholesale prices) that had occurred since the collapse of the international gold standard in 1914. In such a case, the increase in the real value of gold would have been immediate and would not have altered money wage or price levels.

The traditional disavowal by "respectable" economic theorists of the aggregative recessionary impact of an unexpected increase in the demand for the asset which backs money has been the argument that a rise in the demand for gold will simply expand output and employment in the gold industry, so that no aggregative recession results from the shift.¹⁹ Such an argument is based on the absence of any formal theory of employment under a gold standard and a misunderstanding of the nature of the informational imperfection leading to involuntary unemployment. Formally, a pegged money price of gold and the fact that workers' temporary equilibrium supply curves are defined in terms of money wages prevent any expansion in the gold industry despite the fact that the real price of gold has risen. One economic rationale for the higher supply price of labor in terms of nongold commodities is that some workers simply do not know that the nongold price level has dropped and so require the same wages in terms of gold for the same employment. Another economic rationale is that other workers, who know the extent of the fall in the prices of nongold commodities, expect higher real wages in nongold commodities in the post-shift economy because they believe that the lower nongold prices are due to a higher-than-normal rate of technical progress in the nongold industries, when in fact there has been a shift in demand toward gold or a lower-than-normal rate of technical progress in the gold industry.²⁰

H. WAGE FLEXIBILITY AND THE POSSIBILITY OF PERMANENT INVOLUNTARY UNEMPLOYMENT

We have said nothing of the events that occur after market-learning by the unemployed lowers the future temporary equilibrium supply curves of labor. While we again cannot derive any general superiority of one of our monetary

¹⁹ But perhaps the main reason for the academic neglect of employment fluctuations based on changes in the real value of gold was the development of central banking during the nineteenth and early twentieth centuries and the consequent development of numerous business cycle "models" in which central banking played a key role. While a central bank has no effect in a perfectly competitive money model, it has some effect in a competitive banking model with a positive transaction cost of bank lending; viz., the policies of the central bank affect the transaction cost of private lending at a given volume of total loans and hence affect the spread between borrowers' and lenders' rates of interest. While the fluctuation in central bank rates and bond purchases no doubt had some influence on the price of nongold durables and thus employment, the dominance of these fluctuations in pre-Keynesian business cycle theories obscured the causes of the larger economic fluctuations in economic history and has left us a legacy of "practical" men of affairs who believe that central banks affect our economies only through affecting the real cost of lending.

²⁰ A perfectly competitive money model relying solely on the latter type of rationale has some peculiar properties. First, it has the same temporary equilibria regardless of which good is used to back money. Second, all shifts which lead to contraction in some industries without expansion in others are shifts in demands or abnormal reductions in the rate of technical progress. Hence, under the latter rationale, money could indeed be called a "veil."

systems over the other, we can answer a related question. Namely, is permanent involuntary unemployment possible in our alternative monetary systems?

The answer to this question for the modern money model, as developed by Pigou [24], is well known: Permanent involuntary unemployment is impossible because the supply of real cash balances and therefore consumption demand would rise to infinity if wage reductions were to continually pull down output prices sufficiently to prevent the achievement of full employment. The argument, of course, employs a real balance effect. In a perfectly competitive money economy the supply of money changes with prices so as to retain equilibrium in the money market. Hence, even if price reductions for given money supplies generated real wealth increases in a perfectly competitive money economy (which they do not, as indicated in Section I.E), the induced reductions in the money supply would prevent real cash balances from rising during a deflation. The Pigou effect is absent in a perfectly competitive money economy.

However, while a perfectly competitive money economy lacks the anchor of a fixed money supply and real balance effect, it does have an anchor of its own—convertibility. Under convertibility at a fixed rate, when wages fall, it is impossible for all prices to fall in the same proportion. At least one price does not fall at all. In the simple case of a single output, into which money is convertible, a fall in wages produces a proportional fall in real wages because there is no change in the output price. In the general case, if we allow wage expectations and thus wages to fall continuously, adopting the macroeconomic convention that the disequilibrium is based upon incorrect wage expectations, we must, sooner or later, arrive at an equilibrium as long as one exists.

The preceding results lend rationale to the position of the classical economists that involuntary unemployment is only temporary and serve to rationalize the neglect by classical economists of Pigou and real balance effects.

III. Conclusion

A money economy consistent with an orthodox value theory in which money is competitively supplied exists, and any such economy has just about all of the properties that modern monetary theorists claim to have proved to be classical fallacies. In particular: (1) Any perfectly competitive money economy has a classical dichotomy between the real and monetary sectors and yet a determinate equilibrium quantity of real cash balances. (2) Any perfectly competitive money economy has no real balance or Pigou effects but still has an impossibility of permanent, aggregate unemployment. (3) In any perfectly competitive money economy, equilibrium allocations of resources are never affected by anticipated inflation. (4) In any perfectly competitive money economy, aggregate output is never disturbed by Keynesian or Quantity Theory

shifts—that is, by shifts in liquidity preference, the marginal efficiency of capital, the propensity to consume, or the money supply.

Despite the fact that Say's law holds for any money economy consistent with orthodox value theory, the level of aggregative involuntary unemployment in a temporary equilibrium of such an economy varies substantially with certain shifts which alter relative output prices, as well as with shifts in the marginal product and supply of labor. Indeed, such unemployment in a perfectly competitive money economy is *more* susceptible to some recessionary shifts—those which decrease the demand for money—than it is in a modern money economy. The historical accuracy of a perfectly competitive money model in explaining major business fluctuations prior to 1934 appears to be remarkable, and the model highlights the danger of returning to a fully convertible gold standard.

ACKNOWLEDGMENTS

The author benefited from discussions with his colleagues, Armen Alchian, Benjamin Klein, Axel Leijonhufvud, and Joseph Ostroy. Helpful comments on an earlier draft were provided by Dan Benjamin and Robert Clower. Research support was provided by the Lilly Foundation Grant for the Study of Property Rights at UCLA. An earlier draft of this chapter, entitled "In Defense of the Classical Theory of Money and Income," was presented at the December 1969 meetings of the Econometric Society.

REFERENCES

1. Alchian, A. A., and Allen, W. R., *University Economics*, 2nd ed., Chapter 25. Belmont, California: Wadsworth, 1967.
2. Arrow, K. J., "An Extension of the Basic Theorem of Classical Welfare Economics," *Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability* (J. Neyman, ed.). Berkeley: Univ. of California Press, 1951.
3. Arrow, K. J., and Hahn, F., *General Competitive Analysis*, Chapter II. San Francisco: Holden-Day, 1971.
4. Bailey, M. J., "The Welfare Cost of Inflationary Finance," *Journal of Political Economy* 64 (April 1956), 93-110.
5. Becker, G. S., and Baumol, W. J., "The Classical Monetary Theory: The Outcome of the Discussion," in *Essays in Economic Thought* (J. Spengler and W. R. Allen, eds.), pp. 753-771. Chicago: Rand-McNally, 1960.
6. Debreu, G., *Theory of Value*. New York: Wiley, 1959.
7. Friedman, M., "Discussion of the Inflationary Gap," in *Essays in Positive Economics*, pp. 253-257. Chicago: Univ. of Chicago Press, 1953.
8. Friedman, M., *A Program for Monetary Stability*, p. 7. New York: Fordham Univ. Press, 1960.
9. Friedman, M., *The Optimum Quantity of Money and Other Essays*. Chicago: Aldine, 1969.
10. Hicks, J. R., *Capital and Growth*, Chapter VI. London and New York: Oxford Univ. Press, 1965.

11. Kessel, R. A., and Alchian, A. A., "Effects of Inflation," *Journal of Political Economy* 70 (December 1962), 521-537.
12. Keynes, J. M., *The General Theory of Employment, Interest and Money*. New York: Macmillan, 1936.
13. Klein, B., "The Competitive Supply of Money," *Journal of Money, Credit, and Banking*. (to be published).
14. Leijonhufvud, A., *On Keynesian Economics and the Economics of Keynes*, Chapter 2. London and New York: Oxford Univ. Press, 1968.
15. Marschak, J., "Rationale of the Demand for Money and of Money Illusion," *Metroeconomica* 2 (August 1950), 71-100.
16. Marty, A. L., "Gurley and Shaw on Money in a Theory of Finance," *Journal of Political Economy* 69 (February 1961), 57-58.
17. Metzler, L. A., "Wealth, Saving, and the Rate of Interest," *Journal of Political Economy* 59 (April 1951), 93-116.
18. Mill, J. S., *Principles of Political Economy* (W. J. Ashley, ed.), Book III. London: Longmans, Green, 1909.
19. Ostroy, J., "The Informational Efficiency of Monetary Exchange," *American Economic Review* (to be published).
20. Patinkin, D., *Money, Interest, and Prices*, 2nd ed. New York: Harper, 1965.
21. Patinkin, D., "The Indeterminacy of Absolute Prices in Classical Economic Theory," *Econometrica* 17 (January 1949), 1-27.
22. Pesek, B., and Saving, T., *Money, Wealth, and Economic Theory*, Part II. New York: Macmillan, 1967.
23. Pesek, B., "Comment," *Journal of Political Economy* 77, Supplement (August 1969), 889.
24. Pigou, A. C., "The Classical Stationary State," *Economic Journal* 53 (December 1943), 342-351.
25. Radner, R., "Competitive Equilibrium under Uncertainty," *Econometrica* 36 (January 1968), 31-58.
26. Samuelson, P. A., "What Classical and Neoclassical Monetary Theory Really Was," *Canadian Journal of Economics* 1 (February 1968), 1-15.
27. Say, J. B., *Traité d'économie politique*, 5th ed., Vol. 1. Paris: Chez Rapilly, 1826.
28. Schumpeter, J. A., *The History of Economic Analysis*, Chapter 7. London and New York: Oxford Univ. Press, 1954.
29. Sowell, T., *Say's Law*, Chapters 1-IV. Princeton, New Jersey: Princeton Univ. Press, to be published.
30. Starr, R., "The Structure of Exchange in Barter and Monetary Economies," *Quarterly Journal of Economics* 86 (May 1972), 290-302.
31. Thompson, E., "Technical Change, Its Measurement and Introduction into the Theory of the Firm with Special Application to the Explanation of the Building Cycle," Ph.D. Thesis, Harvard Univ. (1962).
32. Thompson, E., "An Optimal System of Property Rights for a General Money Economy," unpublished manuscript (1968).
33. Thompson, E., "A Reformulation of Orthodox Value Theory," manuscript (1971).
34. Thompson, E., "A Generalization of the Cassel-Patinkin Money Model," manuscript (1973).
35. Thompson, E., "A Reformulation of Macroeconomic Theory," manuscript (1973).
36. Thornton, H., *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*, reprint. London: 1939. Library of Economics.
37. Viner, J., *Studies in the Theory of International Trade*, Chapters IV and V. London: Allen and Unwin, 1955.
38. Warren, G. F., and Pearson, F. A., *Prices*, Chapter V. New York: Wiley, 1933.

13.pdf

#2