Murray Rothbard on Interest and Capital: An Exercise in Theoretical Purity[*]

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Introduction

Murray Rothbard was a tenacious defender of the praxeological project originated by Ludwig von Mises. In his most extensive and most consciously theoretical work, *Man Economy and State* he attempted to give clear and complete expression to Mises's vision. This is particularly evident in his treatment of Interest and Capital[1]. He examines these topics with a view to uncovering for the reader their 'essential' nature - providing an accurate picture of those essential characteristics that make Interest and Capital what they are. He is not here as concerned with descriptive realism as he is with logical imperatives. In order to be able to apply economic categories to the real world of history and institutions one must first obtain a correct understanding of these categories. It is important, for example, to be clear as to the origin of the phenomenon of Interest before attempting to understand the various determinants of the interest rates that we observe in real world markets. Similarly, we should understand the true nature of Capital and the earnings commonly attributed to it before attempting to interpret the results of entrepreneurial action in the real world.

In this paper I examine Rothbard's theories of Interest and Capital. Both are what could be described as 'pure' theories. His theory of Interest is a pure time preference theory (PTPT) of Interest. His theory of Capital could be described as a pure zero profit theory (PZPT) of Capital. Both are developed in the context of a steady state economy of a particular kind, an evenly rotating economy (ERE) and are 'pure' in the sense that they attempt to isolate the essential features of Interest and Capital, i.e. those features that would still be there even if no profits or losses were earned. All incomes would then be pure Interest or Rent (on land or labor).

Examining these theories indeed gives us an appreciation for Rothbard's keen insights and for the energy with which he pursues Mises's project as he interprets it. We are however, in the end, left wondering whether what it achieves by abstraction is not at the crucial expense of meaning and relevance. Of particular concern is the banishing of all considerations that pertain to the passage of time. It is possible to feel that since time is an 'essential' aspect of the human existence and since the passage of time necessarily implies change and the occurrence of profits and losses, that the latter are therefore also part of the essential nature of Interest and Capital.

The Interest Problem and its Resolution in Terms of PTPT Restated

The PTPT is notable for its obscurity (from the viewpoint of modern rival theories)[2] and for its resilience. Interest in it has recently resurfaced as part of the development of "Modern Austrian Capital

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[1]For reasons that will hopefully become apparent, I am going to adopt the convention of using upperecase letters to designate 'pure' concepts. Thus 'Interest' will refer to originary or 'pure' interest as used by Rothbard and 'interest' will refer to the concept as more usually understood in its everyday usage. Similarly, 'Capital' refers to Rothbard's specific definition of 'capital' and likewise for 'Land'. For example, it will be seen that 'Land' includes elements different from those usually thought of to be included in 'land' as commonly understood, refering as it does only to 'original, permanent' resources, while 'Capital', by the same token, excludes much on the basis that it includes only 'non permanent' resources.

[2]At the very heart of the terminological thicket is the use of the word "interest" in at least two different contexts. The same word is used for a description of the rates earned and paid on money loans in actual real world economies and for a description of the value premium of present over future goods in a hypothetical world devoid of uncertainty and change, though in the case of the latter, qualifiers like

Theory" (see Faber 1979 and Pellengahr 1986a and 1986b) and has been periodically revisited in the process of the development of Austrian market process theory (Yeager 1979, Garrison 1979a and 1979b and 1988), and most recently by Kirzner (1993). Murray Rothbard is well known for his defense of the PTPT (see for example Garrison 1988) derived from Mises. We begin here with a brief restatement.

If an income source (a capital asset) is known to yield a steady income for a finite period of time, why does the price of the source not equal the sum total of the incomes earned over the life of the asset? So, to be more specific, a 'machine' may be assumed to yield a net income of $100 a year for ten years and then be replaced by a new model[3]. Why can the machine not be sold for $1000? This is a simple way of formulating the generic problem. According to Menger's Law the value of an income source is derived from the value of the income it yields. Why is the source not valued at the sum total of the income yielded over its life? Surely, at any price below $1000 someone could buy the machine and earn an income in excess of the price paid, a surplus. Why is this surplus not competed away?

The answer provides the identification, and indeed the definition, of Interest as a phenomenon. $100 today is not valued the same as $100 a year from now. They are economically different goods. In terms of the consumer's subjective preference ranking the marginal utility of $100 today is greater than the marginal utility *today* of $100 a year from now. This is *time preference* whose expression is Interest[4]

We may note some assumptions and implications: It is important to stress that, in the context in which Mises and Rothbard have developed this theory, it is assumed that the future income is expected with certainty. That way the relative evaluation of the same prospect at different times is influenced only by its position in time from the vantage point of the present and not by any questions of risk or uncertainty[5]. The income at various dates must be *that which would be valued the same at the same date*. The only differentiating factor is time - *it is a pure time preference*. Secondly, it is important to keep all notions of interest rates, such as we observe in the loan market, out of the picture. To admit them into the individual's choice theoretic context would be to fall prey to an all too common circularity. We cannot explain interest rates in terms of individual time preferences if we assume an interest rate already to exist. This is no different in principle from realizing that individuals' preference rankings exist 'prior' to and independently of the prices of the items they are ranking. Time preference is a subjective phenomenon like individual preference rankings and as such is unobservable. But it is nevertheless quite real and exists even in the real world of uncertainty and inflation and is reflected (together with risk and uncertainty) in market interest rates just as other prices express other aspects of individual preferences (interest rates being derived from a ratio of intertemporal prices). Thirdly, it is apparent that Interest does not depend in any way on the productivity of Capital. It does not even depend on the existence of productive assets

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"originary", "pure", "neutral" and "natural" are sometimes added (notwithstanding that these qualifiers are used as well by different theorists to mean different things). See for example, Rothbard 1975 pp. 17-18. On the one hand the phenomenon of "interest" is something with which we are all, in our everyday lives, very familiar. On the other hand, if we study economics we are told by PTPT theorists that "interest" while ubiquitous and crucial to the functioning of any market economy, is nothing we can actually observe because it is hopelessly mingled with profits and losses, inflation (price) premiums, and uncertainty premiums (Mises 1966 p. 253, Rothbard 1970 p. 321).

[3]We leave aside the question of how we know that the 'machine' is the source of the income. Strictly speaking we should say that the use of the machine together with other higher order goods *adds* $100 to income each year. In familiar terms the marginal product of the machine is valued at $100 per year. This will be explored further below.

[4]Specifically, using a neoclassical approach, we may say that the interest rate is the ratio of the marginal utilities minus 1. Symbolically $MU_{t} / MU_{t+1} = 1+r$ where r equals the rate of time preference or Interest. Or more generally $MU_t/MU_{t+n}=1+r_n$, where r_n is the rate of time preference for time horizon n. Marginal utilities are understood to be as of time *t*. So MU_{t+n} is the marginal utility of the prospect in question to be enjoyed at time $t+n$ but contemplated at time *t*.

[5]That this assumption is profoundly problematic will emerge from the discussion to follow.

(whose combined value is identified as Capital). Indeed the price of a capital asset would fully reflect the (discounted) *value* (as evaluated by consumers) of its product, so that a more productive asset would cost more. The rental return to capital is conceptually quite distinct from Interest. Interest is not the return on capital. Interest would exist in a pure exchange economy as long as there was a positive time preference. A positive time preference is a necessary and sufficient condition for the existence of Interest. In fact, in this context, Interest and time preference are virtually synonymous. Interest is thus 'explained' by the propensity of individuals to discount the future. And, since Interest, by definition and by intuition, would not exist in the absence of this propensity, it makes sense to say that the phenomenon of Interest is due to and only due to time preference. The 'essence' of Interest is time preference.

Time Preference in the Literature

So far so good. It would seem that stated in these terms or similar ones (for example Kirzner 1993 and Garrison 1988) PTPT would be clear, if not unobjectionable, and objections would be in terms of arguing for other conceptual schemes. It is apparent, at least to this author, that the PTPT account of interest is not well understood, even by eminent theorists. It seems that a plausible explanation for this is the way in which the PTPT has been developed in the literature to which Rothbard has made important contributions. It may be helpful to examine certain aspects of the development of the theory prior to Rothbard. The most influential theorists are probably Böhm Bawerk (1959 three volumes in one [1884, 1889, 1921]), Fetter (1977 [1902 - 1927] and Mises (1966 [1949])[6]. Rothbard, though following Mises in most respects, elaborated on and occasionally deviated slightly from him (Rothbard 1970 [1962]).

Böhm-Bawerk and Fetter

Böhm Bawerk's (1884) exhaustive (and exhausting!) survey of interest theories establishes clearly the primacy of time preference. He effectively disposes of productivity accounts in explaining the phenomenon of Interest. His account of time preference is much admired. But then in his later volume (1889) when he turns to an examination of *the determinants to time preference* he advances three reasons for the existence of a positive rate of time preference. Two of these are 'psychological' (impatience and myopia) while the third is 'technological' (the 'technical superiority' of present goods over future goods). What he meant by this third reason was the productivity of capital goods that represent the results of 'roundabout' methods of production - because of productivity, present goods could be used to obtain a greater volume of future goods and so were demanded at a premium. In this way he involved himself in an unfortunate and celebrated contradiction[7]. To many later theorists it appeared as though Böhm Bawerk had come to embrace a kind of Fisherian eclecticism, one that established the duality of time preference and productivity in the determination of interest rates. In fact much of the recent mathematical work on "Modern Austrian Capital Theory" seems to reflect this (Faber 1979, 1986). In a way, the contradiction became obscured because the question changed. PTPT was never really about the determination of market interest *rates*, it was about explaining Interest as a phenomenon (Kirzner 1993 p.183 ff.). As we shall see, the fact that productivity may play a role in the former in no way diminishes its irrelevance for the latter.

Frank Fetter's reputation as being unique among economists in his clear grasp of the PTPT, owes a great deal to Rothbard (Rothbard 1977). But, according to Rothbard, while Fetter articulated a valid criticism of Böhm Bawerk's inconsistency he at the same time failed to grasp certain important aspects that were valid in Böhm Bawerk's theory[8]. It was left to Mises to establish a valid theory using what was valuable from Böhm Bawerk and Fetter and putting it in his own unique framework.

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[6]Dates of original publication are indicated in square brackets. For a history of the concept of time preference see Rothbard 1987.

[7]See, however, Maclachlan 1993 pp. 39-40, for a slightly different interpretation.

[8]So, for example, among other things, he "never fully realized the importance [of distinguishing] between land (the original producer's good) and capital goods (created or produced producer's goods)" (Rothbard 1977 p.6).

> The leading economist adopting Fetter's pure time preference view of interest was Ludwig von Mises ... Mises amended the theory, in two important ways. First, he rid the concept of its moralistic tone which had been continued by Böhm Bawerk ... Mises made clear that a positive time preference rate is an essential attribute of human nature. Secondly, and as a corollary, whereas Fetter believed that people could have either positive or negative rates of time preference, *Mises demonstrated that a positive rate is deductible from the fact of human action*, since by the very nature of a goal or an end people wish to achieve that goal as soon as possible (Rothbard 1987 p.421, italics added).

So, according to Rothbard, Mises has *the* definitive PTPT of interest. Thus in order to examine Rothbard's theory one must first turn to Mises. Of particular interest will be Rothbard's claims (i) that Mises has demonstrated "that a positive rate is deductible from the fact of human action, since by the very nature of a goal or an end people wish to achieve that goal as soon as possible" and therefore (ii) that time preference can never be negative.

Time Preference According to Mises

How is time preference to be defined? It turns out to be somewhat problematic. Turning first to Mises:

> Time preference *is a categorical requisite of human action.* No mode of action can be thought of in which satisfaction within a nearer period of the future is not - *other things being equal* - preferred to that in a later period. The very act of gratifying a desire implies that gratification at the present instant is preferred to that at a later instant. He who consumes a nonperishable good instead of postponing consumption for an indefinite later moment thereby reveals a higher valuation of present satisfaction as compared with later satisfaction. If he were not to prefer satisfaction in a nearer period of the future to that in a remoter period, he would never consume and enjoy. He would not consume today, but he would not consume tomorrow either, as the morrow would confront him with the same alternative.
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> Not only the first step toward want-satisfaction, but also any further step is guided by time preference. Once the desire *a* to which the scale of values assigns the rank 1 is satisfied, one must choose between the desire *b* to which the rank 2 is assigned and *c* that desire of tomorrow *to which -in the absence of time preference-the rank of 1 would have been assigned.* If *b* is preferred to *c*, the choice clearly involves time preference. Purposive striving after want-satisfaction must needs be guided by a preference for satisfaction in the nearer future over that in a remoter future (Mises 1966 p. 483 italics added).

In this discussion Mises purports to be proving praxeologically the necessity of positive time preference. In this way (according to him) he improves on the approaches of Böhm Bawerk and Fetter who erroneously supposed time preference to be an 'empirical' matter - subject to what we know about individual psychology, physiology[9] or productive technology. In the process he also provides a *definition* of time preference. Both the argument and the definition bear further examination[10].

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[9]Mises:

> It is possible to search for a psychological understanding of the problem of time preference...However, the praxeological problem is in no way related to psychological issues. We must conceive, not merely understand. We must conceive that a man who does not prefer satisfaction within a nearer period of the future to that in a remoter period would never achieve consumption and enjoyment at all.
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> Neither must the praxeological problem be confused with the physiological (Mises 1966 p. 486).

[10]The claim of praxeological proof appears repeatedly.

First we note that Mises does not explain what he means by *other things being equal* (here or elsewhere though this phrase is often repeated in this context). He does not tell us what these other things are and it is up to the reader to infer from the text to what he is referring. The quoted passage above contains the 'proof' and the definition embedded within it, but it also contains some potential inconsistencies. It appears as though what Mises is trying to do is to compare *satisfactions* that would be equal but for their separation in time (the first sentence). But then he shifts from a comparison of *satisfactions* to a comparison of *desires* and then to a comparison involving the *consumption* of a *non perishable good* in the present and in the future and then back to *satisfactions*.[11] The reader should consider that there are (at least) three different definitions here:

> A. Comparing (i) the *satisfaction* obtained *today* from consuming something *today* with (ii) the *satisfaction* obtained *today* from contemplating the experience of an *equal satisfaction* (however obtained!) tomorrow; if (i) is preferred to (ii) time preference exists.
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> B. Comparing (i) the gratification (satisfying?) of a *particular desire today* with (ii) the gratification of that *same desire tomorrow*; if (i) is preferred to (ii) time preference exists.
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> C. Comparing (i) the *consumption of a particular item (or service) today* with (ii) the *same item (or service) tomorrow*; if (i) is preferred to (ii) time preference exists[12].

A fourth definition is implied by the second paragraph of the quoted text above. There Mises seems to be saying that time preference *may* (and therefore may not?) be involved in some choices, but in any case alludes to the difference between two ideas (1) the existence of time preference as a phenomenon and (2) its degree of influence at different margins. Indeed it is clear that Mises recognized the existence of variations in time preference and this will be discussed below. His discussion here however suggests an alternative way to express time preference, one that is purged of the 'hedonic' elements present in A through C above.

> D. Comparing the purchase of (i) a prospect that is ranked 1 today with (ii) a prospect that would be ranked 1 today if it were available today but is only available tomorrow; since (as indicated by the ranking) (i) is preferred to (ii) time preference exists.

Considering these alternatives it seems to me that none of them self evidently suffices to establish the 'theorem of time preference' - that time preference for the present *must* exist. Referring to A it seems

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> [P]sychology can never demonstrate the validity of a praxeological theorem... It can never make evident that all human action is necessarily dominated by a definite categorical element which, without any exception, is operative in every instance of action (Mises 1966 p. 488).

Other instances appear at pages 527 and 528.

[11]Also: "... present goods are valued higher that future goods *of the same kind and quantity*" (Mises 1966, p.524, italics added). One may ask - what about ice in winter and summer? Rothbard deals with this as discussed below.

[12]Compare for example:

> The theorem of time preference must be demonstrated in a double way. First for the case of plain saving in which people must choose between the immediate consumption of a quantity of goods and the later consumption of the same quantity. Second for the case of the capitalist saving in which the choice is to be made between the immediate consumption of a quantity of goods and the later consumption either of a greater quantity or of goods which are fit to provide a satisfaction which - except for the difference in time - is valued more highly. The proof has been given for both cases. No other case is thinkable (Mises 1966 p. 486).

quite possible that the contemplation of an equal satisfaction in the future may lead to a choice to postpone such satisfaction *under certain circumstances*, about which more will have to be said below, and noting which Mises's phrase 'other things being equal' comes again to mind. Referring to B we must assume that the 'same desire' implies the same desire of the same intensity (so that for example my decision to postpone my haircut until my hair grows longer does not count, since, as my hair grows, the intensity of my desire to get it cut grows as well). Once again it seems possible to conceive of situations where satisfying an exactly equivalent desire tomorrow might appear preferable to satisfying it today. The overall problem is that each of these definitions involves individual (subjective) preference scales about which we normally cannot say very much. Time preference rests on the assumption that for the individual the 'same' prospect (satisfaction, desire, good or income) at two separate moments in time is considered two different prospects. *A priori* one would not expect to be able to say anything in general about the direction of subjective individual rankings of these two prospects. Mises's assertion seems to rest on the categorically special nature of time and on the assumption (embodied in his definition) that the *only* difference between the two prospects is the lapse of time. On this basis his 'proof' seems to proceed as follows:

> From the action axiom (individuals act purposively to improve their situation) we know that individuals consume to satisfy their wants in accordance with their scale of values. If an individual valued (in the present) an equivalent (in the sense explained above) consumption prospect to occur in the future, more highly than if it occurred in the present, he would postpone that consumption; but then tomorrow he would face the same choice, and assuming an unchanged scale of values at each point of time, would postpone it once again and so on indefinitely; leading to the conclusion that the individual would never choose the present prospect; a *reductio ad absurdum* that shows that the future prospect can never be valued more highly than the equivalent present one[13].

This demonstration does not in any way depend on psychological, physiological or technological considerations. It follows logically from the action axiom, under the stated assumption regarding value scales (preference orderings) and the lapse of 'pure time'. But there is a price to be paid. If not the validity, then the relevance of this 'proof' may be questioned. Outside of the context of Mises's simplified 'pure time lapse' world, would a preference for equivalent present prospects always exist?

Time Preference According to Rothbard

At first impression Rothbard seems to mirror exactly Mises's conception of time preference as an apodictically certain praxeological category, though his treatment is a bit more extensive and seems (perhaps because of his more colloquial idiom) to be more accessible. Some of his remarks bear on either the validity or the relevance of Mises's 'proof'.

> Early in *Man Economy and State* Rothbard addresses the phenomenon of time preference.
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> A fundamental and constant truth about human action is that *man prefers his end to be achieved in the shortest possible time.* Given the specific satisfaction, the sooner it arrives, the better. This results from the fact that time is always scarce, and a means to be economized. The sooner any end is attained, the better. Thus, with any *given end* to be attained, the shorter the period of action, i.e. production, the more preferable for the actor. *This is the universal fact of time preference.* At any point of time, and for any action, the actor most prefers to have his end attained in the immediate present. Next best for him is the immediate future, and the further in the future the attainment of the end appears to be, the less preferable it is. *The less waiting time,* the more preferable it is for him (Rothbard 1970 p. 13, italics original)

And in a footnote to this passage:

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[13]For further discussion on this see the appendix below, item 1.

> *Time preference* may be called the preference for *present satisfaction* over *future satisfaction* or *present good* over *future good,* provided it is remembered that it is the *same* satisfaction (or "good") that is being compared over the periods of time. Thus, a common type of objection to the assertion of universal time preference is that, in the winter time, a man will prefer the delivery of ice the next summer (future) to delivery of ice in the present. This, however, confuses the concept "good" with the material properties of a thing, whereas it actually refers to subjective satisfactions. Since ice-in-the-summer provides different (and greater) satisfactions than ice-in-the-winter, they are *not* the same, but *different* goods. In this case, it is different satisfactions that are being compared, despite the fact that the *physical* property of the thing may be the same (Rothbard 1970 p. 436 n15, italics original).[14]

These passages are in many ways reminiscent of the one by Mises quoted earlier, but there is no 'proof' offered. Rothbard refers to the "fundamental and constant truth of time preference", and to the "universal fact of time preference" and seems to suggest there are no exceptions if it is defined properly; but adds curiously, "This results from the fact that time is always scarce, and a means to be economized". So it is not apparent whether this is a universal (empirical) fact of (finite) life, or a necessary category of human action. (One immediately wonders what one could say about a world in which people are assumed to live forever - see below.) In his Palgrave article he refers to Mises's demonstration "that a positive rate is *deductible* from the fact of human action" (Rothbard 1987, p.421, italics added). So the record is not clear.

In a section entitled "Forces affecting time preference", however, Rothbard seems to suggest that time preference has an empirical rather than a praxeological basis.

> Praxeology can never furnish an ultimate explanation for a man's time preferences. These are psychologically determined by each person and must therefore be taken, in the final analysis, as data by economists. However, *praxeological analysis can supply some truths about time preferences, using ceteris paribus assumptions*...(Rothbard 1970, p.380, italics added).

One must be careful not to distort the context here. What Rothbard seems to be saying is that the praxeological analysis is important in establishing the phenomenon of time preference, but that empirical factors are important in accounting for its degree. Indeed, as we shall see, like Mises, he makes extensive use of an overriding *ceteris paribus* device - the evenly rotating economy (ERE) - presumably to establish these praxeological truths. But in the actual operation of the real world economy many things will influence the degree of time preference. (Note in the first sentence of the above quoted passage he refers to "time preferences" rather than "time preference".) Among these influences is real income or wealth. *Ceteris paribus* an increase in real income will lower the time preference rate. Furthermore:

> There are other elements that enter into the determination of time preference schedules. Suppose, for example, that people were certain that the world would end on a definite date in the near future. What would happen to time preferences and to the rate of interest? Men would then stop providing for future needs and stop investing in all processes of production longer than the shortest. Future goods would become almost valueless compared to present goods, time preferences for present goods would zoom, and the pure interest rate would rise almost to infinity. On the other hand, if people all became immortal and healthy as a result of the discovery of some new drug, time preferences would tend to be very much lower, there would be

[14]Other, less extensive, statements appear throughout the book. For example "We have already seen above the universal fact of *time preference* - that a man will always prefer obtaining a given satisfaction earlier than later" (p. 42) and "Since we have seen that the universal law of time preference holds that any given satisfaction will be preferred earlier than later, an equivalent satisfaction will be preferred as early as possible. Present consumption of a good will be given up only in anticipation of a *greater future* consumption" (p.293).

> a great increase in investment, and the pure rate of interest would fall sharply (Rothbard 1970, p.381-2).

How do we know then that the pure rate of interest cannot be negative in such a world?

Time Preference and Marginal Rates of Time Preference

The above discussion shows that in addition to the distinction between the pure rate of time preference interest (Interest or originary interest) and real world market interest, we should make a distinction between the *existence* and the *levels* of *both.* In other words there are two categories (a) pure, uncontaminated time preference Interest and (b) interest as we observe it in the market place, which is contaminated by the risk and uncertainty of price movements and other factors. Category (b) contains (a) within it. Mises and Rothbard investigate (a) as a purely 'logical' phenomenon and go to great pains to remove all contaminations, via the use of the ERE, so as to expose it (and other phenomena) in sharp relief. We shall critically consider that practice in the next section. We note here, perhaps contrary to some misconceptions, that no PTPT proponent has contested the fact that the levels of both (a) and (b) will vary with circumstances, though this has often been less than clear in their writings.

The clearest way to put it would be to distinguish between time preference as a phenomenon and *rates* of time preference and, recognizing that the latter varies as the margin of consumption in different periods varies, to refer to it as the *marginal rate of time preference.* By and large Austrian economists do not adopt this terminology[15] and thus may have invited confusion. However here the record is clear.

In his introduction to the Fetter volume, for example, Rothbard writes (paraphrasing Fetter approvingly):

> Each individual has a personal time preference schedule, a schedule relating his choice of present and future goods to his stock of available present goods. As his stock of present goods increases, the marginal value of future goods rises, and his rate of time preference tends to fall. These individual schedules interact on the time market to set, at any given time, a social rate of time preference. This rate, in turn, constitutes the interest rate on the market, and it is this interest rate that is used to convert (or "discount") all future values into present values....(Rothbard 1977, p. 4).

And again,

> A greater supply of present goods would move to the right and down along a given time preference schedule, so that the marginal utility of present goods would fall in relation to future goods. As a result, on the given schedules, the rate of time preference, of degree of choice of present over future, would tend to fall and so therefore would the interest rate (Ibid. p. 16).[16]

These statements are remarkably concise and precise and point to a crucial distinction - the difference between a time preference schedule and a point on it. Rothbard admits that over time the schedule itself may move around, making it difficult to say anything about time preference movements in a systemic

[15]Kirzner, "...physical productivity may significantly affect the level of wealth, and thus *the marginal rate of time preference*." (1993, p186, italics added) is a rare exception. It is the only time in the article that the phrase is used.

[16]Although much less specific, Mises also indicates an awareness of the existence of changes in the marginal rate of time preference in response to changing scarcity conditions, see Mises 1966, pp. 532-4.

analysis.[17] They also suggest the interesting question - what is the lower limit (the lowest possible point) on the time preference schedule?

Is The Evenly Rotating Economy Useful?

Rothbard, following Mises, devotes a large amount of space in *Man Economy and State* to the evenly rotating economy (ERE). The ERE is a general equilibrium construct. It is adopted in order to impose the most general type of *certris paribus* conditions. Mises uses it to enable the reader to see clearly the connection between time preferences and originary interest[18].

> Under the conditions of a market economy the rate of originary interest is, *provided the assumptions involved in the imaginary construction of the evenly rotating economy are present*, equal to the ratio of a definite amount of money available today and an amount available at a later date which is considered as its equivalent (Mises 1966, p. 532, italics added).

On its face this seems like a reasonable strategy. A closer look at the nature of the ERE and its relationship to time is, however, called for.

> The evenly rotating economy is a fictitious system in which the market prices of all goods and services coincide with the final prices ... there is perfect price stability. The same market transactions are repeated again and again ... No changes in the market data occur. Today does not differ from yesterday and tomorrow will not differ from today. The system is in perpetual flux, but it remains always at the same spot. It revolves evenly round a fixed center, it rotates evenly ... The essence of this imaginary construction is the elimination of the lapse of time and of perpetual change in the market phenomena. The notion of any change with regard to supply and demand is incompatible with this construction (Mises 1966, p. 247).

People are not immortal, but the age distribution is assumed constant as each age group replaces itself (Ibid.). As Mises admits, human action itself is assumed away. "Action is to make choices and to cope with an uncertain future. But in the evenly rotating economy there is no choosing and the future is not uncertain ... Such a rigid system is not peopled with living men making choices and liable to error; it is a world of soulless unthinking automatons; it is not a human society, it is an ant hill." (Mises 1966, p. 248)

> Rothbard's approach is similar but more specific.
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> We realize that the real world of action is one of continual change. Individual value scales, technological ideas, and the quantities of means available are always changing. These changes continually impel the economy in various directions. Value scales change, and consumer demand shifts from one good to another. Technological ideas change and factors are used in a different way. Both types of change have differing effects on prices. Time preferences change, with certain effects on interest and capital formation. The crucial point is this: before the effects of any one change are completely worked out, other changes intervene. What we must consider, however, by the use of reasoning, is what would happen if no changes intervened ... if value

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[17]"Of course, historically, there is no reason why his time preference *schedule* should remain unchanged. It is important to know, however, that, given an unchanged schedule, his relevant time preference rate will fall" (Rothbard, 1970 p. 380). The passage from which this is taken does not clearly define the personal time preference schedule and Rothbard seems here to be trying to relate the real value of the individual's money stock to his time preference. It is likely though that he means by this the value of the individual's present consumption possibilities relative to his future possibilities. In any case, his remarks apply equally to the schedule defined clearly in the text.

[18]Cowen and Fink (1985) have incisively analyzed aspects of the ERE and their analysis will be of some use here, although focus is more specifically on the question of time preference (and Capital and Interest).

> scales, technological ideas, and the given resources remained constant?... The economy tends towards a state of affairs in which it is *evenly rotating*....(Rothbard 1970, p. 275)[19].

The obvious question arises: what can an imaginary world devoid of human action, of market prices[20], indeed of time as we know it, tell us about the world in which we live? The need to abstract from reality is not at issue here. What is at issue is the type of permissible abstractions. What aspects of reality must any simplified story retain in order for us to be able to learn something from it? This is not a question that can be answered satisfactorily here. My own strong inclination can be summarized by saying that resort to the ERE is not helpful in establishing the notion of originary Interest. It may be doubted that as a theoretical construct it is adequate to establish that, even under its restrictive assumptions, time preference and therefore Interest must always be positive. In fact it is more likely that Interest could be negative in the ERE than in the real world. It was noted above that Mises's proof rests crucially on the assumption of unchanging value scales over time - at *each* moment of time, preference orderings are an exact replica of the previous point. But if, by contrast, each moment were regarded by the individual as unique - not a simple spatial displacement of the previous moment - then the preferred time for specific 'acts' of consumption will also be unique (even in the ERE) and the 'proof' fails. As he moves through time the individual consumes according to a preordained plan embodying a preference ordering that spans his entire life with each moment unique (an intertemporal preference scale) and dies having achieved maximum lifetime satisfaction (or at least having made optimal allocations at each moment) with his last dollar in the process of being optimally spent (assuming no bequests). There is no necessary implication of preference for any 'present' over any 'future' in such a world.

The ERE is a world that is 'out of time'. It contains nothing that is analogous to the passage of time in our world. We cannot envisage time elapsing without something unexpected happening, without the arrival of new knowledge. In the ERE, Mises tells us, there is no choice because there is no uncertainty, there is no action there is only reaction. Supposedly it is used as a foil against which to examine the real world phenomena of uncertainty and entrepreneurship[21]. But if the ERE does not have real time, how can we have time preference? What can it possibly mean? Without change there can be no consciousness of time. I suggest, therefore, that anything that we think that we learn about time preference from contemplating the ERE is actually the result of a kind of subliminal modification of the assumptions to allow for real time and real choice to enter unconsciously.

A key point of this paper can be summed up by saying: *time preference is strongly intuitively connected to the presence and type of uncertainty in the world*. Consider the simple experiment that one often uses in teaching the concept of time preference. The teacher takes a ten dollar bill out of his pocket and asks the class which they would prefer (1) the ten dollars right now or (2) the same ten dollars this time next week. He adds that the students may not earn any interest on the ten dollars. Of course everyone opts for (1). Then the teacher changes option two to (2´) ten dollars plus *r* this time next week. At some level of *r* (2´) will just be preferred (or the students will be indifferent between the two). This is then used as an indication of, and as a measurement of time preference. Now if you change the choice a little by adding the assumption that the prospect of ten dollars next week is a certain prospect - the teacher is a perfectly safe bet, while the students' ability to keep the ten dollars safe over the course of the week is less than certain (for example, we could imagine a dangerous society in which predatory behavior regularly threatens peoples' savings) then (2) could very well be preferred to (1). Alternatively, if we

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[19]It should be noted that, as Cowen and Fink point out, Rothbard departs from Mises in assuming the ERE to be a kind of 'end state' towards which the economy is tending. For Mises this is not the case. He uses another construct, 'the final state of rest', for this purpose.

[20]Cowen and Fink explain that 'prices' in such a world bear little resemblance to market prices (867-8).

[21]Indeed for Mises, as for Rothbard, the uncertainty of the real world comes about as a result of the fact that individual value scales cannot be assumed constant from moment to moment, as in neoclassical economics. In fact value scales do not even exist (have no meaning) apart from the act of choice (Mises 1966 p. 122).

assume that (2) and (1) are equally and completely certain (as in the ERE) then *a priori* it does not seem to be possible to say that one will be preferred to the other. The knee jerk preference of (1) over (2) seems to be crucially bound up with the fact that the students automatically realize that the passage of time brings with it unexpected events and that 'a bird in the hand is worth two in the bush'[22]. Resort to constructs that banish the essential nature of time seem to hinder rather than help in understanding time preference[23].

It should be noted that among some writers sympathetic to the time preference approach there is no assumption that it need always be positive or that it is a logical rather than an 'empirical' phenomenon. We have already noted Fetter's contribution. In Kirzner's recent article he implicitly expresses doubts about Mises's treatment, when he says, "This theory solves the interest problem by appeal to widespread *possibly universal* positive time preference" (Kirzner 1993, p. 171 italics added) and again "PTPT accounts for this phenomenon [value productivity] by reference to widespread *possibly universal* preference for the earlier, rather than the later achievement of goals" (Ibid. p. 192 italics added). In considering why (market) interest rates cannot be negative Lachmann explains, "The ultimate reason for this lies in the simple fact that stocks of goods can be carried forward in time, but not backwards. If present prices of future goods are higher than those of present goods, it is possible to convert the latter into the former unless the good is perishable or the cost of storing excessive; while future goods cannot be converted into present goods unless there are ample stocks not otherwise needed which their holders are ready to reduce for a consideration. And as there are always a number of goods for which the cost of storage would be small, money being one of them, a negative rate of interest would be eliminated by a high demand for present goods which are easy to store and a large supply of easily storable future goods, at least as long as the stocks carried are covered by forward sales" (Lachmann [1956] 1978, p. 78). So given that the passage of time is what it is and given (in our society) that generally some goods can be transferred to the future intact (notably money), we would expect interest rates to be positive.

Time Preference and Liquidity Preference

Along these lines we must take note of Fiona Maclachlan's important recent book on interest theory (1993). In considering candidates for the originating cause[24] of Interest she dismisses time preference (though it is clear that her definition thereof is problematic) and offers 'liquidity preference' as a viable alternative. The association of the term liquidity preference with Keynes's particular version in which it first appeared, is consistent with Maclachlan's purpose in reexamining Keynes's contribution. Maclachlan's liquidity preference is, however, importantly different from Keynes's and is closely related to (indeed is part of) time preference in an uncertain world. Specifically, liquidity is "a subjectively determined attribute that reflects both the degree of certainty that one has about an asset's future purchasing power and one's expectation of the transaction costs involved in transforming it into immediate purchasing power. The motive of liquidity preference ... we argue, is the result of the common desire in an uncertain world to keep one's options open. Interest, then, is the amount that must be paid to compensate one for the loss of liquidity associated with trading a present claim for a future one" (p. 16). We may generalize and say that the liquidity of any prospect depends on (1) the anticipated costs of exchanging it and (2) the degree of certainty one feels about its future exchange value at different points of time in the future. Then Interest is the premium that the seller of a claim to (or a promise of) a future prospect pays the seller of an equivalent present prospect in exchange.[25] Following Maclachlan, the

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[22]For further discussion on this see the appendix below, item 2.

[23]For further discussion on this see the appendix below, item 3.

[24]X is an originating cause if and only if (1) whenever X exists, Interest also exists and (2) causality does not run from Interest to X (p. 37).

[25] Maclachlan conducts her analysis in terms only of financial claims and seems to imply that Interest is a 'financial' or 'monetary' phenomenon. Though, of course, monetary factors are important in affecting interest rates, they do not appear to be essential (in the methodological sense) in explaining Interest.

present prospect is self evidently more liquid, the transactions cost of acquiring it is zero (it is already in hand or almost so) and its value is already known. Thus, for someone who wishes to avoid uncertainty it will be preferred.

In this way, it seems to me, Maclachlan does not so much offer an alternative to the time preference theory, as an inquiry into "the crucial, or essential, *motive behind this preference*" (Maclachlan 1993, p. 56, italics added). She argues, in effect, that since time implies change and uncertainty, liquidity preference implies time preference - considering liquidity implies considering future events, present prospects are more liquid than equivalent future prospects. It is important to note that this is only strictly true, and this is probably why Maclachlan talks about claims, of prospects that can be carried intact into the future. So, for example, it cannot be true of services (like haircuts) or perishable goods, but is true of assets or claims to perishable goods or services. One prefers a claim today to an apple tomorrow over a claim tomorrow to an apple tomorrow (or simply an apple tomorrow) even though one may not be hungry today - better to have the credible opportunity to secure tomorrow's needs today than tomorrow. Again, stated in this way one sees the role of uncertainty, in this case of the relative uncertainty attached to different claims. One can also see why money is so important in this regard being a generalized claim on goods and services. Considering again the classroom example: "With a dollar today, one can do everything one can do with the promise of a dollar next year, (all one needs to do is to hold it a year, at which point the two assets are equivalent [compare Lachmann's remarks above]) and one can do more. Within the coming year the present dollar can buy a dollar's worth of goods. To purchase goods with the promise of a future dollar, one must first find a buyer for the promise. Locating a buyer involves a cost and because the buyer can never be as certain about a promise as about the thing itself, it will likely only agree to buy it at a discount" (Maclachlan 1993, p. 56). Thus time preference is really about widening one's options in an uncertain world.

There are some important implications of time preference as liquidity preference in this sense. First, time always implying uncertainty means that a future prospect is in a fundamental sense a *promise* of a future prospect (I may say to the class that I will deliver ten dollars next week, but until it happens it is just a possibility). As Maclachlan says, one can "never be as certain about a promise as about the thing itself". This being the basis of the liquidity-time preference it follows that if we somehow could imagine a situation, like an ERE, where one indeed is just "as certain about a promise as about the thing itself" the basis for time preference would evaporate. If we have anything in an certain world we have just preference not time preference - there is no principle based on time for preferring earlier rather than later and in fact some things will plausibly be preferred later. This just repeats our previous conclusion from a different and complementary perspective. Secondly, our understanding of the world leads us to expect that in general people will exhibit positive liquidity preference although it is not impossible (though it is somewhat implausible) for someone to have negative preferences for liquidity. This turns out to be similar to (is actually a generalization of) the case of negative risk aversion (Maclachlan 1993 p. 28). However we can be certain that in the world as we know it, individuals in general will discount the future - and liquidity-time preferences of individuals will interact to establish positive interest rates. In the absence of this, perpetual income streams would have an infinite price. The longer the time horizon the more uncertain any future prospect and the greater any preference for liquidity is likely to be and therefore, other things constant (like expectations of future interest rates), the higher will be long term rates. So this way of thinking is also fundamental to the term structure of interest rates.

A third implication is that we may expect a preference for liquidity in this sense to operate at *every* margin. "If one is going to prefer the more liquid asset one will do so at all margins. The reason is that the more liquid asset provides one with a greater range of options than the less liquid one (Maclachlan 1993, pp. 55-6)". A preference for liquidity is not a preference for present consumption as against future consumption *per se* which *is* affected by the margin. It is rather a preference for the option of present or future consumption as against just future consumption and does not *a priori* depend on the margin. Thus this implies that no matter what the level of wealth in the society people will plausibly always discount the future because of uncertainty. Fourth, this preference for the ability to secure prospects in the present as against leaving them relatively insecure, can be seen to give rise to the phenomenon of originary Interest. It is pure Interest in the sense that it exists 'prior' to and

independently of productivity, or market interest. Interest rates observed in the market will be affected not only by this phenomenon but also by less essential 'transitory' factors like expectations of inflation (the Fisher effect), profits and losses which affect the demand and supply of loanable funds and (it is important to note) expectations of future interest rates. In this way Maclachlan has built a persuasive account of the 'essential' nature of interest that does not abstract from the nature of time.

Rothbard's Theory of Capital

In his discussion of interest Rothbard seeks to establish originary interest (Interest) as a 'pure' income, one that occurs even in the ERE, that is in a timeless world of no uncertainty. Interest, therefore, is not as is sometimes thought, a return to capital. What then is the return to capital and how is it related to Interest? Rothbard's discussion shows that Capital earns no 'pure' income (rent), it earns only (transitory) profits.

Thus Rothbard's use of the ERE is only partly directed to the establishment of pure Interest. In large part it is also used to establish his understanding of the essential nature of Capital and its income.[26] In particular "the ERE concept is especially helpful in the analysis of profits and losses as compared to interest" (Rothbard 1970, p. 307). His analysis of Capital reflects not only his debt to Mises but also (fundamentally) to Menger (1871) and to Hayek (1939, 1941) and, of course, to Böhm-Bawerk. Thus he envisions a structure of production defined by stages of production that are involved in a continual sequential process in which goods of higher order (capital) become transformed into goods of the lowest or first order (consumption goods)[27]. The incomes of the goods of higher order are derived from the value of the consumption goods they help to produce and, in the ERE, will be equal to their discounted marginal value products (DMVPs), where the rate of discount is the uniform social rate to time preference. Though, as we have seen, different individuals have different time preference schedules, they will interact in the market for loans and capital goods to produce a market rate and in the ERE (since there is no uncertainty) there will be a uniform 'pure' social rate of time preference - also identified by Rothbard as the 'normal' or 'natural' or 'real' rate.

In the ERE the structure of production will be constant and will reflect the best use of the generally known productive techniques. This is the state to which we are to imagine the economy will tend to move in the absence of any change. In the ERE there are no profits and losses. The prices of capital goods - reflecting their DMVPs - are fully captured by the prices of the original 'primary' factors used to produce them. And there are only two such primary factors of production - (ground) Land and (raw) Labor. Everything else in the economy is ultimately produced using these two primary factors, either directly - at the highest stage - or indirectly, combining with already produced capital goods to add value to the next stage. All other incomes can be analytically 'swept back' to those of the original factors. The incomes of Land and Labor are incomes in the nature of a rent, and in the ERE only Labor and Land earn pure rent.

A rent is the unit price of the service yielded by a long lived asset. In the case of a non durable good it is equal to its price. In the ERE the rent on a particular physical asset will equal its DMVP. Thus all durable assets that have a value in production (and can be bought and sold) have capitalized values that will determine their prices. Part of Rothbard's theory of capital is devoted to explaining the nature of the

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[26] "Analysis of the activities of production in a monetary market economy is a highly complex matter. An explanation of these activities, in particular the determination of prices and therefore the return to factors, the allocation of factors, and the formation of capital, can be developed only if we use the mental construction of the *evenly rotating economy*" (Rothbard 1970, p. 274).

[27] Although he doesn't draw this implication, it is clear from Rothbard's discussion that the sequential process of production progressing through each successive stage of production may be envisaged to extend into the household where the final stages of (Becker type household) production take place. He recognizes consumer durables to be capital goods that are used to produce services for ultimate consumption (Ibid. pp. 418-9).

capitalization process. For example, for a perpetual income stream the capitalized value will be equal to the rent divided by the discount rate. His overriding interest, however, is in establishing a correct understanding of pure income categories not to be confused with their contaminated counterparts in the real world. Since all rents except those paid to Land and Labor 'balance out' - since the prices paid for capital inputs by a producer of capital goods at any stage of production must be offset against the prices of the goods he produces - the only pure capitalized values are for Land and Labor. Since Labor cannot be bought and sold in a free society - it can only be rented - the only pure capitalized value that would be observed, is that of Land[28].

Thus for Rothbard there is a crucial distinction to be made between Capital, Land and Labor - since Capital earns no net (pure) income (the distinction between Land and Labor has to do with the lack of a market for the latter, a matter we take up briefly below). To reiterate, Capital refers to produced means of production, whereas Land refers to the non-produced resources of nature. Rothbard is aware that this distinction is likely to trouble the modern reader who might find it difficult to imagine any productive land that has not been altered in some way in the interests of productive activity. Also the fact that at a certain time in the distant past, unspoiled land entered into the production of a particular consumption good is, from an economic point of view, irrelevant. The economic agent takes the world as he finds it and looks forward when making decisions - he inherits a variety of capital goods whose value depends not on their history but on their future usefulness. For both of these reasons he carefully refines the distinction between Capital and Land by "reformulat[ing] the concept of 'land'. Whether a piece of land is 'originally' pure land is in fact economically immaterial, so long as whatever alterations have been made are permanent - or rather so long as these alterations do not have to be reproduced or replaced....In the ERE [a factor that] will continue to give forth its natural powers unstinted without further investment ... is therefore *land* in our analysis."(Ibid. p. 414). Rothbard follows Hayek and Böhm-Bawerk in making this distinction but curiously is insistent that the permanence to which he refers is a *physical* rather than a *value* permanence. The crucial distinction is one that relates to the need or its absence of maintenance activity for whatever reason (physical deterioration or otherwise)[29]. In any case, 'permanence' is not really the key. "The key question is whether a resource has to be *produced*, in which case it earns only *gross* rents. If it does not or cannot, it earns *net* rents as well. Resources that are being depleted obviously *cannot* be replaced and are therefore *land*, not capital goods" (Ibid. p. 460 n.15). So Land is any non human resource that cannot be 'produced' or 'reproduced'. And capital goods are produced means of production that require (allow) maintenance or reproduction. As such, they include the structures on land,

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[28]Rothbard suggests (perhaps confusingly) that in the ERE, even Land earns no 'pure' rent (i.e., rent that is *not* simply a return on previous investment). Any landowner, whether he purchased or inherited (from nature or from someone else) the land, must weigh the alternative of owning and renting against that of selling the land. The reward from the latter is then an opportunity cost of renting and in the ERE is equal to the capitalized value of renting it out. Thus the only pure income left is that accruing to Labor and "time". "Only interest and wages accrue continuously. As long as the ERE continues, there will be no further gains or losses in capital values" (Ibid. p. 424). It remains true however, that the capitalized value of Land still figures with the value of the contributions of Labor and pure Interest in the final value of the goods they produce. (Perhaps one should think of the landowner paying himself the opportunity cost of his land).

[29]"The 'permanence' with which we are dealing refers, of course to the *physical* permanence of the goods, and *not* to the permanence of their value. *The latter depends on the shifting desires of consumers and could never be called permanent*" (Ibid. P. 415). Two comments: In the ERE there are no shifting desires, and in the real world shifting desires and changing technologies may convert a physically permanent resource into an economically impermanent one, one that requires work to enhance its value. Surely what matters is not the physical form of the resource but its *economic* function. If crude oil could be synthesized it would still serve the same economic purpose. And even natural oil can in an economically relevant sense, be 'produced' by exploration activity. So the oil companies invest in order to 'maintain' the value of their oil reserves. As indicated later in the text one may doubt the existence of any economically relevant permanent resources and thus the relevance of this distinction.

agricultural land, and valuable man-made features of the landscape that need to be maintained. Land includes relatively little then, one example being 'location'. Needless to say: "The concept of 'land' as used throughout this book, then, is entirely different from the popular concept of land" (Ibid. p. 415).

An ERE at any time then will have as productive factors Land, Labor and Capital in the sense discussed. Land does not refer to the resources of nature in their pristine originality, but rather to any non reproducible resources that may happen to exist at the time the economy arrived at the ERE. (Rothbard is aware that the ERE cannot abide depletable resources - that would otherwise qualify as land - and bemoans this as an unfortunate shortcoming of an otherwise useful construct). In this economy, the only net incomes earned will be the wages of Labor, the rents of Land and pure Interest. The value of the final product will be accounted for by the contributions of Land (in the restricted sense explained), Labor and Interest. The point of the analysis, one supposes, is to show that the other incomes that we observe in the real world are really, in a fundamental sense, transitory phenomena, though they may be crucially necessary. So his discussion of profits and losses (conceptually completely distinct from Interest) is directed to arguing that their necessary function is to correct the ubiquitous malinvestments and misallocations that occur outside of the particular (zero profit) ERE to which the economy is tending. "Profits are an index that maladjustments are being met and combated by the profit-making entrepreneurs" (Ibid. p. 468, italics removed). And in a continually growing economy Land may earn an income in terms of an increasing capitalized value.

Rothbard's discussion of Capital (and of Interest) is definitely useful in sorting out some common but fundamental confusions like the difference between interest and profit and is strong, for example, on the explanation of the concept of rent. The careful reader comes away with a much better understanding of fundamental categories. He is able to demystify much of Capital theory. The question that concerns us, however, is the applicability and relevance of his theory to an understanding of capital in the real market economy. This is certainly a criterion he himself seems to apply to his work and it behooves us to undertake such an analysis.

The PZPT of Capital and the Neglect of Time and Knowledge

We begin, before critically considering Rothbard's theory of Capital as a whole, by considering his treatment of Labor. Rothbard is clear that rent applies as much to Labor as to any resource - the rent of Labor is called wages. Labor is like Land except that it cannot be sold and, therefore, Rothbard implies that its earnings cannot be capitalized. But to be consistent with his approach one should make a distinction between raw labor and 'human capital', the latter referring to the enhanced value of earnings (or, indeed, of consumption possibilities) that result from investments in the form of education, training, experience, health care, etc. Clearly the value of human capital can be, at least in part, produced and maintained and indeed depreciates without these actions[30]. And clearly, in significant ways, the earnings of human capital are capitalized in the form of loans for education and training, investments made by companies in the training of their workers and so on. It cannot be doubted that most labor is therefore part of Capital and not Labor, leaving one wondering how much 'pure' income is left. Rothbard's neglect of human capital is really only a small aspect of his neglect of knowledge as a phenomenon of crucial importance in any understanding of Capital, one that is inevitably connected to our experience of time.

Capital and time are, in the first instance, connected by the fact that much of Capital is composed of durable production goods. Once produced, these goods have a specific physical form. This form reflects their ability to be used in particular capital combinations (with labor and other capital items) to

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[30]One could also mention that even 'raw labor' must, in a sense, be maintained, is non permanent, in that the working population is continually changing and indeed can be 'produced'. In the ERE it is true that the age distribution of the population and the workforce is constant, so that, in this sense, 'labor' being the amount of 'raw labor' at any 'time', is indeed constant and 'permanent'. This of course abstacts from and can say nothing about many crucial aspects of population economics that have been illuminated with the use of the concept of human capital.

produce specific consumption goods. Whenever the particular capital combination for which they were designed turns out to be uneconomical, or less than optimal in the eyes of the appraising producer, they can be shifted to a limited range of alternative combinations or, in the extreme, scrapped. Sometimes capital combinations will be retained even though they are less than optimal from the viewpoint of the original plan. Since historical costs are irrelevant to the decision of whether or not to retain them, plans may appear optimal from the viewpoint of the present moment. In other words, durable capital goods that exist at any point in time are both opportunities and constraints. The capital structure in the ERE is on the other hand, at every moment in 'time', perfectly appropriate for the achievement of the continuing production activities that occur. (In the ERE there is no difference between "has been produced" and "is produced"). The ERE is defined in essence by its 'fundamentals' - the social rate of time preference, the pure rate of Interest, and its state of technology and level of 'original' resources. And the actual economy revolves around it. In asserting that an economy at any moment in time can be thought of as tending in the direction of the ERE implied by the fundamentals of that moment, one must implicitly have in mind some way by which the actual capital structure could, in the absence of further changes, be molded into that structure appropriate for the ERE. How would producers come to know which capital goods they should produce, in what quantities, etc.? And how should they deal with those goods that do not fit in? All this is perhaps deliberately, and perhaps inevitably, hazy. Rothbard simply asserts that profits and losses provide the necessary feedback signals - it is in his theory an article of faith, or a broad empirical proposition. Profits indicate appropriate action, losses inappropriate action, that, in the absence of further changes (in value scales, resources and technologies), would disappear as the ERE was approached. In Rothbard's view this is the essential function of profits.

The problem with this, as Rothbard himself points out, is that changes are incessant and the ERE is a continually shifting target. It is like a dog chasing a shifting target[31]. One feels that the dog at least has a chance of narrowing the gap and is at all times moving in the right direction. But, to continue this analogy, the dog knows at all times in which direction the target lies. The dog and the target are physically distinct. The dog will not become the target when he finds it. There is nothing in Rothbard's story that tells us how appropriate adjustments are made. Of course it may be doubted that such a theory exists. But one wonders why it is necessary. Why is it necessary for Rothbard to assert convergence to some 'pure' equilibrium?

One apparent reason is the desire to lend coherence to business cycle theory. The Austrian theory of the business cycle depends in a crucial way on the existence of some pure time preference determined intertemporal allocation of expenditure from which inappropriate monetary policy causes the economy to diverge. Or, perhaps more accurately, the monetary expansion causes the interest rate to be different from what it *would have been* if pure time preference alone had been allowed to operate. Rothbard does realize that time preference schedules move around historically, but at any moment in time they jointly provide the fundamental, essential anchor for real expenditures. Our analysis of time preference above leads us to wonder about this picture. If time preference is inextricably bound up with real time and is a kind of liquidity preference broadly understood, then it is natural to ponder how this preference itself might be affected by monetary (or any other macro) policy and how that would affect the cycle story. Can we still talk of returning to the 'natural' rate of time preference as though it were impervious to the state of monetary policy and institutions?

Rothbard also wants to assert convergence because he believes that it helps us to understand the role of Capital and the other factors in the real world. Thus, as explained, he sees the role as profits primarily as one of moving the economy in the direction of achieving the best use of its resources

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[31]"[T]he final equilibrium position is always changing, and consequently no one such position is ever reached in practice. But even though it is never reached in practice, it has a very real importance. In the first place, it is like a mechanical rabbit being chased by the dog. It is never reached in practice and it is always chasing, but it explains the direction in which the dog is moving" (Ibid. pp. 275-6). Perhaps a better analogy would be a dog chasing a cat. The target is continually changing direction and the dog may not even know where it is.

culminating in the ERE. Pursuit of this line of thought leads him to characterize the market process in a rather restricted way however. Perhaps the single most important feature of modern capital using economies is the continual flow of new, convenient and affordable consumer goods and services made possible by the implementation of innovative technologies. A relevant theory of capital may be reasonably expected to explain this remarkable evolving process. But Rothbard's framework is singularly unsuited for this. His treatment for example of the notion of innovation illustrates this. An innovation for him is primarily represented by an entrepreneurial change in the capital structure (a lengthening or shortening - widening or narrowing of the base of the Hayekian triangle) brought about by the implementation of a technique already known but hitherto unused. "There is of course, no denying the importance of the discovery and institution of more productive methods of obtaining a product or of the development of valuable new products. Analytically, however, there is danger of overrating the importance of this process.... When [the entrepreneur] innovates he is *also* an adjuster of the discrepancies of the market as they present themselves in the potential of a new method or product" (Ibid. pp. 492-4). Given the vital importance of innovation in the market process, it is difficult to understand Rothbard's assertion that its importance can be overrated analytically. Would not a theory which incorporated the spontaneous emergence of the new knowledge that facilitated the innovation be a more relevant theory? Such a theory could not posit a necessary convergence to an ERE and would have profits and losses as an 'essential' part of the process.

In short, Rothbard's is a theory that, in common with most theories of capital, cannot account well for economic progress. We have seen that in many ways this is because of its neglect of the implications of time. One particularly damaging aspect of that is a failure to consider the multifaceted importance of the role of knowledge in economic process. We have noted above the overlooking of the existence of human capital, and human capital is but one, though an important, aspect of knowledge. There is no hint of the 'knowledge problem' introduced into consideration first by Hayek (1945) and about which so much recent work has been done. Our final comment will deal with this.

Any accurate understanding of the role of capital must incorporate some understanding of the role of knowledge in the market process. Knowledge must be seen as a vital, if complex, resource. Knowledge is the category name we give to a vast array of necessary and heterogeneous skills, ideas, concepts, etc. only some of which can be communicated and, of those, many only with difficulty and many of which have to be learned by example (show rather than tell) and, further, many of which are possessed unconsciously. Some vital forms of knowledge are unconsciously embodied in a form of social human capital in our shared institutions. An adequate theory of capital must address the human capital environment in which Capital functions. Physical capital in isolation is valueless and devoid of meaning. How does a progressive society come to possess, in the minds of its dispersed and specialized individuals, the necessary types and qualities of knowledge to accomplish the production processes in which its physical capital items are involved? Rothbard's attempt to address this seems to go startlingly wide of the mark.

> "It is logically obvious that while capital cannot engage in production beyond the limits of existing available knowledge, knowledge can and does exist without the capital necessary to put it to use. Technology and its improvement, therefore, play no *direct* role in the investment and production process; technology, while important, must always *work through* and investment of capital ... The relative unimportance of technology in production as compared to the supply of saved capital becomes evident, as Mises points out, simply by looking at the 'backward' or 'underdeveloped' countries. What is lacking in these countries is not knowledge of Western technological methods ('know how'); that is learned easily enough. The service of imparting knowledge, in person or in book form, can be paid for readily. What is lacking is the supply of saved capital needed to put the advanced methods into effect. The African peasant will gain little from looking at pictures of American tractors; what he lacks is the saved capital needed to purchase them." (Ibid. pp. 490-1).

Surely this has matters reversed - the physical capital is relatively easy to procure with the necessary funds (government aid or private saving). It is the human capital, in all its tangible and intangible forms,

necessary to employ it profitably, that cannot be simply procured but must, in the final analysis, emerge from the market process itself.[32]

Conclusion

Murray Rothbard was a passionate and eloquent defender of the market process. It is ironic therefore that our examination of his theories of Interest and Capital suggests they were not really well suited to that defense. His preoccupation with theoretical purity - with the need to identify the essential core concepts of a logically complete conceptual scheme - led him to neglect many aspects of time. Since both Interest and Capital are essentially bound up with time and since the market process is a process in time, his attempt to capture the essence of Interest and Capital came at the expense of capturing the essence of the market process.

[32]Information can be purchased, knowledge cannot. Knowledge must be produced and information is but one of the inputs. The production of knowledge is much more important and much more difficult than the production of physical capital.

Appendix: Further Notes on Mises's Theory of Time Preference

This appendix contains a little more information concerning Mises's approach to time preference. Information for items 1 and 2 was obtained from Appendix A of Greaves (1974), which was kindly brought to my attention by Roger Garrison after he had read a first draft of this paper[33].

1. Although, as indicated above, Mises does not provide any complete 'proof' of his assertion of the categorical necessity of positive time preference, he does periodically refer to it. At the end of his more detailed discussion of Böhm Bawerk in Mises 1940, there are two paragraphs of interest, the last of which apparently contains the 'proof' (in terms that seem to confirm my reconstruction above). They are reproduced below.

> Böhm-Bawerk therefore merely arrived at the conclusion that "as a rule" future goods have a lower value than the same kind and quantity of present goods. But that is not a satisfactory explanation. Are there exceptions to this rule? If there are, what significance do they have for explaining interest? Might the exceptions not become the rule under certain circumstances and interest then disappear entirely?
>
> No, there are no such exceptions! In acting, one must always, without any exception, value a satisfaction at an earlier point in time more than the same kind and amount of satisfaction at a later time. If this were not so, then it would never be possible to decide in favor of a present satisfaction. Whoever uses or consumes anything, whoever seeks by acting to relieve to a greater or lesser extent a felt uneasiness is always expressing a preference for an earlier over a later satisfaction. Whoever eats and consumes anything is making a choice between a satisfaction in the immediate future and one in a more distant future. If he were to decide differently, if he were not to prefer the earlier to the later satisfaction, he would never be able to consume at all. He could not even eat and consume tomorrow, because when tomorrow became today, and the day after tomorrow became tomorrow, the decision to consume would still call for valuing an earlier satisfaction more than a later satisfaction. Otherwise, consumption would have to be delayed still further (pp. 156-7).

Of particular interest is the way Mises seems to jump from a logical definition of time preference in terms of equal satisfactions at different points of time, to a sort of 'empirical' confirmation of positive time preference by the fact that we do, after all, consume. The 'fact' of consumption would only bear (if at all) on the question of time preference under conditions of a zero interest rate. And then, (as discussed in the text) we must wonder how we *know* that, of two equal satisfactions, the present is *always* preferred.

2. In the introduction to Mises's remarks, B. Bien Greaves and P. Greaves write the following:

> In order to appreciate this critique, it is important to realize that, while Mises gave Böhm-Bawerk full credit for his important analysis of the phenomenon of interest, he pointed out here that Böhm-Bawerk failed to understand why present goods regularly attain a higher value than physically identical future goods do, i.e. the sole cause giving rise to the phenomenon of interest. Mises went on to explain [in *Nationalökonomie* and *Human Action*] that time preference is *an inherent category of human action*. [Now follow some remarks that seem to suggest the opposite of what has just been asserted and that resonate with my remarks above]. For the same reason that "a bird in the hand is worth two in the bush," present goods are worth

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[33]On page 488, note 5 of *Human Action* (Mises 1966), Mises says the following: "For a detailed analysis of this part of Böhm Bawerk's reasoning the reader is referred to Mises, *Nationalökonomie*, pp. 439-43. The appendix referred to in the text above is in Greaves 1974, pages 150-157. It is entitled "A Critique of Böhm-Bawerk's Reasoning in Support of His Time Preference Theory", and contains a reproduction, as translated by Bettina Bien Greaves and editd by Percy L. Greaves, of the remarks to which Mises refers in *Human Action*. It also contains an introductory paragraph by B. Bien Greaves and P. Greaves to be discussed below.

> more than the identical items in an uncertain future. Present goods are more valuable than future goods not because of some psychological factor or personal value judgment of particular persons at particular times and places - but simply because the present goods are available here and now and the future goods are not. Thus, interest is a praxeological consequence of man's cognition of time. Individuals are bound - by the limitations of the universe and the very nature of man with his a priori or innate awareness of time - to place a lower value on future goods than they do on present goods. However, to call this lower valuation an UNDER-valuation, as Böhm-Bawerk did, is a judgment of value and not a scientific statement (p.150, italics added).

Remembering that Mises banished all consideration of uncertainty in his derivation of time preference, one might ironically find that a close reading of Böhm-Bawerk's treatment would reveal an approach more congenial to the Greaves's contention than is Mises's.

3. In criticizing Mises's use of the ERE, it is well to note that he was not unaware of the possible pitfalls of using such a construct. On pages 236-237 of *Human Action*, Mises discusses "The Method of Imaginary Constructions" of which the ERE is of course a prime example. He shows there that he is aware of the potential problems of abstraction, but defends the practice on the basis that it is necessary to gain an understanding based on deduction.

> The main formula for designing of imaginary constructions is to abstract from the operation of some conditions present in actual action. Then we are in a position to grasp the hypothetical consequences of the absence of these conditions and to conceive the effects of their existence. Thus we conceive [Mises uses this word to mean 'understand deductively]' the category of action by constructing the image of a state in which there is no action, either because the individual is fully contented ... or because he does not know [any way to improve his situation]. *Thus we conceive the notion of originary interest from an imaginary construction in which no distinction is made between satisfactions in periods of time equal in length but unequal with regard to their distance from the instant of action* (p. 237 italics added).

In the next paragraph Mises concludes the section with a warning note:

> The method of imaginary constructions is indispensable for praxeology; ... It is, to be sure, a method difficult to handle because it can easily result in fallacious syllogisms. It leads along a sharp edge; on both sides yawns the chasm of absurdity and nonsense. Only merciless self criticism can prevent a man from falling headlong into these abysmal depths.

From the discussion in the text, the reader may decide whether, in the matter of time preference and interest, Mises himself has succeeded in avoiding the dire consequences attending the misuse against which he so graphically counsels.

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