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IN SEARCH OF A
MONETARY ANCHOR

A 'New' Monetary Standard

Warren Coats

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In Search of a Monetary Anchor

A 'New' Monetary Standard

Warren Coats



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PREFACE

The International Center for Economic Growth is pleased to publish *In Search of a Monetary Anchor: A "New" Monetary Standard* as the forty-eighth in our series of Occasional Papers, which feature reflections on broad policy issues by noted scholars and policy makers.

In this paper Dr. Warren Coats proposes stabilizing the value of money by linking it to an independently defined unit of account with a relatively constant real value. A common unit of account would lower the cost of trading by reducing transaction and information costs and would increase world trade and improve the efficiency of international resource allocation. The unit he suggests, a commodity basket, would not have the shortcomings that afflict the gold standard—gold's fluctuating relative value. The link between money and this unit that he suggests, fixing the value of a unit of money in terms of the commodity basket by requiring its indirect redeemability, would not have the shortcoming that makes multigood commodity standards very costly—the need to maintain large reserves of all of the commodities in the basket. The innovative idea of *indirect redeemability*, discussed by Yeager, Greenfield, and others, keeps the quantity of money equal to the amount demanded when its value is given by the commodity basket, without the need for the monetary authority to warehouse the commodities in the basket. Indirect redeemability refers to the requirement for the issuer of money to exchange it on demand for some other convenient asset equal in market value to the commodity basket, whereas direct redeemability refers to the requirement to exchange money for the commodity basket itself.

It is risky and expensive to be the first to use a new unit of account, and for convenience most users will continue to use an already existing

one even if it is inferior. When a country's monetary system is seriously troubled, its residents sometimes turn spontaneously to an alternative unit; but currently they can turn only to an already established unit such as the American dollar. It is likely, therefore, that the wide adoption of a common unit of account would only occur after its initial adoption by a major economy or international organization such as the International Monetary Fund (IMF).

Coats argues that giving a constant real value to the IMF's Special Drawing Rights, or SDR, would make it more likely that a constant real value unit would be widely adopted. The SDR, a basket of the five major currencies, is a prime candidate because there is collective agreement by the 177 member countries of the IMF on its value, and its use as the denomination in several international agreements and financial instruments has already been tested. It remains only for a more stable real value to be established. The author also offers an alternative to the SDR that might seem more politically acceptable to the members of the European Community—a real ECU with a constant value.

Coats believes a common unit of account would be a common good, improving the efficiency of international trade, contracting, and payments. It would not only provide an alternative for countries with troubled monetary systems, but it would also exert competitive pressure to stabilize domestic monetary policies in countries that chose not to adopt it. His bold and thought-provoking contribution will lead us closer to a more efficient and productive world economic system.

Nicolás Ardito-Barletta
General Director
International Center for Economic Growth

Panama City, Panama
January 1994

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ABOUT THE AUTHOR

Warren Coats is an adviser with the Monetary and Exchange Affairs Department of the International Monetary Fund and was with the IMF's Treasurer's Department when this paper was written. Before that, he served IMF as an economist for its Central Banking Department. Dr. Coats was a coauthor of the World Bank's *World Development Report, 1989*. In 1979 he worked as a visiting economist for the Board of Governors of the Federal Reserve System.

Currently, Dr. Coats belongs to several organizations, including the American Economic Association, the Mont Pelerin Society, the Philadelphia Society, and the Western Economic Association International—of which he was a member of the Executive Committee. During the last twenty years, he has published more than thirty articles on economic issues.

Dr. Coats has taught economics at the University of Virginia, the University of Hawaii, and the Illinois Institute of Technology. He earned his Ph.D. and M.A. in economics at the University of Chicago and his B.A. in economics from the University of California at Berkeley.

Warren Coats

In Search of a Monetary Anchor

A 'New' Monetary Standard

We have standardized every other unit in commerce except the most important and universal unit of all, the unit of purchasing power. What business man would consent for a moment to make a contract in terms of yards of cloth or tons of coal, and leave the size of the yard or the ton to chance?¹

For centuries few questions have interested economists more than how to ensure the value of money. This paper explores and clarifies ideas associated with Black, Hall, Fama (BHF), Greenfield, and Yeager for establishing monetary systems in which the unit of account is not a unit of money.

Monetary arrangements have evolved, and continue to evolve, so as to reduce transaction costs (and risks) of trade, thereby extending the scope for specialization and growth. The role of a widely used medium of exchange in reducing the need for transactions to satisfy a double coincidence of wants is well understood. The role of the unit of account in lowering the cost of trading, however, is easily overlooked. The coordination of economic activity ("pricing, contracting, accounting, and cost/benefit calculations")² would be more constrained by the lack of a common unit of account than by the absence of a common medium of exchange. An independently defined unit of account opens the way to establishing a standard of value with relatively constant purchasing power.

The inconvenience of quoting prices in terms of anything other

than amounts of the medium of exchange potentially stands in the way of the use of an independently defined unit of account. To be accepted in the marketplace, a monetary system must link its unit of account and its media of exchange in a way that keeps the value of each approximately equal. BHF systems tie the value of money to that of the unit of account rather than the other way around.³

Until fairly recently money's value in most countries was explicitly tied to the value of a specific commodity by making money redeemable for a specific amount of the commodity. As a result, stating prices in terms of money was equivalent to stating them in terms of gold, silver, copper, or whatever commodity or combination of commodities defined the standard (that is, the ultimate unit of account). Redeemability ensured that the quantity of money was kept consistent with the demand for it at its independently determined value.

Single commodity standards, however, transmitted changes in the relative price of the single commodity to the general value of money (that is, to the price level). They did not establish money with constant real value. Standards of value based on baskets of many commodities, which have better prospects of having stable real values, were thought to be impractical and too costly to operate, however, because of the need to warehouse all the commodities in the basket. In any event, most countries have replaced redeemable money with fiat money, the value of which is determined by its supply and demand.

Two recent advances in our understanding of monetary systems have generated new interest in commodity standards as the anchor of the monetary system. The first is the realization that the market can regulate the supply of paper money (claims) without inflation if it is redeemable at a fixed price for something with positive market value. The market regulation that results from the obligation of issuers to redeem their monies removes a major justification for a state monopoly in supplying money. Denying the state its monopoly to issue money strengthens the prospects that redeemability will be adhered to by reducing the government's incentive to suspend it. The second insight is the realization that a viable commodity standard does not require the redemption of money for the specific commodities defining the ultimate unit of account. "Indirect redemption" greatly simplifies and reduces the cost of operating such a system. This paper reviews these

ideas and discusses a practical strategy for establishing stable money by giving the Special Drawing Rights (SDR) of the International Monetary Fund (IMF) a constant real value.

The paper is organized as follows: The first section discusses the importance of a common unit of account for reducing transaction and information costs, contrasts the monetary systems that result from quantity or price standards for the unit of account, and exemplifies the features of traditional price standards with a discussion of the gold standard. The next section explains the role of arbitrage in controlling the quantity of money for both direct and indirect redemption of money. The principles are first established in the context of monetary systems with central banks, then with free banking. The section then reviews Irving Fisher's proposals for a unit of account with a constant real value, contemporary examples of monetary systems based on independently defined units of account, and the proposals of Greenfield and Yeager. The following section discusses the reasons constant real value units of account have not been adopted in the past and suggests that giving the IMF's SDR a constant real value would make it more likely that a constant real value unit would be widely adopted. The section then discusses some technical difficulties with the proposal. A final section summarizes the conclusions.

Price Standards and Quantity Standards

A common unit of account reduces transaction and information costs. Money systems that use a price standard, however, differ greatly from those that use a quantity standard. The gold standard demonstrates the features of the traditional price standard, while the constant money growth rate rule proposed by Milton Friedman is an example of a quantity standard.

The unit of account. A medium of exchange is an asset (or claim to an asset) that is widely accepted in trade and to settle financial obligations. Currency notes or transferable bank deposits are typical examples. A unit of account is the unit in which the medium of exchange and other assets are denominated and in which other values and prices are expressed. Confusion over this distinction results from the fact that most units of account are amounts of a medium of exchange.

The unit of account and medium of exchange are therefore often seen as two attributes or uses of money. The distinction between the unit of account of the United States and its medium of exchange was clearer when U.S. government (Treasury) currency notes were redeemable for an amount of gold (or silver). Then a dollar bill was a medium of exchange, and the indicated amount of gold for which it was redeemable was the unit of account.

Monetary systems can be divided into those that take a unit of fiat money as their unit of account (quantity standards) and those that do not (price standards). In principle the unit of account can be an amount or amounts of anything. If so, by what criteria should the medium or media of account be determined?⁴

Historically, the unit of account has invariably been an amount of money. This is indeed very natural. The entire purpose of money is to reduce the cost of trade, and clearly less calculation is involved when prices are stated as amounts of the assets that will be accepted in exchange; that is, transaction costs are lower when pricing and contracting in units of money. Pricing goods and services in units of money is clearly a convenience of such importance that economic agents even use money of rather unstable value as their numeraire rather than shift to something else.⁵

If money is not redeemable, it will invariably be the country's unit of account. This may be called a *quantity standard* (or fiat standard). Under a quantity standard the value of a country's unit of account is determined by the market value of its money resulting from the quantity supplied and demanded. Hence the importance of the rules or policies governing the supply of money.

A *price standard* (or commodity standard), by contrast, defines the unit of account as an amount of something real such as gold or a "basket" of commodities.⁶ The monetary value of the unit is the market value, in terms of the medium of exchange, of the stipulated amount of the commodity or basket of commodities. The value of the unit of account and of a unit of money may be equal as the result of market forces but are not synonymous.⁷

With a quantity standard, the central bank determines the nominal quantity of money the public holds, and the public determines its value (that is, the price level). With a price standard, given the definition of

the unit of account, the public decides on the nominal amount of money denominated in that unit that it will hold in order to carry out an anticipated volume of real transactions. In both cases the public is determining the real quantity of money it holds.

Commodity standards developed because they lowered the cost of transacting and provided a relatively stable unit of account. Many governments formally adopted price standards for the same reasons. It is intuitively appealing to assume that the ideal price standard is one based on a unit of account with constant real value. It is difficult, in any event, to imagine any other expected behavior in the unit's value that would command widespread support.⁸

The gold standard. The best known price standards were based on gold or silver.⁹ A gold standard required agreement on the amount of gold constituting one unit of money and the willingness of all issuers of money (notes or deposits) to redeem their issues for that agreed amount. Though prices were quoted in monetary units, the unit of account was an amount of gold, not, ultimately, an amount of money.¹⁰ The redeemability of money for gold ensured that the value of a unit of money and a "unit" of gold were kept equal. (This point is discussed more fully below.) The requirement to redeem money for a fixed amount of gold applied to all institutions that issued money, whether private banks or government banks.

Gold standards had several shortcomings: They required inventories (reserves) of gold sufficient to honor potential redemptions, which was costly. Gold's relatively inelastic supply meant that a more rapidly growing demand for money "backed" by gold could be met primarily only through "deflation," that is, by an increase in the price of gold relative to goods and services (though not relative to money). Gold's value, hence money's value, was also sensitive to periodic gold discoveries or improvements in mining or refining technologies, which affected its supply and hence its relative price. Changes in nonmonetary demand for gold could have the same effect.

Despite their shortcomings gold standards had some very attractive features. The supply of gold was endogenously (rather than politically) determined by the cost and other factors of its production in relation to its price. The requirement to redeem bank money or government

money for a fixed amount of gold limited the creation of money to the amount the public was willing to hold at the prevailing price of gold. These features resulted in money's value avoiding the extreme fluctuations that have been experienced with fiat money.¹¹

The New Price Standards

As already noted, a fixed money price of gold did not guarantee a constant real value for money because gold's relative price could change. This shortcoming could be reduced by adopting a unit of account based on a basket of many goods rather than just one. This was traditionally thought to be impractical, however, because of the transaction and storage costs involved in redeeming bank money for a basket of many goods. A more recent insight is that the self-regulating character of a commodity standard does not require redemption for the commodity itself. As discussed in more detail later, all that is required is that bank money be redeemable for a marketable asset having a current market value equivalent to that of the unit of account basket.¹² Indirect redeemability makes possible a monetary system having the virtues of a price standard without its shortcomings.¹³

Along with the medium of exchange and the medium (or media) of account, we must now also consider a separate medium (or media) of redemption. Just because government fiat money (currency and commercial bank deposits with the central bank) currently serves all three of these purposes in most countries, we must not conclude that it has always been or must always be so. In the monetary system discussed here, each of the three media will be different. The principal analytical objective of this section is to establish that indirect redemption works, that is, that it keeps the value of a unit of the medium of exchange satisfactorily close to the value of the unit of account while preserving the independence of the unit of account. In order to separate the very distinct issue of free banking from the use of an independent unit of account, the mechanism is explored first in the context of central bank-controlled base money.

Central bank money. Consider an economy with paper money supplied solely by a monopoly central bank. These "outside," central

bank currency notes may be used as reserves (base money) for a competitive banking system that supplies "inside," deposit money or may be the only money, with no private banks. The unit of account, a valun (from "value unit"),¹⁴ is defined as specific amounts of a large number of goods and services (for example, the consumer price index—CPI-basket). Money is denominated in valuns, and a one-valun bill (currency note) is exchangeable at the central bank for one valun's worth of some other asset, such as Treasury bills, that has a well-defined, market-determined *value* in terms of valuns. One valun is not the same thing as a one-valun central bank note, that is, money, but because of redeemability they will both have the same value.¹⁵

The mechanisms by which redemption maintains equality between the value of the unit of account and a unit of money can be discussed in terms of the quantity theory of money with causation reversed. Let the real demand for money (m^d) be given by the full employment level of income and the full employment rate of interest. The price level (P) in valuns is given by the independently defined unit of account. As when prices of commodities are fixed by decree, the supply must conform to the amount demanded at the fixed price if nonmarket rationing is to be avoided. In the case of money with an independently determined price level, the demand for nominal money balances to which the nominal supply (M) must adjust is given by:

$$M = Pm^d$$

The right-hand side of the equation is totally predetermined, so that all adjustments take place in the left-hand side variable.¹⁶

What is the mechanism for adjusting the quantity of money to its predetermined nominal demand? Suppose that the central bank over-issues paper notes. They will be exchanged by the public for things it would rather have. Some notes may be exchanged directly for the redemption asset by redeeming them at the central bank. Some will be exchanged for other goods and services. To this extent, prices of goods and services quoted in units of money (that is, valun bank notes) will rise. The money prices of the items making up one valun's valuation basket would then add up to more than one valun (that is, the one-valun basket would cost more than a one-valun bill). The difference between

the market value of bank notes and their redemption value creates an arbitrage incentive to exchange (redeem) them for the redemption asset.¹⁷ The public's preferences control the quantity of money in light of its independently determined value.

The mechanism can be brought out more clearly by describing its operational aspects. Let the central bank maintain reserves of Treasury bills for redemption purposes.¹⁸ For simplicity assume that initially, that is, before the overissue of currency, one Treasury bill had a market value of one valun.¹⁹ An overissue of α percent will raise the money price of all goods and services by α percent.²⁰ As a result, the bank-note value of the one-valun valuation basket will be $1 + \alpha$. Assuming that the bank-note price of one Treasury bill remains one valun, $1 + \alpha$ Treasury bills will have the same market value as the one-valun basket. Therefore, the issuers of bank notes find that they must offer $1 + \alpha$ Treasury bills per one-valun bank note to honor their redemption obligation.²¹ A one-valun central bank currency note, therefore, can be redeemed for $1 + \alpha$ Treasury bills. Because the Treasury bill has a monetary value of one bank note in the market, redeeming one bank note and reselling the Treasury bill received in exchange results in a risk-free gain of α . This arbitrage gain will reverse the overissue of notes, which will be redeemed as long as their nominal value (one valun) remains below the market value of the valuation basket ($1 + \alpha$ valuns). Arbitrage will make the overissue of redeemable notes unprofitable. α will never be greater than the transactions cost of going to the central bank and redeeming money at full value. Merchants and others can always accept money as if it were equal to its stated unit of account value both because arbitragers will ensure that it does and because merchants themselves are always free to redeem that money for its full stated value.²²

It is a common misconception that money supplies are limited by the quantity of monetary gold (under a gold standard) or currency reserves (under the present fractional reserve banking system).²³ An individual bank, however, can always buy all the gold or currency it needs or wants. Money creation is limited by the unprofitability of buying gold or currency when unwanted money is redeemed.

The properties of such systems are well established and understood in the context of the small, open economy with fixed exchange rates

and freely mobile capital. Such economies cannot independently determine their money supplies, the demand for which is given by real factors affecting the real demand for money and the independently determined price level. The world price level and fixed exchange rate together fix the domestic price level in much the same way that the independently defined unit of account does in the preceding example.

All private money. The core of the mechanism has now been described. An independently defined unit of account can be established with existing, central bank-controlled monetary systems, as long as central banks are prepared to "play by the rules" by passively adjusting the supply of central bank money to the public's demands. Such a monetary system would provide directly what most economists and monetary authorities claim to want—monetary stability. But how can adherence to its rules be enforced?

One modification of the scheme outlined above that would strengthen the likelihood that its rules would be obeyed would be to replace the central bank with competitive private banks that are free to issue convertible currency notes.²⁴ The role of the state in this version of the scheme would be limited to defining the official unit of account and the enforcement of contracts denominated in that unit.²⁵ Market competition would presumably require the convertibility of bank notes by their issuers. Such notes would be redeemable in accordance with the convertibility rules explained in the preceding section.

Arbitrage would again limit the quantity of bank notes issued in the aggregate to the aggregate quantity demanded. In addition to this mechanism, each note-issuing bank would have the amount of its own note issue limited to the public's demand for its particular notes by the phenomenon of adverse clearing.²⁶ Adverse clearings of bank notes works in essentially the same way bank deposit clearings currently limit the amount of each bank's deposits to the public's demand for them.

A bank that lends, for example, by issuing bank notes (deposits), would find that most of those notes (deposits) are spent by the borrower, falling into the hands of other banks. These notes (checks) are presented through the clearinghouse to the issuing bank for collection, that is, for conversion into the agreed settlement asset (for example,

Treasury bills). In the meantime the issuing bank would have received payments in notes (checks) of other banks, which it also presents through the clearinghouse for collection. If the bank's note issue (deposits) leads to an excess of redemptions of its notes (checks) over its redemptions of other banks' notes (checks), it would experience an adverse clearing that would reverse its excess issue and lower its reserves of the settlement asset (for example, Treasury bills).

It might seem that because the marginal cost of producing additional bank notes (or bank deposits) is close to zero, the free, competitive supply of money would drive its value to approximately zero. This overlooks the implications of the legally or competitively imposed requirement to redeem any issue of money not wanted by the public.²⁷ The competitive creators of money are nothing like the counterfeiter, who issues money and absconds with the difference between the face value of money and the cost of producing it. Honest producers of money accept an obligation to redeem it for something else of agreed value.²⁸ As a result, they are able to increase the supply of money only to the extent wanted by the public.

It is doubtful that even this limited role of government is really necessary for the stability and viability of free note issue and an independently defined unit of account. The government's requirement that banks redeem their deposits and notes as a condition for the right to issue them, while reassuring, hardly seems necessary. While it is an important condition, it is hard to imagine that competition would not impose it voluntarily. Even the mandatory use of the government-defined unit of account is probably unnecessary. The very factors that make a standardized, widely used unit so attractive would surely lead to the rapid voluntary adoption of any satisfactory unit established by the government. In the most liberal of societies the role of the government in the monetary sphere would be simply to define the unit of account used by itself as it currently defines other standards of measurement.²⁹

Fisher's tabular standard and more recent examples. Irving Fisher proposed a constant real value price standard over three quarters of a century ago. The plan, as he described it, involved "a combination of the tabular standard [indexing] with the principles of the

gold-exchange standard.”³⁰ While Fisher described several slightly different versions of this scheme, in essence the plan,

is a convertible paper currency, the paper to be redeemable on demand—not in any required weight or coin of gold, but in a required purchasing power thereof. Under such a plan, the paper money would be redeemed by as much gold as would have the required purchasing power. Thus, the amount of gold obtainable for a paper dollar would vary inversely with its purchasing power per ounce as compared with commodities, the total purchasing power of the dollar being always the same. The fact that a paper dollar would always be redeemable in terms of purchasing power would theoretically keep the level of prices invariable. The supply of money in circulation would regulate itself automatically.³¹

At an address to the American Economic Association in Boston, December 1912, Fisher summarized his scheme as follows:

Briefly stated, the plan is to introduce the multiple standard, in which the unit is a “composite ton” or “composite package” of many staple commodities, not of course by using such a package in any physical way but by employing instead its gold bullion equivalent. In essence it would simply vary the weight of gold in the dollar or rather behind the dollar. The aim is to compensate for losses in the purchasing power of each grain of gold by adding the necessary number of grains of gold to the dollar. . . . With the development of index numbers, . . . we now have at hand all the materials for scientifically standardizing the dollar and for realizing the long-coveted ideal of a “multiple standard” of value. In this way it is within the power of society, when it chooses, to create a standard monetary yardstick, a stable dollar.³²

Fisher’s multiple or tabular standard was never adopted in the form he envisaged. Independently defined units of account have been used in a variety of ways, however. Pegging an exchange rate and the general indexing of prices and monetary contracts are familiar examples of units of account that are not the medium of exchange. So are the IMF’s SDR and the European Community’s European currency unit (ECU),

each of which has values based on a fixed basket of currencies. In fact, those countries that peg the exchange rates of their currencies to the SDR or other currency baskets have adopted a loose form of Fisher's multiple standard.

In addition to these more traditional examples, modern finance is providing an increasing number of interesting uses of independently defined units of account. One example is the use of mutual fund investments denominated in shares to make payments denominated in a currency. This is an *example* of banking, which has very different risks from traditional *par value* banking.

"Par value" banking refers to the traditional practice of recording bank deposits in units of the medium of exchange and transferring or redeeming them at par, that is, for the same number of units of the medium of exchange. Because the value of a bank's assets generally fluctuates in terms of the medium of exchange (except, of course, for "reserves," which are the medium of exchange), the value of its assets will not always change to the same extent as the value of its liabilities.

This risk does not exist for share banking, where accounts are recorded in units or shares of a portfolio of assets. In this case the value of a bank's assets always equals the value of its liabilities. The value of its assets, however, and hence its liabilities can fluctuate in terms of the medium of exchange. This potentially makes share bank deposits less attractive as a means of payment since payments are required in specific amounts of the medium of exchange. This problem has been overcome for money market mutual funds by allowing investors to transfer amounts denominated in the medium of exchange, as is done with par banking checks. When cleared, the amount of the check is converted into its equivalent value in units (shares) of the mutual fund and deducted from the depositor's holdings in the fund.

Another example of an independently defined unit of account is provided by the ECU-denominated bank credits, bonds, and demand and time deposits created by commercial banks. In addition to these and other ECU-denominated assets, a large number of ECU-denominated payments are made daily despite the absence of any central bank or official agency supplying ECU-denominated reserve assets that could be used to settle ECU transfers between banks. To the extent that these payments do not net out between banks in the daily clearing administered by the

Bank for International Settlements (BIS) on behalf of the ECU Clearing Association, ECU-denominated loans are extended, or an equivalent value of other assets is transferred. If one person pays another an amount of ECU through their banks, the payor's bank (to the extent that it is not the recipient of a reverse transfer through the bank clearinghouse) will either transfer the appropriate amounts of the twelve European currencies in the ECU valuation basket³³ or the equivalent value of any one of them (or the U.S. dollar).³⁴ All of these approaches are in fact used.³⁵ The transfer of the agreed settlement asset (national currencies) uses established payment channels. This is an important example of indirect redeemability actually in use.

The private and unrestricted creation of a wide range of financial instruments denominated in ECU (including credit cards, checking accounts, and traveler's checks) is also a concrete example of the stability of an all inside money system (this is discussed below). No central bank or other official agency supplies ECU to the banking system. It has no "outside," high-powered reserve asset.³⁶ Banks freely supply whatever quantity of ECU the public wants. It should be noted, however, that the value of the ECU (and the SDR) floats on the backs of existing national currencies and therefore could not (as presently defined) be a worldwide foundation of value capable of replacing all national currencies.

Greenfield/Yeager standard. If a constant real value price standard were adopted, could it be made more secure than previous price standards, all of which have been abandoned (not, however, without many years of good service)?

One of the most challenging objectives of any monetary arrangement is to ensure adherence to the rules of the game, whatever they are. Governments are notoriously difficult to discipline. In the end the governments that set the rules can change them. As long as governments retain control over the supply of money, this danger will exist for any standard adopted. The most that can be hoped for is strong public support for the rules, which makes them politically unattractive to change. Such support is most likely if the rules are well understood, viewed as fair, produce generally desirable results, and involve the government (with its necessarily political nature) as little as possible.

Rules that do not tempt governments to intervene in the money-supplying process are also more likely to endure.³⁷

The price standard proposed by Greenfield and Yeager is meant to satisfy the criteria above for an enduring, stable monetary system and to overcome the shortcomings of past metallic standards. The essential elements of their proposal are a unit of account based on a large basket of goods and services, a competitive supply of money (that is, bank deposits and notes) redeemable for assets equal in value to the unit of account, and no government money (which could potentially create an inconsistency between the money supply and the value of the unit of account).

The resource cost of their proposed price standard is low because no physical reserves would be used and because goods and services, obligations, and the means of payment all would be denominated in the same abstract unit of account. The absence of government-created or -controlled base money would make it more difficult for the government to succumb to short-run temptations to overissue base money. A unit with constant real value, which favors neither debtors nor creditors, should be able to command widespread public support. It would be free of the periodic inflations and deflations caused by past metallic standards, which were important sources of public discontent and political pressure to modify or abandon such standards. Public support should also be strengthened by the greater responsiveness of the supply of money to its demand that would result from the competitive supply of redeemable money. The market adjustment of the money supply to its demand would reduce or eliminate a major source of economic disequilibrium common to quantity standards.

A Proposed Strategy

Money with constant real value is clearly desirable.³⁸ It has been argued above that money with constant real value is also feasible.³⁹ The question immediately arises why countries have not adopted such a system. In the absence of constant real value money, why have individuals not adopted constant real value units of account more

widely? The next section briefly addresses these questions as a prelude to the paper's central proposal.

Adopting a better unit of account. The fact is that very few transactors have adopted units of account with a constant real value. The reason, I believe, is the fact stressed before that the convenience of using a single common unit of account is so great that even a relatively bad one already in use is better than using an uncommon unit. A corollary to this is that it is very costly to be the first to use a new unit of account—even a significantly superior one—because much of its benefit can be realized only when almost everyone else is also using it.⁴⁰ “An established monetary standard spontaneously persists as a social convention because no trader by himself finds it advantageous to abandon it. . . . If the public are to choose intentionally between standards, they must do so in a setting of constitutional choice.”⁴¹ In short, the unit of account is a public good.⁴²

The failure to give sufficient weight to the costs of multiple units of account, in my view, is also the weakness in the suggestion made by F. A. Hayek over a decade ago to allow competition in supplying money as a way of putting market pressure on domestic monetary arrangements and policies.⁴³ His approach requires only that countries allow their citizens to hold, use, and contract in monies and units of account other than their official national money and that such contracts be enforceable in the relevant courts.⁴⁴ Hayek's argument was that any national money whose behavior was considerably inferior to that of other monies would tend to be displaced by them, even in domestic use.

Hayek did not clearly distinguish the unit of account from the medium of exchange aspects of his proposal. In fact, he seems to have implicitly assumed that money would be the unit of account.⁴⁵ The implications of and prospects for competing media of payment are quite different from those for competing units of account, however. Most economies have had considerable experience with the competitive supply of money. For example, U.S. dollar-denominated means of payment include Federal Reserve notes; coins; personal deposit claims on thousands of different banks, transferable by means of checks, debit cards, and wire; bearer claims in the form of cashier's checks and money orders, similarly drawn on thousands of banks and other institutions;

many brands of traveler's checks; and transferable shares in dozens of mutual funds. No serious transaction costs seem to result from the simultaneous use of many monies as long as they are all denominated in the same unit of account.

Diversity of units of account is more difficult. Much of the purpose of a unit of account is lost if it is not widely used. While the world has learned (at considerable cost) to live with competing units of account internationally (primarily in the form of national currencies), they are generally not in simultaneous use within a given geographical area except in border towns. The efficiency gains of a single standardized unit of account are so large that the behavior of its value must become quite unsatisfactory before it will be spontaneously and voluntarily abandoned.

The considerations above suggest that no country is likely to replace its current monetary arrangements with a constant real value standard unless its monetary system is in serious trouble. Residents of countries in the throes of monetary crisis can only turn spontaneously to already established alternative units. As a practical matter they cannot establish new units of their own. In short, a price standard with a constant real value will not generally be adopted spontaneously, and only well-established alternative units will be considered. The use of the U.S. dollar (or other units) for pricing or payment purposes in some Southern Cone countries with very high inflation proves that there is a cost threshold beyond which the established unit will be abandoned, but the alternative unit chosen spontaneously was the existing U.S. dollar rather than the conceptually possible but nonestablished constant real value unit. Longer-term contracts can also be indexed to maintain the real value of prices and other financial obligations stated in terms of money with decreasing purchasing power (that is, inflation). Indexing nominal values, however, is more costly than directly maintaining the real value of nominal magnitudes on average and is difficult to make comprehensive. Indexing also suffers from lags in adjusting for monetary inflation. The widespread use of indexed contracts is common only in countries with very high and variable inflation rates (for example, Argentina, Brazil, and Israel). CPI-indexed futures contracts, which are available in the United States (where inflation is very low), have not enjoyed much popularity. While governments could replace

their existing official units with a constant real value unit, they must be prepared and able to forgo the revenue from money creation, and many are not.

How can the preference for stable prices be satisfied, when the choice of a superior unit is feasible only if everyone else chooses the same unit? One way out of this monetary Catch-22 would be to prepare the IMF's SDR for the role of an established, constant real value unit waiting in the wings to be adopted by countries (or individuals) with unstable monetary systems. Its value is already independently defined on the basis of collective agreement, and it is already used to denominate a number of international obligations and financial instruments.⁴⁶

The SDR. The SDR was created in the late 1960s by collective agreement of the member countries of the IMF (currently 179 countries) and generally replaced the several gold units that had been used in international treaties and agreements.⁴⁷ The SDR is also used by the IMF to denominate all of its financial activities (for example, loans to its members).

In addition to its official international standing, the attractiveness of the SDR as a unit of account and hence the willingness of institutions and other economic agents to use it for denominating obligations depends on the behavior of its value in terms of real goods and services.⁴⁸ The present definition of the SDR's value as a basket of the five major currencies has a number of attractions. As the inflation rates of the five currencies in the SDR valuation basket have generally been lower than the inflation rates of most other currencies, the SDR's real value has been relatively stable. This definition has also made it easy for commercial banks to create private SDRs on demand without exchange risk to themselves by covering their SDR-denominated liabilities with assets reflecting the composition of currencies in the SDR valuation basket. The SDR's purchasing power, however, has been far from constant (since the adoption of the SDR valuation basket in 1974 its real value has fallen to about one-third of its original value) and remains as uncertain as the inflation rates of its component currencies. Perhaps in part for this reason its adoption as a unit of account has been quite limited, as has the demand for SDR-denominated instruments.

If the SDR had a more stable real value, I believe that it would be

far more widely adopted internationally for denominating obligations. An SDR with a constant real value would provide the world with a unit of account very different from any other of international standing and would potentially have dramatic consequence for interest in and use of the unit.⁴⁹ Providing a more stable contracting unit internationally would also tend to enlarge the extent of world trade and improve the efficiency of international resource allocation. More to the point of this paper, an SDR with a constant real value would be an established unit, which could be adopted easily by individuals and countries. The use of a "real" SDR might be of particular interest initially to individuals or countries whose monetary systems were performing badly.⁵⁰ It might also exert competitive pressure on domestic monetary systems (à la Hayek) to maintain more stable monetary values.

The United Nations Commission on International Trade Law, in its search for "a universal unit of constant value which would serve as a point of reference in international conventions for expressing amounts in monetary terms," concluded that the most desired approach was to combine the use of the SDR with an index that would preserve over time the purchasing power of the resulting unit.⁵¹ For this purpose several fund staff members proposed adjusting the amounts of currency in the SDR's valuation basket in order to offset the effect of changes in the consumer (or some other broad-based) price indexes of the five economies whose currencies are in the SDR's valuation basket.⁵² An increase in one or more of the price indexes (that is, inflation) would result in an increase in the amount of that currency in the valuation basket by enough to preserve the command over goods and services that it contributes to the SDR.⁵³ The resulting real SDR would have a higher currency value if its component currencies were inflating than would the current nominal SDR.

Another approach would be to base the SDR's value on a representative basket of goods. In principle, this basket should be representative of the expenditures of the average (world) economic unit. As a practical matter, the basket would probably include a relatively small number of internationally traded goods whose price behavior was as representative as possible of the larger hypothetical basket and for which market prices were easily obtained.⁵⁴

Any of these approaches could be adopted by the fund's membership

under its existing Articles of Agreement. The method of valuation of the SDR is determined by a 70 percent majority of the fund's voting power. An 85 percent majority of the total voting power is required, however, for a change in the principle of valuation or a fundamental change in the application of the principle in effect. A decision on the valuation of the SDR would require the consent both of countries that hold SDRs and have other assets denominated in SDRs, such as reserve tranche positions and loans to the fund, and of countries that have obligations denominated in SDRs, such as outstanding credits from the fund. It is therefore most unlikely that there would be a change affecting the valuation of the SDR that would be harmful to either creditors or debtors since countries standing to lose from such changes are in a position to block them. More to the point, it is very unlikely that having adopted a real SDR, the fund's membership would be persuaded to abandon it or fundamentally modify it in response to the narrower interests of a few (or even a large number of) countries.

Technical difficulties. Establishing an SDR with more constant real value would require resolving a number of technical difficulties. These difficulties would depend on which approach was adopted. The central requirement is that the valuation basket must be capable of being valued continuously; that is, the current market prices of the items in the basket must be well defined and knowable. This is necessary for the smooth functioning of the arbitrage mechanism that keeps the market value of units of money equal to the market value of the valuation basket.⁵⁵ The arbitrage mechanism that controls the quantity of redeemable money could be unstable if the basket could not be revalued as market prices change. When the market value of the basket is greater than that of a unit of money, it will be profitable to redeem money until its market value rises to that of the basket. This can happen only if the basket's market value is reestablished as monetary redemption proceeds.

The need for continuous valuation limits the items in the basket to commodities or currencies that are easily definable (such as a weight of gold of a particular fineness) and that trade in liquid secondary markets. By adjusting the amounts in the basket to preserve the purchasing power of each, it is possible, of course, to maintain a constant real value with only one item in the basket just as well (and more easily) as

with many. The advantage of having a number of items in the basket is the increased likelihood of relatively constant real value even in the short run, that is, between adjustments in the basket. The conflicting criteria of simplicity and constancy suggest a compromise that involves a basket with relatively few items (say 50–100) and somewhat more frequent adjustments in their amounts.

If the valuation basket is to be adjusted to compensate for drifts in its real value (it would be simpler to allow such drift for a well-chosen but unchangeable commodity basket),⁵⁶ two related issues must be addressed. The first concerns the frequency with which the amounts in the valuation basket are adjusted to correct any drift in the basket's real value. This depends on how much the basket's real value is likely to drift over periods of different duration and the need to avoid large discrete changes in the SDR's value when adjustments are made. In general, the smaller the number of commodities in a commodity basket, the more the basket's real value is likely to change over time. For a currency basket, however, the behavior of the basket's real value will depend primarily on which currencies are included and the institutional and political environment conditioning the monetary policies of the issuers of those currencies. Short-term fluctuations in the real value of the SDR of 1 or 2 percent are not likely to cause problems, especially when it is known that adjustments in the basket will eliminate real changes on average over the long run (exactly where price uncertainty has been greatest in the past fifty years).

Value-compensating adjustments in the amounts of the items in the basket would be a significant departure from the present method of adjusting the SDR or ECU valuation baskets in that the nominal (current market) value of the baskets would actually change on the days the new baskets came into effect.⁵⁷ These modest changes would preserve the real value of longer-term contracts denominated in SDR. Discrete changes in the value of the basket, however, could affect current goods prices and the value of tradable financial instruments near the time of the change, depending on the magnitude of the real change. If basket adjustments were relatively infrequent, for example, annual, the direction and magnitude of the change in value of the basket could be fairly accurately anticipated and would be built into yields on financial instruments but would require offsetting adjustments in goods prices at

the time of each change. If adjustments were made monthly, for example, when the previous month's CPI became available, it is less likely that the change could be anticipated, but the magnitude of each change would probably be very small.

The currency basket approach is possible only as long as the national currencies in the valuation basket remain in use. Consequently, it could not be used if the SDR were to become the common world unit adopted by all countries for national as well as international purposes. This was recognized, for example, by the authors of "The All Saints' Day Manifesto for European Monetary Union,"⁵⁸ who in essence proposed a constant real value ECU by adjusting the national currency amounts in the ECU's valuation basket so as to preserve their purchasing power. They recognized the need to abandon that approach once the ECU replaced national currencies within the EC. "When the [ECU] has ultimately replaced national monies, its supply should be controlled according to a monetary rule that would continue to guarantee its purchasing power stability"; that is, in their proposal the initial price rule would be replaced by a quantity rule.

The role of the official SDR. A potential concern about the use of the SDR as a constant real value unit of account is whether allocations of official SDRs would interfere with the market's ability to supply the quantity of private SDRs demanded and thereby jeopardize the viability of the SDR as an independent unit of account.

Within the official circle of holders, SDRs are used as reserves and to settle obligations to other official holders directly. Allocations of SDRs augment official reserves at lower cost than is otherwise possible. However, allocations of an asset of independently determined value (that is, controlling both the quantity in circulation and the asset's price and interest rate) pose the potential dilemma of forcing participants in the scheme to hold and accept unwanted SDRs at their official price and yield, if allocations exceed the increases desired.⁵⁹ The use of SDRs by one country is a receipt by another. Without some market-clearing mechanism there will generally be a net aggregate desire to use or to receive SDRs. To deal with this problem, uses of the SDR are controlled by comprehensive rules. In recent years, however,

all uses (including receipts in exchange for currency) have been voluntary, suggesting that the SDR is not in oversupply.

The independence of the unit of account from the medium of exchange (which is none the less denominated in the unit of account) might be undermined if the suppliers of money were able to force the public to accept their money. If a government, for example, issued currency denominated in valuns, this currency would run the risk of supplanting the independently defined unit of account and becoming the unit of account itself. There is no danger that this will result from allocations of official SDRs because they can only be held by IMF members and official international entities authorized to do so by the IMF. They cannot be held by banks, firms, or individuals. Consequently, allocations of official SDRs cannot force the public to hold more SDRs than it desires.

Conclusion

Defining a country's unit of account so as to make its real value as constant as possible would have very important implications for efficiency and for the behavior of the monetary system. Much of the disruptive power of monetary shocks reflects the need for money's value to adjust to its "exogenously" determined supply and the effect of that adjustment on values and expectations throughout the economy when money is the unit of account. The value of the unit of account should not be the slave of monetary policy.

Nonetheless, there is considerable advantage in quoting prices in units of money and, hence, in denominating money in the independently defined unit of account. Money can be denominated in an independently defined unit as long as the supply of money adjusts to the nominal quantity demanded at the independently determined price level. If all money is redeemable for the unit of account, arbitrage will ensure that the supply of money equals its demand at that price. This proposition is well known from the gold standard experience.

Like other single commodities, gold's real value has not been constant. A unit of account based on a basket of many goods would have more stable real value. Redeeming money for a large number of goods

would be costly and impractical, however. But indirect redeemability will work just as well. As long as money is redeemable for assets equal in value to the unit of account, arbitrage will ensure that the supply of money equals its demand at the independently determined price level.

The nature of a unit of account requires its wide acceptance and use. It is therefore unlikely that even a superior unit will be accepted spontaneously in the current environment. The adoption and spread of a unit with constant real value will require its initial deliberate adoption by a major economy or an established international organization such as the IMF.

Defining the value of the SDR so as to preserve its real value to the maximum extent possible could achieve this objective but would be worthwhile even if it did not. Such an adjustment in the SDR's valuation would make a useful contribution to the efficiency of international trade, contracting, and payments. If the SDR could also be used for denominating domestic obligations and if SDR-denominated assets could be used to settle them, the SDR could bring the benefits of more certain and more stable monetary value to all who wanted them. In addition, it could become an important competitive force for more stable domestic monetary policies and arrangements in countries that chose not to adopt it. Countries adopting (or pegging their currencies to) the SDR would constitute a "zero inflation club."

The role described above for the SDR could be played by any unit of account with relatively constant real value that was of sufficient standing and importance to serve as a widely used standard. An equally, or perhaps even more, promising candidate is the ECU. The members of the EC might find it politically easier to tie (that is, peg) their currencies (the British ECU, the French ECU, etc.) to a real ECU than to the current currency basket. The resulting surrender of monetary control to the monetary union would be no greater than with any other firmly fixed exchange rate system. It seems more likely, however, that members could more easily find and sustain political support to fix the real value of their currencies than to fix them to the value of some other currency (or basket of currencies).

The relative attractiveness of a real ECU is strengthened by recent developments in Eastern Europe. The absorption of the German Democratic Republic into the Federal Republic of Germany and the

unification of their two currencies increases the risk of the inflation of the German mark (the current anchor of the European Monetary System). In addition, the prospective membership of Eastern European countries in the EMS and therefore the eventual addition of their currencies to the ECU valuation basket is more likely to weaken than strengthen the stability of the ECU's value. Monetary union based on the redeemability of national currencies for an ECU valuation basket with a constant real value would produce European currencies as uniform as the currency notes of the twelve Federal Reserve Districts of the U.S. Federal Reserve System.

NOTES

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1. Irving Fisher 1913, 501-2.

2. Yeager 1989, 370.

3. I will use "money" as synonymous with media of exchange.

4. The medium of account is the commodity (or commodities) used to define the unit of account. For example, for the gold standard the medium of account is gold, while the unit of account might be one ounce or one pound of gold of specific purity.

5. The strength of this "inconvenience" is revealed by the fact that historically the value of money has had to behave very badly indeed before other units (such as cigarettes or U.S. dollars) were adopted for pricing purposes. See Friedman and Schwartz 1986 and Friedman 1986.

6. A price standard might also anchor the value of money to that of some other monetary unit by fixing the rate of exchange of domestic money for a foreign currency; that is, the unit of account could be a foreign currency.

7. This important distinction is explained in more detail in the section "Central bank money."

8. An exception might be a preference for deflation (constant nominal wages and falling commodity prices) for the reasons articulated in Friedman 1969, Chapter I.

9. For an interesting discussion of bimetallic standards, see Friedman 1989.

10. These very general statements skirt over more complex legal issues of contract law. Many of these issues have been discussed over the years by Sir Joseph Gold in his surveys of legal developments in SDRs, currencies, and gold.

11. While the year-to-year value of money (gold) varied considerably under the gold standard in the United States, its value was essentially the same at the beginning of World War II as it had been at the beginning of the Civil War or the beginning of the Union, a two-hundred-year period. Since the beginning of World War II, however, the value of money has fallen to about 12 percent of its previous value (that is, prices have risen by a factor of more than 8).

12. This point is made by Stanley Fisher 1982.

13. For example: Black, Fama, Hall, and Greenfield and Yeager.

14. Following Yeager 1989.

15. This discussion abstracts from the fact that secondary market prices contain a bid/ask spread, which reflects the cost of making and operating the market. The existence and appropriateness of a spread are well known from the gold standard experience, which in the case of gold tended to reflect transportation costs. The existence of bid and ask prices for the redemption asset means that the value of one-valun bank notes may differ from the value of one valun by an amount determined by the bid/ask spread of the redemption asset.

16. With a quantity standard, P would adjust in the equation to an exogenously given M .

17. This key insight, described in more detail in subsequent paragraphs, is critical to the argument. I suspect that it was the failure to understand this mechanism that led to White's claim (subsequently withdrawn) that the Greenfield/Yeager scheme is circular and nonoperational. See White 1984, 1986, and 1989 and Greenfield and Yeager 1986.

18. Assume that a one-valun currency note states, "Redeemable for an amount of Treasury bills with a current market value equal to that of the basket of goods and services defined as one valun." This is not a traditional commodity standard because the redemption asset and the good or goods defining the unit of account are not the same. It would not serve the intended purposes of the scheme to simply redefine the unit of account as one Treasury bill because a T-bill's price relative to the basket or to individual goods in the basket can change. The avoidance of such relative price changes is, of course, the only reason for preferring a more complicated basket to a single good for defining the unit of account. More important, the use of a bond as the unit of account and redemption asset would give rise to the circularity referred to by White 1984 and 1986, namely that bank notes could not simply be promises to pay bonds that were in turn simply claims to bank notes, ad infinitum. (I am indebted to an anonymous referee for this and many other observations.)

19. Though long-term contracts would legally be denominated in valuns (the unit of account), it may be assumed that goods and services would be priced in units of money (valun bank notes).

20. When the conditions for monetary neutrality hold, for example, absence of wealth effects.

21. An anonymous referee has pointed out that a Treasury bill denominated in valun bank notes would continue to have the same bank-note value whatever the value of bank notes as long as market interest rates are unchanged. I had originally implicitly assumed that Treasury bills were denominated in "official" valuns (the basket) rather than bank notes, in which case the bank-note value of Treasury bills would change to the same extent as everything else. It seems to me now, however, more natural to assume that Treasury bills are denominated in valun bank notes like other currently available goods and services. With appropriate adjustment, the analysis goes through either way.

22. The argument has been made that the use of a commodity as the redemption asset would dominate its relative price in the market. Some have argued (e.g., Whitaker and Schnadt) that if banks are initially committed to redeeming valun bank notes for gold (the redemption asset in their example), gold's market price could not rise (or fall) with the prices of other goods and that this would make the system unstable.

Schnadt and Whittaker argued that: (1) if the market price of the redemption asset cannot rise because it is dominated by its redemption price, the arbitrage incentive to redeem excess notes will be absent and hence the mechanism won't work; and (2) the recomputation of the redemption price of the redemption asset will set off a downward spiral in its market price. These points reflect a misunderstanding of how arbitrage works in practice.

An overissue of valun bank notes would lead to an increased demand for everything else, including the redemption asset (gold). The price (in terms of bank notes) of everything would tend to rise, but the publicly held quantity of gold would tend to rise at an unchanged price as a result of redemptions (which would partially reverse the initial overissue of notes). If the overissue of notes is not fully reversed by this process, the bank-note prices of goods (hence the valun basket) will rise enough to require an increase in the amount of gold obtained when redeeming bank notes (that is, a fall in the bank-note price of gold). This will increase redemptions until the upward pressure on prices (in bank notes) is removed. The failure of gold's market price to rise, or indeed its tendency to fall, results from the assumption that it can be supplied without limit when redeeming notes. In fact, gold reserves will not be unlimited and will need to be replenished or maintained by buying the gold redeemed from the market, thus tending to increase its price along with general prices.

Practical operations require discrete adjustments in the value of the valun basket and hence in the redemption bank-note price of gold (for example, yesterday's closing commodity prices are used to value the valun today and to set today's redemption bank-note price for gold). If on this basis today's valun basket is equal to $1 + \alpha$ valun bank notes and yesterday's redemption price of one ounce of gold for 1 valun is lowered to $1/(1 + \alpha)$, such that a one-valun bank note can be redeemed for $1 + \alpha$ ounces of gold, gold will be more attractive than before, leading to an increase in redemptions of bank notes. During the course of the day, the bank-note issuer is committed to this price (any intraday price adjustment will affect the value of the valun basket, and hence gold, only tomorrow). If prices (being sticky) do not adjust appreciably during the day, the valun basket will continue to be worth almost $1 + \alpha$ valun bank notes the next day as well. As one valun bank note now buys $1 + \alpha$ ounces of gold, tomorrow note issuers must stand ready to redeem about $1 + 2\alpha$ ounces of gold per one-valun bank note and could experience massive redemptions. For this reason it has been suggested that sticky prices could make the system dynamically unstable. Such instability could generally be avoided by the use of a sufficiently wide bid/ask spread between purchases and sales at the redemption window. A spread would be required in any event, as in the foreign exchange and other asset markets, to cover the cost of the window's operations.

The use of a commodity (such as gold) as the redemption medium would seem to suffer from the problem that it becomes difficult for the market to determine its relative price when the issuers of bank notes are prepared to redeem them for an amount of the commodity equal in value to the valun basket. Under these circumstances the redemption price of the commodity will set the market price, and the market will be supplied all it wants at that price. The issuers of bank notes cannot respond to the markets' excess demand for the commodity at its most recently posted redemption price by adjusting its price unless the market price of the redemption asset rises. This is exactly

what happens as note issuers buy the asset in the market in order to satisfy redemptions without unduly depleting their reserves. Nonetheless, this exerts powerful market forces against the overissue of bank notes.

The use of financial assets as the redemption medium is free of this problem. The value bank-note price of a Treasury bill depends only on its (value-bank-note-denominated) interest return (and market interest rates). The purest form of the use of a financial asset as the redemption medium would be the use of bank notes. The moment the bank-note value of the value basket rose above one value, issuers would be required to redeem the basket's value in bank notes for each bank note returned (for example, one bank note could be redeemed for $1 + \alpha$ bank notes). In this case redemption would not reduce the quantity of money *directly* but would exert powerful market pressure on issuers to do so through other means. Any stickiness in market price adjustments would necessitate bid/ask spreads at the redemption window.

23. This is obviously a misconception for individual banks (or money issuers), but it is a misconception for all banks collectively as well because not all gold or reserves would be in the banking system.

24. Just as the market has dealt with the risk of payment by check, it would need to cope with the risk of multiple currencies issued by private banks. Payment with checks drawn on thousands of (unknown) banks are acceptable, in part, because payments are not legally final until the checks have been cleared—that is, until the transfers of assets between the paying and receiving banks have been completed. It seems likely that bank notes of only (possibly a small number of) major well-known banks would circulate much outside the immediate region of the issuing bank's offices. This would depend, in part, on the extent of branching. Attempting, however, to second-guess the evolution of market arrangements for dealing with these or other risks is itself a very risky business.

25. It does not seem necessary or desirable to limit the units in which voluntary contracts may be denominated.

26. See George A. Selgin's very important book (1988) for an extensive discussion of this point. See also Timberlake 1984.

27. In a panel discussion with Hayek in St. Andrews, Scotland, in September 1976, I argued that money was one of the few economic goods that could not be competitively supplied (obviously bank money can be competitively supplied, if constrained by a limited supply of government-controlled reserve money). My mistaken view at that time in part reflected my failure to fully appreciate the implications of the "money" back (redemption) guarantee in terms of a unit of account defined independently of the medium of exchange. See the excellent discussion in Selgin 1988.

28. Economic agents are not likely to accept privately produced money that does not carry a redemption guarantee. Counterfeit money therefore makes such a pledge as well, though the issuer has no intention of honoring it. Counterfeiting is therefore correctly categorized as fraud.

29. The government might also wish to impose prudential conditions for the right to operate banks and hence to produce money. This might include minimum capital requirements, accounting and reporting standards, and external audits. Contract and the criminal law would, of course, also need to apply.

30. Irving Fisher 1913, 337.

31. *Ibid.*, 331.

32. *Ibid.*, 494, 502.

33. The number of currencies went from ten to twelve on September 21, 1989.

34. The value of the ECU in terms of the U.S. dollar and other currencies is circulated and published daily by the Commission of the European Communities. A dollar value may be computed at any time by applying the market exchange rates of the currencies in the ECU valuation basket in terms of the dollar and adding up the dollar equivalent of each currency.

35. See Coats et al. 1987. These details of the ECU Clearing House settlements changed after 1987. The current settlement rules are described in Folkerts-Landau and Garber 1991.

36. The "official" ECU used among EC central banks does not constitute such an asset as it is not and cannot be held by commercial banks.

37. Several conditions would be particularly helpful in protecting the rules of the game by making it less attractive or more costly to violate them. Chief among these is the right to contract in the unit (that is, valuns rather than valun notes). This right would be violated if any monetary asset were made legal tender. Several other conditions would also be helpful: the prohibition of government from issuing currency or borrowing from banks (especially a central bank); the general domestic and international convertibility of money; the right of residents to hold and deal in any monetary assets of their choice; and appropriate rules on the assets that must be held against currencies issued.

38. This point is not defended here, but the reasons would include (a) more efficient resource allocation because of the improved quality of price signals; (b) increased and more efficient investment as a result of reduced risk of long-term contracting; and (c) reduction or elimination of monetary business cycles as a result of elastic adjustment of money supply to (changes in) demand. The widespread use of such money (that is, truly fixed exchange rates) would extend those benefits from national economies to the world economy. On the other hand, there could no longer be monetary policy in the sense of manipulations of the money supply to influence aggregate demand. I am persuaded by the evidence, however, that monetary policy has caused economic disturbances more often than it has prevented or moderated them. See, for example, Friedman and Schwartz 1963.

39. The notion of constant real value, however, is somewhat ambiguous. A unit of account can be defined unambiguously as so much gold of a specified purity or as a basket of specific amounts of commodities of particular qualities, but not as a basket of all goods and services, or even of all commodities, present and future. The economic world is characterized by ever-changing relative values between an ever-changing collection of goods and services. This does not mean that the value of a carefully chosen basket of representative commodities might not closely mirror the value on average of all goods and services. Nevertheless, it must be understood that a concretely defined unit of account cannot go beyond aggregating in some fashion the values of a discrete and specific set of things whose values concern us and cannot be defined so as to guarantee its real value in terms of an ever-changing list of all goods and services.

40. The telephone and fax come to mind. Facsimile machines have been around for several decades but have only become very useful recently after a large number of them were in use.

41. White 1983, 294.

42. The arguments against the treatment of money as a public good given by White (ibid. 291–92) do not apply to the unit of account. An anonymous referee made the following insightful observation: “The unit of account is not a public good at the relevant margin. That is, the market gives us one without collective action, . . . and one is as many as we want. *Improvement* of the unit of account, or synchronized *switching* to a better unit of account, could be considered a public good.”

43. See Hayek 1978.

44. See Gold.

45. The same point was made by Yeager 1983.

46. Examples of institutions or agreements that use the SDR are the Arab Monetary Fund, the International Telecommunications Union, the Common Fund for Commodities, and the International Center for Settlement of Investment Disputes.

47. Historically, the IMF’s members created the new asset to supplement existing reserve assets, not to introduce a new unit of account. The SDR’s value was defined to be the same amount of gold as defined one U.S. dollar at that time (1970). Its valuation was first based on a basket of currencies in 1974, after the widespread floating of the major reserve currencies.

48. This criterion is less important for the units denominating financial instruments because anticipated changes in the “real” value of such units (that is, anticipated inflation in terms of such units) tend to be reflected (hence compensated for) in the interest rates paid on such instruments.

49. As IMF quotas are also denominated in SDRs, this would have the further advantage of maintaining the real value of the size of the IMF even when inflation erodes the values of the SDR basket currencies. Similarly, the real value of allocated “official” SDRs would be preserved.

50. In addition to the usual list of high-inflation countries, the countries of Eastern Europe and the former Soviet Union come to mind.

51. General Assembly document A/CN.9/200, May 11, 1981.

52. Effros 1982, 40.

53. Each currency component would simply be multiplied by its price index.

54. One candidate is gold. In the *IMF Staff Survey* article by Robert C. Effros cited in note 52, however, it is reported that “over the last decade the market price of gold appears to have been more volatile than the prices of most commodities.” In addition, the inclusion of gold in the valuation basket might raise questions about the restriction in the IMF’s Articles of Agreement (Article V, Section 12) against fixing the price of gold in the gold market. It is obvious, however, that fixing the gold content of money does not fix the relative price of gold in the gold markets.

55. The purpose of frequent valuation of the present SDR valuation basket is quite different. It is officially valued daily by the IMF and as needed (that is, continuously) in private financial markets because most SDR obligations are settled in national currencies and because most SDRs are acquired or used in foreign exchange transactions. If the SDR were adopted as a national (or worldwide) unit of account, SDR obligations would be settled with SDR-denominated assets one for one. Its valuation basket would need to be valued only for purposes of the obligations to redeem SDR-denominated money.

56. An unchangeable commodity basket (or one with quinquennial adjustments

that preserve the basket's value at the time of each change) is a potentially interesting compromise between the present currency basket and a fully constant real value basket.

57. The present rules require that a new basket have the same value as the old one on the last day the old one is in use.

58. The *Economist*, November 1, 1965. The signatories of the manifesto were Giorgio Basevi, Michele Fratianni, Herbert Giersch, Pieter Korteweg, David O'Mahoney, Michael Parkin, Theo Peeters, Pascal Salin, and Niels Thygesen.

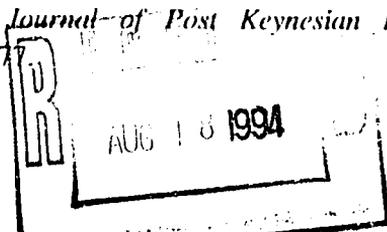
59. While this would not be true on average, since allocations must be approved by 85 percent (weighted) of the IMF's members, it could be true for some individual recipients.

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