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ECONOMIC THEORY, APPLICATIONS AND ISSUES

Working Paper No. 81

**Barter and the Origin of Money and Some
Insights from the Ancient Palatial Economies of
Mesopotamia and Egypt**

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THE UNIVERSITY OF QUEENSLAND

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¹ The initial draft of a possible contribution to a book to be edited by Dr. Dalia A. Pokutta (Archaeology, Stockholm University) and others focussing on barter exchange and other economic features of ancient economies.

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Barter and the Origin of Money and Some Insights from the Ancient Palatial Economies of Mesopotamia and Egypt

ABSTRACT

The "Metallist" origin of money, used as a medium of exchange, is based on the presumed low efficiency of barter. However, barter is usually ill-defined and archaeological evidence about it is inconclusive. Moreover, the transaction costs associated with barter seem to have been exaggerated by metallists. Indeed, the introduction of a unit of account reduces the complexity of the relative prices system usually associated with barter. Similarly, in-kind transactions have timing constraints which are often labeled as "the double coincidence of wants"; with a system of debt and credit, delayed exchange, that is lending, is possible. Such adaptability of barter is confirmed by the study of Mesopotamian and ancient Egyptian palatial economies. They provide evidence that non-monetary transactions have persisted during millennia, challenging the metallist vision about the origin of money.

Keywords: Money, Unit of Account, Medium of exchange, Barter, Palatial economies, Transaction costs, Mesopotamia, Sumerian city-states, Ancient Egypt, Phoenician city-states.

JEL Codes: B11, O1, Z13

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1. Introduction

Money is a fascinating object which, apart from economists, has attracted the attention of other social scientists, especially philosophers, historians and archaeologists. For the latter, the introduction of money in past societies represents one of their major socio-economic changes - as does the introduction of agriculture or metalworking. This should, therefore, lead them to analyze it by means of the usual set of queries, when and where, why and how? However, this is not the case, i.e. this set, or package, of usual queries is not well-tailored for the study of the origin of money.

It is widely agreed by scholars that, for southwestern Asia, coinage was introduced for the first time in Lydia¹ around the seventh century B.C.E.. Such evidence seems to provide a convincing answer to the when and where queries. However, it does not explain why it was introduced. Before coinage, other forms of money existed. Indeed, coining was designed to facilitate the free transferability of metallic money by providing a guarantee of the fineness and weight of metal used as money. Pre-coinage currencies were not restricted to pieces of metal, i.e. various commodities, such as salt, cattle, barley (...) could also be considered as primitive monies (Einzig, 1966; Geva, 1987; Grierson, 1977; Powell, 1996; Quiggin, 1949). The problem with all these primitive monies (including metal ingots) is that they were used for two different purposes, as a means of exchange, and as commodities; therefore, it is very difficult – almost impossible – for archaeologists to identify primitive money from artefacts provided by archaeological excavations. For instance, a retrieved silver ingot could have been kept either for casting jewelry or to be used as a medium of future transactions. Thus, before the introduction of coinage is considered, the when and where queries about the origin of money remain unanswered. This is because unlike agriculture or metalworking, which are both from a mixed-product of nature and culture, money is a purely cultural invention, an "idea". Therefore,

¹ There is evidence that coinage did not originate in Lydia but was imported from elsewhere; however, because Lydian coinage was the first to spread and to gain universal expansion, Lydia can be regarded as the first effective source of coinage (Geva, 1987, p. 130).

since the functions of money evolved and because much of this evolution was not as a result of conscious thought, it is vain to try to find out when and where this idea emerged.

Given this previous restriction on the determination of the origin of money, scholars have focused their attention on the two remaining queries: why money has been introduced in past societies, and how such an introduction unfolded? Starting in the Classical period in ancient Greece, attempts to answer these questions have led to controversies among famous philosophers which are still alive today. On the one hand, Plato (1992) suggested that currency should be regarded as an arbitrary "symbol"² to help exchanges. He was against using precious metals (such as gold and silver) because, in his opinion, the value of currency should be independent from the material from which money is made. On the other hand, for Aristotle (1984) currency was a third merchandise with intrinsic value rather than an abstract monetary sign. For him, the inconvenience of barter led people in ancient societies to choose metals as a means of exchange, because of their physical features.

This Aristotelian or "metallist" vision of currency has been dominant over the Platonic vision until nowadays. Indeed, and as shown in economic textbooks, the origin of money is usually presented according to the metallist vision by "orthodox" or mainstream economists, i.e. economists who firmly believe in the virtues of the market-economy (Clower, 1969; Jevons, 1875; Menger, 1892; North, 1984; Samuelson, 1967; Smith, 1776). For these economists, money, as a medium of exchange - and implicitly also as a unit of account - has been introduced in the economy owing to the lower efficiency of the barter system. Barter - pure and simple - or cashless exchange, is defined as the direct exchange of commodities (or services) between agents, without any intermediate object in the transaction (Chapman, 1980, p. 35). The presumed inefficiency of barter stems from two main transaction costs associated with it. On the one hand, unlike monetary transactions in which money is automatically a unit of account, barter does not imply the introduction of a standard of value. Then as the number of tradeable goods present in the economy increases, the number of relative prices is growing exponentially. On the other hand, since there is no medium of exchange, the transactions necessitate the double coincidence of wants. Even in an economy with a large number of goods and agents, such double coincidence of wants can hardly happen without incurring important searching costs.

² Some contemporary authors agree with Plato's vision even though they used different expressions such as "Money as a metaphor" (Cribb, 2005) and "Money is a creature of law" (Knapp, 1924).

From the mid-eighteen century onward, orthodox economists have supported the metallist vision of the origin of money, because it matches with the economic system they were describing and promoting, namely capitalism. Indeed, money fosters market transactions and the division of labor as well as it promotes economic prosperity. Even though capitalism has been the dominant mode of production only for the last few centuries, scholars are divided about how economies operated in past societies (Davies, 2005). On the one hand, there are the "modernizers" and the "formalists" who share the view of orthodox economists that ancient economies were similar in kind to modern ones and only different in degree, i.e. they were driven by the rational behavior of self-interested optimizing individuals. On the other hand, there are the "primitivists" and the "substantivists" (Polanyi, 1944) who consider that ancient economies were socially embedded or mainly driven by institutions and social obligations, i.e. that the role of individuals as well as markets were secondary. This controversial issue about ancient economies raises doubt about the relevance of the metallist vision for explaining the origin of money in past societies. This doubt becomes even more important when evidence about the existence of barter and pre-coinage currencies in past societies are considered. Indeed, this evidence is either lacking or ambiguous, i.e. can be interpreted according to different and even from opposite points of view. If the analysis of the evidence about barter and money is inconclusive, it is also because barter and the use of coins are not discrete cases- even if the reverse is often thought to be so. Indeed, they are both located at the extremes of a continuous spectrum which includes several intermediate cases such as different media of exchange and primitive monies.

As pointed out by Schumpeter (1972, p. 63), *"whatever may be its shortcomings, this theory [Aristotle's], 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"*. Recently this theory has been challenged on the grounds that it is historically inaccurate. Indeed, recent anthropological studies question the idea that early societies went from a barter economy to money and instead contend that money arose to keep track of pre-existing credit relationships (Douglas, 2016; Graeber, 2011; Martin, 2013). It is therefore our purpose to provide some insights about its relevance for explaining the origin of money in ancient palatial economies. To do this, we assess the extent to which market exchanges are hindered by the presumed transactions costs associated with barter. Then we examine how ancient Near Eastern societies – Mesopotamian and ancient Egyptian – managed to rely on barter for exchange, despite their

growing economies. The available evidence provides some support to Plato's explanation of the origin of currency, and therefore confirms our doubt about the relevance of the metallist vision.

2. The Origin of Money: Metallism vs. Chartalism

As stated previously the origin of money has led to a controversy at least from the Classical period in Greece. This controversy was also present among economists, and is still present today.

According to the epoch considered, the Aristotelian vision of currency is often labeled "Metallism". Metallists believe that money developed spontaneously as a medium of exchange in order to eliminate the obvious limitations of barter. In other words, the origins and the early evolution of money are viewed as an unintended consequence of spontaneous individual actions in the context of barter. Thus, money emerged via a natural process of transaction cost minimization. Metallism was an economic principle stating that the value of money derived from the purchasing power of the commodity upon which it is based. It has deeply influenced monetary policies during the most recent centuries, at least until the end of the Bretton Woods system in the late 1970s, even though the latter issue is still controversial. Nowadays, economists have kept the label "Metallism" even though they are perfectly aware that the value of money has nothing to do with metals. As pointed out by Ingham (2004), even though it is no longer argued that money needs to consist of a material with an intrinsic exchange-value, it is still conceptualized as a commodity since it is understood, as any other commodity, by means of an orthodox methodology in micro-economics.

On the other hand, there is the Platonic vision of currency, also called the credit theory of money (de Bruin *et al.*, 2018). This contends that money is a social construction rather than a physical commodity. The abstract entity in question is a credit relationship; that is, a promise from someone to repay a favor (product or service) to the holder of the token. In order to function, two further features are crucial. First, the promise must be sufficiently credible, that is, the issuer is "creditworthy". Second, the credit must be transferable, that is, others will also accept it as payment for trade. This Platonic vision of currency led to "Chartalism", a term³ coined by Knapp (1924). Indeed it is commonly thought that the most creditworthy issuer of money is the State. Thus, Chartalism, also called "Modern Monetary Theory" in its most recent form, is a theory which argues that money originated with states' attempts to direct economic activity

³ The name derives from the Latin *charta*, in the sense of a token or ticket.

rather than as a spontaneous solution to the problems with barter. It states that fiat currency has value in exchange because of sovereign power to levy taxes on economic activity payable in the currency they issue. Such claim is even grounded on some historical cases, such as for archaic Greece and ancient Mesopotamia (Semenova, 2011). Even though it has fewer proponents than Metallism, some famous economists have supported it to some extent (for example, Galbraith, 2010; Keynes, 1914, 1982; Minsky, 2008; Mitchell-Innes, 1913).

To some extent, the origin of the controversy between metallists and chartalists relies on different points of view about barter. The metallist view posits that individuals engaged in trucking and bartering developed money to minimize their transaction costs (North, 1984)(North, 1984). Hence, the adoption of money as a medium of exchange is simply considered as a technical development. Orthodox economists have proposed various arguments to support this view. For instance, Samuelson (1967, p. 54) stated that "*if we were to reconstruct history along logical lines, [...then] we should naturally follow the age of barter by the age of commodity money.*" These authors have an evolutionist view of modes of exchange across the ages based on the following 'logical' sequence⁴: barter - barter plus primitive money - primitive money - primitive plus modern money - then modern money almost exclusively. Samuelson added (1967, p. 54) that "*Even in the most advanced industrial countries (...) if we strip exchange down its barest essentials and peel off the obscuring layer of money, we find that trade between individuals or nations largely boils down to barter.*" In fact, the vision orthodox economists have about money is not grounded on any evidence (archeological or historical), but is provided by pure logical reconstruction of how they believe transactions were performed in the past. As highlighted by Humphrey (1985, p. 50-51), a good illustration of this methodological approach is provided by Clower (1969). He imagined an island economy without money and assumed that people have a natural desire to trade goods. Given the transactions costs implied by barter, he deduced that people would first bartered at fairgrounds. In the subsequent stage of evolution, he logically deduced that some trading-posts would be established for particular goods. In the next stage, one of the most common item should be used as means of exchange at all the posts. At the final stage, this commodity should be used as money, i.e. as a means of payment, a store of value and a unit of account. This commodity is preferred to others because it can be used as a medium of exchange owing to its intrinsic qualities: divisibility, storability, durability, transportability, uniformity.

⁴For the sake of simplicity we present this evolution in discrete stages. However, archaeological and historical evidence support the view that evolution has rather occurred along the lines suggested.

One may note that the process described in Clower's example is grounded on the rationality of agents, i.e. it seems to be the outcome of an intended process decided and organized by rational agents. We contend a different view, i.e. the introduction of money is rather the outcome of social selection of the fittest media of exchange for the purpose it serves in exchange. It is a process external to individuals *per se* and involves social selection from sets of new possibilities as they arise. Given the presence of embedding, the overall development is independent of individual rationalism.

3. Ancient Economies: Formalists vs. Substantivists

In fact, the origin of the controversy between metallists and chartalists is deeper than a mere opposition of different views about barter or even money. Indeed, it is related to the tremendous controversy between formalists/modernizers and substantivists/primitivists who, when compared to modern ones, explain how ancient economies were operating (Davies, 2005).

Here again, the origin of this controversy can be understood by starting from the view metallists/orthodox economists have about barter. For them, the complexity of the relative price system and the double coincidence of wants are two main drawbacks demonstrating that economic transactions are hindered in a barter economy. Since Adam Smith seminal work (1776), it is well known that economic prosperity results from the division of labor, and that the latter necessitates that market transactions – especially between workers who have specialized tasks – should be facilitated. Money, as a medium of exchange is therefore an important pre-requisite (as well as property rights) for the development of market transactions. Without money, market exchanges are hindered as well as the division of labor, and therefore economic growth remains lower than what has been observed during the last centuries as a consequence of the spread of capitalism. Given this previous statement, it seems that from the mid-eighteen century, the way orthodox economists have explained the origin of money – assuming that barter inefficiency had led individuals to introduce money – had been chosen simply because it was consistent with their vision of the economy and the society. Indeed, by assuming that money had been introduced thanks to individuals initiatives, and that this had ultimately led to the development of the market-economy (and capitalism), they highlighted the virtues of an egalitarian society based on individuals, i.e. a society in which State agency is lacking or merely useless.

The preceding view – assuming that the introduction of money triggered the development of markets and finally of the whole economy – is shared by orthodox economists as well as by some other social scientists (especially anthropologists and historians) labeled as the "modernizers". Unlike their opponents, the "primitivists", they consider that ancient economies only differ in degree, not in kind, compared to modern economies. This dichotomy echoes another one between the "formalists" and the "substantivists". The former who mainly agree with the "modernizers", assume that economic behavior based on rational self-interested individuals and market exchanges were already the cornerstones of ancient economies. This orthodox/modernizers/formalists view is then at odds with the view contended by the primitivists/substantivists as well as by some economists labeled as "heterodox" (Keynes, 1914, 1982; Marx, 1954; Mitchell-Innes, 1913; Schumpeter, 1972). According to the latter view, ancient economies were socially and politically embedded. In other words, individuals did not exist as relevant social entities since all their actions were constrained by various social obligations. This has led Polanyi (1944) to distinguish three modes of exchange, namely reciprocity, redistribution and market-exchange. While he agreed that these three modes of exchange co-existed at any epoch, he stressed that it was only during the last few centuries - and the spread of capitalism - that market-exchange had become the dominant one. Polanyi's term, "the great transformation," refers to the divide between modern, market-dominated societies and non-western, non-capitalist pre-industrial societies.

As explained above the academic literature is far from having any consensus among scholars concerning what were ancient economies. Thus, if we assume that ancient economies were closer to what Polanyi (1944; 1957) described, i.e. were socially embedded with very few market exchanges, then the question is whether the view of metallists/orthodox economists about the origin of money is consistent or not with such economies?

4. Archaeological and Ethnographical Evidence About Bartered or Monetary Transactions Are Inconclusive

Even though all scholars agree that barter is universal (Chapman, 1980), i.e. can be, in theory, organized at any place and at any moment, empirical evidence about it is quite limited. Humphrey (1985) even claims that there is no evidence, historical or contemporary, of a society in which barter is the main mode of exchange. Most, if not all, the evidence we have about barter comes from ethnographic studies of remote (and often shrinking) communities who - for various reasons - are living at the margins of our capitalist and monetary modern world. Then,

it is quite sure that our knowledge of barter is biased, i.e. must be quite different from the system on which all human living on earth have organized their exchanges during millennia. In other words, our empirical knowledge of barter is biased and can hardly be used to infer how economic transactions were operated in ancient societies.

As it is well known by biologists, many plants, insects or animals have a symbiotic relationships, i.e. they obtain mutual advantages from the direct exchange of resources or services. Since *Homo sapiens* is a 'social animal', it is not surprising to claim that barter – the direct exchange of resources or services between human – is as old as the recorded history of man (Davies, 2002). While it is certain that barter has existed during prehistory, it remains very difficult to identify it from the archaeological records. Several reasons explain why this is so. It is likely that many commodities used, even frequently, for bartering, have left no or very few archaeological record since they were perishable (e.g. furs, salt, cattle) or have been transformed in subsequent periods (e.g. due to metal recycling). Even for non-perishable goods (such as shells, stones), researchers face several methodological problems (Tykot, 2004). Indeed, even though a durable good is found in large quantities at a given place where it can be considered as "exotic", it nevertheless remains difficult to identify all the different steps associated with its *chaîne opératoire*. These steps include the provenance of the object, its production, transportation, use and disposal. For some objects – see e.g. the obsidian (Tykot, 2004) – such traceability can be realized by using specific technologies (e.g. isotopic analysis); however, a fundamental mystery remains about the motivation underlying the flow of these goods (Oka and Kusimba, 2008). Was the presence of this type of good associated with a one-way flow or with a two-way flow? Was this flow motivated by reciprocity, redistribution or was it market-exchange? Moreover, different artefacts of the same item can be found at the same place but each of them could be there for different reasons.

According to primitivists, societies from the remote past were characterized by fundamentally distinct modes of socio-economic integration which are not found in modern days. More specifically, it seems likely that both domestic and foreign trade were marginal, at least before the Bronze Age, even though we do not know precisely to what extent it was marginal.

In addition to these problems of evidence about barter, it is widely agreed by scholars that hunting and gathering societies were based on sharing (Benz, 2010), or the "rule of hospitality" (Henry, 2004). Indeed in most foraging societies, exchanges based on self-interest – and this includes barter – were inexistent and sometimes even forbidden. Except for personal

belongings, such as clothes, there was no private property in such economies. It is likely that the same social rule was present in the small farming communities of the Early Neolithic, since they were also socially organized on kin, as pre-Neolithic foraging groups were. Hence, it is difficult (even impossible) to define accurately to what extent barter was present in foraging groups as well as in early farming hamlets and villages. In fact, accurate knowledge about barter in practice can only be obtained from the historical period, i.e. from the period in which writing exists. As explained below, the first evidence of writings (or pre-writings) are found in Mesopotamia (especially in Sumerian city-states) and ancient Egypt around the end of the fourth millennium B.C.E..

If, as stated previously, it remains difficult – if not to say impossible – to find archaeological evidence of barter in prehistoric societies, the same can be said of money. With such claim we do not challenge the fact that money, used as a means of exchange, has been introduced in economies at some early stage of their evolution. On the contrary, we have numerous examples provided by ethnographic studies, realized on all continents, that various objects (e.g. shell, stone, metal ingots, salt, cattle...) have been used as primitive monies (Quiggin, 1949). When compared to a more advanced money, primitive monies are *"all money that is not coin or, like modern paper money, a derivative of coin"* (Grierson, 1977, p. 14). More precisely, and as stated by Einzig (1966, p. 317), a primitive money is *"A unit or object conforming to a reasonable degree to some standard of uniformity, which is employed for reckoning or for making a large proportion of the payments customary in the community concerned, and which is accepted in payment largely with the intention of employing it for making payments."* However, the available ethnographic examples of primitive monies can hardly be used to determine what has precisely happened in ancient economies. Indeed, even though a particular object is found in large quantities in the archaeological excavations at a given location, several interpretations are possible: it could have been used as either only a commodity, or as a commodity and a means of exchange, or only as money. Even if we assume that a commodity was used exclusively as primitive money, we do not really know why and how it became part of the economy. In other words, were primitive monies introduced because barter was inefficient, as claimed by orthodox economists, or was it for another reason? Or was it a result of a process of social selection?

5. Barter: Its Motivations, Timing, and Finality.

In addition to the reasons detailed in the previous section, archaeological evidences about the existence of barter or money are inconclusive also because both concepts do not have a unique and widely agreed definition. While it is beyond the scope of the present paper to provide an analysis of the definition of money, a brief analysis of the definition of barter helps to illustrate such difficulties.

According to the Cambridge dictionary of English, the verb "to barter" is defined as "to exchange goods for other things rather than for money".⁵ Even though it is clear from this definition that under barter, goods (or services) are exchanged for other goods (or services), there are three additional dimensions which remain vague in this definition.

The first is about the motivations of the agents leading to the exchange of goods. For some authors, such as Chapman (1980), barter should be restricted to pure economic transactions, i.e. only to market exchange. However, it is also possible to consider that exchanges motivated by social obligations or even coercion (e.g. by reciprocity or redistribution, according to Polanyi's terminology) are also barter if they are cashless.

The second dimension is about the timing of the exchange. What is implicit in the above definition of barter, is that the terms of exchange of goods are settled at the same time. This does not exclude the possibility that the goods are delivered at different times. In such a case, we should talk about delayed barter. According to Graeber (2011), "gift economies" were common, at least at the beginnings of the first agrarian societies, when humans used elaborate credit systems. In other words, if we do not allow the existence of delayed barter -and therefore of the associated debt/credit system – then barter is a pure abstraction.

The third dimension concerns the finality of the exchange, i.e. what the goods are used for once they have been exchanged. What is implicit with the above definition of barter, is that the exchanged goods are used as goods (consumed or invested), immediately or later. However, this may give rise to an intricate outcome. Let us consider the following example: one may assume that a good is exchanged today and that initially its buyer wanted to consume it later. Let us now assume that for some reasons, its owner decides in the future to use this good for (the payment of) another exchange. Then this good, which is not consumed, is used in the future as a medium of exchange. In other words, the way this good is used in the future implies that

⁵ <https://dictionary.cambridge.org/fr/dictionnaire/anglais/barter> accessed on June 13, 2019.

the initial transaction should not be considered as pure barter because the latter excludes the existence of any intermediate object.

The latter situation is also useful in demonstrating that the boundaries between bartered and monetary transactions are blurred. Indeed, once a good is exchanged not for itself, i.e. not to be consumed, it becomes a medium of exchange. Once a good is exchanged mainly not to be consumed as a good but to be used as a medium of exchange, it becomes a primitive money.

6. The Complexity of the Relative Price System and the Unit of Account

The first presumed drawback associated with barter is the complexity of the relative price system. From a theoretical point of view, such complexity can be illustrated as follows.

Let us assume a given economy in which $n \in \mathbb{N}_+^*$ goods (and/or services) exist and can be exchanged. In a monetary economy, money is used as a medium of exchange and is also, implicitly, a standard of value. So, once one of these n goods is considered as money, the value of the $(n-1)$ remaining goods can be expressed with respect to it. In other words, the number of relative prices in this economy is equal to $(n-1)$.

In a pure barter economy, the value of any good must be expressed with respect to all the $(n-1)$ remaining goods. Thus, the total number of relative prices is equal to $(n-1).(n/2)$, given that, obviously, the relative price of a good with respect to itself is equal to 1.

While the total number of relative prices is proportional to the number of goods when money is introduced, it increases exponentially in the barter-economy. Then, in such a theoretical framework, the relative price system associated with barter is very difficult to handle. However, one may wonder whether such limit associated in theory with barter also exists in practice? Two cases deserve special attention.

The first one is deduced from what happens in a monetary economy, as we have described previously. In such economy, the complexity of the price system has been reduced by introducing money, given the fact that one of the three functions of money is to be a unit of account. However, the converse is not necessarily true, i.e. a good can be used as a unit of account without being considered as a money, i.e. without fulfilling the two other functions of money (medium of exchange and store of value). Indeed, a unit of account is simply the unit by which the prices of all other items are quoted. Therefore, a pure and simple bartering system

may be associated with a simple price system (similar to the one associated with money) as long as a unit of account has been introduced. As a remark, even though the value of the exchanged goods is expressed with respect to a standard of value, it does not mean that the latter is also exchanged during the transaction. In other words, barter can also be realized when an object of an agreeable value is used as a measuring device of the exchanged goods. This object can be anything acceptable to the parties of the transaction; then the buyer and the seller reckon the present value of their goods against a third commodity of common use.

The second case, which is less demanding when compared to the first one, is to introduce some "set rates" or "customary rates" (Chapman, 1980). This means that some relative prices – for instance those concerning the goods which are most frequently exchanged – are set or decided arbitrarily. This case is worthwhile since it highlights the fact that the presumed complexity of the relative price system depends on the scale at which the economy is analyzed, namely either at the micro or at the macro level. Let us consider both levels.

At the micro or individual level, we may assume, especially since we consider ancient economies, that the total number of goods present in the economy was quite limited. We may also assume that, given his preferences and income (both depending on the social class he belongs to), a representative agent of such ancient economy could afford only a limited number of different goods. In other words, it is likely that an agent was used to exchange a limited number of goods, and moreover that these exchanges were repeated several times per year, month or even days, depending on the goods considered. Therefore, this agent was very aware of the relative prices of the goods he was intended to buy or to sell; then, the computation of all the relative prices was completely useless from his point of view since only a limited set of prices was relevant for him.

On the contrary, at the macro level, computing all the relative prices could be important and even necessary. However, one may wonder what does it mean to talk about the "macro level" in ancient economies? For sure it can make sense only from the development of city-states and empires, such as the ones which have emerged in Mesopotamia and ancient Egypt. For the others social organization, such as the band, the tribe or the chiefdom, according to Service's (1966) classification of the stages of social evolution, it is of no value to know all the relative prices of the goods present in the economy since most exchanges were based on either sharing/reciprocity or redistribution. Nevertheless, such knowledge was crucial in the early states which have appeared later, at the turn of the Neolithic and the metal age periods (namely

during the Chalcolithic period). Indeed, Sumerian city-states as well as Pharaonic Egypt were based on palatial economies, as were later Minoan and Mycenaean economies (Svizzero and Tisdell, 2015). In these palatial economies it was crucial for the administration to know all the relative prices in order to compute, to record and to enforce the payment of various social obligations (e.g. taxes, levies, corvée labor, slavery...) and to measure their wealth. Hence, it is very likely that it was in these early states that a unit of account had been introduced in order to solve the problem encountered by the barter system. Indeed, while agriculture was present in the Near East from around 10,000 B.C.E., the emergence of these early states coincides with the extensive development of irrigated agriculture, during the third millennium BC. The latter has led to the hydraulic civilization (Wittfogel, 1957), characterized by an increase of the agricultural production, an expansion of the population, the development of non-agricultural activities associated with the "urban revolution" (Childe, 1950). In other words, the implementation of extensive irrigated agriculture triggered an increase of the number of goods as well as of the number of persons in the economy. This would have led to a growing complexity if a unit of account had not been introduced.

7. The Double Coincidence of Wants and the Credit System

The second presumed drawback of barter is, for an exchange to occur, there is the necessity to have the double coincidence of wants, a term used by Jevons (1875). In fact, in-kind transactions require three conditions to occur:

- a) both parties must agree about the relative price or the terms of exchange,
- b) each party is motivated for buying the good supplied by the other party,
- c) the goods involved in the exchange are available immediately.

Let us consider what happens when any of these three conditions is not fulfilled.

If, unlike condition a), an agreement is not reached, even after both parties have bargained for a while, one may expect that the competitive pressures provided by the other members of the economy could finally lead both parties to agree. However, such an outcome is not certain. What is more important is that whatever the economy, with or without money, the previous conclusion remains the same.

When condition b) is not verified, it means for instance that one party is not attracted by the good sold by the other party, whatever its price. In other words, there is no coincidence of

wants. Agent A wants to buy the good sold by agent B, but B is not attracted by the good sold by A. Despite this lack of coincidence of wants, there are two situations in which agent A could nevertheless buy the good sold by B. The first, as suggested by the metallists, is to introduce a medium of exchange –which is socially accepted, for example money. In this case, A obtains the good sold by B, and B gets some money with which he/she will be able to buy the good he wants from another agent. The second situation occurs when the intermediate is not a commodity but a third person (a middleman), agent C. Then, what may happen is the following sequence of exchanges: C first exchanges with B, and then he exchanges with A. At the end of the process, A and B are satisfied (and C as well), but this process requires the coincidence of wants between B and C as well as between C and A. The question is then which situation is the more likely to occur, the first one based on money, or the second one, which includes a third person? Both situations may lead to an exchange, but it is impossible to say *a priori* which is the easiest one to implement. Indeed, the first situation requires money, but money has first to be socially accepted, and this is not straightforward to achieve. In the second situation, the exchanges require two coincidence of wants, and here also this adds some costs.

When condition c) is not verified, it means that there is no immediate coincidence of wants. The problem here is about the timing, i.e. the goods can only be delivered at different dates. For instance cherries and grapes ripen respectively in May and September, so they cannot be physically exchanged at the same date. However, both parties may agree to exchange since the delayed coincidence of wants is reached. What is needed is an agreement explaining that cherries are delivered in May for grapes which will be delivered in September. Such agreement implicitly means that a debt and credit system is introduced between both agents. This system implies that the lender gets sufficient information about the borrower in order to be sure to be repaid on the due date. It also necessitates the definition of some compensation for the lender if, for any reason, the borrower cannot repay in due time.

The previous demonstration leads us to the following conclusion.

If there is no coincidence of wants – immediate as well as delayed – then the exchange requires the introduction of an "intermediate". The latter can be either money or a third person. However it is *a priori* impossible to determine which of these two cases – the monetary transaction or the in-kind transaction – is the easiest to implement in society. In other words, barter is not necessarily more difficult to achieve than monetary transactions.

If the coincidence of wants is not immediate but is delayed, then the exchange may nevertheless occur if an appropriate system of debt and credit is introduced.

Therefore, it seems that the importance of the transaction costs implied by the double coincidence of wants associated with barter has been largely exaggerated in the academic literature. Indeed, most economic activities are based on temporal processes. Production is not a one-shot event but a process which takes time, i.e. one has first to incur the costs associated with the investments in order to be able to reap the benefits provided by the production later.

8. Irrigated Agriculture and Complex Societies of Mesopotamia and Ancient Egypt

The general history of Mesopotamian (especially from the Early Dynastic period (2990-2300) to Ur third dynasty (2047-1940)) economic and social development accords nicely with that of ancient Egypt (the Old kingdom, 2700-2200).

The first reason in support of this comes from the fact that both civilizations, which have emerged during the IV to the III millennia B.C.E., were located in the Near East and therefore experienced quite the same bio-geographic conditions. The latter encompass the climate, the quality of the soil, the access to fresh water, animal species suitable for domestication and plant species suitable for cultivation. As is well known, agriculture first occurred in the Near East about 10,000 BCE. The transition from foraging to farming societies was probably very slow and gradual - despite the label of "Neolithic revolution" - because farming was a trial and error process during its early ages. Mixed economies, combining food procurement and food production would have been the rule for a while (Smith, 2001). In this context, and despite the emergence of agriculture, the social structure remained almost unchanged during most of the Neolithic period, i.e. quite similar to the one which prevailed during the pre-Neolithic period. Band of foragers were egalitarian, i.e. their social structure was not hierarchical. With the development of agriculture, such social relationships gradually vanished; sharing and the rule of hospitality mostly disappeared and social obligations between social groups or classes became the rule. This pattern of social evolution is well documented in the academic literature and has been labeled the transition from simple to complex societies (Tainter, 1988). In ancient Egypt for instance, this transition happened in the period 4400-3000 BCE (Henry, 2004, p. 80).

The second common factor of Mesopotamian and Egyptian civilizations was that the level of agricultural production was tremendously enhanced by the building of large irrigation systems (Wittfogel, 1957), thanks to the existence of large rivers (Nile, Euphrates, Tigris). According

to Malthus's law, a greater amount of agricultural production results in a higher level of population. However, such a catalytic relationship between agriculture and demography increased the dependency of the human population on food production. Since the bulk of the population became dependent on irrigated agriculture for its survival, it has also become dependent on a small group of people - let us call these "the elite" - who were able to conceive, to build and to maintain the irrigation systems (consisting mainly of canals, dykes and water tanks). Of course, this elite rapidly took advantage of the situation to impose several social obligations on the commoners (e.g. taxes, levies, corvée labor, slavery...) (Tisdell and Svizzero, 2017). This led to the emergence of palatial economies, i.e. to economies which were dominated by temples and palaces.

Even though they have most features in common, the palatial economies of Mesopotamia and ancient Egypt also had differences. In Egypt, the Pharaoh had total control of the society; his power was economic, political and religious (Henry, 2004). He, and his administration, were therefore able to collect social obligations from any Egyptian village. Such control was quite easy to monitor since most (if not all) villages were dependent on the Nile's flows. As illustrated by the Sumerian city-states, the Mesopotamian economy was dual (Hudson, 2004). On the one hand there was the rural-family economy present in hamlets and small villages. These centers were mostly independent entities. On the other hand, there was the palatial economy comprised of temples and palaces owning land, seed corn, flocks, tools and various other commodities that were all rented to a significant part of the population. The Mesopotamian temple was the dominant social institution (Seaford, 2004). It organized the collection and redistribution of the agricultural surplus. The production was also administrated from the center the bureaucrats at the temples.

9. Barter, Credit and Unit of Account in Mesopotamian and Ancient Egyptian Palatial Economies.

Even though the Sumerian and the Egyptian palatial economies had different structures, they had a common thread. Unlike current governments which are debtors with respect to their population, they were creditors. Indeed they provided the population with advances, such as grain to farmers, or commodities to traders. These advances created social obligations or debts, i.e. commoners owed something to the temple. These debts were paid at some precise periods, such as, for farmers, during the harvest time, and for traders, once they came back from their trip. In fact, most economic activities, such as crop cultivation, animal husbandry, and trade are

temporal processes, i.e. they take time to be achieved. They necessitate important initial investments and a delay before production can be achieved. Therefore, with such features, the immediate coincidence of wants is not verified and barter seems to be impossible. Indeed, if for instance a farmer wants to sow grain in his fields, but has nothing to barter against the seed corn he wants, he cannot start any agricultural activity. Even though the immediate coincidence of wants is not verified, the delayed coincidence of wants can hold. Then, by introducing a system of debt and credit, exchanges of goods were possible in palatial economies even though no medium of exchange was introduced because they were relying on a system of delayed exchange. It is important to note that a condition for these delayed exchanges to occur is that an agreement between the parties is reached in advance to exchange commodities.

The introduction of writing

It is commonly agreed that the concept of writing was conceived and developed in ancient Sumer between 3400 and 3300 B.C.E.. Similarly, writing systems also arose in ancient Egypt around 3100 B.C.E.. Mesopotamian cuneiforms as well as Egyptian hieroglyphs were both introduced in order to keep account related to crops and farm animals. By the mid third millennium B.C.E., the inhabitants of Mesopotamia and ancient Egypt were recording in writing details of payments. These writings - inscribed in cuneiform on clay tablets in Mesopotamia - list the charges made to inhabitants for the lease of temple land for agricultural use. The details of such lease agreement are provided for instance by clay tablets associated to the reign of Urukagina, king of Lagash (2400 B.C.E.). The lease gave the tenant farmer of one particular plot of land the use of it to grow barley and to graze his goats on condition that he made the following three separate payments to the temple treasury (Cribb, 2004):

- a number of basketfuls of barley, representing a proportion of the grain harvested from the land, to be paid as rent,
- a weighted amount of silver to pay for his right to graze goats on the land,
- a specified number of goats paid to cover the costs the temple has incurred in irrigating the land.

The details of the previous agreement provide two insights. On the one hand, because this agreement was between the temple and a mere farmer, it demonstrates that a system of debt and credit was ubiquitous in ancient economies, i.e. was not restricted to high-value transactions or international trade. On the other hand, since the payments had to be made in barley, silver and

goats, i.e. in various commodities, it shows that the system of debt and credit was associated with bartered transactions rather than with monetary payments.

The standardization of weights and measures

The main problem for the administration and the elite with this system of social obligations based on debt and credit was to define its precise accounting. Indeed, it was important to define these obligations, to record them and to enforce their payment in due time. It is widely agreed by scholars that it was for solving such accounting problems that writing was developed. Besides writing, the administration has also had to define various standards of measure related to weight, length, capacity and also to value. Concerning the latter, the administration of palatial economies introduced a unit of account. It is important to note that such unit of account was a "good" only used for this purpose, i.e. was not used as a medium of exchange. By doing so these administrations have resolved the problem of the complexity of the relative price system associated with barter.

In Pharaonic Egypt, this unit of account was called the *Deben* and was in fact a measure of weight equal to 91 grams (Henry, 2004). Initially, it was a weight measure of barley, then of metal (copper) and finally of silver. These changes of the goods used to define the *Deben* show that it was not these goods *per se* that were important, but the fact that it was a unit of account of all the goods of the economy. In fact, the Deben had no actual existence, as, for example does a dollar today. In Sumerian city-states, the unit of account was called the *Shekel*. It was also a unit of weight which initially was defined as the weight of 180 grains of barley (which corresponds to a handful of barley grains) (Hudson, 2004). Once again, Urukagina, king of Lagash (2400 B.C.E.), fixed the official weight standards by which all commodities were to be measured in all payments (Cribb, 2004):

- the *talent* (about 30 kg) which was divided into 60 *mina*,
- the *mina* (about half kg) which was divided into 60 *shekels*,
- the *shekel* (about 8.3 grams) was divided into 180 *grains*,
- the *grain* (about 0.045 grams) represented the average weight of a grain of barley.

It is worth noting that the previous system of units of account was a system based on the measure of weight (and volume) and was not based on any specific commodity which could be interpreted as money. Indeed, by considering various commodities such as, for instance barley

and silver, it was possible with this system of units of account to define the value of any object present in the economy. One may easily imagine that for luxury goods, their values were defined with respect to silver (or other scarce goods) while for everyday goods, such as staples, their values were most likely defined with respect to barley.

In both Mesopotamia and Egypt, their administrations introduced these units of account in order to define arbitrarily the relative prices of all the commodities. Indeed, in these palatial economies market exchange was marginal since most prices were regulated. For instance, the silver *Shekel* was equal in value to the monthly consumption unit of barley (which was called a *bushel*). In Mesopotamia also, from 2400 to 2000 B.C.E., there is much evidence of payments of many kinds based on laws issued from legal codes drawn up on clay tablets (Cribb, 2004). For instance, king Ur-Nammu (2047-2030 B.C.E.), founder of the third dynasty of Ur in southern Mesopotamia, is chiefly remembered today for his legal code, the oldest known surviving example in the world. This code, from which 20 laws have been retrieved on clay tablets, set the amounts due in certain payments, as compensation. His law 25 is the following:

If a man appeared as a witness in a lawsuit and was shown to be perjured he must pay 15 shekels of silver.

Similarly, the law 1 of the Eshnunna legal code - written at the end of the third millennium by a king of the northern city of Eshnunna - lists the official prices (exchange rate) of 1 *shekel* of silver for several other commodities. For instance, it has to be exchanged for:

1 *kor* (an ancient unit of capacity) of barley,
6 *mina* of wool,
2 *kor* of salt,
3 *mina* of copper.

In its law 2, this Eshnunna code defines similar relative prices in terms of barley. Law 7 defines the payment of wages, either in silver or in barley.

All these legal codes provide evidence that prices were administrated in ancient economies and that even though these prices were often defined with respect to some commodities, especially silver and barley, it does not imply that these were used during the exchanges (Powell, 1996). These legal codes also confirm that the debt and credit system was ubiquitous and therefore that most - if not all - transactions were in fact delayed exchange. Indeed, these codes also describes loan with interest. Law 21 of the Eshnunna code states that:

If a man gives silver as a loan at face value, he shall receive the silver and its interest, one sixth of shekel and six grains per shekel.

Similarly, law 20 describes the payment of barley for the return of a loan and its interest.

The existence of loans with interest demonstrates that the credit system was ubiquitous in ancient economies. Money played no part since these loans and their repayments were defined in terms of commodities. For example, repayments were in terms of items such as silver and barley.

10. Conclusion

According to the metallists, the origin of money in the economy comes from the lower efficiency of barter. It is because transaction costs associated with barter hindered exchanges that agents adopted a medium of exchange. This view expressed in the late 19th century which is supported by orthodox or neo-classical economists, became dominant among economists as well as in other social sciences. However, this view is subject to two main criticisms. First, the metallist perspective projects the notion of a preeminence of markets and trade into ancient economies. On the one hand, unlike substantivists, we do not believe that individuals are disembedded, even though we agree that they were modern market economies and embedded ancient economies. We contend that individuals are still embedded in the current socio-economic system, possibly more so than in the distant past (Tisdell, 2017), but the current socio-economic system radically differs from the ancient one. Institutions, habits of thought, transactional modes, and forms of socio-economic integration which characterized past societies are not found in modern societies. With these modern institutions transplanted into ancient societies, the origins of money follow logically rather than based upon historically situated and institutional grounded inquiry. On the other hand, it is a fallacy to project today's notions of trade and commerce in analyzing ancient societies without a good deal of qualification. These activities were both quite marginal compared to the importance they have nowadays.

Second, the metallists specify money's origins and nature in terms of purely logical reconstructions. The adoption of money - as a medium of exchange - is conceived by metallists as the outcome of a rational process, i.e. as a result of foresight or forethought by individuals. Rather than such rational choice theories of the adoption of money, we opt for a more evolutionary and adaptive approach based on the process of social selection. The use of money

and its spread are not explained as the consequences of intended decisions taken by rational agents but simply because it had evolutionary advantages which were revealed quite late, as shown by the late adoption of coinage in the Near East. Nevertheless, we posit that some elites hindered the introduction of monetary exchange because it was to their advantage e.g. it enabled them to retain more political power and more easily extract a larger portion of the economic surplus.

These ancient economies of Mesopotamia and ancient Egypt were palatial. There was very little market exchange. Barter, associated with a system of debt and credit, and including an arbitrary unit of account, was ubiquitous. Such economies, without any monetary transactions existed for millennia. Indeed, money as a medium of exchange was introduced in these economies long after the 3rd millennium. For instance, while coinage was well known from its Lydian seventh century B.C.E. adoption, it was only introduced in Egypt during the Ptolemaic period (i.e. during the last three centuries B.C.E.). Similarly, it is only at the end of the Achaemenid period (about 330 B.C.E.) that the presence of coins is attested to archaeologically in Mesopotamia. Such apparent disinterest in coinage cannot be because Mesopotamia was an economic backwater, since by the third millennium B.C.E., at the latest, it was crisscrossed by trade routes connecting it with Asia, the Mediterranean, and the Indian subcontinent (Powell, 1996, pp. 225-226). What seems likely, it that the success of their system of payment - based on delayed barter and a system of units of account - postponed the adoption of primitive monies and ultimately the introduction of coinage. It is also likely that in these ancient societies, the elite (temple and palace) hampered or hindered the introduction of coinage because with its centralized system of debt and credit, their control over the whole economy was total and so the surplus extraction was easier. Other more recent historical examples strengthen this view. For instance Szabo (2002) quoted the following :

"From the very start, England's 17th century colonies in America had a problem – a shortage of coins. The British idea was to grow large amounts of tobacco, cut timber for the ships of their global navy and merchant marine, and so forth, sending in return the supplies they felt were needed to keep the Americans working. In effect, early colonists were supposed to both work for the company and shop at the company store. The investors and the Crown much preferred this to paying in coin what the farmers might ask, letting the farmers themselves buy the supplies – and, heaven forbid, keep some of the profit as well."

It is because money, whatever its form, is the most liquid asset, and therefore its uses are very difficult to monitor, that elites have favored in-kind transactions, as is illustrated by the 17th century mercantilist policy which England imposed on its American colonies.

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