

Monetary Systems and Monetary Theory

By Filippo Cesarano*, Rome

The focus of research on the international monetary system has shifted towards the study of exchange rate regimes as the evolution of monetary arrangements culminated in the abandonment of any form of convertibility. The chain of events begun in the interwar period eventually led to the overall emergence of fiat money. Milton Friedman has thus remarked: "(T)he world's current monetary system is, I believe, unprecedented. No major currency has any link to a commodity" (1986, p. 643). This epoch-making change was accompanied by the development of modern monetary policy, which, in contrast with the rules of a metallic standard, assigns the central bank an active role in the pursuit of price stability and other welfare targets. On the international plane, the choice of the exchange rate regime becomes a key issue,¹ but this is simply a necessary implication, or a mirror image, of the transformation of commodity money into a fiat instrument. The present paper, therefore, is concerned with the characteristics of the money object and, laying emphasis on the close connection between theory and institutions, investigates the changes in arrangements from a money-theoretical perspective. In a sense, it inverts the traditional approach to the subject since, instead of taking the monetary set-up as given, it looks at its evolution through the lens of theory.

The first part of this article discusses the relationships between monetary institutions and monetary theory, showing that besides contributing to the understanding of institutions, theory is an essential factor in their development. Together with the level of technology, the state of the art of monetary economics shapes monetary arrangements, which thus adapt to

* Thanks are due to David Laidler, Milton Friedman, Jürg Niehans, Larry White, and an anonymous referee for their perceptive comments. The usual caveat applies. The views expressed herein are those of the author and not necessarily those of the Banca d'Italia.

¹ *Krugman* regards the choice of an exchange regime "as the central intellectual question of international monetary economics" (1993, p. 4). The literature on these topics is extensive. Recent references include *Bordo* (1993), *McKinnon* (1993), and *Eichengreen* (1995).

the prevailing theory. The second part considers the development of non-tangible payment media thanks to advances in information technology. The importance of this innovation lies in its potential impact on institutional design, rather than, as the new monetary economics holds (Fama 1980; Hall 1982), on the theory of money. In fact, the complete abandonment of tangible exchange media could have far-reaching implications for the monetary system by reintroducing some of the positive features that characterized commodity standards.

I. Monetary Systems and the Theory of Money

The influence of monetary theory on the evolution of the monetary system is manifest inasmuch as the latter, throughout its history up to the early twentieth century, has been the outcome of a mistaken hypothesis, i.e. metallism.² Paradoxically, this very mistake, when translated into a policy norm, gave the system its strength through the credibility of the rules of the game epitomized by the so-called “gold standard mythology”. However uninteresting nowadays, metallism dominated monetary economics from Aristotle onwards.³ In classical writings the distinction between theoretical and practical metallism is often blurred since it is hard to separate the abstract argument for commodity money from the policy goal of monetary discipline. In any case, the predominance of this doctrine for such a prolonged period is puzzling.

Menger (1892) explains the emergence of exchange media as a spontaneous process, driven by market forces, through which commodities with

² *Schumpeter's* definition runs as follows: “By Theoretical Metallism we denote the *theory* that it is logically essential for money to consist of, or to be ‘covered’ by, some commodity so that the logical source of the exchange value or purchasing power of money is the exchange value or purchasing power of that commodity, considered independently of its monetary role. ... By Practical Metallism we shall denote sponsorship of a principle of monetary policy, namely, the principle that the monetary unit ‘should’ be kept firmly linked to, and freely interchangeable with, a given quantity of some commodity. Theoretical and Practical Cartalism may best be defined by the corresponding negatives” (1954, p. 288, italics in the original).

³ “Whatever may be its shortcomings, this theory (the Metallist Theory of Money), though never unchallenged, prevailed substantially to the end of the nineteenth century and even beyond. It is the basis of the bulk of all analytic work in the field of money” (*Schumpeter* 1954, p. 63). Indeed, as recently as 1929, Hawtrey remarked: “Apart from schemes of the type favored by Mr. Keynes, paper money dissociated from gold is a monetary disease. The abuse of paper money became so prevalent during and after the World War, that it has been given an almost disproportionately important place in latter-day monetary theory” (1929, p. 698).

the highest “saleability” are selected. Modern theory dwells upon Menger’s hypothesis and maintains that a very common good happens to be chosen as a first commodity money because of its market rather than physical characteristics (Jones 1976, p. 775). All the goods that performed monetary functions – cattle, salt bars, cowry shells, and the like – possessed, to varying degrees, those market properties. The selection process was guided by the search for informationally more efficient ways of settling transactions and, as a result, converged towards metals. This advance was conditioned by the state of technology. In the sixth century B.C., progress in metallurgy was in fact essential to start minting coins of uniform quality in Lydia and, hence, to fix the standard more precisely, further enhancing the informational efficiency of commodity money. The innovation soon spread to neighboring Ionian cities and throughout the Greek world (Hicks 1969, pp. 65 - 66). The singular experience of the introduction of paper money in China in the ninth century A.D. was favored by the invention of paper, ink, and printing (Tullock 1957, p. 395). But technology alone cannot account for the prevalence of metallic money for almost three thousand years; the reason must be sought elsewhere.

Primitive money may not have performed all of the traditional three functions. Evidence of an embryonic monetary mechanism can be traced back to ancient societies, such as the Sumerian, which resorted to standardized silver bars as a means of payment. Yet to the economist, a fully-fledged monetary economy emerges with the medium of exchange function which allows the decentralization of exchange. In a commodity money system, information about the quality of the means of payment is a main issue. With regard to the earliest forms of money, this guarantee was provided by merchants (Mélitz 1974, p. 92), but was then appropriated by the political authority, which at first might have commanded a higher reputation. Eventually, the role of fixing the standard and supplying the currency became instrumental to the extraction of seignorage (Friedman 1960, p. 5). In fact, throughout the whole history of metallic money, the government imposed seignorage when it had sufficient power to enforce it (Mundell 1993, p. 2) and when the economy was relatively closed (De Cecco 1987, p. 539). The opposition to this form of disguised taxation provides an early analytical basis for a tightly disciplined commodity money on grounds of distributional justice.

However, the entrance of the government into monetary arrangements has momentous implications for the role of theory in that, as soon as the operation of the system is taken over by a monopolist, an element of voli-

tion is introduced. The exercise of this power requires knowledge of the working of a monetary economy and, thus, even at the most rudimentary stage, the theory of money becomes a central factor in the evolution of monetary institutions. On the other hand, innovation in the payments system and the development of inside money have their roots in competitive market forces so that theory has had little or no effect on the growth of banks and financial intermediaries. The present paper, therefore, disregards the latter topic and concentrates exclusively on the “core” of the monetary system, i.e. the ground rules governing the standard. In contrast with the unplanned spread of banking and finance, the early role of the government as the sole issuer of the currency entailed the design of those rules on the basis of the prevailing state of the art, however backward it was. In particular, an understanding of the nature of money and of the effects of money stock variations was needed.

The classics fully grasped the functions of money, but seldom made the further analytical step to show that the performance of those functions does not require, in principle, an intrinsically useful object.⁴ The most insightful writers intuited the conventional character of money but stopped short of advocating a paper standard. In his penetrating analysis, Galiani (1751, pp. 67 - 71) puts forward the key concepts of today’s literature relating to the notion of money as a record-keeping device and its role in enforcing budget constraints. Nonetheless, he staunchly supports a metallic system. Hume contrasts the nature of money with that of commodities and recognizes the greater security and transportability of paper money but rejects it because of its inflationary effects (1752, pp. 35 - 36).⁵ These works pave the way for the metallist view, common

⁴ The contrast between the first and the second paragraph of the following passage by Say is eloquent: “If . . . money be employed as a mere intermedial object of exchange between an object in possession and the object of desire, the choice of its material is of no great importance. Money is not desired as an object of food, of household use, or of personal covering, but for the purpose of re-sale, as it were, and re-exchange for some object of utility, after having been originally received in exchange for one such already. Money is, therefore, not an object of consumption; it passes through the hands without sensible diminution or injury; and may perform its office equally well, whether its material be gold or silver, leather or paper.

Yet, to enable it to execute its functions, it must of necessity be possessed of inherent and positive value; for no man will be content to resign an object possessed of value, in exchange for another of less value, or of none at all” (1803, pp. 220 - 21).

⁵ In a letter sent to Morellet dated 10 July 1769, *Hume*, while still arguing for a commodity standard in order to maintain purchasing power stability, points out the conventional nature of money. “It is true, money must always be made of some materials, which have intrinsic value, otherwise it would be multiplied without

in classical works, which calls for a convertible paper standard in order to restrain the money stock. This policy prescription, however, does not exclude the conventional character of money on a purely abstract plane. As Mill shows (1848, pp. 542 - 55), an inconvertible paper currency circulates on the sole basis of convention⁶ and its value is regulated by the principle of fixing the quantity, which ultimately depends on the fiat of the monetary authority. This lucid analysis notwithstanding, Mill fiercely opposes the introduction of paper money because it would allow discretion in monetary management, the effects of which are pernicious.

“Such a power (of issuing inconvertible currency), in whomsoever vested, is an intolerable evil. All variations in the value of the circulating medium are mischievous: they disturb existing contracts and expectations, and the liability to such changes renders every pecuniary engagement of long date entirely precarious. ... Not to add, that the issuers may have, and in the case of a government paper, always have, a direct interest in lowering the value of the currency, because it is the medium in which their own debts are computed.” (1848, p. 544)

The originality and modernity of Mill's contribution is evident. On theoretical grounds, inflation tampers with the price system and heightens uncertainty about long-run commitments. Underlying this approach is an equilibrium or natural rate hypothesis that excludes increases in output through engineered changes in money. In the realm of policy, he stresses the need to check money creation and to design a system that attains this objective. The high information content of a commodity standard effectively constrains policymakers' behavior. This provides the rationale for preferring a metallic system to a rule governing an inconvertible paper currency, i.e. maintaining the market price of bullion at the mint price (Mill 1848, pp. 545 - 46). Such an advanced analysis is

end, and would sink to nothing. But, when I take a shilling, I consider it not as a useful metal, but as something which another will take from me; and the person who shall convert it into metal is, probably, several millions of removes distant. ... Our shillings and sixpences, which are almost our only silver coin, are so much worn by use, that they are twenty, thirty, or forty per cent below their original value; yet they pass currency which can arise only from a tacit convention. Our colonies in America, for want of specie, used to coin a paper currency; which were not bank notes, because there was no place appointed to give money in exchange; yet this paper currency passed in all payments, by convention; and might have gone on, had it not been abused by the several assemblies, who issued paper without end, and thereby discredited the currency” (1752, pp. 214 - 15).

⁶ “In the case supposed (of an inconvertible paper currency), the functions of money are performed by a thing which derives its power for performing them solely from convention; but convention is quite sufficient to confer the power; since nothing more is needful to make a person accept anything as money, and even at any arbitrary value, than the persuasion that it will be taken from him on the same terms by others” (Mill 1848, p. 542).

hard to find in later works which also advocate metallism but support it with much less refined arguments. Jevons's discussion of inconvertible paper money (1875, pp. 234 - 37), for instance, compares rather poorly with Mill's.

This concise account of classical thinking points to the overall dominance of metallism and of a model of the economy based on the existence of a stable equilibrium, which both bear upon the widespread support of a commodity money system. There were, of course, exceptions to this ruling paradigm – e.g. the inflationist views of Thomas Attwood and the Birmingham School – but they had little or no following. The classics consider the economy as self-adjusting and, thus, do not even conceive of an activist use of the monetary instrument within a welfare optimizing framework. This theoretical approach goes hand in hand with the rules of a metallic standard inhibiting variations in the money stock. The latter were, in fact, resorted to only in exceptional circumstances.

A metallic system, however, can suffer from an excess of discipline in that it may not allow sufficient growth in the money stock to stabilize the price level. In the last quarter of the nineteenth century, characterized by declining prices, a wide debate developed on monetary reforms designed to attain a stable purchasing power (Laidler 1991, ch. 6). A gradual but steady process led to support for the introduction of discretionary elements into the rigid rules of commodity standards. Throughout this period and even beyond the First World War, a stable price level remained the only target and the analysis was still based on the model of classical economics with the assumption of equilibrium stability. Afterwards, however, both metallism and the equilibrium hypothesis were criticized and eventually overturned, thus ending a tradition that dated back to the dawn of monetary theory. Keynes's *Tract* (1923) marks this epoch-making intellectual departure by providing a thorough critique of the gold standard. The monetary authority is assigned an active role in stabilizing the price level, output, and employment (1923, pp. 172 - 73).⁷

⁷ Keynes's analysis was at the time a radical one and represented a minority position. Only in the thirties, after the shock of the Great Depression, did his ideas gain ground. Nonetheless, a group of continental writers continued to advocate a metallic standard emphasizing the problem arising from its demise. Ludwig von Mises gave an early warning of the danger of discretionary monetary policy, both from a political and a macroeconomic viewpoint. In particular, he anticipates the key argument, i.e. the lack of knowledge of the transmission mechanism underlying Friedman's simple rule. "The ideal of a money with an exchange value that is not subject to variations due to changes in the ratio between the supply of money and the need for it – that is, a money with an invariable *innere objektive*

To this end Keynes turns the design of monetary arrangements upside-down: instead of setting up rules to constrain central bank behavior, the system must allow freedom of action to the policymaker.

From an international economics viewpoint, the counterpart to this position is the call for flexible exchange rates. Keynes discusses at length (1923, ch. IV) the choice between price level and exchange rate stabilization and supports the former since, under fixed exchange rates, the adjustment mechanism is too slow and costly in terms of employment and real income. A flexible exchange rate regime complements an analytical framework in which the stock of fiat money is maneuvered by the central bank to control the price level and the business cycle. Hence, a key aspect underlying the choice between fixed and flexible exchange rates hinges on alternative views about the nature of money and the equilibrium properties of the economy. Once the target of stabilizing output and employment opens the Pandora's box of a fiat medium of exchange, it seems hard to go back to commodity money, or to any other system whose rules strictly constrain central bank behavior. It is eloquent that Milton Friedman, the arch-enemy of discretionary monetary policy, regards "a return to a gold standard as neither desirable nor feasible" (1986, p. 646) despite the cost of a low degree of long-run price-level predictability in the presence of fiat money. In such a system, it may be further remarked, deflation is an unlikely event since it is difficult to imagine a persistent decline in prices engineered by the monetary authority. To use a recurrent metaphor, today's monetary system is, in a sense, exposed to inflationary drift insofar as it lacks a monetary anchor and exchange rate flexibility reflects this state of affairs.

A main implication of the transition to fiat money is the possibility of implementing continuous as opposed to once-and-for-all changes in the money stock. This is important not only from the viewpoint of pure theory, but also on policy grounds. First, it raises the time inconsistency

Tauschwert – demands the intervention of a regulating authority in the determination of the value of money; and its continued intervention. But here immediately most serious doubts arise from the circumstance, already referred to, that we have no useful knowledge of the quantitative significance of given measures intended to influence the value of money. More serious still is the circumstance that we are by no means in a position to determine with precision whether variations have occurred in the exchange value of money from any cause whatever, and if so to what extent, quite apart from the question of whether such changes have been effected by influences working from the monetary side. Attempts to stabilize the exchange value of money in this sense must therefore be frustrated at the outset by the fact that both their goal and the road to it are obscured by a darkness that human knowledge will never be able to penetrate" (*Mises* 1912, p. 269).

problem, which, in a metallic standard, was solved by the very rules of the system. Second, it allows monetary financing of the public deficit even for sizable amounts, with virtually no time limit. Under the gold standard, this policy could only be temporary since it involved a publicly announced breaking of the rules, namely the suspension of convertibility or a variation of the unit of account, but the latter could not be implemented day to day and the former was subject to the limit of the “restoration rule” (McKinnon 1993, pp. 6 - 7), which required the re-establishment of the traditional mint parity. True, even metallic standards had elements of discretion but a crucial difference compared with fiat money was the exceptional nature of recourse to them. Indirect evidence is provided by the behavior of the price level which remained roughly constant in both Britain and the United States during the periods 1740 - 1930 and 1832 - 1932 respectively (Friedman 1986, p. 643). In a fiat money system, instead, no announcement is needed about policy shifts, which, in any case, are not constrained by pre-set rules. When all countries are on an irredeemable paper standard, a fixed exchange rate regime is a fragile construction.⁸ The refusal to disinflate the American economy in 1971 in order to prolong the Bretton Woods system was, rather than a schizophrenic attitude as argued by McKinnon (1993, p. 39), simply the consequence of the epochal change in the approach to money and monetary policy. Having assigned a central place to discretionary policymaking, it was natural for the U.S. not to sacrifice domestic targets to maintain the stability of the international monetary system. Indeed, the factors singled out by Bordo to account for the short life of the Bretton Woods system – 1. two fatal flaws in its design: the gold exchange standard and the adjustable peg; 2. the failure of the United States to maintain price stability after 1965; and 3. the reluctance of the other major industrial countries to follow U.S. leadership when it conflicted with their national interests (1993, p. 83) – all boil down to the spread of managed fiat money.

All in all, the history of monetary institutions has been conditioned by the government having early arrogated to itself the role of fixing the standard and supplying the currency. This monopolistic element has pushed market forces, which were a key factor in the origin of money

⁸ According to *Giovannini*, “a fixed-exchange-rate system under a fiat currency regime is a monetary rule ... only under two rather strong conditions: that the exchange rate is a more credible target than any other monetary target and that the international system has built-in features that discourage global inflation (penalties for deficit countries or independent and conservative central bankers)” (1993, p. 114).

and the introduction of fiduciary instruments as less costly ways of settling transactions, away from the core of the monetary system and has given theory a prominent place. Indeed, the transition from commodity to fiat money was accompanied by the major turn in theory away from metallism and the model of classical economics.

II. Non-Tangible Payment Media and the Monetary System

Technical progress has often been the driving force in the development of monetary institutions. A notable example is the introduction of the steam-powered stamping press in the early eighteenth century, which set the pace of the diffusion of the gold standard (Redish 1990). In recent decades, an equally momentous breakthrough has been determined by computing technology that substitutes electronic signals for physical payment media. From a theoretical viewpoint, however, the shift from commodity to fiat money is much more significant than that from fiat to non-tangible money, since the latter merely concerns the outer shape of the means of payment already severed from its commodity characteristic.⁹ Replacing dollar bills with electronic signals is, in analytical terms, a much less dramatic change than introducing irredeemable paper money in place of metallic currency. Nevertheless, the substitution of an accounting system of exchange for tangible fiat money may considerably influence the design and operation of monetary arrangements.

The quantum jump in information and computation technology has brought about substantial changes in the financial industry, fostering the growth of new products, increasing social welfare, raising the industry's overall efficiency. This development is not without consequences for the main properties of the monetary system. Indeed, the introduction of fiduciary elements in the metallic standards of the nineteenth century set in motion major innovations, which eventually gave rise to central banking and modern monetary policy. Likewise, the current innovations in pay-

⁹ "Increasing the use of cash-cards substituting for cash is comparable to increasing the use of checks relative to cash. ... The mentioned developments increase the efficiency of the MOE (medium of exchange) because they allow individuals to transact without incurring 'shoe-leather costs' for obtaining cash and for gathering information about products and services. The developments do not fundamentally change the payment system, however, because they still depend strongly on national banking systems. In the terminology of monetary theory the cash cards and the use of credit and payment cards for electronic payments increase the velocity of money issued by central banks" (*Eliasson and Wihlborg 1998*, pp. 8 - 9).

ment technology, pointing towards non-tangible money, may well introduce entirely new features in the monetary mechanism.¹⁰ The enhanced efficiency of payment media supplied by private issuers will erode central banks' seignorage. Moreover, in countries experiencing substantial price increases, the base of the inflation tax will shrink, thus reducing this source of government revenue. In the short run, however, a significant role remains for central banks, not because of the issuing monopoly granted by law, but rather for reasons relating to the microfoundations of money. On empirical grounds, Friedman and Schwartz (1986, p. 44) emphasize the continued use of money in countries hit by hyperinflation, even if alternatives are available, in order to call attention to the value people attach to a single unit of value and medium of exchange. The basis of this observation is the notion of money as a record-keeping device, i.e. as an information-producing mechanism allowing the decentralization of exchange. The cost, in the form of an information loss, of parting with the money already in circulation is so great that it overcomes the huge tax due to hyperinflation. Hence, private competitors are challenging the central bank not by offering a different money but by dramatically improving the efficiency of the payment system to the point of making physical exchange media totally obsolete.

This is the state of affairs envisaged by Fama (1980) in a well-known article which pioneered the so-called "new monetary economics". The main function of banks is to maintain an accounting system of exchange that, in contrast with currency, does not require a physical medium. Banks invest customers' deposits in securities and thus perform a second major function, portfolio management. Since the portfolio management activities of banks, in a competitive environment, are subject to the Modigliani-Miller theorem, there is no need to control the stock of either deposits or securities to obtain a stable general equilibrium with respect to output and the price level. As Fama (1980, p. 49) acknowledges, however, this result relates to a Walrasian, not to a monetary economy. The accounting system of exchange reflects a Walrasian world, in which money plays no essential role, and thus runs into the Wicksellian price level indeterminacy problem. There are, in fact, no well-defined demand and supply functions for money by means of which to assign the unit of account determinate prices in terms of other commodities.¹¹ As long as

¹⁰ The effects of the advance in electronic payment systems on commercial banks are not addressed in the present paper but are examined by *Eliasson and Wahlborg* (1998).

¹¹ In his discussion of the "clearing system", *Hicks* explains the problem originally raised by Wicksell's analysis of a "pure credit system" (1906, pp. 79 - 126).

currency survives because of a higher level of efficiency, the indeterminacy problem does not arise. Yet, this state of affairs may not last. Currency velocity would then tend to infinity, which is but another angle from which to view the indeterminacy problem (Eliasson and Wihlborg 1998, p. 9).

The principle of bank clearing is of course not new. The growth of the banking industry prompted classical economists to envisage universal bank accounts together with the elimination of cash as an “ideal case” (Mill 1848, p. 524). Jevons (1875, pp. 303 - 304) even imagined a “world’s clearing house”. Amid this widespread debate, Wicksell’s analysis of a “pure credit economy” (1906, pp. 87 - 126) was a main contribution to the understanding of a payment system devoid of currency. The present-day advance in communications and computing has given content to a pure abstract framework and represents a further stage of an evolutionary process. The cashless society may not be at hand insofar as transaction costs, accounting and anonymity features make currency hard to replace (Shubik 1990, pp. 191 - 92), although this opinion may underestimate future progress in transaction technology.¹² However, the issue here is not factual. The important point is whether the set of rules governing non-tangible money can restore monetary discipline.

Viable standards must rest on a peg and, very often, proposals for reform have simply changed the type of peg. Any monetary system is organized on the basis of “rules of the game” that assure its viability: fixing the metal content of the monetary unit in the gold standard and

“For it is with this organization (the clearing system) that we first meet a clear case of the Wicksellian phenomenon, a market in which absolute prices – money prices – are indeterminate. The money is simply a unit of account; it is not one of the traded commodities; there is therefore no supply-demand equation to determine its value. The Walras equations are sufficient to determine relative prices, prices (that is) in terms of one of the traded commodities taken as numeraire; but this numeraire is not the money in terms of which calculations are made. That money does not enter into the Walras equations; it is altogether outside them. The money prices can be at any level, yet the same Walras equilibrium will be attained” (1967, pp. 9 - 10). Patinkin’s solution of the Wicksellian problem hinges on the following point. “(I)n order for the absolute price level to be determined by market-equilibrating forces, changes in it must impinge on aggregate *real* behavior in *some* market – i. e., must create excess demand in *some* market” (*Patinkin* 1961, p. 113, italics in the original).

¹² According to *The Economist* (29 January 1994, vol. 330, pp. 71 - 72), the National Westminster Bank is experimenting with a smart card that can be used both to pay and to receive money in up to five different currencies. Furthermore, the recent technology of “digital cash” allows to preserve the payer’s anonymity in electronic deposit transfers. I owe this information to Larry White.

setting a limit on the quantity of fiat money are examples of rules. Commodity standards have dominated throughout history because of the simplicity of their rules.¹³ A pure commodity-money system, as long as there is no interference in the market of the money commodity, only requires the definition of the unit of account. The momentous implication of the simplicity of such rules is the easy detection of breaking them: this enhances enforcement and, thus, credibility. These characteristics are maintained even after the introduction of fiduciary elements through convertibility (see the discussion of Mill's views in section I.). Things become quite different, however, in a fiat money standard, which not only lacks a mechanism to control money creation but also, and more importantly, lacks a direct and timely informational device to monitor the behavior of the issuing authority. Commodity money, which rested on the myth of metallism, was immune from such failures. Nowadays, a new myth is not available and the system must be built on more solid foundations.

In a fiat money regime, the degree of discipline characteristic of commodity standards seems difficult to restore. Resort to written, constitutional rules to bind policymakers' behavior would not do insofar as any commitment technology is doomed to fail if it is difficult to monitor and is not based upon widely held tenets. Credible rules should be founded on principles that are derived from theory, not artificially constructed. In the past, the unyielding trust in commodity money gave rise to the principles of metallism. Today, the eventual evolution towards an accounting system of exchange could bring forth a different set of principles to fill the void left by the collapse of the metallist myth. With the disappearance of tangible means of payment, theory calls for the control of a nominal quantity which acts as a peg or an anchor of the price level (Patin-kin 1961) and thus solves the Wicksellian indeterminacy problem. In an advanced monetary environment where physical exchange media have long vanished, a constant stock of a fiat instrument – even, say, a single dollar bill, if we disregard the inconvenience of quoting prices in trillionths – simply satisfies the technical requirement of making the price

¹³ Commenting on the difficulty of implementing a plan designed to prevent inflation, *Peter Bernholz* notes: "The pure gold and silver standards had one clear advantage. The rule of convertibility of bank notes against the precious metal and vice versa, at a fixed parity, could always be tested by everybody and could not be easily reinterpreted by governments, central banks, or supreme courts" (1987, p. 103). He then puts forward a radical proposal, i.e. to "institute a pure gold standard, and allow free banking" (1987, p. 104), inspired by the successful Scotch free banking system.

level determinate. This requirement, it should be emphasized, is quite distinct from a guideline for monetary policy. More important, it is dictated by theory and is difficult to tamper with precisely because it admits no variation at all. Thus, violations are immediately detectable¹⁴ and the system regains the simple, easily enforceable and credible rules of commodity money. Paradoxically, the complete demise of tangible payment media leads to an institutional framework whose properties are, in some respects, like those of the earlier commodity standards. This result rests on the solution of Wicksellian indeterminacy, which necessitates a clear-cut technical requirement to assure viability. If this were thought of as natural and ineluctable, as metallism was, then the system would lose the man-made character of fiat money and re-establish unquestionable rules of the game as in a commodity standard proper.

Besides currency and commodity money, price level determinacy can also be obtained by imposing reserve requirements (Fama 1980, pp. 51 - 53). Such requirements are a form of government regulation because the demand for non-interest bearing central bank reserves would otherwise not exist. But this may be short-lived. In fact, in a context of accelerating technological progress, the problem common to all the solutions – currency, commodity money, and reserve requirements – is their long-term survival. The exploitation of profit opportunities can hardly be stopped by government. Indeed, the search for less costly ways of executing transactions has been the driving force of monetary evolution since its dawn. The only limit to this spontaneous, natural process is the specific requirement for assuring the system's viability, as suggested by the prevailing theory. Hence, credible solutions of the determinacy problem should not have the character of regulation but must rest on firm analytical foundations.

A final word of caution is in order. In this advanced state of monetary arrangements, money supply changes aimed at pursuing welfare targets are excluded, though the government can still influence economic activ-

¹⁴ *Friedman* has called for such a rule, albeit in the traditional context of monetary policy in a tangible money world. "Why zero growth? Zero has a special appeal on political grounds that is not shared by any other number. If 3 percent, why not 4 percent? It is hard, as it were, to go to the political barricades to defend 3 rather than 4, or 4 rather than 5. But zero is – as a psychological matter – qualitatively different. It is what has come to be called a Schelling point – a natural point at which people tend to agree, like 'splitting the difference' in a dispute over a monetary sum. Moreover, by removing any power to create money it eliminates institutional arrangements lending themselves to discretionary changes in monetary growth" (1984, p. 50).

ity through other policies. The financial industry is completely deregulated and banks, besides managing the payments system, are portfolio managers matching the demand for and supply of assets held by the public. The disappearance of monetary policy may be either hailed as progress or viewed as a step backward, depending on whether the equilibrium hypothesis is accepted or refused. During the last quarter of a century, the pendulum has swung back towards the classical model, thus rejecting the possibility of steering the economy on a superior welfare trajectory through active monetary management. But the subject, one of the most controversial in economics, is far from being settled. A necessary condition for the emergence of the state of affairs described in the present section is the rejection of discretionary monetary policy on the basis of an equilibrium model. Then, the flexibility of the real sector of the economy, enhanced by the removal of regulation and the spread of information, could match the advance in transaction technology and draw near the kind of frictionless world underlying the classical paradigm. In this scenario, the rules of an accounting system of exchange would allow only once-and-for-all changes in the money stock in response to extraordinary events, as in commodity standards.

III. Concluding Remarks

The early appropriation by the government of the money issuing function has introduced a volitional element in the design of the monetary system whose evolution has thus been conditioned by the progress of monetary theory. Throughout history up to the early twentieth century, metallism and the equilibrium model of the economy provided the analytical foundations of commodity standards. The critique of both principles after the First World War turned the approach to monetary arrangements upside down paving the way for the development of fiat money. However, the benefit of the resource saving associated with the abandonment of commodity money must be set against the lack of long-term price level predictability. In the current system, discipline is hard to impose and, thus, the credibility problem, which the rules of a commodity standard solved from the very start, is now rather intractable. Hence, Friedman has noted “that there is need for either some anchor to provide long-term price predictability, some substitute for convertibility into a commodity, or, alternatively, some device that would make predictability unnecessary” (1986, p. 646).

Substantial advances in information and communication technology could bring forth such a device in order to assure the viability of an accounting system of exchange. The constant stock of a fiat instrument needed to make the price level determinate is indeed a technical device to anchor the system, much like convertibility in metallic standards. Underneath this institutional framework, it should be recalled, there is a conception of the equilibrium properties of the economy that leads back to the classical approach. Unless this “vision” were firmly held by both policymakers and society at large, the new monetary order could hardly emerge despite the available technology. The history of monetary arrangements is indeed conditioned by the limitations of theory.

The foregoing discussion should not be interpreted as a proposal for reform – exercises of this kind are as abundant as they are ephemeral and uninteresting – but as an analysis of the evolution of monetary arrangements. Innovation in domestic money is eventually transferred to the international arena, although reform projects, even the most brilliant and original ones, such as Wicksell’s and Fisher’s, are often checked by the influence of the prevailing theory. The diffusion of a new monetary system is, in fact, a complex process and difficult to initiate.¹⁵ The progress in payment technology may eventually foster theoretical advances providing the foundation of an innovative and more stable monetary system.

References

Bernholz, Peter: “The Implementation and Maintenance of a Monetary Constitution”, in James A. Dorn and Anna J. Schwartz, eds., *The Search for Stable Money. Essays on Monetary Reform*, Chicago, The University of Chicago Press, 1987. – *Bordo, Michael D.*: “The Bretton Woods International Monetary System: A Historical Overview”, in Bordo and Eichengreen (1993). – *Bordo, Michael D./Eichengreen, Barry, eds.*: *A Retrospective on the Bretton Woods System. Lessons for International Monetary Reform*, Chicago, The University of Chicago Press, 1993. –

¹⁵ The following episode is reported by Gordon *Tullock*: “The necessity of a lengthy indoctrination in the use of paper money before an inflationary policy becomes possible can be illustrated by an incident which occurred during the Mongol dynasty. The Mongol IlKhans in Persia, impressed by the use of paper money by their suzerain in China, decided to use the same device themselves. Technical advisers were sent from Peking, and an elaborate organization was set up. The Persians, however, had not been accustomed to the use of paper currency by several hundred years of gradual developments. They simply refused to believe that these nicely printed pieces of paper were worth anything, and the experiment was a failure” (1957, p. 395, f. 5).

De Cecco, Marcello: "Gold Standard", in John Eatwell, Murray Milgate and Peter Newman, eds., *The New Palgrave. A Dictionary of Economics*, London, Macmillan, 1987. – Eichengreen, Barry: "The Endogeneity of Exchange Rates Regimes", in Peter B. Kenen, ed., *Understanding Interdependence*, Princeton, Princeton University Press, 1995. – Eliasson, Gunnar/Wihlborg, Clas: "Electronic Money. New Markets for Banks, Markets for New Banks, or Markets for Non-Banks", Paper presented at the International Joseph A. Schumpeter Conference, Vienna, June 1998. – Fama, Eugene F.: "Banking in the Theory of Finance", *Journal of Monetary Economics*, January 1980, 6, 39 - 57. – Friedman, Milton: *A Program for Monetary Stability*, New York, Fordham University Press, 1960. – Friedman, Milton: "Monetary Policy for the 1980s", in John H. Moore, ed., *To Promote Prosperity: U.S. Domestic Policy in the Mid-1980s*, Stanford, Hoover Institution, 1984. – Friedman, Milton: "The Resource Cost of Irredeemable Paper Money", *Journal of Political Economy*, June 1986, 94, 642 - 47. – Friedman, Milton/Schwartz, Anna J.: "Has Government Any Role in Money?", *Journal of Monetary Economics*, January 1986, 17, 37 - 62. – Galiani, Ferdinando: *On Money*, (1751), translated by Peter R. Toscano, Ann Arbor, University Microfilms International, 1977. – Giovannini, Alberto: "Bretton Woods and Its Precursors: Rules versus Discretion in the History of International Monetary Regimes", in Bordo and Eichengreen (1993). – Hall, Robert, E.: "Monetary Trends in the United States and the United Kingdom: A Review from the Perspective of New Developments in Monetary Economics", *Journal of Economic Literature*, December 1982, 20, 1552 - 56. – Hawtrey, Ralph G.: "Money", in *The Encyclopaedia Britannica*, 14th edition, London, The Encyclopaedia Britannica Company, 1929. – Hicks, John R.: *Critical Essays in Monetary Theory*, Oxford, Oxford University Press, 1967. – Hicks, John R.: *A Theory of Economic History*, Oxford, Oxford University Press, 1969. – Hume, David: "Of Money", (1752) in Eugene Rotwein, ed., *Writings on Economics*, Madison, The University of Wisconsin Press, 1970. – Jevons, Stanley W.: *Money and the Mechanism of Exchange*, London, C. Kegan Paul & Co., 1875. – Jones, Robert A.: "The Origin and Development of Media of Exchange", *Journal of Political Economy*, August 1976, 84, 757 - 75. – Keynes, John M.: *A Tract on Monetary Reform*, London, Macmillan, 1923. – Krugman, Paul: "What Do We Need to Know About the International Monetary System?", *Essays in International Finance* No. 190, Princeton, N. J., Princeton University, International Finance Section, July 1993. – Laidler, David: *The Golden Age of the Quantity Theory. The Development of Neoclassical Monetary Economics 1870 - 1914*, New York, Allan, 1991. – McKinnon, Ronald, I.: "The Rules of the Game: International Money in Historical Perspective", *Journal of Economic Literature*, March 1993, 31, 1 - 44. – Mélitz, Jacques: *Primitive and Modern Money*, Reading, Mass., Addison Wesley, 1974. – Menger, Carl: "On the Origin of Money", *Economic Journal*, June 1892, 2, 239 - 55. – Mill, John Stuart: *Principles of Political Economy*, (1848), edited with an introduction by William Ashley, London, Longmans, Green & Co., 1909. – Mises, Ludwig von: *The Theory of Money and Credit*, (1912), Indianapolis, IN, Liberty Classics, 1981. – Mundell, Robert: "Prospects for the International Monetary System", Paper presented at the Conference on "The Future of the International Monetary System and its Institutions", Geneva, September 2 - 4, 1993. – Patinkin, Don: "Financial Intermediaries and the Logical Structure of Monetary Theory", *American Economic Review*, March 1961, 51, 95 - 116. – Redish, Angela: "The Evolution of the Gold Standard in England", *Journal of Economic History*, December 1990, 50, 789 - 805. – Say,

Jean-Baptiste: *A Treatise on Political Economy*, (1803), New York, Kelley, 1971. – Schumpeter, Joseph A.: *History of Economic Analysis*, Oxford, Oxford University Press, 1954. – Shubik, Martin: “A Game Theoretic Approach to the Theory of Money and Financial Institutions”, in Benjamin M. Friedman and Frank H. Hahn, eds., *Handbook of Monetary Economics*, Amsterdam, North-Holland, 1990. – Tullock, Gordon: “Paper Money – A Cycle in Cathay”, *Economic History Review*, April 1957, 9, 393 - 407. – Wicksell, Knut: *Lectures on Political Economy*, (1906), vol. 2, London, Routledge, 1935.

Summary

Monetary Systems and Monetary Theory

The evolution of monetary arrangements is analyzed from a theoretical perspective showing that, together with technology, the theory of money is an essential factor in the development of monetary institutions. The diffusion of non-tangible payment media will impinge on the monetary system, possibly allowing for the reestablishment of some of the positive features that characterized commodity standards. (JEL E42, F33)

Zusammenfassung

Währungssysteme und Währungstheorie

Die Analyse von Währungsvereinbarungen zeigt, daß die Geldtheorie – parallel zu technologischen Innovationen – die Entwicklung währungspolitischer Institutionen wesentlich geprägt hat. Die Verbreitung elektronischer Zahlungsmittel wird das Währungssystem beeinflussen und dabei möglicherweise wieder einige der positiven Faktoren betonen, die für Warenwährungen charakteristisch waren.

Résumé

Systèmes monétaires et théorie monétaire

L'évolution des accords monétaires est analysée dans cet article du point de vue théorique. Il est montré que, parallèlement à la technologie, la théorie monétaire est un facteur essentiel pour le développement des institutions monétaires. La diffusion de moyens de paiement non-tangibles se heurte au système monétaire, ce qui permettra probablement de rétablir quelques traits positifs qui caractérisent les normes de base.