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Economic Time

by

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It has been recognized in various disciplines that unique conceptions of time are necessary theoretical constructs. The Steven Hawking bestseller, *A Brief History of Time* demonstrates that physics requires a particular view or understanding of time different from any commonsensical position that might be held by the general population (Hawking, 1988; see as well Coveney and Highfield, 1990). In *Time's Arrow, Time's Cycle* (1987), Stephen Jay Gould establishes a relation between general geological theories and time, where one's position on time reflects conceptions of geological formations (and vice versa). Psychologists have long recognized that the perception of time is not a universal constant, but is viewed differently in different cultures, historic periods, and even by individuals as they progress through their life-cycles (Cottle and Klineberg, 1974; Hartocollis, 1983). At a very general level, students of time have come to an understanding that time itself, as an ideological construct, is not an absolute but is influenced by a society's general awareness of and perspective on time that is dictated by various social features of the population under scrutiny. Even the very description of time is influenced by the historic, cultural, and economic setting of the population that is developing or incorporating the particular temporal perspective (Whitrow, 1988).

The very notion of time, then, and its significance for analysis is determined by what is being examined. Simply put, there is no single meaning of time, no constant that is independent of the questions being addressed and the field of inquiry within which analysis is undertaken. What is time? It depends.

It is argued here that economists require a particular concept of time in order to facilitate the development of theory that has greater explanatory power in describing and analyzing the sort of economy in which we are primarily interested–the monetary economy usually termed capitalism. And while it is observed that a concept of time has been recognized as important by economists of various persuasions, it is argued that a very specific concept is required and that this concept is dictated by the property relations that delineate capitalism from all other forms of economic organization, and which necessitate production for monetary gain. We propose a concept of time to be used in analysis which is consistent with the perception and experience of time in a monetary or capitalist economy. This concept of time is determined by the debt cycle, and the length of this cycle is determined by the interest rate. Thus, while our proposed time-measure is certainly of an historical nature (months, years), it is not simply clock-time: the length of economic time is fluid and is regulated by the interest rate, a variable of significance in dictating a host of socially important effects.

Neoclassical economists, while perhaps paying lip service to time, limit themselves to several concepts of time that are merely of technical interest and are forced by a view of economics as a search for narrowly defined equilibria states. "Logical" (or "analytical") time can be defined as "...an abstract idea in the minds of economists, which is related not to the unfolding of a sequence of events, but to the fulfilment of certain theoretical requirements" (Snooks, 1993, p. 8). That is, time that is long enough for whatever logically needs to happen to satisfy the equilibrium outcomes of the model under examination. The short and long runs are not to be confused with historic periods of time (as textbooks continually claim, positing "more than a year" to specify the long run, for instance), but are mere logical structures developed to distinguish the fixity or

variability of inputs. Both short and long run analyses are driven from the same "production function" which is invariant to time.

In general equilibrium models, the conception of time is similarly driven by the needs of the model, rather than by any understanding of real world processes. (See Ingrao and Israel, 1990.) In one sense, these models are timeless because everything "happens at once", so to speak. There is certainly no conception of process or of linearity of time. On the other hand, one usually thinks of "timeless" as denoting "unending", which might be interpreted to mean that something goes on forever. In the general equilibrium, however, essentially nothing happens unless something were to disturb the system, setting off another search for an equilibrium price vector which again requires no time to achieve. As Veblen characterized the neoclassical agent, "Self-imposed in elemental space, he spins symmetrically about his own spiritual axis until the parallelogram of forces bears down upon him, whereupon he follows the line of the resultant. When the force of the impact is spent, he comes to rest, a self-contained globule of desire as before" (Veblen, [1898] 1961, pp. 73-4). At rest, our self-contained globule of desire enjoys timeless (unending) bliss until knocked from equilibrium, in which case he returns to equilibrium instantaneously (without time).

In other words, the neoclassical view of time is not based on the institutionalized properties of an actual monetary economy. Time is nothing but a device dictated by the requirements of theorists who then attempt to formalize (and "naturalize") the economy on the basis of their perception of theory:) time is a *construct* developed by neoclassical theorists to conform to the equilibrium strictures of neoclassical theory rather than a socially-generated concept that is unique to a particular economic organization. Indeed, the necessary neoclassical assumptions of perfect knowledge of past, present, and future, where there are no disappointed expectations in the past and where the future is "fully anticipated," "emasculate the very concepts of time and uncertainty..." (Davidson, 1972, pp. 13-14).

Keynesians (along with Institutionalists, Marxists, and Austrians), on the other hand, have a history of pressing the issue of historic time as one of the major criticisms directed against their neoclassical antagonists (though it is arguable as to what extent neoclassical and Austrian theories *are* antagonistic). Perhaps the ablest (and certainly most outspoken) proponent of the need to incorporate real time into economic theory was Joan Robinson (see, among a raft of papers incorporating this issue, her 1974 Thames Polytechnic paper in Robinson, 1980, and her 1980 *Kyklos* article in Robinson, 1981). As economic processes take place in real time, where present actions are based on the past and have consequences for the future, there is no normal tendency toward equilibrium in the sense that markets clear or that the economy demonstrates some optimal outcome. (Indeed, equilibrium itself becomes a rather nebulous if not intellectually dishonest concept–a "pretty, polite technique which tries to deal with the present by abstracting from the fact that we know very little about the future" (Keynes, [1936] 1987, p. 115). As adjustments require change, and change can only occur within a period of real time, by the time the logical process leading to equilibrium would be worked out, the initial conditions on which the equilibrium relationship was specified would all have changed as well. Essentially, we cannot simply derive a supply curve or production function, then willy-nilly move along such a function in any direction as required by equilibrium conditions (say, changes in relative prices) as by the time we "get there" the initial function would no longer exist.

Now, while we agree with the basic criticism directed by Robinson and others against the timeless time of neoclassical theory, we argue that it is insufficient to merely incorporate historical time as a necessary variable in economic theory. One must construct a concept of time that, while certainly of an historical nature, is consistent with and limited by the characteristics of the economy under examination. That is, we need a concept of *economic time*. When Robinson (citing Bergson) jokes, for example, that time "is a device invented to keep everything from happening at once" (Robinson, 1964, title page), she is referring to historical or sequential time–the notion that there is a past, present, and future. In contrast, when Davidson says that "...economic decisions are made by human beings facing an uncertain and unpredictable future while they are moving away from a fixed and *irreversible past* " (Davidson, 1991, p. 32), we have moved beyond mere historic or sequential time to an economic conception of time, which is appropriate only to certain forms of economic organization. Keynes clearly recognized the relationship between time and the pecularities of a monetary economy in his argument regarding time, uncertainty, and the "peculiar properties of money as link between the present and the future" which gives "rise to the characteristic problems of a monetary economy" (Keynes, [1936] 1987, pp. 233-4).

Historic time exists independently of the economic system. While it is certainly true that the *perception* of time changes given various cultural and technological considerations, the *objective* measurement of time does not. Ignoring problems associated with the winding down of the universe (which is of interest to physicists but not economists), the length of a "minute" is the same today as it was a million years ago. However, a pre-agricultural gathering society does not require a concept of minutes, days, months: there is neither a social need nor a production requirement that would demand such mental constructs. Apparently, pre-agricultural society had no conception of time–other than, perhaps, a vague notion concerning the proximate return of migrating animals. Life, while perhaps difficult (depending upon the vicissitudes of nature) is certainly not regulated by clock-watching. Similarly, while the modern analyst can use objectively similar notions of measurement of number or weight in studies of these societies, pre-agricultural society had no need for such measurements—even counting beyond three or four was not useful.

Agricultural societies (regardless of their social nature) must require greater precision in time-keeping. Moreover, time now becomes more of a regulator. As the economic success of the organization requires more-or-less accurate knowledge of the seasons in order to assure adequate harvests, such economies must develop recording devices that generate information sufficient for the production processes allowed by technological advance. Hence, it is here that we observe the development of calendars, some of which were exceptionally accurate **(**though the degree of accuracy was most likely induced by the requirements for social control by a priestly class rather than any technical requirements imposed by the agricultural cycle)[1].

Capitalism, more than any other form of economic organization, is driven by the underlying property relations that dictate a particular, and not simply precise, concept of time. This economic time is based upon, not the production aspects of such a society (though these are surely important), but its monetary features.

This is not to argue that the production process is irrelevant in the consideration of the appropriate period of time, but production time has more to do with the regulation or social disciplining of labor than with the physical or technical aspects of production. As capitalism increasingly penetrated the social fabric of European society, so too did a more precise, constrained conception of time. The first public clocks were situated in the textile centers and "...signalled to workers when they should arrive at work, the timing of meals, and the close of the day" (Schor, 1991, p. 49). The rather casual rhythms of work associated with pre-capitalist organization were replaced by a more orderly, systematic work rhythm in which hours, minutes, *punctuality* became the standard (Le Goff, 1980, pp. 43-52). And with the increasing requirements of discipline, coupled to the technological developments promoted (or demanded) by capitalist profit-seeking, clocks themselves became more precise (Cipolla, 1967, p. 43; Landes, 1983). Essentially, clocks went from expensive luxury toys designed for wealthy monarchs, etc. to more utilitarian precision instruments in a fairly short historical period of time.

And with the work-disciplining effects of capitalist production processes, the narrowly defined constraints of clock-time increasingly permeated and dominated the daily lives of normal folk. Time now becomes money, or, "(t)ime is now currency: it is not passed but spent" (Thompson, 1967, p. 61). The attention paid by Marx in his lengthy discussion of the length of the work-day and the division of that period into necessary and surplus labor-time (or paid and unpaid labor) is reflective of this concern for time (Marx, [1867] N.D., parts 4 and 5, passim)[2]. Even such concepts as a "normal" work-day or work-year, or even employment and unemployment require a particular, socially constructed view of time and the appropriate way in which time should be spent. In pre-capitalist society, the notion that one must work 8 (or 10 or 12) hours per day, 260 (or 312) days per year to be fully employed would have been entirely foreign.

But this view of time and the change in the concept of time is based on production and its organization (though one must be mindful that Marx's argument goes beyond mere production**)**. A sequential concept of time is a natural outgrowth of even handicraft production–as in Adam Smith's famous pin example, the wire must first be drawn and straightened before it is cut, pointed, and ground to receive its head–although it is with the assemblyline batch production process that a sequential concept comes to dominate (see below). Granted, this is important and it is likely that given the advances in technology and the need to coordinate the production process in a machine-dominated economy, this will be a feature of any economic organization in the foreseeable future. But, while certainly some aspects of the organization of the production process differ under

capitalism, it is not the *technical* aspects of production that delineate this mode of production from all others. At a technical level, all economies look similar: Labor is combined with the fruits of past labor (machines and raw materials) to produce current output; various skills are demanded given the technological requirements at any particular juncture. A unit of time founded on production is not the distinguishing concept required in analyzing a monetary economy. Attempts to explain various income categories based on production time or technical characteristics must necessarily fail. These endeavor to locate such categories in some "natural" characteristics common to all societies, and cannot, therefore, specify the distinguishing features of the economy which is ostensibly being explained.

The distinguishing aspect of capitalism (for this purpose) does not lie in the production process, but in the process of exchange. As recognized by economists such as Marx, Veblen, Keynes and *some* Post Keynesians (see, Davidson, 1991; Minsky, 1982, especially pp. 59-161; Wray, 1990), the purpose of production in such an economy is to produce, not goods, but money. The production of goods (or use values) is not an end but a means to an end, where the end is more money than that at the beginning of the production cycle. Hence, capitalism is characterized by a money-commodity-money (M-C-M') sequence, where M' must be greater than the initial M used to produce the commodity C. This is quite different from the neoclassical description of its economy which is of a C-M-C' form where C AND C' differ as to their respective use-values:

> The classical theory supposes that the readiness of the entrepreneur to start up a productive process depends on the amount of value in terms of product which he expects to fall to his share; i.e. that only an expectation of more *product* for himself will induce him to offer more employment. But in an entrepreneur economy this is a wrong analysis of the nature of business calculation. An entrepreneur is interested, not in the amount of product, but in the amount of *money* which will add to his share. He will increase his output if by so doing he expects to increase his money profit, even though this profit represents a smaller quantity of product than before (Keynes, [1933] 1979, p. 82)[3].

To accomplish this end of producing more money, capitalism requires the formation of debt. If spending were always constrained by income received during the preceding period, then spending could not grow, nor could M' exceed M. Credit allows spending in excess of received income, which allows spending, and, in turn, income, to grow. As production in a capitalist economy is undertaken only on the expectation that profits (more money)will be realized, credit is the key to capitalist production since otherwise M' could not exceed M at the aggregate level. While production can occur, and can even grow, in pre-monetary economies without credit, this is not the case for economies in which production is for market on the expectation that the firm will end up with more money than it started with.

As both Kalecki and Marx showed, if there are two sectors (or departments), one of which produces consumer goods and the other which produces investment goods, then so long as all worker income is spent on consumer goods, aggregate profits are equal to purchases by capitalists (of investment goods and of consumer goods, if the marginal propensity to save out of profits is less than one). Adding other sectors (a government sector or a sector that produces goods for export) adds other workers and spending on consumer goods, thus, other profit sources. Note that such an analysis implicitly adopts a particular concept of time–the time required to complete a monetary circuit. We begin with spending on the various wage bills (for workers in each of the sectors) and end when all final spending has been completed (all produced consumer and investment goods have been sold). Incomes (and expenditures) are then summed over this period and it is found, for example, that worker income equals wages, which equals consumption spending, while capitalist net income, or profit, equals investment, which equals saving (on the "classical" assumption that workers don't save and capitalists don't consume). The total amount of money that circulates to generate this level of spending and income is not easy to determine, and depends on length of production periods, gap between receipt of income and spending, and so on.

In Circuitiste models, it is frequently assumed that the circuit begins with a bank advance equal to the total wage bill, and ends after all incomes have been spent, allowing firms to retire all bank loans (at which point all the created money is destroyed). Only if some incomes are not spent (so that some money is hoarded), is there money left outstanding at the end of the circuit. We could call the length of the period required to complete a circuit a "debt cycle". Note that from the perspective of historical time, the debt cycle is of an arbitrary length–it

is the amount of historical time required to allow short term credit to be extinguished. To be consistent with the requirements of a capitalist economy, the circuit must grow over time–the circuit for each succeeding debt cycle must be larger. That is, spending must increase, and this requires a source of spending not financed out of current income (that is, generated by current production)–debt. But, spending, feuled by debt, takes real, historical time in order to increase. M', the amount of money realized at end of the circuit taken by money, can only grow and exceed M, the money at the beginning, if time exists.

Now, as the purpose of production in a capitalist economy is to create an increase in money (or surplus in the Marxian terminology), and this increase is represented by the nominal income realized in the form of profits (which are allocated among several forms of "unearned income"), the market, then, is not a mechanism or institution for the exchange of one good for another. That would be appropriate to the hypothetical barter world of neoclassical economists in which a mythical collection of peasants, each owning his/her individualized means of production produces goods on own account, then "trades" any surplus production for other goods which generate a higher level of utility than that afforded by the additional consumption of the specialized good produced by each peasant. Clearly, in such a fictitious economy, money can only serve as a means to mediate among the various goods on the market, serving as a medium through which the varying utility calculations are equilibrated and the difficulties associated with trading based on a double coincidence of wants eased–a C-M-C' view of the economy. Under capitalism, however, a lender loans *today* on the promise of payment (M') *tomorrow* . The market is thus a mechanism to clear debt–the borrower produces goods to sell so that loans can be serviced. And this process mandates the development of contracts of various sorts which are *dated* . "Once a financial perspective is adopted, time cannot be interpreted away as just adding additional commodities to the economy" (Minsky, 1982, p. 62). That is, Walrasian (neoclassical) money, serving only to assure market-clearing equilibrium, violates the time element necessitated by a monetary economy.

This means, however, that from the perspective of the capitalist (or "entrepreneur" depending upon one's definition), the proper time account is not that of the production period, but rather the debt cycle. The capitalist produces goods so that debt can be cleared and (if all goes well) M' becomes greater than M–profits are positive. The appropriate period of time is founded on the circulation of money, not the production period. This monetary circuit is the tail that wags the dog of production. Failure to service debt, at least in the sense of generating sufficient money to allow new loans to be acquired, results in bankruptcy or loss of the productive enterprise–the money-making machine[4].

The debt cycle, and hence economic time, is necessarily founded on the property relations that underlie a capitalist economy. In tribal society, for example, one finds no social requirement for economic time as there is no economic category represented as debt. Here, where there is collective control over the productive apparatus available to the population, production is undertaken by the collective for the collective good. Use values only are produced; there is no exchange, no money, and there is certainly no private accumulation in money terms–which is not to say that such economies do not grow in terms of output per capita. Rather, the rule of hospitality prevails, a social institution that, in essence, guarantees (to the extent possible) subsistence to all members of the organization (Morgan, [1881] 1965, pp. 42-62). No individual is separable from the larger collective and each individual's welfare is dependent on the welfare of the whole. Money debt (and all other economic categories associated with a monetary economy) is impossible within such a society, and, indeed, would appear so foreign to people living therein that it would be incomprehensible.

In a monetary economy, however, the means of production are separated from the control of the collective and "fall" into the hands of some. Here, there is no incentive to merely produce use values as there would then be no advantage to the control exercised over such assets. To advantage oneself, then, the capitalist must attempt to secure gain, and this gain rests upon the private control of the productive assets of the community[5].

But this also means that the owner (or controller) of such assets can no longer depend upon the assistance of the community should he/she experience economic difficulty. As the community cannot depend upon the capitalist for its livelihood–there is no social compulsion to produce for the good of the whole–there can be no reciprocal dependence on the community for the well-being of the capitalist: The rule of hospitality has been destroyed.

Hence, when we move forward to a modern, capitalist economy, we find the capitalist existing as an individual,

separated (economically) from the community. And this means that he/she faces an uncertain future.[6] Uncertainty, then, is based on the property relations that define capitalism: a capitalist had only himself upon which to rely and to prepare for an uncertain future. (At least this was true in the halcyon days of the system prior to the elaborate support systems currently employed by governments to force the community to provide various kinds of [welfare?] support-systems to this class.**)** This is why the appropriate view of time is transformed from a merely sequential movement from one point to the next (again, Smith's example of pin production is applicable) to one which emphasizes the movement from an "unalterable past while moving toward a perfidious future" (Davidson, 1972, p.7). The notion that the future is unknowable would appear preposterous to the member of a tribal society; given ties of reciprocity and ceremonial practices to appease the gods, the future was expected to be, for all intents and purposes, exactly like the past. While, objectively, unforeseen events could intervene to make the future very much unlike the past, the individual in these societies would behave no differently even if she doubted that the past actually serves as a good guide to the future (although such doubts would not be normal, in any case).

However, in a capitalist society, one *does* behave as if the future is unknowable; one attempts to protect oneself against the uncertain future. To attempt to guard against the vicissitudes of an uncertain future, capitalists must attempt to accumulate stocks of wealth. But stocks of goods are perishable and have significant carrying costs. What is desired is the accumulation of financial claims on others–credits. Stock holders of perishable goods will lend those stocks in exchange for claims on future output. These claims must include a premium that is determined, at least in part, by the uncertainty the lender faces when parting with his/her "insurance" as the debtor may require the stocks before payment is due. And such claims require the establishment of a unit of account in which the claims can be specified–money. Eventually, the various financial instruments we normally associate with money are developed and a modern monetary economy is formed. (For a more or less complete story of the process, see Wray, 1993; Heinsohn and Steiger, 1983.)

Financial claims, however, can only be realized in the future, and as the future is uncertain, expectations become a necessary determining characteristic of such an economy. Expectations must enter today's decision-making processes, including pricing decisions. Today's prices are thus based in part on current expectations as to what the future will look like. Hence, given the uncertainty that is a necessary feature of an individualized, propertied economy, an uncertainty that is inextricably linked to debt and the debt cycle, economic time becomes an important characteristic of such an economic organization.

We can further illustrate the significance of time in a monetary economy through a brief excursion into pre-capitalist history where time can clearly be shown to have a different meaning given the difference in the nature of debt. Until recently, all societies had a circular view of time, which would have been consistent with the preponderance of experience: lunar, solar, and estrous cycles. Even after the development of civilization and complex political and economic institutions, the concept of time remained cyclical. Until modern times, most societies measured time from the beginning of a dynasty (year one) to its end and the beginning of another. As Michael Hudson (1998) has demonstrated, the debt cycle of the early civilizations matched the reign of the emperor. In year one of the emperor's reign, all debts would be wiped clean, a policy known as "clean slate". Paradoxically, this would restore the "rightful" position of the emperor above his subjects because it would render null and void all the claims of the rentier class over his subjects. Over the course of his reign, debts would grow, increasing the power of the rentiers. For the most part, these individuals became enriched by lending money and grain to those who could not meet tax liabilities to the emperor (the earliest lenders were actually tax farmers–those who had the right to collect taxes for the emperor–who would pay taxes and place the debtors in bondage). The typical interest rate on such loans was 33 percent per year–an interest rate which was impossible to meet through the natural rate of increase of agricultural output. Over time, then, debt would grow at a rate near to the rate of interest (since interest would be capitalized) as wealth and power shifted to the rentier tax farmers who gained bondpersons and later control over property. It was traditional that all debt would be canceled in the thirtieth year of the emperor's reign, or sooner if he should die (with a new emperor and a new "year one"). With debt cancellation, time would begin anew–with a clean slate. Much of the terminology was carried over to the Bible–redemption, forgiveness, jubilee, and hallelujah–with terms that originally had to do with debt relief taking on religious significance.

From the time of the Babylonians to the present, it has been recognized that there is a tendency for debt claims on income to rise more quickly than the ability to pay (this is the so-called Soddy principle, named after Nobel

winner Frederick Soddy). Religious admonition as well as secular law has frequently banned lending at interest–originally termed "usurious", although over time that term came to be associated only with lending at "high" interest rates. By the middle ages, certainly, lending at interest was accepted, but only under specified conditions (though increasingly honored more often in the breach). Older religious proscriptions were giving way to increasing private mercantile activity, and Church officals (such as Aquinas) concocted prohibitions against "usury" (which would disturb the "natural order of things") while developing new rules that would provide Christian sanction to economic realities (and which recognized the alliance between the Church and the merchant class). However, debt cancellation has historically been more successful than usury laws at preventing, or at least relieving, excessive indebtedness.

Clearly, the principle of periodic debt cancellation was not consistent with accumulation of private wealth. On the other hand, debt relief was required because the "miracle" of compounded interest caused debt to grow more quickly than income in pre-capitalist societies. Wide-scale debt cancellation was essentially ended with the spread of Roman property law, which protects the value of private property.

At the same time, Roman law reduced uncertainty (for creditors and other wealth holders) and may have contributed to a very long-run, gradual, decline of interest rates. (Homer and Sylla) Development of capitalism increased economic growth and thereby increased the rate of growth of ability to pay as production could increase faster than under pre-capitalist agricultural-based production. More importantly, for our purposes, Roman law changed the legal conception of time—from a circular view, with time beginning anew with each dynasty, to a linear view of time: debts are never forgiven; time moves in one direction, only.

The interest rate enforces a "time is money" view upon capitalism. By its very nature, an interest rate is stated for a time period. In an economy based on production for market, the interest rate sets the standard return that must be achieved by any for-profit production, as well as for ownership, for profit, of any asset. If the interest rate is twelve percent per year, then anything which might be held to generate returns (whether that might be a financial asset or real capital) must have an expected return in excess of twelve percent per year. This, more than the "production period" is the key time concept in a capitalist society. The higher the interest rate, the higher the "intensity" of production–generally, returns must be higher, technological advance must be faster, the workday and workweek will be lengthened (to increase "surplus labor time"), the entire production process will be subject to the "speedup". Our own notion of time changes from a "natural", circular, conception to a more linearly-based, sequential view. Output always increases, wealth (for some) always grows, income and spending always grow, products are always becoming "new and improved", and "progress" is "normal" and expected.

The problem is that production cannot occur where returns are expected to grow at a rate below the rate of interest.It is the interest rate that enforces the "short view" on the market economy. Many projects, even many with obvious social benefits, cannot be undertaken even during the best of times because their private returns are insufficient. Others may be expected to have high returns–but the returns are too far in the future to permit private undertaking. When expectations collapse, many and even most returns may fall below the rate of interest–which itself rises due to enhanced uncertainty about the future—leading to falling asset prices to equalize returns. Production becomes constrained in a very real sense by our conception of time–the span of historical time over which prospective returns can be calculated. And the higher the interest rate, the faster any purchased asset must "pay for itself," recovering costs (M) and generating profits (M'-M). For example, when the (simple) interest rate is 10%, a $100 investment must pay for itself in 10 years, while at an interest rate of 20%, it must pay for itself in five years.

In ancient times, the rate of interest could not act as such a constraint. While interest could redistribute wealth in favor of the rentiers, the "natural order" would be restored by a "clean slate" policy. The emperor could, if there were sufficient resources under his command, order the construction of a new pyramid. The only time constraint placed on construction would be the lifespan of the ruler (and even that would not be necessarily binding since it could be passed along to heirs). No matter how high the interest rate, this could not stand in the way of pyramid construction. In the modern economy, virtually no firm–not even the largest–can privately build the equivalent of a pyrmid. Only government can build (or have private firms build) pyramids, for only government can ignore the hurdle set by the rate of interest (and if it follows the dictates of "fiscal responsibility", even government may not be able to do so).

The modern economic conception of time pervades even the dictionary definition of time as "a nonspatial continuum in which events occur in apparently irreversible succession". This definition would be equally foreign to members of pre-capitalist society as well as to modern day physicists. In agricultural societies, while production follows a sequence, that sequence is plainly reversible: corn is planted, then harvested and eaten, but then it is planted again. While it is true that one's own life experience might be thought of as a succession of irreversible events (one is born, married, and dies), most peoples have built up elaborate systems of beliefs that explicitly deny such a sequence (rebirth, reincarnation). It is ironic that the modern definition of the opposite of time, timeless, is "unending" which would be closer to the circular notion of time that most pre-capitalist peoples held.

Conclusion

We argue here that an explicit concept of a unit of time is necessary in the development of economic theory designed to analyze and evaluate the behavior of a monetary economy. As such an economy is a "debt economy," we propose that the "debt cycle"–the period of time required to allow the extinguishing of short term debt–is the appropriate time unit. While this period of time is certainly historical or sequential in nature, it is neither a "month" nor a "year," but time enough to allow the completion of the debt circuit so that M' can be greater than M–a necessary result if a capitalist economy is to succeed in its growth requirement.

This period of time is based on the interest rate. The higher the interest rate, the "faster" must be the circuit. Production must be more intense, and all economic agents must be subjected to a "speedup." To generate the higher returns necessary to pay the greater cost of debt at higher interest rates, greater effort, particularly the effort of production workers, must be made to "push" the production process at accelerated rates. What was once done in a "year" now must be accomplished in "six months." Thus, time "moves faster" the higher the rate of interest.

Clearly, theory that cannot incorporate time in its core argument is incapable of understanding, and thus addressing, the nature of and the problems posed by a capitalist economy. Ridding the economy of its necessary time element, and eliminating the uncertainty that is integral to the decision-making process of this economy, neoclassicism also rids itself of any understanding of money, thus of an economic organization based on money. It simply becomes a sterile, bankrupt intellectual enterprise, suitable for cloistered academic monks but of no use in facilitating a more correct understanding of any real-world economy.

But, it must be pointed out that non-neoclassicists are also guilty of ignoring the significance of time in their theorizing. Neoclassical equilibrium theory must be admitted to have a very strong influence on all divisions within the discipline. We are all trained to this approach and it is this approach that dominates the field. To truly break with the ideas of these "academic scribblers," we must break with all that has been, consciously or not, incorporated into or omitted from non-neoclassical theory. And this means, among other matters, thinking seriously about time.

Notes

1. In Mesoamerica, for instance, some Mayan organizations developed astronomical systems of time measurement that were more accurate than those used in Europe at the time of the conquest. Also, with the development of settled agriculture and the need for a new system of time-keeping, we also find changes in social or cultural features of the organization. The Mayans, apparently, laid out their city patterns to correspond to the recurring changes in astral bodies; various ceremonies celebrating the winter solstice and the vernal equinox took on much greater significance, etc. See, Aveni, 1981, especially pp. 233-45.

2. Marx's analysis of the division of the work-day into necessary and surplus labor-time is not just confined to production, but production and exchange in the context of a monetary economy. Surplus labor-time represents the production of surplus value which must be sold ("realized") if the capitalist production process is to succeed in money terms—if M' is to be greater than M. The ongoing contest, then, over the length of the

work-day is really a contest over the amount and control of surplus labor workers will be forced to provide in this production process.

3. In Marx's terms, the equivalent Keynesian statement appears as follows: But, although boots are, in one sense, the basis of all social progress, and our capitalist is a decided "progressist," yet he does not manufacture boots for their own sake....Use-values are only produced by capitalists, because and in so far as, they are the material substratum, the depositories of exchange-value. Our capitalist has two objects in view: in the first place, he wants to produce a use-value that has a value in exchange...a commodity; and secondly, he desires to produce a commodity whose value shall be greater than the sum of the values of the commodities used in its production...that he purchased with his good money in the open market. His aim is to produce not only a use-value, but a commodity also; not only use-value, but value; not only value, but at the same time surplus-value (Marx, [1867] N.D., p. 181).

4. Minsky's well-known classification of financial positions as ponzi, speculative, or hedge has an important time element. A hedge unit is expected to generated an income stream sufficient to service debt over every time period—no matter how short. A speculative unit has income flows that are expected to only cover interest in the "near term"; over the longer term, income flows are expected to rise. A ponzi unit cannot even cover interest over the near term. To a large extent, the difference between "near term" and "longer term" boils down to the interest rate reset period: a hedge unit cannot be affected by rising interest rates because it is able to pay interest and retire principal so it cannot be made subject to a higher interest rate. The speculative unit will be forced to "roll over" debt at a new and possibly higher interest rate, while the ponzi unit will have to "capitalize" interest at possibly rising interest rates. See, "Finance and Profits," in Minsky, 1982, pp. 22-3.

5. In a most perceptive analysis of the *General Theory* , Dudley Dillard juxtaposed the social and individual character of output under a monetary economy: "'Real goods' appear to the individual producer as an artificial form of wealth until they are converted into money which appears as real wealth to the individual producer." From the community's point of view, goods *are* real wealth while money appears as artificial (Dillard, 1954, pp.28-9).

6. In some general sense, all future is uncertain: An errant comet could destroy the earth next year. The type of uncertainty of interest to Keynes, et al., is clearly not this type but is based on the specific features of monetary economy (though natural phenomena clearly might influence financial markets).

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